IBM Application Discovery for IBM Z V5.1.0

Installation and Configuration Guide

SC27-8969-06

Contents

Chapter 1. Accessibility Features for IBM Application Discovery for IBM Z

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

IBM® Application Discovery for IBM Z® includes the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

IBM Application Discovery for IBM Z uses the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by IBM Application Discovery for IBM Z.

The IBM Application Discovery for IBM Z online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help (https://www.ibm.com/support/knowledgecenter/en/about/releasenotes.html).

Keyboard navigation

This product uses standard navigation keys.

Interface information

For alternative installation using Command Line Installation (CLI), refer to section Alternative Installation for ADDI Using CLI in *IBM AD Installation and Configuration Guide*.

The IBM Application Discovery for IBM Z user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Application Discovery for IBM Z web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Application Discovery for IBM Z web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
800-IBM-3383 (800-426-3383)
(within North America)

For more information about the commitment that IBM has to accessibility, see IBM Accessibility (www.ibm.com/able).

Chapter 2. IBM AD High-Level Architecture Overview

The following diagram illustrates IBM Application Discovery for IBM Z (AD) high-level architecture and the relationships among the different components of the suite.

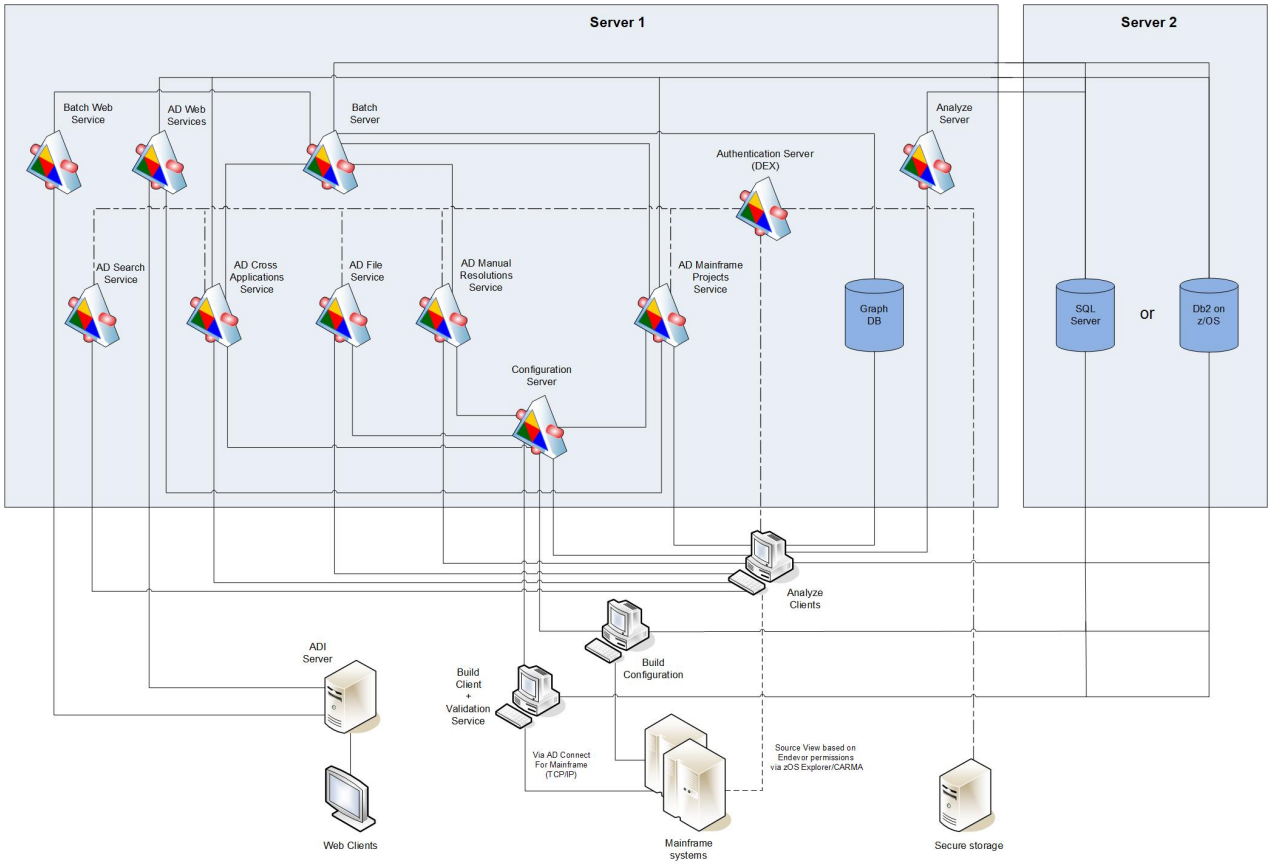


*Figure 1. **IBM AD** high-level architecture*

Following is a brief description of the relationships among the different components of IBM AD.

IBM AD Configuration Server ensures the consistency of the installation parameters throughout an installation and allows the system administrator to manage user access to workspaces.

IBM AD Build - uses data from mainframe systems to build projects. It uses project sources that are brought from z/OS®®, performs a compilation/build process and stores the analysis data to the repository.

IBM AD Validation Service - works with ChangeMan SCM only. Provides coding rule enforcement via synchronization with ChangeMan and upon member staging.

IBM AD Batch Server - imports data from the relational database repository into the GraphDB (OrientDB) repository, automates processes such as report generation and indexing, and manages the creation of the annotations database.

IBM AD Analyze Client - runs over Eclipse or IDz and provides project analysis via graphs reports and usage views. When the analyzed application sources are coming from Endevor, it allows viewing source code per user based on Endevor permissions that are checked via z/OS Explorer/CARMA interface.

IBM AD Mainframe Projects - authorizes the access to the AD projects, by using SSO authentication within AD. This service is mandatory to be configured to use AD, whether the authentication feature is in place or not.

IBM AD File Service - in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder that contains the source files. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

IBM AD Search Service - is responsible with the access to the indexed data. Whether the authentication feature is in place or not, the folder path in which the indexes are generated needs to be accessible for both **IBM AD Batch Server** and **IBM AD Search Service**.

IBM AD Manual Resolutions Service - manages the manually added resolutions and allows clients that use SSO authentication within AD to ask for user authentication to access these resolutions. This service is mandatory to be configured if you want to use callgraph-based analyzes (graphs or reports), whether authentication feature is in place or not.

Authentication Server (DEX) - is an identity service that uses OpenID Connect and supports OAuth2 protocol in order to allow clients to use SSO authentication within AD. With the credentials provided by the user, it interrogates a **Secure Storage**, through the LDAP protocol. The **Secure Storage** can be an **Active Directory** or any other entity that stores users and groups and can communicate through **LDAP**. This service is mandatory to be installed and configured only when authentication feature is in place.

IBM AD Cross Applications Service - is mandatory to be configured if you want to generate a Cross Applications Callgraph, whether the authentication feature is in place or not.

Batch Web Service - serves the data that is provided by a component of the Batch Server and prepares it for delivery.

IBM AD Web Services - contains the following features: **AD Audit**, **AD Catalog** and **AD BRD REST API**.

Chapter 3. Installation Prerequisites

Note: Starting with IBM AD V5.0.4.1, the IBM AD Licensing Server, IBM AD Java™ Bridge and IBM AD Monitor Service components are no longer used, therefore must be uninstalled from your environment.

Before installing IBM AD components, make sure you install 64bit Java Runtime Environment (JRE) v1.8. Please uninstall any previous version of Java before installing v1.8; failing to do this might result in unexpected IBM AD behavior. JRE can be downloaded from http://www.oracle.com/technetwork/java/javase/downloads/index.html. Make sure to use the latest service release of Java v1.8.

Deploying IBM AD in your environment can be logically divided into two phases: *installing* IBM AD and then *configuring* IBM AD. For existing IBM AD installations, please see Chapter 4, "Upgrading Components from Earlier Versions," on page 19 before deciding on an installation method.

CPU, RAM, and Storage Requirements

Note:

- On **Linux for System z** a minimum of at least four cores from a single IFL are recommended in order to run the IBM AD components.
- For detailed system requirements, you can find a software product compatibility report at https://www.ibm.com/software/reports/compatibility/clarity/softwareReqsForProduct.html.

For Production Level implementations

The minimum recommended hardware requirements for Production-level implementations with multiple users and projects:

Note:

- The dedicated database server is a server with a running instance of Microsoft SQL Server, dedicated to IBM AD components. It is recommended that all IBM AD components to be installed on one or more machines that are separate from the machine where Microsoft SQL Server is running.
- **IBM Application Discovery** can be deployed on Virtual Machines (VMs) as well, if the minimum hardware requirements are met. In a virtual environment, it is highly recommended to have:
  - Microsoft SQL Server and IBM AD Service Components VM Machines located in the same cluster or even better on the same physical hardware. This setup reduces any potential network latency and slowness.
  - A dedicated storage solution (drive) for **IBM Application Discovery** (that includes Microsoft SQL Server VM), instead of a shared solution (with other VMs, products).
- For IBM AD Dedicated Database Server:
  - CPU: Intel XEON Dual processor with minimum of 4 cores each, 3 GHz or higher, with Turbo support.
  - 64 GB of RAM.
  - Dedicated hard disk drive for the operating system, minimum 500 GB. Secondary dedicated hard disk drive for data, minimum 2 TB.
- For all the IBM AD components:
  - CPU: Intel XEON Dual processor with minimum of 4 cores each, 3 GHz or higher, with Turbo support.
  - Minimum 32 GB of RAM.
  - Dedicated hard disk drive for the operating system, minimum 500 GB. Secondary dedicated hard disk drive for data, minimum 2 TB.
  - 4 GB allocated Virtual Memory.

- For IBM AD Analyze Client:
  - CPU: Intel i5 or equivalent.
  - Minimum 8 GB of RAM.
  - 20 GB allocated disk space.
- For IBM AD Build Client:
  - CPU: Intel i5 or equivalent.
  - 16GB of RAM.
  - 20 GB allocated disk space.

For Evaluation / POC implementations

The minimum recommended hardware requirements for evaluating the IBM AD in a Windows environment:

Note: SQL Server and all the IBM AD components can be installed on this machine for evaluation / POC purposes only.

- For IBM AD Workstation:
  - CPU: Intel Core i5 or equivalent.
  - 32 GB of RAM.
  - 35 GB allocated disk space.

Supported Platforms and Versions

Supported Operating Systems

IBM AD Analyze Server/Batch Server/Configuration Server can be installed on:

- Windows 10 (64-bit)
- Windows Server 2008/2012/2016/2019
- Linux® Red Hat/SUSE/Ubuntu

Important: Make sure that a Linux Samba client is set up before installing IBM AD products on Linux.

IBM AD Build/Analyze Client can be installed on:

- Windows 7/8.1/10
- Windows Server 2008/2012/2016/2019

IBM® AD Connect for Mainframe can be installed on z/OS 2.2/2.3.

Note: For more information about the minimum operating system service level, hardware and bitness, see Supported Operating Systems for IBM Application Discovery.

Supported Databases

The following databases are supported:

- Db2® for z/OS version 11.1 and later
- Microsoft SQL Server 2012 and later

Note:

- Only one relational database repository type, either Microsoft SQL Server or Db2 for z/OS, is taken into account when creating a project.
- Microsoft SQL Server Standard or Enterprise Edition is required for IBM Application Discovery Microsoft SQL Server repository support.

- Microsoft SQL Server Express® Edition can be used for IBM AD Suite evaluation purposes only.
- For more information about the minimum prerequisite level that is required for a specific database and version, see Supported Databases for IBM Application Discovery.

Prerequisite Software and Configurations

- **Eclipse Classic / RCP and RAP Developers**

  32/64 bit Eclipse Classic (RCP and RAP Developers), minimum supported version v4.4. Eclipse Classic can be downloaded from www.eclipse.org.

- **IBM Rational® Development for z Systems® (RDz)**

  Supported versions are v9.1.x to v9.5.x.

- **IBM Developer for z Systems (IDz)**

  Minimum supported version is v14.0.0.0.

- The supported Internet browsers (used for accessing the **IBM AD Configuration Server**) are: Google Chrome (recommended), Mozilla Firefox and Microsoft Edge.

  Note: Make sure to enable JavaScript on your Internet browser of choice.

Java Runtime Environment

Any of the following Java Runtime Environments must be installed on your machine:

- 64-bit AdoptOpenJDK 8/11/13 HotSpot - https://adoptopenjdk.net/

  Note: Make sure that *Set JAVA_HOME variable* and *JavaSoft (Oracle) registry keys* subfeatures are selected when you install AdoptOpenJDK Development Kit with Hotspot.

- 64-bit Java 8 Oracle - https://www.oracle.com/java/technologies/javase-jre8-downloads.html
- 64-bit Java 8 IBM - https://developer.ibm.com/javasdk/downloads/

  Note:

  – **On Windows**

  Since there is no executable for IBM Java, it needs to be unzipped, and you need to set the IBM Java path in *Windows Registry*.

  Important: IBM AD installer is looking in *Windows Registry* to find out the IBM Java path. Use extreme caution when you edit the *Windows Registry*. Incorrect edits can render your computer unusable.

  1. Create the following path: **Computer** > **HKEY_LOCAL_MACHINE** > **SOFTWARE** > **JavaSoft** > **Java Development Kit** > **1.8**.
  2. Right-click **1.8**, and then select **New** > **String Value**.
  3. Rename **New Value #1** to **JavaHome**.
  4. Right-click **JavaHome**, and then select **Modify**.
  5. In **Value data**, enter the path to the unzipped IBM Java folder.

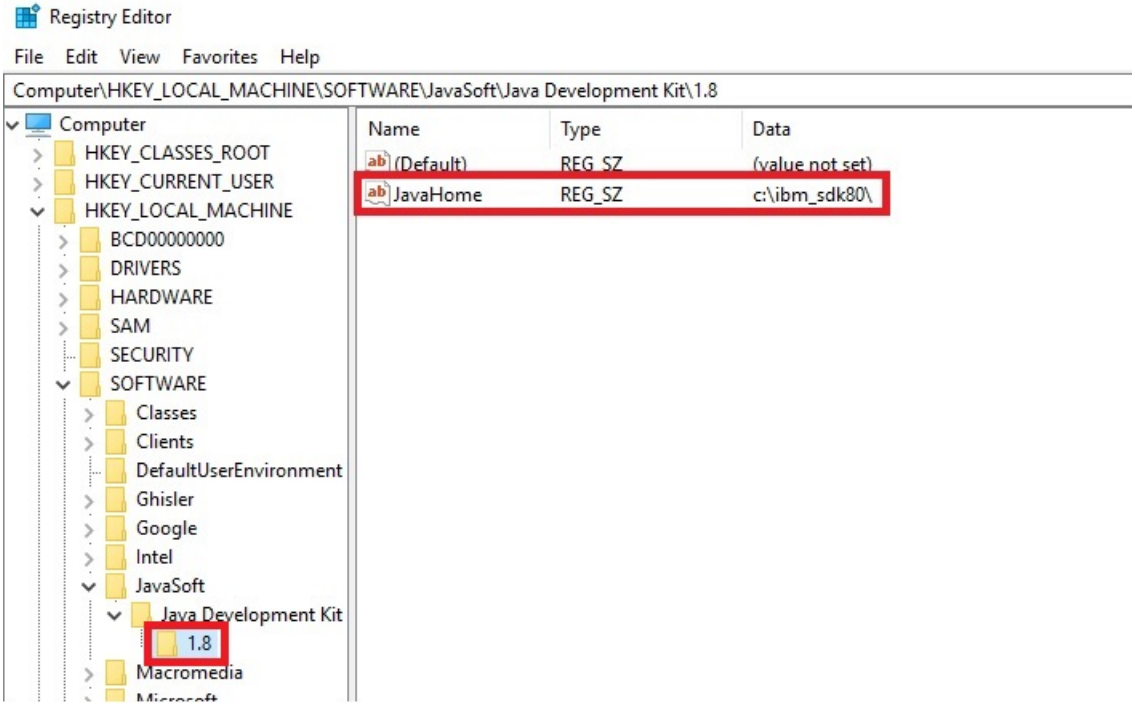


*Figure 2. **IBM Java** path*

Note: ibm_sdk80 represents the IBM Java version that is used during the installation process.

6. Restart the Windows machine so that the changes can take effect.

– **On Linux or Linux for System z**

Make sure to run the update-alternatives command to set the specified IBM Java location to be used on the system.

Example:

```
update-alternatives --install /usr/bin/java java /opt/ibm/java-s390x-80/bin/java 1
```

Where `/opt/ibm/java-s390x-80/bin/java` represents the location of IBM Java. Based on the IBM Java version that is used during the installation process, the location might change slightly.

Important:

- Make sure to uninstall any previous version of Java before you install the newest version and use the latest service release of Java v1.8. Failing to do this an unexpected IBM AD behavior might result.
- 32-bit or 64-bit Java 8 Oracle/IBM must be installed before you install IBM AD Analyze Client.
- IBM AD Build Client runs only on the 64-bit JVM.

Important: Make sure that the path for Java is set in your system as follows: **Start** > **System** > **Advanced Settings** > **Environment Variables** > **System variables** > **Path**. The path to the Java installation folder must be set to include the `bin` folder as in `C:\Program Files\Java\jre1.8.0_131\bin`.

User Access

User access to workspaces

Workspaces that are created in IBM AD Configuration Server contain IBM AD projects. Configuring user access to workspaces can restrict user access to projects from IBM AD Analyze Client and IBM AD Build Client. When a workspace is created in IBM AD Configuration Server, by default, it is public. To configure the user access to this workspace, add the credentials of the users who must have access to projects. User names are case-sensitive in IBM AD Configuration Server.

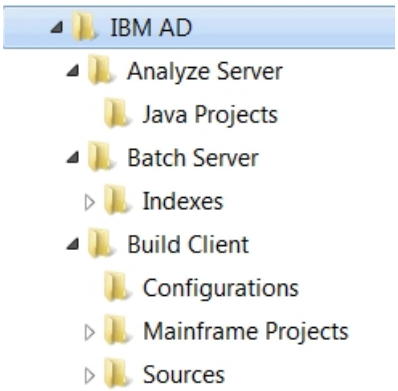
For more information about user access to workspaces, see Managing workspaces' access rights in *IBM AD Configuration Server User Guide*.

Windows service access and user access to local or shared folders

The following table shows the required access to folders of different IBM AD components. By default, IBM AD services are configured to use the Windows LocalSystem account ID, which can be changed. For IBM AD Analyze Client and IBM AD Build Client, grant access to the logged on Windows user that is running the component.

Components	Folders	Required access types	Notes®
IBM AD Analyze Client	Local Eclipse installation folders	Read and write	
	Local workspace folders	Read and write	
	Local folders where sources are based	Read	If you want to visualize the sources in Endevor or ChangeMan, the read access to local sources is not required.
IBM AD Analyze Server (Optional)	Local installation folders	Read and write	The write access is required for the user under which the Windows service or Linux process runs.
	The shared folder for shared Java projects	Read and write	A shared folder for shared Java projects must be created and be referenced in the IBM AD Analyze Server manager.
IBM AD Build Client	Local project folders	Read and write	
	Local configuration folders for z/OS connections	Read and write	
	Local source code folders	Read and write	
IBM AD Batch Server	The `Indexes` local folder	Read and write	
	Local installation folders	Read and write	
	Local project and source folders	Read and write	

The following image shows a best practice example of the IBM AD installation folder structure. However, you can customize the structure based on your particular needs.



Microsoft SQL Server Configurations

Most IBM AD components connect to an Microsoft SQL Server by using SQL Authentication. For Microsoft SQL Server 2012/2014/2016/2017, perform the following configurations:

1. Make sure that Microsoft SQL Server instance is configured with a **case-insensitive (CI)** collation.

   Important: IBM Application Discovery does not support the Microsoft SQL Server instance's collation *Latin1_General_CP1254_CI_AS*.
2. Make sure Microsoft SQL Server Agent service is started.
3. Setting up an SQL user account:
   a. Start SQL Server Management Studio.
   b. Expand **Security** > **Logins** then right-click **Logins** and choose **New Login**. Add a login name, select SQL Server Authentication, add a password, and make sure that the default database is set to master. This user is referred to as **IBM AD SQL Identity**.
   c. Expand **Databases** > **System Databases** > **master** > **Security** > **Users** then right-click **Users** and choose **New User**. Choose the **IBM AD SQL Identity** user and click **OK**.
   d. Expand **Databases** > **System Databases** > **master** then right-click **master** and choose **Properties**. Go to **Permissions** tab and for the **IBM AD SQL Identity** and make sure that permissions are granted for: **Create database**, **Create function**, **Create procedure**, **Create table**, and **Create view**.
   e. The following permission must be granted only if the **Rename project** feature is used in IBM AD Build, otherwise it is not needed. Right-click on the **SQL server** instance and then select **Properties**. In the **Server Properties** window select **Permissions**: From the roles list, select the **IBM AD SQL Identity** and then select **Grant** for *Alter any database* permission.
4. Configuring SQL Server to enable it to accept connection over TCP/IP:
   a. Start SQL Server Configuration Manager.
   b. Select **SQL Native Client Configuration (32bit)** > **Client Protocols** and then right-click **TCP/IP** and set it to **Enabled**.
   c. Select **SQL Server Network Configuration** > **Protocols for <Instance ID>** and make sure that **Shared Memory**, **TCP/IP**, and **Named Pipes** are set to **Enabled**.
   d. Select **SQL Native Client Configuration** > **Client Protocols** and make sure that **Shared Memory**, **TCP/IP**, and **Named Pipes** are set to **Enabled**.
   e. Close SQL Server Configuration Manager.

   Important: SQL Server Configuration Manager writes startup parameters to the registry. They take effect upon the next startup of the SQL Server.

IBM Db2 for z/OS Server Configurations

On workstations where IBM AD Build Client is installed, Data Server Client V11.1 that contains IBM Data Server Provider for .NET must be installed and licensed. The mentioned package is part of Db2 Connect™ V11.1 product.

Note: .NET framework 4.5.1 or higher is prerequisite for IBM AD Build Client.

To license the .NET provider, click **Start**, select **Run**, type **cmd** to open the command window and run the following command:

```
"<Installation Path for IBM Data Server Client>\BIN\db2licm.exe" -a <path to license file>
\db2consv_ee.lic
```

Example:

```
"C:\Program Files\IBM\SQLLIB\BIN\db2licm.exe" -a C:\Apps\DB2_CEE_QS_Activation_11.1\consv_ee
\db2\license\db2consv_ee.lic
```

In case that IBM AD Build Client is intended to be used by a standard user, with no administration privileges, make sure that during Db2 Connect V11.1 installation process the **Enable operating system security** check box is selected.

Note: If you selected the **Enable operating system security** check box, you now have to add users to the *DB2ADMNS* or the *DB2USERS* groups for users that need to run IBM AD Build Client. For more information, see Adding your user ID to the DB2ADMNS and DB2USERS user groups.

Some packages must be bound on the server. The bound files are listed in the `ddcsmvs.lst` file for IBM Z, for example, `C:\Program Files\IBM\SQLLIB_01\bnd\ddcsmvs.lst`.

User permissions

In IBM AD application, a z/OS user account (Authentication ID) is used to work with the Db2 for z/OS repository. The user account must have permissions to perform the following actions:

- Use the storage group that is specified when configuring the Db2 z/OS connection in **IBM AD Configuration Server**.

  Note: Make sure that the storage group is initially created.
- Use the SYSDEFLT default storage group.
- Use the default buffer pools.
- Create and use databases, tables, table spaces, indexes, constraints, views, triggers, stored procedures, and user-defined functions.
- Run the **SELECT** command over system tables (`SYSIBM.SYS*`).
- Have full control over the databases that are created by the user account.
- `GRANT BINDADD, BINDAGENT, CREATEDBA, CREATESG, DISPLAY`
- `GRANT ALTERIN, CREATEIN, DROPIN ON SCHEMA *`
- `GRANT CREATE IN COLLECTION *`
- `GRANT SELECT ON TABLE SYSIBM.SYSROUTINES_SRC`
- `GRANT SELECT ON TABLE SYSIBM.SYSROUTINES_OPTS`

Important: All permissions must be granted directly to the user account (Authentication ID).

IBM AD Connect for Mainframe Prerequisites

IBM AD Connect for Mainframe can be installed on:

- z/OS version 2.2 or later.
- The maximum storage space is 5 cylinders.

Before installing IBM AD Connect for Mainframe on the host machine (mainframe), you need to take the following steps:

1. Authorize to add IBM AD Connect for Mainframe's load library to APF.
2. Authorize IBM AD Connect for Mainframe's listener to run.
3. Authorize to access all libraries specified in the STEPLIB card (see section "Configuring the listener PROC" in *IBM AD Connect for Mainframe Configuration Guide*).
4. Make sure to provide authorization according to the analyzed area:

Analyzed Area	Required Authorization
Adabas	Authorization to issue an ADAREP command
Control-M	Access to the libraries containing the Control-M data
DB2®	Rights to read from the Db2 system tables (SYSIBM)
SMF	Access to the SMF dump files

Analyzed Area	Required Authorization
Libraries and Members	Access to the libraries
Natural	Authorization to issue a Natural batch command and read Access to all Natural libraries (LOGON)
Operator commands	Normal RACF® security to allow the user to issue those commands.
WebSphere® MQ	Authorization to perform PUT and GET from command and reply queues

IBM AD Web Services Prerequisites

Before you install and configure IBM AD Catalog, IBM AD Audit and IBM AD BRD web services, make sure that the following steps are performed:

- Any of the following Java Runtime Environments is installed:
  - 64-bit AdoptOpenJDK 8/11/13 HotSpot
  - 64-bit Java 8 Oracle
  - 64-bit Java 8 IBM

  For more information, see “Java Runtime Environment ” on page 7.
- Microsoft SQL Server 2012/2014/2016/2017 is installed and configured (accessible, if it is installed on a different machine). For more information, see “Microsoft SQL Server Configurations” on page 10.
- IBM WAS Liberty Web Server is installed and configured. For more information, see “Installing WAS Liberty” on page 62.

  Note: Make sure that the ports that are used by IBM WAS Liberty Web Server are open, unused, and not blocked by your firewall. The default ports for IBM WAS Liberty Web Server are **9080** and **9443**.
- An SQL database needs to be manually created by your database administrator for the Audit entries.

  Note:

  - The name of this database must match the name of the database that will be added in the `server.xml` configuration file, during the configuration process of IBM AD Audit. For more information, see “Configuring the Audit Service” on page 65.
  - The database user that is used in the `server.xml` configuration file and connects to the Audit database needs to have the *db_owner* database role membership.

  Set up manually the Audit database

  1. Start SQL Server Management Studio.
  2. Log in by using the username and password for the **IBM AD SQL Identity**, as defined in “Microsoft SQL Server Configurations” on page 10.
  3. Right-click **Databases** and choose **New Database**.
  4. Enter the **Audit** database name, for example: **audit_db** and press **OK**.
  5. As a result the **audit_db** database is created.

     Important: The Audit database will be automatically populated when **IBM Application Discovery Web Service** starts.
- An SQL database needs to be manually created by your database administrator for IBM AD Catalog.

  Note:

  - The name of this database must match the name of the database that will be added in the `server.xml` configuration file, during the configuration process of IBM AD Catalog. For more information, see “Configuring the Catalog Service” on page 62.

– The database user that is used in the `server.xml` configuration file and connects to the Catalog database needs to have the *db_owner* database role membership.

Set up manually the Catalog database

1. Start SQL Server Management Studio.
2. Log in by using the username and password for the **IBM AD SQL Identity**, as defined in "Microsoft SQL Server Configurations" on page 10.
3. Right-click **Databases** and choose **New Database**.
4. Enter the **Catalog** database name, for example: **catalog_db** and press **OK**.
5. As a result the **catalog_db** database is created.

   Important: The Catalog database will be automatically populated when **Data Collector** starts for the first time.

For **Data collector** the version of the target **z/OS Connect** server must be 3.0.2 or higher.

TCP Port Requirements and Firewall Exceptions

The following table summarizes the TCP ports that need to be allowed by the firewall in order for the Application Discovery Suite to function as intended.

In all cases, communication is bidirectional. The firewall must allow both the incoming traffic, which represents requests, for the mentioned ports, and the outgoing traffic, which represents the answers to these requests.

From (Sender)	To (Listener Component)	Default Listener Port	Note
• AD Analyze Clients • AD Audit Service • AD Batch Server • AD Build Client • AD Build Configuration • AD Catalog	SQL Server	TCP 1433	The port of the SQL Server Database Engine instance that hosts the AD databases. Majority of the AD components use this port to read/write data from/into the SQL databases. The default instance of the SQL Server Database Engine listens on TCP port 1433, but it can be changed via SQL Server admin tools. Ask your database server administrator what port is used by the SQL server instance that is used by AD. Make sure not to use TCP port 1434, which is used by Dedicated Administration Console (DAC).
The computer where the browser session is opened	AD Configuration Server	TCP 8080	The port that is used to access the web interface of AD Configuration Server. The default port is 8080, but it can be changed in the `admin-ws.properties` file, which is located in the `conf` folder where AD Configuration Server is installed. If the web interface is accessed only locally on AD Configuration Server, this port does not have to be opened in the firewall.
• AD Analyze Clients • AD Batch Server	AD Configuration Server	TCP 2181	The port that AD Configuration Server listens on for requests from various AD components that need to obtain the configuration settings from AD Configuration Server.

From (Sender)	To (Listener Component)	Default Listener Port	Note
• AD Build Client • AD Build Configuration • AD Validation Server			The default port is 2181, but it can be changed in the `server.properties` file, which is located in the `conf` folder where AD Configuration Server is installed.
AD Analyze Clients	AD Batch Server	• TCP 2424 - TCP 2430 • TCP 2434 - TCP 2440 (*)	The port of the OrientDB database instance that is hosted by AD Batch Server. AD Analyze Client makes requests to this port for retrieving the data that is related to callgraph analyses. OrientDB uses the first free TCP port in the range 2424 - 2430. This can be changed in the `config/orientdb-server-config.xml` file. (*) If the `ssl` implementation is used, the default port for OrientDB SSL is 2434. You need to change your port range to `2434-2440` in the `config/orientdb-server-config.xml` file. For more information, see Configuring OrientDB for SSL/TLS.
AD Analyze Clients	AD Analyze Server	TCP 1099	The port where the Remote Method Invocation (RMI) registry can be found on AD Analyze Server. AD Analyze Clients make RMI-specific requests to this port. The default port is 1099, but it can be changed from AD Analyze Server Manager. To change the setting, click **Server Settings > RMI Registry Port**. AD Analyze Server is required only when AD Analyze Clients use and run Java-specific analyses, so if AD Analyze Server is not installed, the port does not have to be opened in the firewall.
AD Analyze Clients	AD Analyze Server	TCP 1900	The port that is used by AD Analyze Server for the Remote Method Invocation (RMI) communication. AD Analyze Clients make requests to this port for obtaining various information that is needed for Java analyses. The default port is 1900, but it can be changed from AD Analyze Server Manager. To change the setting, click **Server Settings > Export Port**. AD Analyze Server is required only when AD Analyze Clients use and run Java-specific analyses, so if AD Analyze Server is not installed, the port does not have to be opened in the firewall.

From (Sender)	To (Listener Component)	Default Listener Port	Note
AD Analyze Server	AD Analyze Client	A random free TCP port, which is allocated at run time, in the ephemeral port range 49152 - 65535.	The port that AD Analyze Client listens on for notifications from AD Analyze Server. This port is temporarily used, which is released after the application is closed. The default port is a random free TCP port, which is allocated at run time, in the ephemeral port range 49152 - 65535, but AD Analyze Client can be configured to use a specific port. To configure the setting, click **Window > Preferences > Application Discovery > Local Settings > General Settings > Client Settings** in Eclipse, and then set a value in the range 1 - 65535 in the **Port** field. Value 0 means that a free port on AD Analyze Client is selected at run time in the ephemeral port range 49152 - 65535. AD Analyze Server is required only when AD Analyze Clients use and run Java-specific analyses, so if AD Analyze Server is not installed, the port does not have to be opened in the firewall.
• AD Build Client • AD Build Configuration	AD Connect for Mainframe	Any available TCP port (no default value)	The port that AD Connect for Mainframe listens on. It is used by AD Build Configuration to retrieve source code information and operational information from the mainframe, and used by AD Build Client to retrieve source code files from the mainframe. For how to set or change the port that is used by AD Connect for Mainframe, see section Configuring the Listener PROC in *IBM AD Connect for Mainframe Configuration Guide*. There is no default port that is specified. Any available port can be selected. For example, port 6000 or port 46000. After you change this port in AD Connect for Mainframe, the z/OS connection setup needs to be reconfigured to use the new port. To configure the setting, click the **zOS** tab in the AD Build Configuration tool.
AD Connect for Mainframe	AD Validation Service	Any available TCP port (no default value)	The port that AD Validation Service listens on for validation requests from AD Connect for Mainframe. It can be configured in the `ServicePort.txt` configuration file that is located in the AD Validation Server installation folder. No default port is set by default. Any available TCP port can be used. For example, port 48000.

From (Sender)	To (Listener Component)	Default Listener Port	Note
			AD Validation Service is an optional component. If it is not used, this port does not have to be opened in the firewall.
• AD Analyze Clients • AD Batch Server • AD Build Client	AD Audit Service	TCP 9080	The port that AD Audit Service listens on to receive requests from various AD components for logging audit events. The port number can be changed by altering the httpPort value in the `server.xml` file. The file is located in the folder of the IBM Liberty instance that hosts AD Audit Service. After you change this port, make sure to reconfigure the AD components that audit events to use the new port. For more information, see *IBM AD Web Services User Guide*. The AD Audit and AD Catalog services are optional AD components. They are both hosted by the same WebSphere Liberty instance. If neither of them is used, the port does not have to be opened in the firewall.
• AD Analyze Clients • AD Data Collector	AD Catalog Service	TCP 9080	The port that AD Catalog Service listens on. This port is used by AD Data Collector to push data into AD Catalog, and it is used by AD Analyze Clients to retrieve the data that is needed for displaying API analyses. The port number can be changed by altering the httpPort value in the `server.xml` file. The file is located in the folder of the IBM Liberty instance that hosts AD Catalog Service. After you change this port, make sure to reconfigure AD Data Collector and AD Analyze Client to use the new port. For more information, see *IBM AD Web Services User Guide*. The AD Audit and AD Catalog services are optional AD components. They are both hosted by the same WebSphere Liberty instance. If neither of them is used, the port does not have to be opened in the firewall.
• AD File Service • AD Analyze Client • AD Search Service • AD Manual Resolutions Service • AD Mainframe Projects Service	Authentication Server (DEX)	TCP 7600	The default port on which **Authentication Server (DEX)** listens to different requests is 7600. It can be modified in the `conf.yaml` file.

From (Sender)	To (Listener Component)	Default Listener Port	Note
• AD Cross Applications Service • Secure Storage			
• (Optional) Authentication Server (DEX) • AD Analyze Client	AD File Service	TCP 7700	The default port on which **AD File Service** listens to different requests is 7700. It can be modified in the `conf.yaml` file.
• (Optional) Authentication Server (DEX) • AD Analyze Client	AD Search Service	TCP 7800	The default port on which **AD Search Service** listens to different requests is 7800. It can be modified in the `conf.yaml` file.
• (Optional) Authentication Server (DEX) • AD Analyze Client • AD Batch Server	AD Manual Resolutions Service	TCP 7900	The default port on which **AD Manual Resolutions Service** listens to different requests is 7900. It can be modified in the `conf.yaml` file.
• (Optional) Authentication Server (DEX) • AD Analyze Client • AD Batch Server	AD Mainframe Projects Service	TCP 7650	The default port on which **AD Mainframe Projects Service** listens to different requests is 7650. It can be modified in the `conf.yaml` file.
• (Optional) Authentication Server (DEX) • AD Analyze Client • AD Batch Server	AD Cross Applications Service	TCP 7850	The default port on which **AD Cross Applications Service** listens to different requests is 7850. It can be modified in the `conf.yaml` file.
Authentication Server (DEX)	AD Analyze Client	TCP 9999	The port that is used by **Authentication Server (DEX)**, opened on all Analyze Client machines (in environments using DEX), and used for callback.

Note: Make sure that the firewall does not prevent AD Analyze Client from communicating with AD Batch Server, AD Configuration Server, AD Analyze Server, and the relational database server. Program rules in the firewall might need to be created to allow both the inbound and outbound traffic for the `eclipse.exe` instance on each AD Analyze Client that is located under the installation folder of your Eclipse or IDz instance.

Chapter 4. Upgrading Components from Earlier Versions

Upgrading to IBM AD V5.1.0.6

Upgrading from IBM AD V5.1.0.5

Steps to be performed when you upgrade **IBM AD V5.1.0.5** to **IBM AD V5.1.0.6**.

1. Run the IBM ADDI V5.1.0.6 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.6 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see the Migrating from a previous release section, in the ADI documentation.
2. Make sure that **IBM AD File Service**, **IBM AD Search Service**, **IBM AD Manual Resolutions Service**, **IBM AD Mainframe Projects Service**, and **IBM AD Cross Applications Service** are configured and the services are up and running. For more information, see Chapter 6, “Configuring IBM AD ,” on page 57.
3. In order to upgrade **IBM AD Connect for Mainframe** to the latest level, apply the PTF to your SMP/E CSI for IBM AD, and stop / start the Connect for Mainframe task. For more information, see:
   - **README.txt** - contains a summary of the package contents and steps that need to be performed.
   - **HALT510.UI68268.install.html** - contains the detailed install instructions for the PTF.
4. **IBM AD Analyze Client** can be upgraded to the latest level as follows:
   a. If **IBM AD Analyze Client** is installed into IBM IDz, you need to perform the following steps:

      Important: Before you start upgrading **IBM AD Analyze Client** into IBM IDz to the latest level, make sure that **IBM Developer for z/OS (IDz or IDz EE)** application is closed.

      1) Make sure that **IBM Installation Manager** version 1.9 or later is installed on your machine.
      2) Launch **IBM Installation Manager** and click **Update**.
      3) Select the package group that has installed the current version of **IBM Application Discovery**.
      4) For **IBM Application Discovery**, select **Version 5.1.0.6** and click **Next**.
      5) Select the features that you want to install and click **Next**.

         Note:

         Prior to **IBM AD V5.1.0.51** in **IBM Installation Manager** you could not select which features to add during installation time. If the **Application Discovery integration with IBM Explorer for z/OS** was selected, it enabled in IBM AD a functionality that whenever **View Source** was triggered, the content of a given member was displayed directly on the host.

         Starting with **IBM AD V5.1.0.51** it is recommended to keep selected only **Application Discovery mainframe analysis**, so that all other features installed before **IBM AD V5.1.0.6** release can be uninstalled automatically. This step is required to have the **View source** option available for the sources downloaded from the mainframe, without being necessary to have a RSE (Remote Systems Explorer) / CARMA (Common Access Repository Manager) connection from IBM IDz.

6) In the **Updates** list, all features that will be installed are displayed. Click **Update** to upgrade **IBM AD Analyze Client** to the latest level.

b. If **IBM AD Analyze Client** is installed into an Eclipse package that is not IBM IDz, for example an Eclipse distribution that is downloaded from eclipse.org, you need to perform the following steps:

1) Install the latest version of **IBM AD Analyze Client**, which is delivered through the **IBM AD V5.1.0.6 installer**. For more information, see "STEP 12. Installing IBM AD Analyze Client" on page 96.

2) Configure **IBM AD Analyze Client**. For more information, see "STEP 13. Configuring IBM AD Analyze Client" on page 97.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.4

Steps to be performed when you upgrade **IBM AD V5.1.0.4** to **IBM AD V5.1.0.6**.

1. Run the IBM ADDI V5.1.0.6 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.6 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see the Migrating from a previous release section, in the ADI documentation.
2. Once the upgrade to IBM AD V5.1.0.6 is finalized, make sure to manually delete the cross databases that were used by **IBM AD Cross Applications Service** in IBM AD V5.1.0.4 from Microsoft SQL Server.
3. Make sure that **IBM AD File Service**, **IBM AD Search Service**, **IBM AD Manual Resolutions Service**, **IBM AD Mainframe Projects Service**, and **IBM AD Cross Applications Service** are configured and the services are up and running. For more information, see Chapter 6, "Configuring IBM AD ," on page 57.
4. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

   a. Go to `<IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server` folder and back up the following data:

   - `server.xml` configuration file.
   - `conf.brd-ws` folder.

   b. Delete the existing `wlp` folder and the `wlp-webProfile7-18.x.x.x.zip` file.

   c. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder to the IBM AD Web Services installation folder. The default installation folder is `<IBM ADDI Installation Folder>\IBM AD Web Services`.

   d. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.

e. Restore the backed up `server.xml` configuration file, overwriting the existing one, and the `conf.brd-ws` folder to the `\wlp\usr\servers\ad_server` folder.

f. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-x.x.x.jar` file to `\wlp\usr\shared\config`.

g. From the `IBM AD Web Services` installation folder, copy the following files to the `\wlp\usr\servers\ad_server\apps` folder:

- `com.ibm.etools.ad.catalog.war`
- `com.ibm.ad.audit.service.war`
- `com.ibm.ad.brd.restapi.war`

h. Go to `\wlp\bin` folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

5. In order to upgrade **IBM AD Connect for Mainframe** to the latest level, apply the PTF to your SMP/E CSI for IBM AD, and stop / start the Connect for Mainframe task. For more information, see:

- **README.txt** - contains a summary of the package contents and steps that need to be performed.
- **HALT510.UI68268.install.html** - contains the detailed install instructions for the PTF.

6. **IBM AD Analyze Client** can be upgraded to the latest level as follows:

a. If **IBM AD Analyze Client** is installed into IBM IDz, you need to perform the following steps:

Important: Before you start upgrading **IBM AD Analyze Client** into IBM IDz to the latest level, make sure that **IBM Developer for z/OS (IDz or IDz EE)** application is closed.

1) Make sure that **IBM Installation Manager** version 1.9 or later is installed on your machine.

2) Launch **IBM Installation Manager** and click **Update**.

3) Select the package group that has installed the current version of **IBM Application Discovery**.

4) For **IBM Application Discovery**, select **Version 5.1.0.6** and click **Next**.

5) Select the features that you want to install and click **Next**.

Note:

Prior to **IBM AD V5.1.0.51** in **IBM Installation Manager** you could not select which features to add during installation time. If the **Application Discovery integration with IBM Explorer for z/OS** was selected, it enabled in IBM AD a functionality that whenever **View Source** was triggered, the content of a given member was displayed directly on the host.

Starting with **IBM AD V5.1.0.51** it is recommended to keep selected only **Application Discovery mainframe analysis**, so that all other features installed before **IBM AD V5.1.0.6** release can be uninstalled automatically. This step is required to have the **View source** option available for the sources downloaded from the mainframe, without being necessary to have a RSE (Remote Systems Explorer) / CARMA (Common Access Repository Manager) connection from IBM IDz.

6) In the **Updates** list, all features that will be installed are displayed. Click **Update** to upgrade **IBM AD Analyze Client** to the latest level.

b. If **IBM AD Analyze Client** is installed into an Eclipse package that is not IBM IDz, for example an Eclipse distribution that is downloaded from eclipse.org, you need to perform the following steps:

1) Install the latest version of **IBM AD Analyze Client**, which is delivered through the **IBM AD V5.1.0.6 installer**. For more information, see "STEP 12. Installing IBM AD Analyze Client" on page 96.

2) Configure **IBM AD Analyze Client**. For more information, see "STEP 13. Configuring IBM AD Analyze Client" on page 97.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.3

Steps to be performed when you upgrade **IBM AD V5.1.0.3** to **IBM AD V5.1.0.6**.

1. Run the IBM ADDI V5.1.0.6 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.6 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see the Migrating from a previous release section, in the ADI documentation.
2. Make sure that **IBM AD File Service**, **IBM AD Search Service**, and **IBM AD Manual Resolutions Service** are configured and the services are up and running.
3. Once the upgrade to IBM AD V5.1.0.6 is finalized, **IBM AD Mainframe Projects Service** and **IBM AD Cross Applications Service** need to be configured as follows:
   a. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see "STEP 7. Configuring IBM AD Mainframe Projects Service" on page 80 (without authentication) or "STEP 8. Configuring IBM AD Mainframe Projects Service" on page 131 (with authentication).
   b. **IBM AD Cross Applications Service** - is an **additional** service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance in **IBM AD Analyze Client**. For more information on how to configure **IBM AD Cross Applications Service**, see "STEP 10. Configuring IBM AD Cross Applications Service" on page 91 (without authentication) or "STEP 11. Configuring IBM AD Cross Applications Service" on page 142 (with authentication).
4. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:
   a. Go to `<IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server` folder and back up the following data:
      - `server.xml` configuration file.
      - `conf.brd-ws` folder.
   b. Delete the existing `wlp` folder and the `wlp-webProfile7-18.x.x.x.zip` file.
   c. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder to the IBM AD Web Services installation folder. The default installation folder is `<IBM ADDI Installation Folder>\IBM AD Web Services`.
   d. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.

e. Restore the backed up `server.xml` configuration file, overwriting the existing one, and the `conf.brd-ws` folder to the `\wlp\usr\servers\ad_server` folder.

f. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-`*`x.x.x`*`.jar` file to `\wlp\usr\shared\config`.

g. From the `IBM AD Web Services` installation folder, copy the following files to the `\wlp\usr\servers\ad_server\apps` folder:

- `com.ibm.etools.ad.catalog.war`
- `com.ibm.ad.audit.service.war`
- `com.ibm.ad.brd.restapi.war`

h. Go to `\wlp\bin` folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

5. In order to upgrade **IBM AD Connect for Mainframe** to the latest level, apply the PTF to your SMP/E CSI for IBM AD, and stop / start the Connect for Mainframe task. For more information, see:

- **README.txt** - contains a summary of the package contents and steps that need to be performed.
- **HALT510.UI68268.install.html** - contains the detailed install instructions for the PTF.

6. **IBM AD Analyze Client** can be upgraded to the latest level as follows:

a. If **IBM AD Analyze Client** is installed into IBM IDz, you need to perform the following steps:

Important: Before you start upgrading **IBM AD Analyze Client** into IBM IDz to the latest level, make sure that **IBM Developer for z/OS (IDz or IDz EE)** application is closed.

1) Make sure that **IBM Installation Manager** version 1.9 or later is installed on your machine.
2) Launch **IBM Installation Manager** and click **Update**.
3) Select the package group that has installed the current version of **IBM Application Discovery**.
4) For **IBM Application Discovery**, select **Version 5.1.0.6** and click **Next**.
5) Select the features that you want to install and click **Next**.

Note:

Prior to **IBM AD V5.1.0.51** in **IBM Installation Manager** you could not select which features to add during installation time. If the **Application Discovery integration with IBM Explorer for z/OS** was selected, it enabled in IBM AD a functionality that whenever **View Source** was triggered, the content of a given member was displayed directly on the host.

Starting with **IBM AD V5.1.0.51** it is recommended to keep selected only **Application Discovery mainframe analysis**, so that all other features installed before **IBM AD V5.1.0.6** release can be uninstalled automatically. This step is required to have the **View source** option available for the sources downloaded from the mainframe, without being necessary to have a RSE (Remote Systems Explorer) / CARMA (Common Access Repository Manager) connection from IBM IDz.

6) In the **Updates** list, all features that will be installed are displayed. Click **Update** to upgrade **IBM AD Analyze Client** to the latest level.

b. If **IBM AD Analyze Client** is installed into an Eclipse package that is not IBM IDz, for example an Eclipse distribution that is downloaded from eclipse.org, you need to perform the following steps:

1) Install the latest version of **IBM AD Analyze Client**, which is delivered through the **IBM AD V5.1.0.6 installer**. For more information, see "STEP 12. Installing IBM AD Analyze Client" on page 96.
2) Configure **IBM AD Analyze Client**. For more information, see "STEP 13. Configuring IBM AD Analyze Client" on page 97.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.2

Steps to be performed when you upgrade **IBM AD V5.1.0.2** to **IBM AD V5.1.0.6**.

1. Run the IBM ADDI V5.1.0.6 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.6 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see the Migrating from a previous release section, in the ADI documentation.
2. Once the upgrade to IBM AD V5.1.0.6 is finalized, the following services need to be configured as follows:

   a. **IBM AD File Service**

      Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

      Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

      If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

      Note:

      - If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see "STEP 5. Configuring IBM AD File Service" on page 72.
      - If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see "STEP 6. Configuring IBM AD File Service" on page 123.

   b. **IBM AD Search Service**

Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In **IBM AD Analyze Client** a search in resources was directly performed by using **Search in Files** analysis.

Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf \project.properties`, where the *index.indexFolder* parameter is present.

The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf\project.properties`, where the *index.extraSources* parameter is present.

Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see "STEP 9. Configuring IBM AD Search Service" on page 88.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see "STEP 10. Configuring IBM AD Search Service" on page 139.

c. **IBM AD Manual Resolutions Service**

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see "STEP 6. Configuring IBM AD Manual Resolutions Service" on page 77 (without authentication) or "STEP 7. Configuring IBM AD Manual Resolutions Service" on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the `<IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service` folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.

5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see "STEP 7. Configuring IBM AD Mainframe Projects Service" on page 80 (without authentication) or "STEP 8. Configuring IBM AD Mainframe Projects Service" on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see "STEP 10. Configuring IBM AD Cross Applications Service" on page 91 (without authentication) or "STEP 11. Configuring IBM AD Cross Applications Service" on page 142 (with authentication).

3. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

a. Go to <IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server folder and back up the following data:

- server.xml configuration file.
- conf.brd-ws folder.

b. Delete the existing wlp folder and the wlp-webProfile7-18.*x.x.x*.zip file.

c. Extract the wlp folder from the wlp-webProfile7-19.*x.x.x*.zip file, and place the wlp folder to the IBM AD Web Services installation folder. The default installation folder is <IBM ADDI Installation Folder>\IBM AD Web Services.

d. Go to \wlp\bin and execute the following command: **server.bat create ad_server**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the \ad_server folder is present in \wlp\usr\servers or not.

e. Restore the backed up server.xml configuration file, overwriting the existing one, and the conf.brd-ws folder to the \wlp\usr\servers\ad_server folder.

f. From the IBM AD Web Services installation folder, copy the com.ez.jtds-*x.x.x*.jar file to \wlp\usr\shared\config.

g. From the IBM AD Web Services installation folder, copy the following files to the \wlp\usr\servers\ad_server\apps folder:

- com.ibm.etools.ad.catalog.war
- com.ibm.ad.audit.service.war
- com.ibm.ad.brd.restapi.war

h. Go to \wlp\bin folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at \wlp\usr\servers\ad_server\logs\console.log.

4. In order to upgrade **IBM AD Connect for Mainframe** to the latest level, apply the PTF to your SMP/E CSI for IBM AD, and stop / start the Connect for Mainframe task. For more information, see:

- **README.txt** - contains a summary of the package contents and steps that need to be performed.
- **HALT510.UI68268.install.html** - contains the detailed install instructions for the PTF.

5. **IBM AD Analyze Client** can be upgraded to the latest level as follows:
   a. If **IBM AD Analyze Client** is installed into IBM IDz, you need to perform the following steps:

      Important: Before you start upgrading **IBM AD Analyze Client** into IBM IDz to the latest level, make sure that **IBM Developer for z/OS (IDz or IDz EE)** application is closed.

      1) Make sure that **IBM Installation Manager** version 1.9 or later is installed on your machine.
      2) Launch **IBM Installation Manager** and click **Update**.
      3) Select the package group that has installed the current version of **IBM Application Discovery**.
      4) For **IBM Application Discovery**, select **Version 5.1.0.6** and click **Next**.
      5) Select the features that you want to install and click **Next**.

         Note:

         Prior to **IBM AD V5.1.0.51** in **IBM Installation Manager** you could not select which features to add during installation time. If the **Application Discovery integration with IBM Explorer for z/OS** was selected, it enabled in IBM AD a functionality that whenever **View Source** was triggered, the content of a given member was displayed directly on the host.

         Starting with **IBM AD V5.1.0.51** it is recommended to keep selected only **Application Discovery mainframe analysis**, so that all other features installed before **IBM AD V5.1.0.6** release can be uninstalled automatically. This step is required to have the **View source** option available for the sources downloaded from the mainframe, without being necessary to have a RSE (Remote Systems Explorer) / CARMA (Common Access Repository Manager) connection from IBM IDz.
      6) In the **Updates** list, all features that will be installed are displayed. Click **Update** to upgrade **IBM AD Analyze Client** to the latest level.
   b. If **IBM AD Analyze Client** is installed into an Eclipse package that is not IBM IDz, for example an Eclipse distribution that is downloaded from eclipse.org, you need to perform the following steps:
      1) Install the latest version of **IBM AD Analyze Client**, which is delivered through the **IBM AD V5.1.0.6 installer**. For more information, see "STEP 12. Installing IBM AD Analyze Client" on page 96.
      2) Configure **IBM AD Analyze Client**. For more information, see "STEP 13. Configuring IBM AD Analyze Client" on page 97.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.0

Steps to be performed when you upgrade **IBM AD V5.1.0.0** to **IBM AD V5.1.0.6**.

1. Run the IBM ADDI V5.1.0.6 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.6 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see the Migrating from a previous release section, in the ADI documentation.

2. Once the upgrade to IBM AD V5.1.0.6 is finalized, make sure to configure the following services:

   a. **IBM AD File Service**

      Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

      Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

      If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

      Note:

      - If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see "STEP 5. Configuring IBM AD File Service" on page 72.
      - If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see "STEP 6. Configuring IBM AD File Service" on page 123.

   b. **IBM AD Search Service**

      Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In **IBM AD Analyze Client** a search in resources was directly performed by using **Search in Files** analysis.

      Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf \project.properties`, where the *index.indexFolder* parameter is present.

      The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf\project.properties`, where the *index.extraSources* parameter is present.

      Note:

      - Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see "STEP 9. Configuring IBM AD Search Service" on page 88.
      - If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see "STEP 10. Configuring IBM AD Search Service" on page 139.

   c. **IBM AD Manual Resolutions Service**

      Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

      Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible

only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see "STEP 6. Configuring IBM AD Manual Resolutions Service" on page 77 (without authentication) or "STEP 7. Configuring IBM AD Manual Resolutions Service" on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the <IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see "STEP 7. Configuring IBM AD Mainframe Projects Service" on page 80 (without authentication) or "STEP 8. Configuring IBM AD Mainframe Projects Service" on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see "STEP 10. Configuring IBM AD Cross Applications Service" on page 91 (without authentication) or "STEP 11. Configuring IBM AD Cross Applications Service" on page 142 (with authentication).

3. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

a. Go to <IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server folder and back up the following data:

- `server.xml` configuration file.
- `conf.brd-ws` folder.

b. Delete the existing `wlp` folder and the `wlp-webProfile7-18.x.x.x.zip` file.

c. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder to the IBM AD Web Services installation folder. The default installation folder is <IBM ADDI Installation Folder>\IBM AD Web Services.

d. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.

e. Restore the backed up `server.xml` configuration file, overwriting the existing one, and the `conf.brd-ws` folder to the `\wlp\usr\servers\ad_server` folder.

f. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-`*`x.x.x`*`.jar` file to `\wlp\usr\shared\config`.

g. From the `IBM AD Web Services` installation folder, copy the following files to the `\wlp\usr\servers\ad_server\apps` folder:

- `com.ibm.etools.ad.catalog.war`
- `com.ibm.ad.audit.service.war`
- `com.ibm.ad.brd.restapi.war`

h. Go to `\wlp\bin` folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

4. In order to upgrade **IBM AD Connect for Mainframe** to the latest level, apply the PTF to your SMP/E CSI for IBM AD, and stop / start the Connect for Mainframe task. For more information, see:

- **README.txt** - contains a summary of the package contents and steps that need to be performed.
- **HALT510.UI68268.install.html** - contains the detailed install instructions for the PTF.

5. **IBM AD Analyze Client** can be upgraded to the latest level as follows:

a. If **IBM AD Analyze Client** is installed into IBM IDz, you need to perform the following steps:

Important: Before you start upgrading **IBM AD Analyze Client** into IBM IDz to the latest level, make sure that **IBM Developer for z/OS (IDz or IDz EE)** application is closed.

1) Make sure that **IBM Installation Manager** version 1.9 or later is installed on your machine.
2) Launch **IBM Installation Manager** and click **Update**.
3) Select the package group that has installed the current version of **IBM Application Discovery**.
4) For **IBM Application Discovery**, select **Version 5.1.0.6** and click **Next**.
5) Select the features that you want to install and click **Next**.

Note:

Prior to **IBM AD V5.1.0.51** in **IBM Installation Manager** you could not select which features to add during installation time. If the **Application Discovery integration with IBM Explorer for z/OS** was selected, it enabled in IBM AD a functionality that whenever **View Source** was triggered, the content of a given member was displayed directly on the host.

Starting with **IBM AD V5.1.0.51** it is recommended to keep selected only **Application Discovery mainframe analysis**, so that all other features installed before **IBM AD V5.1.0.6** release can be uninstalled automatically. This step is required to have the **View source** option available for the sources downloaded from the mainframe, without being necessary to have a RSE (Remote Systems Explorer) / CARMA (Common Access Repository Manager) connection from IBM IDz.

6) In the **Updates** list, all features that will be installed are displayed. Click **Update** to upgrade **IBM AD Analyze Client** to the latest level.

b. If **IBM AD Analyze Client** is installed into an Eclipse package that is not IBM IDz, for example an Eclipse distribution that is downloaded from eclipse.org, you need to perform the following steps:

1) Install the latest version of **IBM AD Analyze Client**, which is delivered through the **IBM AD V5.1.0.6 installer**. For more information, see "STEP 12. Installing IBM AD Analyze Client" on page 96.
2) Configure **IBM AD Analyze Client**. For more information, see "STEP 13. Configuring IBM AD Analyze Client" on page 97.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.0.5.0, V5.0.5.1 or V5.0.5.2

Steps to be performed when you upgrade **IBM AD V5.0.5.0, V5.0.5.1 or V5.0.5.2** to **IBM AD V5.1.0.6**.

1. Run the IBM ADDI V5.1.0.6 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.6 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see the Migrating from a previous release section, in the ADI documentation.
2. Once the upgrade to IBM AD V5.1.0.6 is finalized, make sure to configure the following services:

   a. **IBM AD File Service**

   Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

   Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

   If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

   Note:

   - If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see "STEP 5. Configuring IBM AD File Service" on page 72.
   - If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see "STEP 6. Configuring IBM AD File Service" on page 123.

   b. **IBM AD Search Service**

   Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In

IBM AD Analyze Client a search in resources was directly performed by using **Search in Files** analysis.

Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf \project.properties`, where the *index.indexFolder* parameter is present.

The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf\project.properties`, where the *index.extraSources* parameter is present.

Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see "STEP 9. Configuring IBM AD Search Service" on page 88.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see "STEP 10. Configuring IBM AD Search Service" on page 139.

c. **IBM AD Manual Resolutions Service**

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see "STEP 6. Configuring IBM AD Manual Resolutions Service" on page 77 (without authentication) or "STEP 7. Configuring IBM AD Manual Resolutions Service" on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the `<IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service` folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see "STEP 7. Configuring IBM AD Mainframe Projects Service" on page 80 (without authentication) or "STEP 8. Configuring IBM AD Mainframe Projects Service" on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see "STEP 10. Configuring IBM AD Cross Applications Service" on page 91 (without authentication) or "STEP 11. Configuring IBM AD Cross Applications Service" on page 142 (with authentication).

3. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

a. Go to <IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server folder and back up the following data:

- server.xml configuration file.
- conf.brd-ws folder.

b. Delete the existing wlp folder and the wlp-webProfile7-18.*x.x.x*.zip file.

c. Extract the wlp folder from the wlp-webProfile7-19.*x.x.x*.zip file, and place the wlp folder to the IBM AD Web Services installation folder. The default installation folder is <IBM ADDI Installation Folder>\IBM AD Web Services.

d. Go to \wlp\bin and execute the following command: **server.bat create ad_server**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the \ad_server folder is present in \wlp\usr\servers or not.

e. Restore the backed up server.xml configuration file, overwriting the existing one, and the conf.brd-ws folder to the \wlp\usr\servers\ad_server folder.

f. From the IBM AD Web Services installation folder, copy the com.ez.jtds-*x.x.x*.jar file to \wlp\usr\shared\config.

g. From the IBM AD Web Services installation folder, copy the following files to the \wlp\usr\servers\ad_server\apps folder:

- com.ibm.etools.ad.catalog.war
- com.ibm.ad.audit.service.war
- com.ibm.ad.brd.restapi.war

h. Go to \wlp\bin folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at \wlp\usr\servers\ad_server\logs\console.log.

4. In order to upgrade **IBM AD Connect for Mainframe** to the latest level, you need to perform the following steps:

a. Install base function **HALT510**.

b. Receive, apply, and optionally accept **PTF UI68268**. For more information, see the **HALT510.UI68268.install.html** file.

c. **PTF UI68268** has no pre-requisites. It can be applied directly to **HALT510**.

5. **IBM AD Analyze Client** that is installed into an Eclipse package that is not IBM IDz, for example an Eclipse distribution that is downloaded from eclipse.org, can be upgraded to the latest level as follows:

   a. Install the latest version of **IBM AD Analyze Client**, which is delivered through the **IBM AD V5.1.0.6 installer**. For more information, see "STEP 12. Installing IBM AD Analyze Client" on page 96.

   b. Configure **IBM AD Analyze Client**. For more information, see "STEP 13. Configuring IBM AD Analyze Client" on page 97.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading to IBM AD V5.1.0.5

Upgrading from IBM AD V5.1.0.4

Steps to be performed when you upgrade **IBM AD V5.1.0.4** to **IBM AD V5.1.0.5**.

1. Run the IBM ADDI V5.1.0.5 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.5 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.
2. Once the upgrade to IBM AD V5.1.0.5 is finalized, make sure to manually delete the cross databases that were used by **IBM AD Cross Applications Service** in IBM AD V5.1.0.4 from Microsoft SQL Server.
3. Make sure that **IBM AD File Service**, **IBM AD Search Service**, **IBM AD Manual Resolutions Service**, **IBM AD Mainframe Projects Service**, and **IBM AD Cross Applications Service** are configured and the services are up and running. For more information, see Chapter 6, "Configuring IBM AD ," on page 57.
4. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

   a. Go to `<IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server` folder and back up the following data:

      - `server.xml` configuration file.
      - `conf.brd-ws` folder.

   b. Delete the existing `wlp` folder and the `wlp-webProfile7-18.x.x.x.zip` file.

   c. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder to the IBM AD Web Services installation folder. The default installation folder is `<IBM ADDI Installation Folder>\IBM AD Web Services`.

   d. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.

e. Restore the backed up `server.xml` configuration file, overwriting the existing one, and the `conf.brd-ws` folder to the `\wlp\usr\servers\ad_server` folder.

f. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-x.x.x.jar` file to `\wlp\usr\shared\config`.

g. From the `IBM AD Web Services` installation folder, copy the following files to the `\wlp\usr\servers\ad_server\apps` folder:

- `com.ibm.etools.ad.catalog.war`
- `com.ibm.ad.audit.service.war`
- `com.ibm.ad.brd.restapi.war`

h. Go to `\wlp\bin` folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.3

Steps to be performed when you upgrade **IBM AD V5.1.0.3** to **IBM AD V5.1.0.5**.

1. Run the IBM ADDI V5.1.0.5 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.5 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.
2. Make sure that **IBM AD File Service**, **IBM AD Search Service**, and **IBM AD Manual Resolutions Service** are configured and the services are up and running.
3. Once the upgrade to IBM AD V5.1.0.5 is finalized, **IBM AD Mainframe Projects Service** and **IBM AD Cross Applications Service** need to be configured as follows:

   a. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see “STEP 7. Configuring IBM AD Mainframe Projects Service” on page 80

(without authentication) or “STEP 8. Configuring IBM AD Mainframe Projects Service” on page 131 (with authentication).

b. **IBM AD Cross Applications Service** - is an **additional** service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance in **IBM AD Analyze Client**. For more information on how to configure **IBM AD Cross Applications Service**, see “STEP 10. Configuring IBM AD Cross Applications Service” on page 91 (without authentication) or “STEP 11. Configuring IBM AD Cross Applications Service” on page 142 (with authentication).

4. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

   a. Go to <IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server folder and back up the following data:

      - server.xml configuration file.
      - conf.brd-ws folder.

   b. Delete the existing wlp folder and the wlp-webProfile7-18.*x.x.x*.zip file.

   c. Extract the wlp folder from the wlp-webProfile7-19.*x.x.x*.zip file, and place the wlp folder to the IBM AD Web Services installation folder. The default installation folder is <IBM ADDI Installation Folder>\IBM AD Web Services.

   d. Go to \wlp\bin and execute the following command: **server.bat create ad_server**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

      Note: You can verify the successful web service creation by checking whether the \ad_server folder is present in \wlp\usr\servers or not.

   e. Restore the backed up server.xml configuration file, overwriting the existing one, and the conf.brd-ws folder to the \wlp\usr\servers\ad_server folder.

   f. From the IBM AD Web Services installation folder, copy the com.ez.jtds-*x.x.x*.jar file to \wlp\usr\shared\config.

   g. From the IBM AD Web Services installation folder, copy the following files to the \wlp\usr\servers\ad_server\apps folder:

      - com.ibm.etools.ad.catalog.war
      - com.ibm.ad.audit.service.war
      - com.ibm.ad.brd.restapi.war

   h. Go to \wlp\bin folder and execute the **server.bat start ad_server** command.

      Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

   i. Check the execution log file, accessible at \wlp\usr\servers\ad_server\logs\console.log.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.2

Steps to be performed when you upgrade **IBM AD V5.1.0.2** to **IBM AD V5.1.0.5**.

1. Run the IBM ADDI V5.1.0.5 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.4 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.

2. Once the upgrade to IBM AD V5.1.0.5 is finalized, the following services need to be configured as follows:

   a. **IBM AD File Service**

      Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

      Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

      If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

      Note:

      - If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see "STEP 5. Configuring IBM AD File Service" on page 72.
      - If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see "STEP 6. Configuring IBM AD File Service" on page 123.

   b. **IBM AD Search Service**

      Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In **IBM AD Analyze Client** a search in resources was directly performed by using **Search in Files** analysis.

      Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf \project.properties`, where the *index.indexFolder* parameter is present.

      The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf\project.properties`, where the *index.extraSources* parameter is present.

      Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see “STEP 9. Configuring IBM AD Search Service” on page 88.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see “STEP 10. Configuring IBM AD Search Service” on page 139.

c. **IBM AD Manual Resolutions Service**

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see “STEP 6. Configuring IBM AD Manual Resolutions Service” on page 77 (without authentication) or “STEP 7. Configuring IBM AD Manual Resolutions Service” on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the <IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see “STEP 7. Configuring IBM AD Mainframe Projects Service” on page 80 (without authentication) or “STEP 8. Configuring IBM AD Mainframe Projects Service” on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see “STEP 10. Configuring IBM AD Cross Applications Service” on page 91 (without authentication) or “STEP 11. Configuring IBM AD Cross Applications Service” on page 142 (with authentication).

3. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

a. Go to <IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers \ad_server folder and back up the following data:

- `server.xml` configuration file.
- `conf.brd-ws` folder.

b. Delete the existing `wlp` folder and the `wlp-webProfile7-18.x.x.x.zip` file.

c. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder to the IBM AD Web Services installation folder. The default installation folder is <IBM ADDI Installation Folder>\IBM AD Web Services.

d. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.

e. Restore the backed up `server.xml` configuration file, overwriting the existing one, and the `conf.brd-ws` folder to the `\wlp\usr\servers\ad_server` folder.

f. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-x.x.x.jar` file to `\wlp\usr\shared\config`.

g. From the `IBM AD Web Services` installation folder, copy the following files to the `\wlp\usr\servers\ad_server\apps` folder:

- `com.ibm.etools.ad.catalog.war`
- `com.ibm.ad.audit.service.war`
- `com.ibm.ad.brd.restapi.war`

h. Go to `\wlp\bin` folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0

Steps to be performed when you upgrade **IBM AD V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0** to **IBM AD V5.1.0.5**.

1. Run the IBM ADDI V5.1.0.5 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.5 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.
2. Once the upgrade to IBM AD V5.1.0.5 is finalized, make sure to configure the following services:

a. **IBM AD File Service**

Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

Note:

- If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see "STEP 5. Configuring IBM AD File Service" on page 72.
- If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see "STEP 6. Configuring IBM AD File Service" on page 123.

b. **IBM AD Search Service**

Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In **IBM AD Analyze Client** a search in resources was directly performed by using **Search in Files** analysis.

Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf\project.properties`, where the *index.indexFolder* parameter is present.

The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf\project.properties`, where the *index.extraSources* parameter is present.

Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see "STEP 9. Configuring IBM AD Search Service" on page 88.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see "STEP 10. Configuring IBM AD Search Service" on page 139.

c. **IBM AD Manual Resolutions Service**

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated

needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see “STEP 6. Configuring IBM AD Manual Resolutions Service” on page 77 (without authentication) or “STEP 7. Configuring IBM AD Manual Resolutions Service” on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the <IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see “STEP 7. Configuring IBM AD Mainframe Projects Service” on page 80 (without authentication) or “STEP 8. Configuring IBM AD Mainframe Projects Service” on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see “STEP 10. Configuring IBM AD Cross Applications Service” on page 91 (without authentication) or “STEP 11. Configuring IBM AD Cross Applications Service” on page 142 (with authentication).

3. Starting with IBM AD V5.1.0.5, **IBM AD Web Services** are using a new version of **IBM® WAS Liberty Web Service** and you need to perform the following steps:

a. Go to <IBM ADDI Installation Folder>\IBM AD Web Services\wlp\usr\servers\ad_server folder and back up the following data:

- `server.xml` configuration file.
- `conf.brd-ws` folder.

b. Delete the existing `wlp` folder and the `wlp-webProfile7-18.x.x.x.zip` file.

c. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder to the IBM AD Web Services installation folder. The default installation folder is <IBM ADDI Installation Folder>\IBM AD Web Services.

d. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

Server ad_server created.
```

Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.

e. Restore the backed up `server.xml` configuration file, overwriting the existing one, and the `conf.brd-ws` folder to the `\wlp\usr\servers\ad_server` folder.

f. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-x.x.x.jar` file to `\wlp\usr\shared\config`.

g. From the `IBM AD Web Services` installation folder, copy the following files to the `\wlp\usr\servers\ad_server\apps` folder:

- `com.ibm.etools.ad.catalog.war`
- `com.ibm.ad.audit.service.war`
- `com.ibm.ad.brd.restapi.war`

h. Go to `\wlp\bin` folder and execute the **server.bat start ad_server** command.

Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.

i. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading to IBM AD V5.1.0.4

Upgrading from IBM AD V5.1.0.3

Steps to be performed when you upgrade **IBM AD V5.1.0.3** to **IBM AD V5.1.0.4**.

1. Run the IBM ADDI V5.1.0.4 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.4 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.
2. Make sure that **IBM AD File Service**, **IBM AD Search Service**, and **IBM AD Manual Resolutions Service** are configured and the services are up and running.
3. Once the upgrade to IBM AD V5.1.0.4 is finalized, **IBM AD Mainframe Projects Service** and **IBM AD Cross Applications Service** need to be configured as follows:

   a. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see “STEP 7. Configuring IBM AD Mainframe Projects Service” on page 80 (without authentication) or “STEP 8. Configuring IBM AD Mainframe Projects Service” on page 131 (with authentication).

b. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance in **IBM AD Analyze Client**. For more information on how to configure **IBM AD Cross Applications Service**, see “STEP 10. Configuring IBM AD Cross Applications Service” on page 91 (without authentication) or “STEP 11. Configuring IBM AD Cross Applications Service” on page 142 (with authentication).

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

a. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.

b. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.1.0.2

Steps to be performed when you upgrade **IBM AD V5.1.0.2** to **IBM AD V5.1.0.4**.

1. Run the IBM ADDI V5.1.0.4 installer without uninstalling AD components and make sure that the same **IBM AD** installation path is used, but do not use the same **IBM ADI** installation path if ADI has been previously installed.

   Important: When using the IBM ADDI V5.1.0.4 installer, do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.
2. Once the upgrade to IBM AD V5.1.0.4 is finalized, the following services need to be configured as follows:

   a. **IBM AD File Service**

      Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

      Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

      If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

      Note:

      - If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see “STEP 5. Configuring IBM AD File Service” on page 72.
      - If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see “STEP 6. Configuring IBM AD File Service” on page 123.

   b. **IBM AD Search Service**

      Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In

IBM AD Analyze Client a search in resources was directly performed by using **Search in Files** analysis.

Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf \project.properties`, where the *index.indexFolder* parameter is present.

The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf\project.properties`, where the *index.extraSources* parameter is present.

Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see "STEP 9. Configuring IBM AD Search Service" on page 88.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see "STEP 10. Configuring IBM AD Search Service" on page 139.

c. **IBM AD Manual Resolutions Service**

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see "STEP 6. Configuring IBM AD Manual Resolutions Service" on page 77 (without authentication) or "STEP 7. Configuring IBM AD Manual Resolutions Service" on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the `<IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service` folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see "STEP 7. Configuring IBM AD Mainframe Projects Service" on page 80 (without authentication) or "STEP 8. Configuring IBM AD Mainframe Projects Service" on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see "STEP 10. Configuring IBM AD Cross Applications Service" on page 91 (without authentication) or "STEP 11. Configuring IBM AD Cross Applications Service" on page 142 (with authentication).

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

a. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.

b. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading from IBM AD V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0

Steps to be performed when you upgrade **IBM AD V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0** to **IBM AD V5.1.0.4**.

1. Before you run the IBM ADDI V5.1.0.4 installer, you must uninstall the **IBM AD** components, but do not uninstall **IBM ADI**. For more information, see Chapter 10, "Uninstalling IBM AD Components," on page 161.

   Important: When using the IBM ADDI V5.1.0.4 installer, make sure to install the IBM AD components in the same folder as in the previous version, but do not use the same installation path to install a newer version of ADI over an existing version of ADI. Installing a higher level of ADI directly over an existing instance of ADI can cause problems when trying to migrate ADI configuration information and data to a newer level. For more information, see topic Migrating from a previous release in *IBM ADDI Extension User Guide*.

2. Delete the `orientdb-community-2.1.5_ezpatch1` folder from the following location `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\orientdb`.

3. Once IBM AD V5.1.0.4 is installed, you need to perform the following steps since the version and the location of **OrientDB** have changed.

   a. Go to `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \orientdb\orientdb-community-2.1.25-ibm1\bin\` and run `server.bat` on **Windows** or `server.sh` on **Linux**. A command prompt window opens, asking for the **root** user account password. Fill in a password of your choosing and press **ENTER**. The password is case-sensitive. A message, which indicates that the service is now active is displayed.

   b. Go to **IBM AD Configuration Server** and fill in the password for OrientDB at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database**.

   Note: At this point, OrientDB is configured to run with the **root** user name and the password that is configured above.

   Important:

   - It is necessary to upgrade the repository for each project by using either **AD Build Client** or **AD Build Configuration** and it is highly recommended to perform a full Build.

- In case that full Build is triggered, then step 3 can be skipped as the links will automatically be created (it is recommended as a Best Practice).

c. Go to <IBM AD Batch Server Installation folder> and run `recoverGDBSymbolicLinks.bat` on Windows and `recoverGDBSymbolicLinks.sh` on Linux to re-create the symbolic links.

Note: Both of the files must be executed with the following two parameter values:

Location of the graph databases
"<IBM AD Batch Server Installation path>\data\tmp\gdb"

Location where the symbolic links must be created
"<IBM AD Batch Server Installation path>\orientdb\orientdb-community-2.1.25-ibm1\databases"

Example: `recoverGDBSymbolicLinks.bat "<IBM AD Batch Server Installation path>\data\tmp\gdb" "<IBM AD Batch Server Installation path>\orientdb\orientdb-community-2.1.25-ibm1\databases"`

4. Make sure to configure the following services:

a. **IBM AD File Service**

Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

If you still want to use the **existing projects**, you need to add the path to the shared sources folders that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

Note:

- If the authorization/authentication feature **is not used**, for the new projects you need to have a shared folder to access those files from another machine. For more information on how to configure **IBM AD File Service** without authentication, see "STEP 5. Configuring IBM AD File Service" on page 72.
- If the authorization/authentication feature **is used**, for the new projects it is not necessary to have a shared folder. For more information on how to configure **IBM AD File Service** with authentication, see "STEP 6. Configuring IBM AD File Service" on page 123.

b. **IBM AD Search Service**

Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In **IBM AD Analyze Client** a search in resources was directly performed by using **Search in Files** analysis.

Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under <IBM ADDI Installation Folder>`\IBM Application Discovery Batch Server\conf\project.properties`, where the *index.indexFolder* parameter is present.

The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found

under <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf\project.properties, where the *index.extraSources* parameter is present.

Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them. For more information on how to configure **IBM AD Search Service** without authentication, see "STEP 9. Configuring IBM AD Search Service" on page 88.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears. For more information on how to configure **IBM AD Search Service** with authentication, see "STEP 10. Configuring IBM AD Search Service" on page 139.

c. **IBM AD Manual Resolutions Service**

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the .resolutions folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the conf.yaml file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions. For more information on how to configure **IBM AD Manual Resolutions Service**, see "STEP 6. Configuring IBM AD Manual Resolutions Service" on page 77 (without authentication) or "STEP 7. Configuring IBM AD Manual Resolutions Service" on page 128 (with authentication).

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

To preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1) Go to the <IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service folder and locate the **moveResolutions.ps1** script.
2) Run the **moveResolutions.ps1** script by using Windows PowerShell.
3) Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4) Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5) As a result, all the **journal files** are moved in the newly set location.

d. **IBM AD Mainframe Projects Service** - is a **mandatory** service that needs to be configured to authorize the access to the AD projects. The list of projects is not cached at the restart of the **IBM AD Analyze Client** and it is necessary to use the **Get project list** contextual-menu option each time when **IBM AD Analyze Client** starts. For more information on how to configure **IBM AD Mainframe Projects Service**, see "STEP 7. Configuring IBM AD Mainframe Projects Service" on page 80 (without authentication) or "STEP 8. Configuring IBM AD Mainframe Projects Service" on page 131 (with authentication).

e. **IBM AD Cross Applications Service** - is an additional service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance. For more information on how to configure **IBM AD Cross Applications Service**, see "STEP 10. Configuring IBM AD Cross Applications Service" on page 91 (without authentication) or "STEP 11. Configuring IBM AD Cross Applications Service" on page 142 (with authentication).

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

a. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.

b. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading to IBM AD V5.1.0.3

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

There are several steps and situations that you must take into account when upgrading to IBM AD V5.1.0.3:

- **IBM AD File Service**, **IBM AD Search Service**, and **IBM AD Manual Resolutions Service** are mandatory to be installed during the upgrade/install process.
- The procedure for upgrading is slightly different, depending on which existing version you have installed before you begin the upgrade:
  - From IBM AD V5.1.0.2
  - From IBM AD V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0
- Once the upgrade is completed, you need to perform additional steps to configure the new IBM AD components. For more information, see "Additional steps to take for configuring the new components" on page 49.

Upgrading to 5.1.0.3 from earlier levels:

- **IBM AD V5.1.0.2**

  Run the IBM AD V5.1.0.3 installer without uninstalling AD components and make sure that the same installation path is used.

- **IBM AD V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0**

  Important: Before running the IBM AD V5.1.0.3 ADDI installer, you must uninstall the IBM AD components. For more information, see Chapter 10, "Uninstalling IBM AD Components," on page 161.

  Run the IBM AD V5.1.0.3 ADDI installer and make sure to install the IBM AD components in the same folder as in the previous version.

  Note that the version and location of **OrientDB** have changed. After installing IBM® AD V5.1.0.3, take the following steps:

  1. Go to `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \orientdb\orientdb-community-2.1.25-ibm1\bin\` and run `server.bat` on **Windows** or `server.sh` on **Linux**. A command prompt window opens, asking for the **root** user account password. Fill in a password of your choosing and press **ENTER**. The password is case-sensitive. A message indicating that the service is now active is displayed.

2. Go to **IBM AD Configuration Server** and fill in the password for OrientDB at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database**.

   Note: At this point, OrientDB is configured to run with the **root** user name and the password that is configured above.

   Important:

   – It is a must to upgrade the repository for each project by using either **AD Build Client** or **AD Build Configuration** and it is highly recommended to perform a full Build.

   – In case that full Build is triggered, then step 3 can be skipped as the links will automatically be created (it is recommended as a Best Practice).

3. Go to `<IBM AD Batch Server Installation folder>` and run `recoverGDBSymbolicLinks.bat` on Windows and `recoverGDBSymbolicLinks.sh` on Linux to re-create the symbolic links.

   Note: Both of the files must be executed with the following two parameter values:

   Location of the graph databases
   "<IBM AD Batch Server Installation path>\data\tmp\gdb"

   Location where the symbolic links must be created
   "<IBM AD Batch Server Installation path>\orientdb\orientdb-community-2.1.25-ibm1\databases"

   Example: `recoverGDBSymbolicLinks.bat "<IBM AD Batch Server Installation path>\data\tmp\gdb" "<IBM AD Batch Server Installation path>\orientdb\orientdb-community-2.1.25-ibm1\databases"`

Additional steps to take for configuring the new components

Once the upgrade to IBM AD V5.1.0.3 is finalized, it is mandatory to configure and start the following components as follows:

IBM AD File Service

Prior to IBM AD V5.1.0.3, the sources and the project folders need to be shared.

Starting with IBM AD V5.1.0.3, **IBM AD File Service** was introduced and in the context of the authorization/authentication, the access rights of users or users' groups are mapped to a certain folder with the source files that are on the same machine with **IBM AD File Service** or not. Once authenticated and authorized, the user can start the analysis on the source files as long as the user has read access rights.

If you still want to use the **existing projects**, you need to add the path to the shared sources folders, that were used during the project creation, when configuring **IBM AD File Service**. In this way, you are still able to access the sources from another machine. This path needs to be added in the `conf.yaml` file, in the mapping section, where the *remote* parameter is present.

Note:

- If the authorization/authentication feature **is used**, for the new projects you will not need to have a shared folder.
- If the authorization/authentication feature **is not used**, for the new projects you will need to have a shared folder in order to access those files from another machine.

IBM AD Search Service

Prior to IBM AD V5.1.0.3, **IBM AD Batch Server** was generating, through the index component, the indexed data for the resources of a project into a path set in the `project.properties` file. In **IBM AD Analyze Client** a search in resources was directly performed by using **Search in Files** analysis.

Starting with IBM AD V5.1.0.3, **IBM AD Search Service** is responsible with the access to the indexed data. Whether the authorization/authentication feature is used or not, the folder path in which the indexes

are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**. The path where the index data is generated needs to be added in the `conf.yaml` file, where the *indexPath* parameter is present. This path can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf\project.properties`, where the *index.indexFolder* parameter is present.

The path to the source folders that are added to the project or any additional folder that needs to be indexed (apart from the project folders), needs to be added in the `conf.yaml` file of **IBM AD File Service**, where the mapping section is present. The path to the additional folder can be found under `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\conf \project.properties`, where the *index.extraSources* parameter is present.

Note:

- Make sure that **IBM AD Search Service** and **IBM AD File Service** are started as **Search in Files** analysis depends on them.
- If the authorization/authentication feature **is used**, the user that is logged in **IBM AD Analyze Client** needs to have read access rights to see the content of the files where the search pattern appears.

IBM AD Manual Resolutions Service

Prior IBM AD V5.1.0.3, the dynamic call resolutions were stored and managed by using files located in the `.resolutions` folder under each project's path.

Starting with IBM AD V5.1.0.3, **IBM AD Manual Resolutions Service** manages these files, so the path where these files are generated is separated from project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. This path where the journal files are generated needs to be added in the `conf.yaml` file, where the *projectPath* parameter is present. Once a project is imported, a folder with the same name is generated in that path and hosts all the files that are needed to manage dynamic call resolutions.

Note: Make sure that **IBM AD Manual Resolutions Service** is started as the **import process** depends on it.

In order to preserve the journal files that were used in the previous versions, the **moveResolutions.ps1** script allows you to automatically move the journal files from a previous location to a new destination, where for each project, a folder that contains the journal files is created.

To run the **moveResolutions.ps1** script, perform the following steps:

1. Go to the `<IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service` folder and locate the **moveResolutions.ps1** script.
2. Run the **moveResolutions.ps1** script by using Windows PowerShell.
3. Set the **source** parameter, which represents the path where the **IBM AD Build Client** projects were created. The default path is found in **IBM AD Configuration Server** at the following location: **Home Page** > **"YourConfigurationServer:Port"** > > **Install Configurations** > **IBM Application Discovery Build Client** > **Default projects path**.
4. Set the **destination** parameter, which represents the path for the files that are moved on, as described in step 5, in the *Configuring IBM AD Manual Resolutions Service* section.
5. As a result, all the **journal files** are moved in the newly set location.

Upgrading to IBM AD V5.1.0.2 from versions V5.0.5.0, V5.0.5.1, V5.0.5.2 or V5.1.0.0

Note: Once the latest version of IBM Application Discovery and Delivery Intelligence is installed and fully configured, you need to:

1. Mandatory, upgrade the repository for each project by using either **IBM AD Build Client** or **IBM AD Build Configuration** and it is highly recommended to perform a full Build.
2. Highly recommended to perform a full Build of each IBM AD project.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Run the IBM® AD V5.1.0.2 installer without uninstalling AD components and make sure that the same installation path is used.

Please note that the version and location of **OrientDB** have changed. After installing IBM® AD V5.1.0.2, take the following steps:

1. Go to `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \orientdb\orientdb-community-2.1.25-ibm1\bin\` and run `server.bat` on **Windows** or `server.sh` on **Linux**. A command prompt window opens, asking for the **root** user account password. Fill in a password of your choosing and press **ENTER**. The password is case-sensitive. A message indicating that the service is now active is displayed.
2. Go to **IBM AD Configuration Server** and fill in the password for OrientDB at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database**.

   Note: At this point, OrientDB is configured to run with the **root** user name and the password that is configured above.

   Important:

   - It is a must to upgrade the repository for each project by using either **AD Build Client** or **AD Build Configuration** and it is highly recommended to perform a full Build.
   - In case that full Build is triggered, then step 3 can be skipped as the links will automatically be created (it is recommended as a Best Practice).
3. Go to `<IBM AD Batch Server Installation folder>` and run `recoverGDBSymbolicLinks.bat` on Windows and `recoverGDBSymbolicLinks.sh` on Linux to re-create the symbolic links.

   Note: Both of the files must be executed with the following two parameter values:

   Location of the graph databases
   "<IBM AD Batch Server Installation path>\data\tmp\gdb"

   Location where the symbolic links must be created
   "<IBM AD Batch Server Installation path>\orientdb\orientdb-community-2.1.25-ibm1\databases"

   Example: `recoverGDBSymbolicLinks.bat "<IBM AD Batch Server Installation path>\data\tmp\gdb" "<IBM AD Batch Server Installation path>\orientdb\orientdb-community-2.1.25-ibm1\databases"`

Upgrading to IBM AD V5.0.5.0

To upgrade to IBM AD V5.0.5.0, you can run the ADDI installer without uninstalling AD components.

Note: After upgrading the IBM AD code to the latest level, take the following steps:

1. Upgrade the repository database to the latest level.
2. Perform a full Build of each IBM AD project to correctly populate the repository database and allow the corresponding changes to be propagated to the graph database.

Instructions for upgrading the repository can be found at Upgrade a repository.

Instructions for performing a full Build of the project can be found at Building projects.

Upgrading to IBM AD V5.0.4.2

Before upgrading to IBM AD V5.0.4.2, you must back up the configurations and uninstall the IBM AD components.

Important: Please note that the location of the products you are about to install might be different than the one from previous installations. To maintain the existing configurations, be sure to:

- Back up the configurations before uninstalling the application by following the backup steps described below under each application.
- Once the application is installed, restore the backed-up configurations by manually copying them into the new location.

Before you upgrade to a newer version, follow the steps to keep your old configurations:

IBM AD Configuration Server (from v5.0.2.x onwards)

To back up the data from **IBM AD Configuration Server** (also the projects published by **IBM AD Build Client** in **IBM AD Configuration Server**), please make sure you keep:

- The `store` folder.
- The `conf` folder.

Both folders are stored under the **IBM AD Configuration Server** installation folder. To restore these settings copy them from the backup location into the new installation folder.

IBM AD Analyze Server

When uninstalling the **IBM AD Analyze Server**, there is an automated process that creates a backup for the `server.properties` and `client.properties` files, renaming them to `server.properties.bak` and `client.properties.bak`. If you want to keep previous settings, please make sure you do not delete these files. They are kept under the installation folder. To restore these settings, copy `server.properties.bak` and `client.properties.bak` from the backup location to the new installation folder and rename them back to `server.properties` and `client.properties`.

IBM AD Batch Server

To back up the data from **IBM AD Batch Server** make sure you don't delete:

- The `conf` folder. Note that from one version to another, the `server.properties` and the `project.properties` files structure might change. It is better not to overwrite the new files with the old ones, but instead to copy the parameters and their values that were modified by the administrator from the old files into the same parameter/value settings in the corresponding new files.
- The `data` folder.
- The `orientDB` folder.

All the folders are kept under the installation folder. To restore these settings copy them from the backup location into the new installation folder.

Details on how to back up the Symbolic Links: The following part describes how to manually move the Symbolic Links to a temporary location depending on the OS used (Windows or Linux System).

1. On Windows. Before uninstalling **IBM AD Batch Server**:
   - Go to Start menu under **IBM AD Batch Server** and stop **IBM AD Web Service**, **IBM AD GraphDB Service** and **IBM AD Batch Service**.
   - Backup the content of databases folder present under `\IBM Application Discovery Batch Server installation folder>\orientdb\orientdb-community-2.1.5_ezpatch1\databases` using the following command in a command prompt window:

     ```
     robocopy "path to source folder" "path to the target folder" /S /SL
     ```

     Note: Path to source folder is the path to the databases folder under **IBM AD Batch Server** installation folder. Path to the target folder is the path to a folder created on the disk where the content of the databases folder will be copied. (example: **`robocopy "C:\Program Files\IBM Application Discovery Batch Server\orientdb\orientdb-community-2.1.5_ezpatch1\databases" "C:\databases" /S /SL`**)

- Once you install **IBM AD Batch Server** use **robocopy** command to copy from the folder where the symbolic links were saved to the databases folder under `\IBM Application Discovery Batch Server installation folder>\orientdb\orientdb-community-2.1.25-ibm1`. (Example: robocopy "C:\databases" "C:\Program Files\IBM Application Discovery Batch Server \orientdb\orientdb-community-2.1.25-ibm1\databases" /S /SL)

  Note: Once the installation of **IBM AD Batch Server** is completed set the password for GraphDB server. For more information, see step 2 in Configuring IBM AD Batch Server.

2. On Linux (from v5.0.4.1 onwards). Before uninstalling **IBM AD Batch Server**:
   - Stop **IBM AD Web Server**, **IBM AD GraphDB Server** and **IBM AD Batch Server**.
   - Backup the content of databases folder present under `\IBM Application Discovery Batch Server installation folder>\orientdb\orientdb-community-2.1.5_ezpatch1\databases` using the following command in a terminal:

     ```
     cp -Prv "path to source folder" "path to the target folder"
     ```

     Note: Path to source folder is the path to the databases folder under **IBM AD Batch Server** installation folder. Path to the target folder is the path to a folder created on the disk where the content of the databases folder will be copied (Example: cp -Prv /home/user/IBM\ Application\ Discovery\ Batch\ Server/orientdb/orientdb-community-2.1.5_ezpatch1/databases/* /home/user/databases)
   - Once you install **IBM AD Batch Server** use the same command to copy from the folder where the symbolic links were saved to the databases folder under `\IBM Application Discovery Batch Server installation folder>\orientdb\orientdb-community-2.1.25-ibm1`. (Example: cp -Prv /home/user/databases/* /home/user/IBM\ Application\ Discovery\ Batch\ Server/orientdb/orientdb-community-2.1.25-ibm1/databases)

     Note: Once the installation of **IBM AD Batch Server** is completed set the password for GraphDB server. For more information, see step 2 in Configuring IBM AD Batch Server.

IBM AD Build Client

Important: When upgrading from IBM AD Build **v5.0.1.x to v5.0.4.1**, take the following steps:

1. Uninstall the existing **v5.0.1.x** components.
2. Install **any v5.0.3.x** AD Build Configuration and Client.
3. Install IBM AD Configuration Server **v1.0.6**, which is included with IBM AD **v5.0.3.x**.
4. From **AD Build Configuration Administration** tool, click **Publish Projects**.
5. Once the projects have been published, uninstall the **v5.0.3.x** Build Components and **v1.0.6** IBM AD Configuration Server.
6. Proceed with 5.0.4.1 installation.

Important: When upgrading from IBM AD Build **v5.0.2.x to v5.0.4.1**:

Once the installation of **IBM AD Build Client** is done (on the same machine where previous version of **IBM AD Build Configuration** was installed), a file called `ConfigurationParameters.txt` is automatically generated in the installation folder under the folder `bin`, subfolder `release`. This file contains all information related to the configurations made in **IBM AD Configuration Server** for **IBM AD Build Client**:

- Path for the Mainframe Connection (Path)
- Encoding (Japanese / No Encoding)
- Member Synchronization information (Yes / No and Path)
- Enable Communication Logging (Yes / No)
- Keep communication buffers (Yes/No)

  Note: The user must add these configurations in the **IBM AD Build Client** settings page from **IBM AD Configuration Server**. This step is a must to maintain the old configurations.

Chapter 5. Installing IBM AD

You can use the IBM Application Discovery and Delivery Intelligence for IBM Z (ADDI) installer or Command Line Installation to install IBM AD.

Installing with the IBM ADDI Installer

To install IBM AD on Windows or Linux, use the IBM ADDI installer. You can also use the IBM ADDI installer to install IBM Application Delivery Intelligence for IBM Z (ADI).

Procedure

1. To run the IBM ADDI installer, double-click the `IBM_Application_Discovery_and_Delivery_Intelligence_Installer-5.1.0.x.exe` file.
2. On the **Welcome** page, click **Next**.
3. On the **Licensing Agreements** page, click **I accept the terms of this license agreement**, and then click **Next**.
4. On the **Installation Path** page, specify the installation path, and then click **Next**. The default installation path is `C:\Program Files\IBM Application Discovery and Delivery Intelligence`.

   If the installation path that you specify does not exist, the target directory is created. Confirm the path, and click **OK** in the **Message** dialog box.
5. On the **Select Installation Components** page, select the components that you want to install, and then click **Next**. The components that are not applicable for the current system cannot be selected.

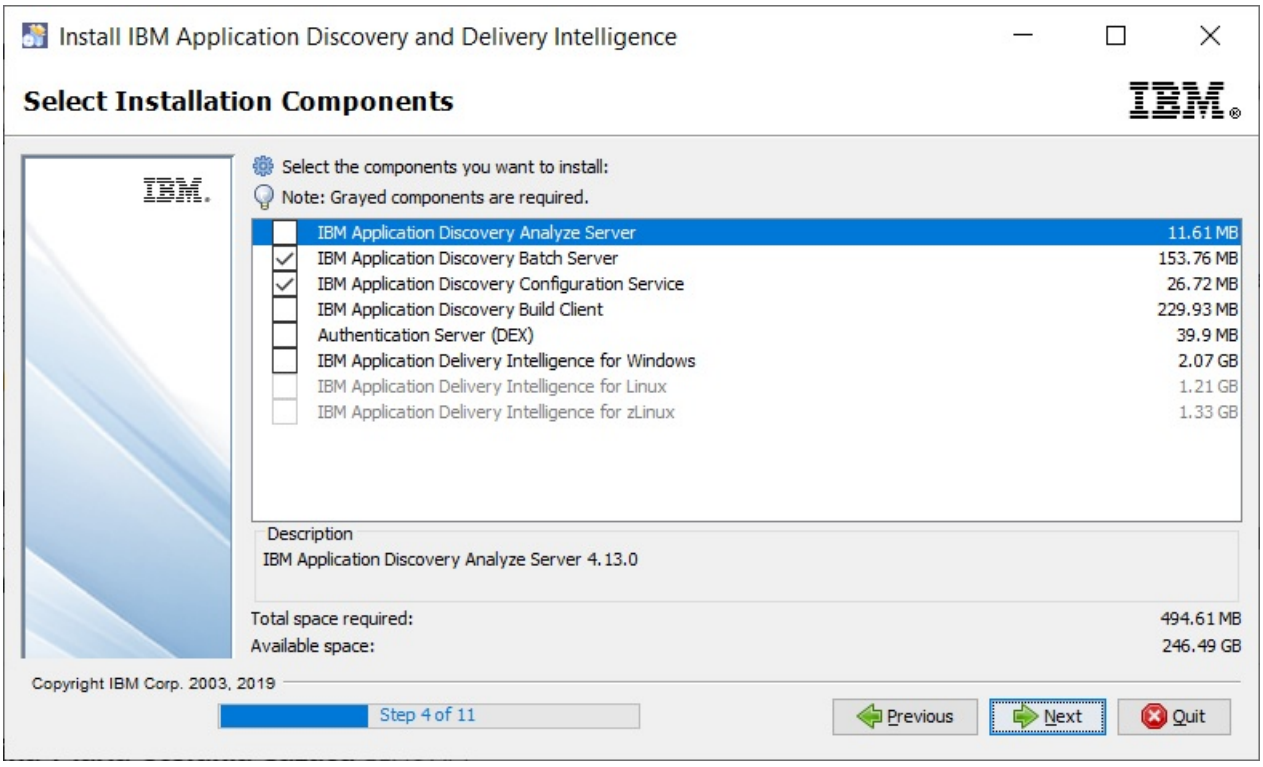


*Figure 3. **Select Installation Components** wizard page*

6. On the **User Data** pages, specify the settings and click **Next**.

a. If the IBM Application Delivery Intelligence (ADI) check box was selected in step 5, you can specify the IBM ADI installation path. The default installation path is `C:\ibm`.

b. Specify the configuration service IP address and service port for IBM AD Build Client.

7. On the **Setup Shortcuts** page, select the shortcuts that you want to create, and then click **Next**.
8. Additionally, after the installation is completed choose the **Generate an automatic installation script** option to create an installation script, where the installation parameters are saved in a `*.xml` file, that can be used later for silent installations. A **Save** dialog box is displayed, allowing to choose the location and name of the installation script. By default, the name of the installation script is `auto-install.xml`.

Alternative Installation for IBM ADDI Using CLI

In case you do not have access to a graphic interface, follow this procedure to install IBM ADDI:

1. Navigate to the **IBM ADDI** installation path and open a command line.
2. For regular installation, run the following command:

```
java –jar "<installer name>"
```

3. For a silent installation, run the following command:

```
java –jar "<installer name>" -f "<path to install xml file>"
```

Note:

- The `<installer name>` represents the full name including the `.exe` extension.
- To install in silent mode, make sure that an interactive installation was initially performed and that the automatic installation script was generated. For more information, see step 8 in “Installing with the IBM ADDI Installer” on page 55.

Chapter 6. Configuring IBM AD

After IBM AD is installed, follow the steps to configure the components.

Without Authentication

STEP 1. Configuring IBM AD Configuration Server

About this task

The IBM AD Configuration Server component can run with the default settings. If the default settings are not compatible with your environment, you can configure the component and overwrite the default settings.

Procedure

1. Configure the settings in the `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/server.properties` file.
   a) Configure the port that AD Configuration Server listens on by setting the value of the **`server.port`** parameter.

      The default value is 2181.

   b) Configure the number of the snapshots and the corresponding logs that are retained by AD Configuration Server. To configure the setting, set the value of the **`zookeeper.autopurge.snapRetainCount`** parameter.

      The default value is 4, and the minimum value is 3.

   c) Configure the time interval in hours for the purge task by setting the value of the **`zookeeper.autopurge.purgeInterval`** parameter.

      The purge task deletes old snapshots and the corresponding log files according to the time interval. The default value of the parameter is 24. To enable the purge task, you must set a value that is greater than `0`.
2. Configure the web server settings in the `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/webservice.log4j.properties` file.
   a) Configure the root logger level and the appenders by setting the **`log4j.rootLogger`** parameter with one of the following values:

      - `OFF`
      - `FATAL`
      - `ERROR`
      - `WARN`
      - `INFO`
      - `DEBUG`
      - `TRACE`
      - `ALL`

      The default log level is `INFO`. The default appenders are `file`, which indicates a rolling file appender, and `stdout`, which indicates a console appender.

      Example

      ```
      log4j.rootLogger=DEBUG
      ```

b) Configure the file roller appender log level by setting the **log4j.appender.file.threshold** parameter with one of the following values:

- OFF
- FATAL
- ERROR
- WARN
- INFO
- DEBUG
- TRACE
- ALL

Note: If you do not set the value of the **log4j.appender.file.threshold** parameter, the file roller appender log level is the same as the root logger level. To set the **log4j.appender.file.threshold** parameter, the value must be lower than or equal to the root logger level.

Example

```
log4j.appender.file.threshold=ERROR
```

c) Configure the file roller appender location by setting the value of the **log4j.appender.file.File** parameter.

Note: The value of the **log4j.appender.file.File** parameter must be a valid absolute or relative path.

Example

```
log4j.appender.file.File=/home/user/logs/webservice.log
```

d) Configure the file roller appender minimum number of backup files to keep by setting the value of the **log4j.appender.file.MaxBackupIndex** parameter.

Example

```
 log4j.appender.file.MaxBackupIndex=5
```

e) Configure the file roller appender maximum file size by setting the value of the **log4j.appender.file.MaxFileSize** parameter.

Example

```
log4j.appender.file.MaxFileSize=100M
```

3. Configure the web server settings in the <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/admin-ws.properties file.

The web server is attached to AD Configuration Server.

a) Configure the network interface that the web server listens on by setting the value of the **host** parameter.

The default value is localhost.

Note: To expose the web server, you must set the **host** parameter with one of the following values:

IP_address
One of the IP addresses that are attached to a network interface on the computer where AD Configuration Server is running.

0.0.0.0
Exposes the web server to all network interfaces.

b) Configure the port that the web server listens on by setting the value of the **port** parameter.

The default value is 8080.

Note: If the web server is exposed to the network, the communication on the specified port must be enabled by the firewall.

c) Configure the path to the configuration file of the logger by setting the value of the **log-conf-file** parameter.

The default value is <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/webservice.log4j.properties.

4. By default, the HTTP protocol is used to run the web service. To use the SSL/HTTPS protocol, follow the steps:

a) Generate a self-signed key pair and store it in a Java keystore by using the Java Keytool command-line interface. Run the following command:

Note: Java SDK or Java JRE must be installed, and the *JAVA_HOME* and *PATH* environment variables must be configured for the Java SDK or Java JRE.

```
keytool -genkeypair -keyalg RSA -alias {alias}
-ext SAN=DNS:localhost,IP:127.0.0.1 -dname {dname}
-validity {validity} -keysize 2048 -keypass {keypass}
-storepass {storepass} -keystore {keystore}
```

{alias}
The name that is used by the Java keystore to identify the generated key. The name must be unique within the Java keystore.

{dname}
The distinguished name from the X.500 standard. This name is associated with the alias for the key pair in the keystore. Also, the name is used as the value in the "issuer" and "subject" fields in the self-signed certificate.

{validity}
The number of days that the certificate that is attached to the key pair is valid.

{keypass}
The password that is needed to access the key pair within the keystore.

{storepass}
The password for the Java keystore.

{keystore}
The path to the keystore file, which is used to store the generated key pair. If the file does not exist, a keystore file is created.

Example

```
keytool -genkeypair -keyalg RSA -alias my-key-pair
-ext SAN=DNS:localhost,IP:127.0.0.1 -dname CN="IBM AD"
-validity 9999 -keysize 2048 -keypass my-key-password
-storepass my-store-password -keystore C:\my_keystore
```

b) Configure the web server that is attached to IBM AD Configuration Server to use the SSL/HTTPS protocol. In the <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/keystore-config.properties file, configure the following parameters:

path
Set the value to the path of the Java keystore that is generated in the preceding substep.

storepass
Set the value to the password for the Java keystore.

keypass
Set the value to the password that is needed to access the key pair within the keystore.

c) In the <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/admin-ws.properties file, set the value of the **keystore-conf-file** parameter to the path of the keystore configuration file.

5. Start **IBM Application Discovery Configuration Admin Service** and **IBM Application Discovery Configuration Service**
   - **On Windows** the services start automatically after the installation of **IBM Application Discovery Configuration Service**. In case that they are not up and running follow these steps:
     a. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery Configuration Admin Service** and **IBM Application Discovery Configuration Service**.
     b. If the service does not start, check the `server.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/` folder.
   - **On Linux**
     a. Go to `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/` and locate the `startServer.sh` and `startWebServerUI.sh` files.
     b. In case that the `.sh` files are not executable, open a terminal and run the following commands for flagging them as executable:

     ```
     chmod +x startServer.sh
     ```

     and

     ```
     chmod +x startWebServerUI.sh
     ```

     c. If the service does not start, check the `server.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/` folder.

Important: For monitoring the **IBM AD Configuration Server** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client

About this task

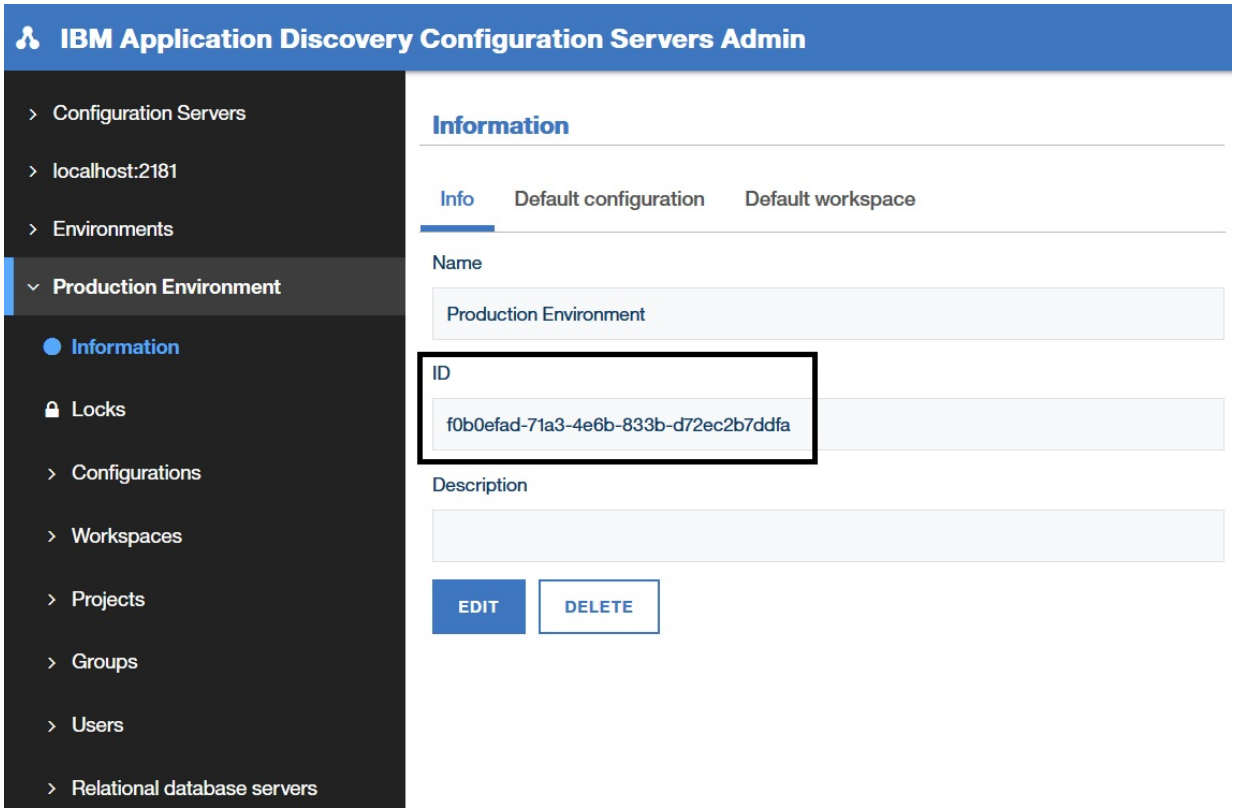
IBM AD Configuration Server ensures that the installation parameters are consistent throughout the different components of IBM AD by storing them in a central location, in a scalable, and fail-safe manner.

IBM AD Configuration Server additionally allows the system administrator to coordinate the access to the resources by creating workspaces and user groups.

Procedure

1. Start IBM AD Configuration Server, by selecting **Start** > **All Programs** > **IBM Application Discovery Configuration Service** > **Launch IBM Application Discovery Configuration Service Admin**.
2. Create an environment, on the **IBM AD Configuration Server** main page, by selecting the localhost server. From the available options, select **Environments** then click **Add Environment**. Enter a name and a description for the new environment then click **Save**. Select the newly defined environment. A **Default workspace** is automatically created for the new environment and is attached to it. Also, a **Default blank configuration** is automatically created and attached to the new environment.

   Note: The **environment ID** will be later used in configuring other components.



3. On the **IBM Application Discovery Configuration Servers Admin** page, click **localhost:2181 > Install Configurations > IBM Application Discovery Build Client**, and configure the following parameters.
   a) **`Default Project path`**: A default path where all **AD Build Client** projects are stored. Add the path so that it can be accessed by any **AD Build**, **Analyze Clients** and **AD Batch Server**. This default path can be changed while creating a Project in **AD Build Client**.
   b) **`zOS configuration folder`**: A default path where the z/OS Connections are stored. Add the path so that it can be accessed by any **AD Build Client** / **AD Build Configuration** Administration tool.
   c) **`Path for the retrieved members`**: A default path where all the members downloaded from a Mainframe system, are stored. Add the path so that it can be accessed by any **AD Build**, **Analyze Clients** and **AD Batch Server**.
4. To add a relational database server, in **IBM AD Configuration Server** main page, from the available servers, select the localhost server where you defined your environment. From the available options, select **Environments** > **your Environment** then click **Relational database servers**. Click **Add relational database server** and enter the following parameters:
   - **Name**: Enter a name for the relational database server.
   - **Host**: IP or name of the computer where the relational database server is installed.
   - **Port**: The relational database server port. The default port for SQL Server is 1433.
   - **Instance/Location**: The relational database server instance name (if exists).
   - **Username/Password**: User name and password for the **IBM AD SQL Identity** as defined in "Microsoft SQL Server Configurations" on page 10, or for the Db2 for z/OS instance.
5. At this point, you can create new projects in **AD Build Client**.

   Note: For more information on how to create new projects, please refer to *IBM AD Build User Guide*.

   Note: In order to activate your IBM AD Build Client copy, follow the procedure described in Chapter 9, "Activating Your IBM AD," on page 159.

   Important: For monitoring the **IBM AD Build Client** tasks, see Chapter 7, "Log Files Location," on page 153.

STEP 3. (Optional) Configuring IBM AD Web Services

Installing WAS Liberty

About this task

To configure IBM AD Catalog, IBM AD Audit and IBM AD BRD web services, a Liberty web server must be installed. You can install and use the IBM WAS Liberty Web Server, which is provided after the installation of IBM AD.

Procedure

1. Extract the `wlp` folder from the `wlp-webProfile7-19.x.x.x.zip` file, and place the `wlp` folder in the IBM AD Web Services installation folder. The default installation folder is `<IBM ADDI Installation Folder>\IBM AD Web Services`.

   Note: The IBM AD Catalog, IBM AD Audit, and IBM AD BRD web services are deployed on the same IBM WAS Liberty. If you plan to reinstall or update IBM WAS Liberty, it is recommended to back up the web services together because they are using the same configuration file. For more information, see VI. AD Web Services.
2. Go to `\wlp\bin` and execute the following command: **`server.bat create ad_server`**.

   ```
   Microsoft Windows [Version 10.0.14393]
   (c) 2016 Microsoft Corporation. All rights reserved.

   C:\Users\Administrator>cd C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin

   C:\Program Files\IBM Application Discovery and Delivery Intelligence\IBM AD Web Services\wlp\bin>server.bat create ad_server

   Server ad_server created.
   ```

   Note: You can verify the successful web service creation by checking whether the `\ad_server` folder is present in `\wlp\usr\servers` or not.
3. From the `IBM AD Web Services` installation folder, copy the `server.xml` configuration file to `\usr\servers\ad_server`, overwriting the existing one.

   Note: This file represents a template for all IBM AD Web Services settings.
4. From the `IBM AD Web Services` installation folder, copy the `com.ez.jtds-x.x.x.jar` file to `\usr\shared\config`.

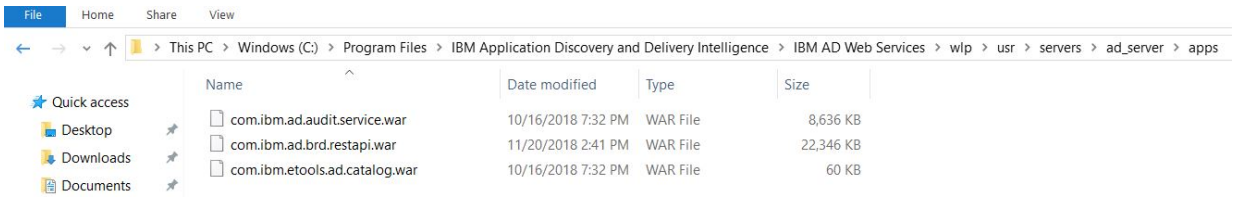
IBM AD Catalog

The **IBM AD Catalog** package is used to enable the impact analysis on the APIs published by a **z/OS Connect** server.

Configuring the Catalog Service

Procedure

1. Make sure IBM WAS Liberty Web Service is correctly installed. For more information about installing IBM WAS Liberty Web Server, visit “Installing WAS Liberty” on page 62.
2. From the `IBM AD Web Services` installation folder, copy file `com.ibm.etools.ad.catalog.war` to `\wlp\usr\servers\ad_server\apps`.

3. Open the `server.xml` file from `\wlp\usr\servers\ad_server`.

4. In the *<!-- Add the Catalog database connection details-->* area, enter the SQL database in the **databaseName** field.

```
databaseName="Catalog"
```

   Note: The Catalog Service uses only a database created on a **SQL Server**.
5. In the same area, enter the IP of the server in the **serverName** field.

```
serverName=
```

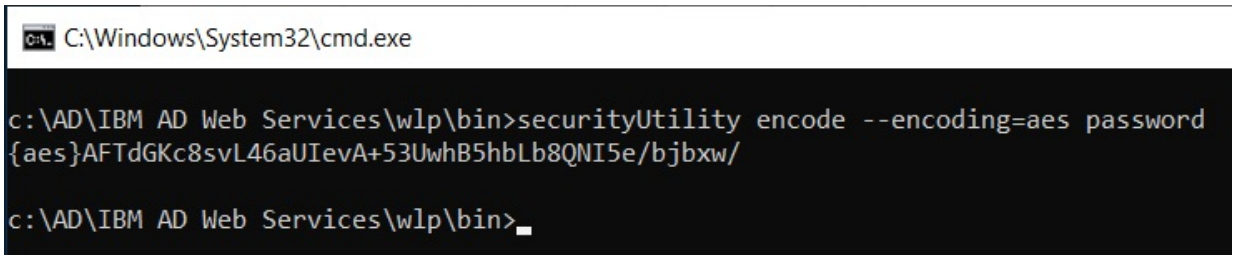
6. Enter the SQL port in the **portNumber** field (the default is 1433).

```
portNumber="1433"
```

7. Enter the user and password used to connect to the SQL database in the **user** and **password** fields.

```
<!-- Add the Catalog database connection details-->
<dataSource id="ADCatRDB" jndiName="jdbc/ad/catalog/relational" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource"/>
    <properties databaseName="catalog" serverName="127.0.0.1" portNumber="1433" user="sa" password="password"/>
</dataSource>
```

   Important: The password used to content to the SQL database can be encrypted. The **securityUtility** command supports plain text encryption for Liberty.



   The encrypted password needs to be added in the **password** field.

```
<!-- Add the Catalog database connection details -->
<dataSource id="ADCatRDB" jndiName="jdbc/ad/catalog/relational" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource" />
    <properties databaseName="catalog_db" serverName="127.0.0.1" portNumber="1433" user="sa" password="{aes}AC5GisUJCV5euhQeOaJBJnmfEjbfKeOxfdB4Epdsq961" />
</dataSource>
```

   For more information, see the WebSphere Application Server Liberty base documentation.

   Note: By default, the **Catalog Service** communicates through **port 9080**. However, you can change the port number by altering the **httpPort** field from the `server.xml` file.

```
<!-- To access this server from a remote client add a host attribute to the following element, e.g. host="*" -->
<httpEndpoint httpPort="9080" httpsPort="9443" id="defaultHttpEndpoint" host="*"/>
```

8. Once the configuration is done, make sure to start the IBM AD Web Services. For more information, see "Starting AD Web Services" on page 68.

   Note: The Catalog database will be automatically populated when **Data Collector** starts for the first time.

Configuring the Data Collector

About this task

Follow below steps to configure **Data Collector** that gathers the information related to the services exposed by the mainframe.

Procedure

1. Copy the files for **Data Collector** from `zoscDataCollector` to a new working directory.
2. Update the `DC.properties` file in this newly created working directory, by setting the following property values:

Important: Please do not update other property values in the file, unless otherwise instructed by IBM Support.

a. **ZoscURL**: Specify the protocol, the host name and the port for the **z/OS Connect** server as a URL.

   Note: You need to append `/zosConnect/apis` as the path part of the URL. An example value is *http://<zoscHost>:9081/zosConnect/apis*.

b. **ZoscUser**: Specify the user name by which **Data Collector** connects to the **z/OS Connect** server. If user authentication is disabled on **z/OS Connect** server or **IBM AD Catalog**, you do not need to define this property value in the property file

c. **ZoscPass**: Specify the password (in plain text) used by **Data Collector** to connect to the **z/OS Connect** server. If user authentication is disabled on **z/OS Connect** server or **IBM AD Catalog**, you do not need to define this property value in the property file

d. **DataCollectorId**: Specify the **Data Collector** ID, for **AD** to identify an instance of **z/OS Connect** server.

   Note: For v5.0.4, the **DataCollectorId** string must be the same as the **ZoscURL** property value. Additionally, **DataCollectorId** must contain the *zosConnect/apis* string which can be either *zosConnect/apis* or the full URL of the *ZoscURL*.

e. **ADCatalogURL**: Specify the protocol, the host name and the port used by the **AD Catalog**.

   Note: You need to append `com.ibm.etools.ad.catalog/cat/entity` to the URL path. An example value is *http://<catalogHost>:9080/com.ibm.etools.ad.catalog/cat/entity/*.

f. **ADCatalogUser**: Specify the user name by which **Data Collector** connects to the **AD Catalog** If user authentication is disabled on **z/OS Connect** server or **IBM AD Catalog**, you do not need to define this property value in the property file.

g. **ADCatalogPass**: Specify the password (in plain text) used by **Data Collector** to connect to the **IBM AD Catalog** If user authentication is disabled on **z/OS Connect** server or **AD Catalog**, you do not need to define this property value in the property file.

3. Check the PATH environment variable. You need to add the directory where `java.exe` resides in the *PATH environment* variable, in case it is missing.
4. Update `zoscdc.cmd`.

   Important: You need to specify the jar file of **JSON4J** that resides under `/WAS_Liberty_Library/lib/` with full path name, as a part of the *-classpath* argument. The file name of the jar file should look like `com.ibm.json4j_x.x.x.jar`.

   Alternatively, you can specify the property values listed in **step 2** as the property values passed to the java command. For example, the **ZoscUser** property can be specified as an argument for **-DZoscUser=user1**.

How to Collect z/OS Connect API Information

About this task

Take the following steps to invoke **Data Collector** to collect **z/OS Connect** API information.

Procedure

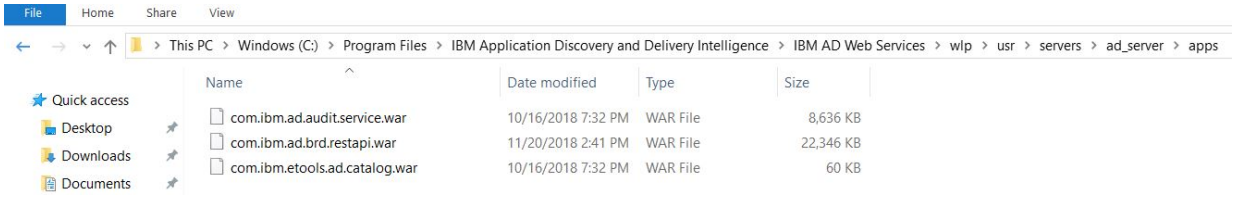
1. Open a windows command prompt and change the current directory to the `/Data_Collector_Working_Directory/`.
2. Run `zoscdc.cmd`.

IBM AD Audit

Configuring the Audit Service

Procedure

1. Make sure IBM WAS Liberty Web Service is correctly installed. For more information about installing IBM WAS Liberty Web Server, visit “Installing WAS Liberty” on page 62.
2. From the `IBM AD Web Services` installation folder, copy file `com.ibm.ad.audit.service.war` to `\wlp\usr\servers\ad_server\apps`.



3. Open the `server.xml` file from `\wlp\usr\servers\ad_server`.
4. In the *<!-- Add the Audit database connection details-->* area, enter the SQL database in the **databaseName** field.

```
databaseName="Audit"
```

Note: The Audit Service uses only a database created on a **SQL Server**.

5. In the same area, enter the IP of the server in the **serverName** field.

```
serverName=
```

Important: If the SQL Server has an instance name, the following parameter needs to be added after the `serverName` parameter.

```
instance="NameOfTheSQLServerInstance"
```

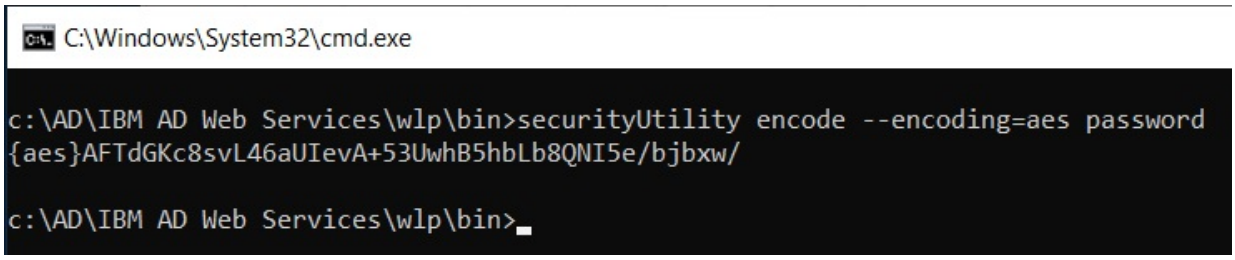
6. Enter the SQL port in the **portNumber** field (the default is 1433).

```
portNumber="1433"
```

7. Enter the user and password used to connect to the SQL database in the **user** and **password** fields.

```
<!-- Add the Audit database connection details-->
<dataSource id="DefaultDataSource" jndiName="jdbc/datasource" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource"/>
    <properties databaseName="audit" serverName="127.0.0.1" portNumber="1433" user="sa" password="password" ssl="request"/>
</dataSource>
```

Important: The password used to content to the SQL database can be encrypted. The **securityUtility** command supports plain text encryption for Liberty.



The encrypted password needs to be added in the **password** field.

```
<!-- Add the Audit database connection details -->
<dataSource id="DefaultDataSource" jndiName="jdbc/datasource" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource" />
    <properties databaseName="audit_db" serverName="127.0.0.1" portNumber="1433" user="sa" password="{aes}AC5GisUJCV5euhQeOaJBJnmfEjbfKeOxfdB4Epdsq961" />
</dataSource>
```

For more information, see the WebSphere Application Server Liberty base documentation.

Note: By default, the **Audit Service** communicates through **port 9080**. However, you can change the port number by altering the **httpPort** field from the `server.xml` file.

```
<!-- To access this server from a remote client add a host attribute to the following element, e.g. host="*" -->
<httpEndpoint httpPort="9080" httpsPort="9443" id="defaultHttpEndpoint" host="*"/>
```

8. Once the configuration is done, make sure to start the IBM AD Web Services. For more information, see “Starting AD Web Services” on page 68.

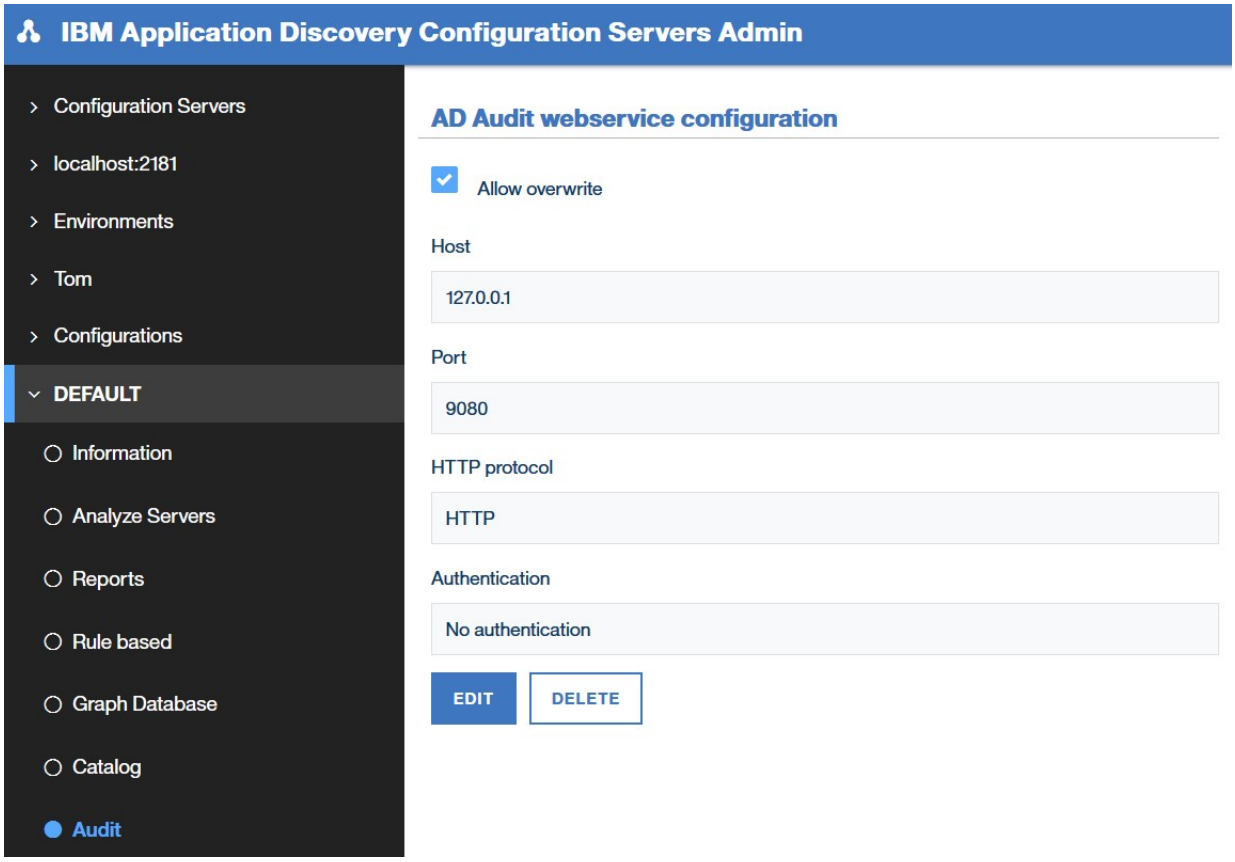
   Note: The Audit database will be automatically populated when **IBM Application Discovery Web Service** starts.

Configuring IBM AD Components to Use the Audit Service

About this task
IBM AD Build Client, **IBM AD Batch Server** and **IBM AD Analyze Client** can be configured to use the **Audit Service** by following these steps.

Procedure

1. Open the **IBM AD Configuration Server** application, and go to **Configurations** > **Audit page**.
2. Set the *hostname* and the *port* used to communicate with the **Audit Service**.



   Note: The **Audit Service** for **IBM AD Batch Server** is set to be enabled by default. To stop using the **Audit Service**, set **`audit.enable=true`** to **`audit.enable=false`** in the `server.properties` file located in the `\conf` folder.

```
##Audit server
# default true
#audit.enable=true
```

Using the Audit Service Web GUI

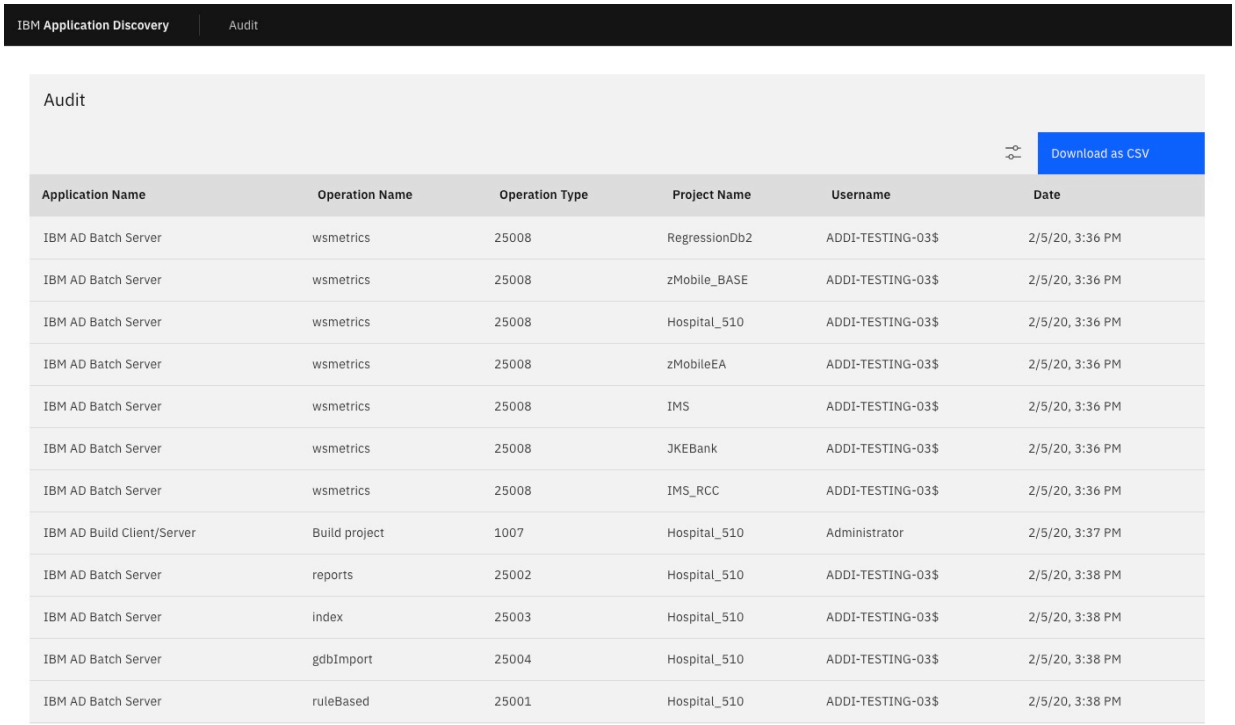
Procedure

1. Open a browser and access the following address: localhost:9080/ad-audit.

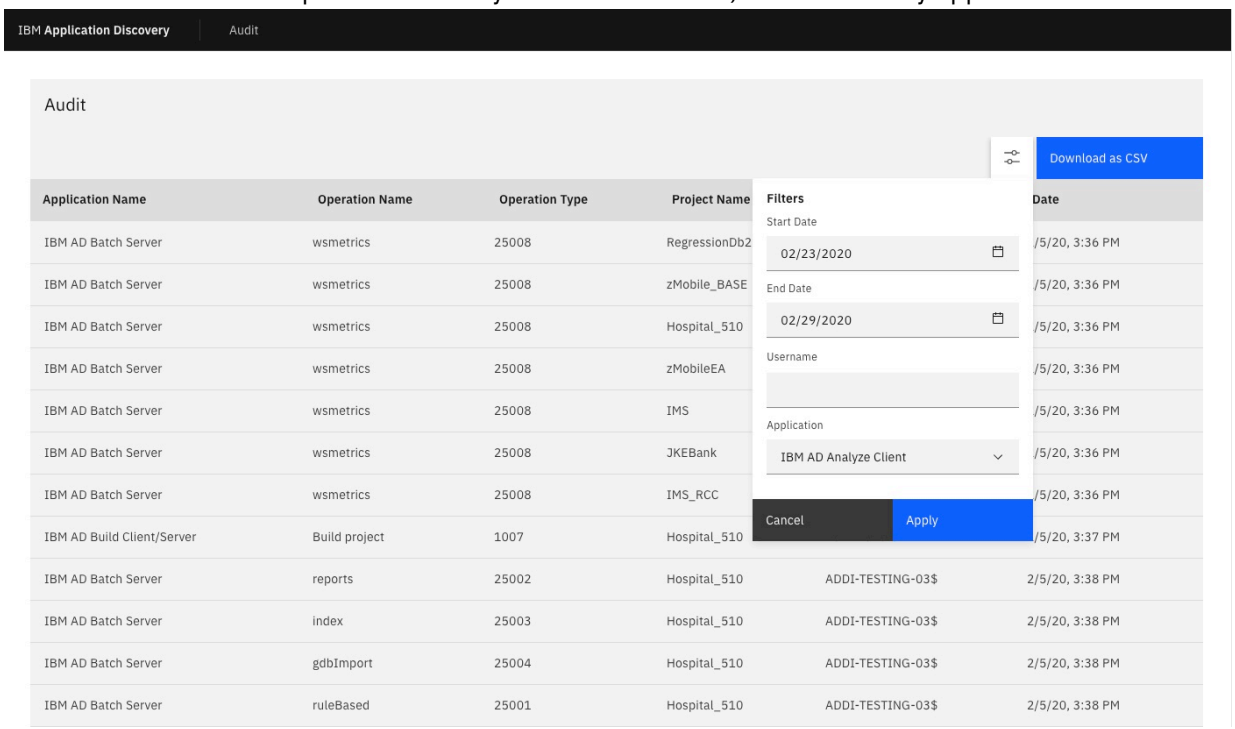
Note:

- Use the same port as the one configured in the **AD Web Service**.
- The **Audit** page is available only after **Ad Server** is started. For more information, see “Starting AD Web Services” on page 68.

As a result, the **Audit** page is displayed as in the following image.



2. Use filters to search for specific entries by start and end date, username or by application.



3. Alternatively, you can export the results by clicking **Download as CSV**.

```
Application Name, Operation Name, Operation Type, Project Name, Username, Date, IP, Instance Id
IBM AD Build Client/Server,Open Project,1000,SQL_Within,Username,03.03.2020 at 03:00:36,9.228.129.107,null
IBM AD Build Client/Server,Build project,1007,SQL_Within,Username,03.03.2020 at 03:11:05,9.228.129.107,null
IBM AD Build Client/Server,Build project,1007,SQL_Within,Username,03.03.2020 at 03:43:01,9.228.129.107,null
IBM AD Build Client/Server,Open Project,1000,Defect24633DBDFile,Username,03.03.2020 at 03:43:12,9.228.129.107,null
IBM AD Build Client/Server,Close project,1001,SQL_Within,Username,03.03.2020 at 03:43:15,9.228.129.107,null
IBM AD Batch Server,gdbImport,25004,Defect24633DBDFile,SYSTEM,03.03.2020 at 03:57:57,9.228.129.107,4ed6d264-441e-4f8d-bb9d-c8c7302e41fc
IBM AD Batch Server,index,25003,Defect24633DBDFile,SYSTEM,03.03.2020 at 03:57:57,9.228.129.107,4ed6d264-441e-4f8d-bb9d-c8c7302e41fc
IBM AD Batch Server,annUpdate,25005,Defect24633DBDFile,SYSTEM,03.03.2020 at 03:57:57,9.228.129.107,4ed6d264-441e-4f8d-bb9d-c8c7302e41fc
```

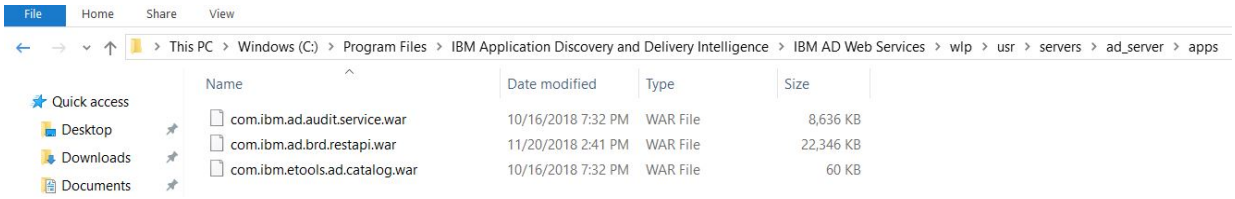
IBM AD BRD

IBM AD BRD allows IBM AD to save data that is used to define Business Rules within IBM Application Delivery Intelligence (ADI).

Configuring the BRD Service

Procedure

1. Make sure IBM WAS Liberty Web Service is correctly installed. For more information about installing IBM WAS Liberty Web Server, visit “Installing WAS Liberty” on page 62.
2. From the `IBM AD Web Services` installation folder, copy file `com.ibm.ad.brd.restapi.war` to `\wlp\usr\servers\ad_server\apps`.



3. From the `IBM AD Web Services` installation folder, copy folder `conf.brd-ws` to `\wlp\usr\servers\ad_server`.
4. Go to `\wlp\usr\servers\ad_server\conf.brd-ws` and in `application.properties` file, enter the desired values for the properties detailed below.
5. Fill in the username and the password defined for IBM AD BRD Service.
   - **`ad.user`**=<UserName>
   - **`ad.password`**=<Password>
6. Add the IP of the computer where the **IBM AD Configuration Server** host is installed.

```
## IBM AD Configuration Server host
ccs.server.host=
```

7. Add the port number to be used by **IBM AD Configuration Server**; the default port is 2181, if no other value is specified the default value will be used.

```
## IBM AD Configuration Server port
## default 2181
#ccs.server.port=
```

8. Add the ID of the Environment set in **IBM AD Configuration Server**.

```
## IBM AD Configuration Server environment
ccs.environment=
```

9. Once the configuration is done, make sure to start the IBM AD Web Services. For more information, see “Starting AD Web Services” on page 68.

Starting AD Web Services

About this task

Once the installation and configuration are done, you can start the IBM AD Catalog, IBM AD Audit and IBM AD BRD web services by following these steps.

Procedure

1. Go to `\wlp\bin` and execute the **`server.bat start ad_server`** command.

   Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.
2. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

STEP 4. (Optional) Configuring IBM AD Validation Service

About this task

IBM AD Validation Service component is specific only for ChangeMan ZMF users, therefore it is not part of the *must have* components installation.

IBM AD Validation Service is automatically installed during the **IBM AD Build** installation.

IBM AD Validation Service acts like a listener and is linked directly with **IBM AD Connect for Mainframe** component (Mainframe Agents).

After **IBM AD Validation Service** is installed, go to `<IBM AD Build Client installation folder>\Bin\Release\IBMApplicationDiscoveryValidationServer\SampleConf`.

Select all configuration files and copy them to `<IBM AD Build Client installation folder>\Bin\Release\IBMApplicationDiscoveryValidationServer.`

Next, perform the following configurations.

Procedure

1. Configure `ProjectsMapping.txt` to have a valid input. This is the configuration file for defining the mapping between the projects that are used to download mainframe members, applications, and subsystems.

   Note: Comparing with the `ProjectsMappingParallelBuild.txt` file, the projects that are specified in the `ProjectsMapping.txt` file do not need to contain the virtual folder that is specified in the `FoldersMapping.txt` file, as they are not used for builds. However, a z/OS connection must be attached and configured to the projects.

   Each line of the configuration file must have the following comma-separated values format:

   `<ProjectName>, <ApplicationName>, <Subsystem>`

   Note:

   - `<ProjectName>` represents the project that is defined in **IBM AD Build Client**.
   - `<ApplicationName>` and `<Subsystem>` are defined in **ChangeMan ZMF**.

   Example of the configuration file:

   ```
   Project1, App1, Subsys1
   ```
2. Configure `IncludesOrder.txt` to have a valid input. This is the configuration file for defining the ChangeMan Baseline Libraries Types and the order of COBOL Includes locations. This configuration file is used later on while you set up the path for the COBOL Include folders

   The configuration file must have the following comma-separated values format:

   `<Type1>, <Type2>,…, <Type`*`n`*`>`

   Example of the configuration file:

   ```
   CPY, INC, IND, CPA
   ```

   Note: It is EXTREMELY important to add the types in the order in which the include files must be looked after.

3. Configure `FoldersMapping.txt` to have a valid input. This is the configuration file for defining a mapping between a type of a mainframe member, that is defined in ChangeMan ZMF, and a virtual folder name of an **IBM AD** project. This configuration file is used during the synchronize phase of the validation process.

   Each line of the configuration file must have the following comma-separated values format:

   `<MemberType>, <VirtualFolderName>`

   - `<MemberType>` is defined in **ChangeMan ZMF**.
   - `<VirtualFolderName>` is defined in **IBM AD Build Client**.

   Examples of the configuration file:

   ```
   COB, zOS Cobol
   ```

   ```
   ASM, Assembler
   ```

4. Configure `ServicePort.txt` to have a valid input. This is the configuration file for defining the Service's port.

   The configuration file must have the following format:

   `<Port Number>`

   Any available port can be used, for example:

   ```
   48000
   ```

5. Enable or disable sending feedback to the mainframe by configuring the `LoopbackResults.txt` file with one the following values:

   Y
   Enables sending feedback to the mainframe according to the weight of rules.

   N
   Disables sending feedback to the mainframe.

6. Set parallel validation parameters for the maximum-allowed values by configuring the `ParallelValidationParameters.txt`.

   The configuration file must have the following comma-separated values format:

   `<Number_of_validations_in_parallel>,<Number_of_components_per_validation>`

   Note:

   - Do not set the number of validations in parallel greater than the number of CPU cores. Otherwise, the validation process might be unstable.
   - Do not set the number of components per validation greater than 20. Otherwise, the performance might be negatively affected.

   Examples of the configuration file:

   ```
   4,10
   ```

   Allows a maximum of four validation instances in parallel, and a maximum of 10 stages or members that are allocated for each instance. You can set these values for a computer with 4 CPU cores.

   ```
   8,15
   ```

   Allows a maximum of eight validation instances in parallel, and a maximum of 15 members that are allocated for each instance. You can set these values for a computer with 8 CPU cores.

7. Configure the mapping between the projects that are used to compile the members to be validated in parallel, applications, and subsystems. Set the mapping values in the `ProjectsMappingParallelBuild.txt` file.

   Each line of the configuration file must have the following comma-separated values format:

<ProjectName>, <ApplicationName>, <Subsystem>

Note:

- <ProjectName> represents the project that is defined in **IBM AD Build Client**.
- <ApplicationName> and <Subsystem> are defined in **ChangeMan ZMF**.
- The number of the projects that are mapped to one pair of an application and a subsystem must be greater than or equal to the maximum number of validations in parallel, which is specified in the ParallelValidationParameters.txt file. Otherwise, the service cannot start.
- Comparing with the ProjectsMapping.txt file, the projects that are specified in the ProjectsMappingParallelBuild.txt file do not need to have a z/OS connection that is attached and configured, as they are used only for builds. However, the projects must contain the virtual folder that is specified in the FoldersMapping.txt file.

The following example shows the mapping configurations for eight validations in parallel:

```
Project1, App1, Subsys1
Project2, App1, Subsys1
Project3, App1, Subsys1
Project4, App1, Subsys1
Project5, App1, Subsys1
Project6, App1, Subsys1
Project7, App1, Subsys1
Project8, App1, Subsys1
Project9, App2, Subsys1
Project10, App2, Subsys1
Project11, App2, Subsys1
Project12, App2, Subsys1
Project13, App2, Subsys1
Project14, App2, Subsys1
Project15, App2, Subsys1
Project16, App2, Subsys1
```

8. Configure the completion code for messages by configuring the CompletionCodeVsMessage.txt file.

   Each line of the configuration file must have the following pipe-delimited format:

   <CompletionCode>|<DescriptiveMessage>

   Note: The descriptive message must have a maximum length of 23 **characters**.

   Example of the configuration file:

   ```
   0|Validation Success
   4|Validation Warning
   8|Validation Failed
   ```

   Each of the numbers in the example reflects the weight of the rule that is specified in the ruleBased.properties file.
9. Configure the approval request parameters in the ApprovalRequestParameters.txt file.

   Each line of the configuration file must have the following comma-separated values format:

   <ProjectName>,<ProcLibrary>

   Note:

   - <ProjectName> represents the project that is defined in **IBM AD Build Client**.
   - <ProcLibrary> is a PDS/E library that is defined in **ChangeMan ZMF**.
   - <ProcLibrary> must have a maximum length of 23 **characters**.

   Example of the configuration file:

   ```
   Project1,PJ.PROCLIB.S814
   ```

What to do next

1. Go to <IBM AD Build Client installation folder\Bin\Release \IBMApplicationDiscoveryValidationServer\ReportsGenerator\sample-conf folder. This sample-conf folder contains the templates for all the configuration files needed to customize the functioning of **ReportsGenerator**. To configure **ReportsGenerator**, copy the templates from the sample-conf folder, and place them in the conf folder.

   Once this step is completed and before you start **IBM AD Validation Service**, some preliminary configurations are required. You need to specify on which projects you want **ReportsGenerator** to run the reports, which reports to generate, where to store the generated reports etc. The configuration parameters are stored in server.properties, project.properties, ruleBased.properties and ruleBasedConfig.properties files.

   For more information, see the following sections from *IBM AD Batch Server Configuration Guide*, that contain a detailed description of the parameters available in these four files:

   - Server Properties File
   - Global Settings File
   - ruleBased.properties File
   - ruleBasedConfig.properties File

   Note: ReportsGenerator is invoked by Validation Server after the Build process.
2. Start **IBM AD Validation Service**: Click **Start** and then select **All Programs** > **IBM Application Discovery Build Client** > **Start IBM Application Discovery Validation Service**.

   The service can also be started from Windows Services (services.msc) by locating IBMApplicationDiscoveryValidationServer and pressing **Start**.

   Important: For monitoring the **Validation Service** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 5. Configuring IBM AD File Service

Follow the configuration steps that are needed to have up and running **IBM AD File Service**:

1. Configure the parameters that are present in the conf.yaml file
2. Start IBM AD File Service
3. Make IBM AD File Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the conf.yaml file

On the machine where **IBM AD File Service** is installed, go to <IBM ADDI Installation Folder>/IBM Application Discovery File Service/sample-conf/ and copy the conf.yaml file to <IBM ADDI Installation Folder>/IBM Application Discovery File Service/conf/. Open the conf.yaml file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD File Service** listens to. The default value is 7700.

   ```
   #port to listen to
   port: 7700
   ```
2. Set the **https** parameter as follows:

a. If the **https** parameter is set to *false*, a non-secured communication is used.

```
#if true, tls information (key, cert) must be specified
https: false
```

b. If the **https** parameter is set to *true*, a secured communication is used.

Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

```
#if true, tls information (key, cert) must be specified
https: true
```

3. If the **https** parameter is set to *true* and the TLS certificate for **IBM AD File Service** are generated, enter the paths of the `certificate(.crt)` and the `key(.key)` files. If the **https** parameter is set to *false* leave blank the following lines. Example:

```
#mandatory if https: true
tls:
    key: C:\certs\file.service.key
    cert: C:\certs\file.service.crt
```

4. Leave blank the line where the **authSrv** parameter is present since **Authentication Server (DEX)** is not needed.

```
#authentication server URL
authSrv:
```

5. In the **mapping** section, configure the **remote** parameter as follows:

- Add the **Default project path** where all **AD Build Client** projects are stored. For more information see, Step 3.a from " STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client " on page 60.
- Add the **Path for the retrieved members** where all the members downloaded from a Mainframe system are stored. For more information, see Step 3.c from " STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client " on page 60.

Note:

- In case you have multiple physical folders that resides resources or projects, an entry for each folder needs to be added in the **mapping** section.
- In order to see **Flow Chart** analysis in **IBM AD Analyze Client** for a specific project, you need to add the path of the project folder or the path of the folder that contains all projects.

  Examples:

  – `remote: \\9.20.128.222\Projects` - path to all projects.

  – `remote: \\9.20.128.222\ADProject` - path to a specific project.

```
#mapping specifies path query prefixes to local paths as a list
#of entries with the following keys:
#   remote: a remote path that can be used to query this service
#           for example a UNC path or a local path where the resources/projects resides.
#   local:  local path that mirrors the remote path. If missing, it is
#           identical to remote.
#   groups: a list of group names that are allowed in all subfolders
#           of the local path. Since paths are matched by remote
#           the most specific remote will be used to obtain the groups
#           If groups are not specified, all authorized users have access.
Examples for the mapping section:
Example 1
mapping:
   -  remote: \\9.20.128.222\Resources
      local: C:\Resources
      groups:

  -   remote: \\9.20.128.222\Resources2
      local: C:\Resources2
```

```
      groups:

  -   remote: \\9.20.128.222\ADProject
      local: C:\ADProject
      groups:


Example 2
mapping:
   -  remote: C:\Resources
      local: C:\Resources
      groups:

  -   remote: C:\Resources2
      local: C:\Resources2
      groups:

  -   remote: C:\Projects
      local: C:\Projects
      groups:
```

6. The **caseSensitive** parameter can be set to *true* or *false*. Through this parameter, you set the mapping type (case-sensitive) of the folders under which the resources are located.

```
caseSensitive: false
```

7. The default value of the **disableAuth** parameter is *true*. Leave the default value since **Authentication Server (DEX)** is not needed.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: true
```

8. The default value of the **matchUsers** parameter is *false*, which means that the matching is made by **group names**. If you want to authorize users and not groups, set the **matchUsers** to true and define users in **IBM AD Configuration Server**. For more information, see Adding a User.

```
matchUsers: false
```

9. Configure the **groups** section as follows:

```
groups:

  - type: ccs
    #addrs - (mandatory) a list of servers that serve as CCS endpoints
    addrs: [127.0.0.1]
    #env (mandatory) the environment in CCS server
    env: a8155844-be04-4193-a389-32993beccb0f
```

Where:

- **Type** is **ccs**.
- **Addrs** is the IP address of the machine where **IBM AD Configuration Server** is installed.
- **Env** is the environment ID defined in **IBM AD Configuration Server**.

Note:

- By defining **Groups** and **Users** in **IBM AD Configuration Server** you can decide which users can access the related mapping folders.
- If no **Groups** or **Users** are defined in **IBM AD Configuration Server** and no groups are listed in the **mapping** section all users have access to the related mapping folders.

10. Optionally, add the refresh time to check periodically the groups that are present in **IBM AD Configuration Server**.

```
#groupsPolling (optional) - refresh period expressed as a time duration
GroupsPolling: 2h
```

2. Start IBM AD File Service

- **On Windows**
  1. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery File Service**.
  2. If the service does not start, check the `.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/` folder.
- **On Linux**
  1. Go to `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/` folder and locate the `micro-srcd-x.x.x.bin` file.
  2. In case that the `.bin` file is not executable, open a terminal and run the following command for flagging them as executable:

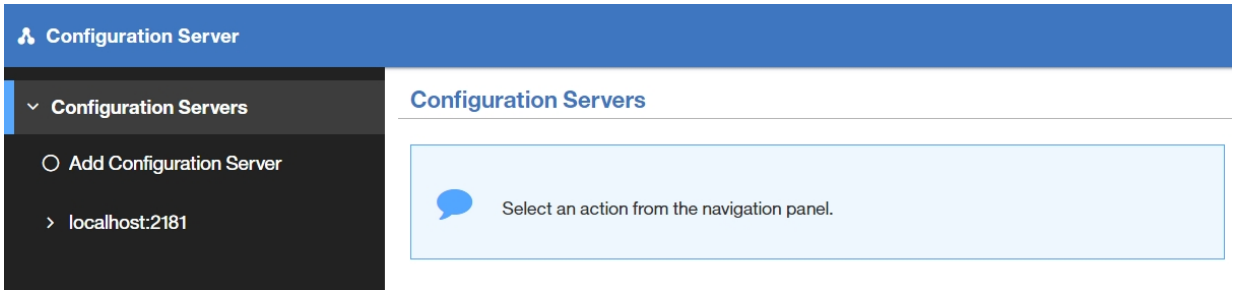
     ```
     chmod +x micro-srcd-x.x.x.bin
     ```

  3. If the service does not start, check the `.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/` folder.

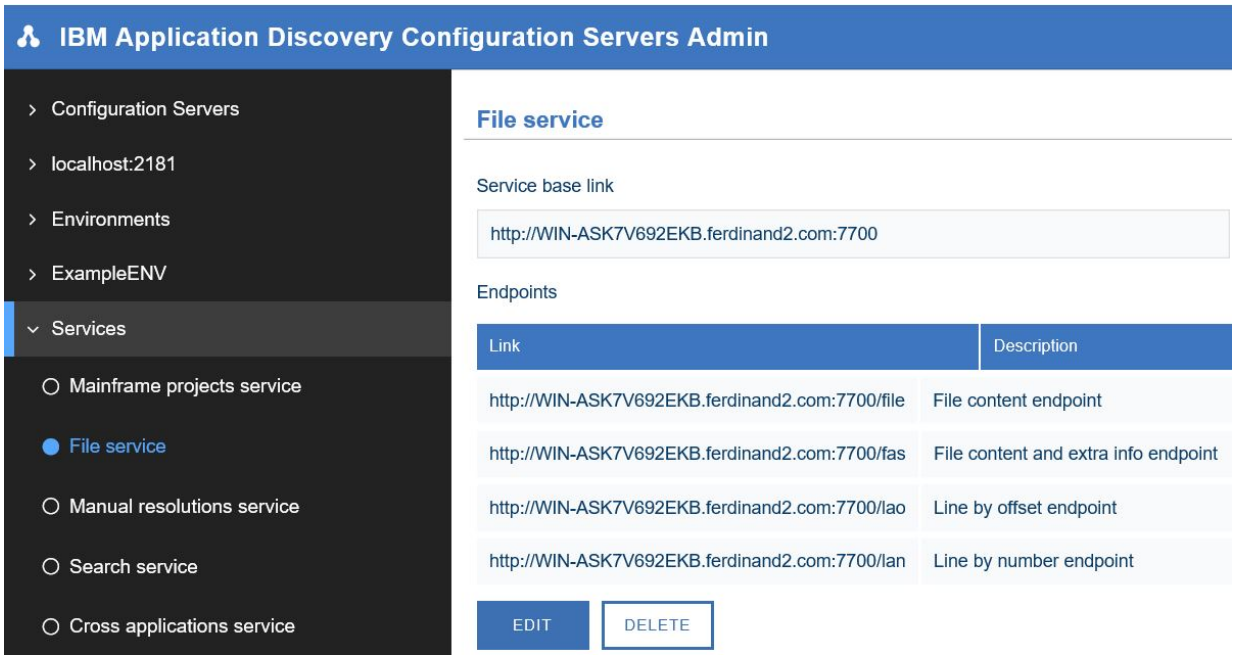
3. Make IBM AD File Service available in IBM AD Configuration Server

After **IBM AD File Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD File Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **File Service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"File Service"** page is displayed as in the following image.



Click **Edit** and enter the following information:

- **Service base link**: Expects the URL of the **File Service**. It represents the full computer name or IP of the machine that hosts the **File Service** and the port to which it listens.

  Example:

  ```
  http://WIN-ASK7V692EKB.ferdinand2.com:7700
  ```

- **Endpoints**
  - **File Content endpoint**: Expects the URL of **File Service** and the endpoint (`file`) used to obtain the file content.

    Example:

    ```
    http://WIN-ASK7V692EKB.ferdinand2.com:7700/file
    ```

  - **File Content and extra info endpoint**: Expects the URL of **File Service** and the endpoint (`fas`) used to obtain the file contents and to return a status.

    Example:

    ```
    http://WIN-ASK7V692EKB.ferdinand2.com:7700/fas
    ```

  - **Line by offset endpoint**: Expects the URL of **File Service** and the endpoint (`lao`) used to obtain the corresponding text for a given list of offsets.

    Example:

    ```
    http://WIN-ASK7V692EKB.ferdinand2.com:7700/lao
    ```

  - **Line by number endpoint**: Expects the URL of **File Service** and the endpoint (`lan`) used to obtain the corresponding text for a given list of line numbers.

    Example:

    ```
    http://WIN-ASK7V692EKB.ferdinand2.com:7700/lan
    ```

7. Click **Save** to save the parameters.

STEP 6. Configuring IBM AD Manual Resolutions Service

Follow the configuration steps that are needed to have up and running **IBM AD Manual Resolutions Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Manual Resolutions Service
3. Make IBM AD Manual Resolutions Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Manual Resolution Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Manual Resolutions Service** listens to. The default value is 7900.

   ```
   #port to listen to
   port: 7900
   ```

2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

   ```
   #if communication should be secured with TLS
   https: false
   ```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   #if communication should be secured with TLS
   https: true
   ```

   Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/` and replace the following line:

   ```
   set tlsoptions=
   ```

   with:

   ```
   SET keystorepath=<"path_to_keystore">
   SET keystorepass=<"password_of_keystore">
   set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
   Djavax.net.ssl.keyStorePassword="%keystorepass%"
   ```

   Where:

   - **Path to keystore** is the path to the keystore that holds the certificate for **IBM Manual Resolutions Service**.
   - **Keystore password** is the keystore password.

3. Leave blank the line where the **authSrv** parameter is present since **Authentication Server (DEX)** is not needed.

```
#authentication server URL
authSrv:
```

4. The default value of the **disableAuth** parameter is *true*. Leave the default value since **Authentication Server (DEX)** is not needed.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: true
```

5. Add the path where the **journal files** are created. The path where these files are generated is separated from the project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. Once a project is imported, a folder with the same name is generated in the related path and it hosts all the files that are needed to manage dynamic call resolutions.

```
#generic path setting for journal files
#project name will be automatically added to the path
projectPath: C:\Resolutions
```

Note: On Linux, mount the Windows folder where the journal files are present (generated at the project's level) and add the path.

```
projectPath: /LinuxUser/Resolutions
```

6. Add the host of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server host
ccs.server.host: 127.0.0.1
```

7. Add the port of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server port
## default 2181
ccs.server.port: 2181
```

8. Add the environment ID under which the projects are created.

```
## Coordination and Configuration environment
ccs.environment: ce127609-197e-4136-af34-83b612689b09
```

Note: The current configuration is only available for one environment.

9. Optionally, the main path where the manual resolutions are created for each project, can be overwritten by the following configuration.

```
#optional
#overrides projectPath for a specific project.
projects:
   - project: Project1
     path: C:\Resolutions\Projects\Project1
```

2. Start IBM AD Manual Resolutions Service

- **On Windows**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/ and run `startServer.bat`.
2. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery Manual Resolutions Service**.
3. If the service does not start, check the `manualres.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/log folder.

- **On Linux**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/ and locate the startServer.sh file.
2. In case that the .sh file is not executable, open a terminal and run the following command for flagging them as executable:

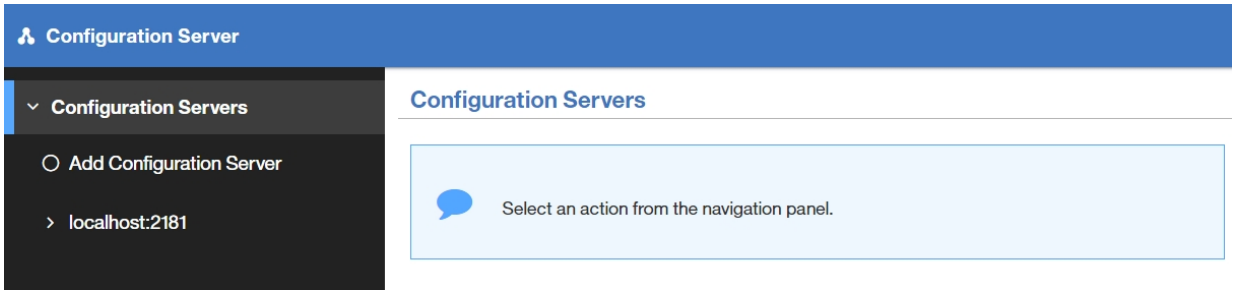
```
chmod +x startServer.sh
```

3. If the service does not start, check the manualres.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/log folder.

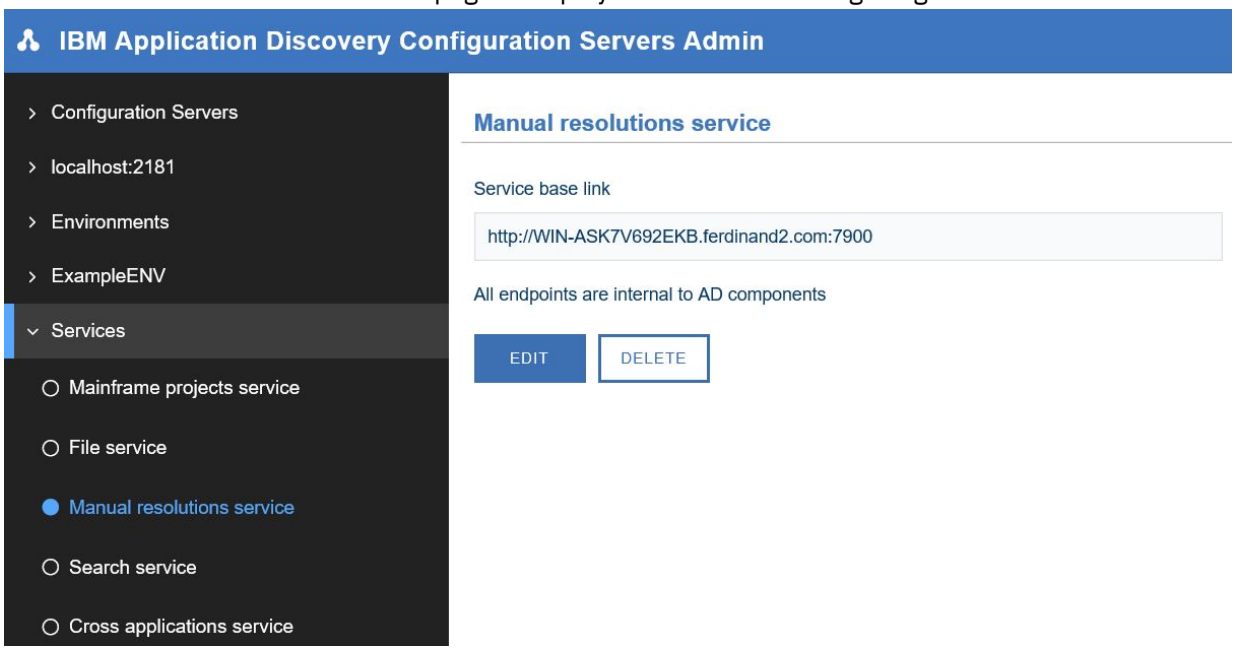
3. Make IBM AD Manual Resolutions Service available in IBM AD Configuration Server

After **IBM AD Manual Resolutions Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Manual Resolutions Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Manual resolutions service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Manual Resolutions Service"** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Manual Resolutions Service** in the **Service base link** section. It represents the full computer name or IP of the machine that hosts the **Manual Resolutions Service** and the port to which it listens.

Example:

```
http://WIN-ASK7V692EKB.ferdinand2.com:7900
```

7. Click **Save** to save the parameters.

STEP 7. Configuring IBM AD Mainframe Projects Service

Follow the configuration steps that are needed to have up and running **IBM AD Mainframe Projects Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Mainframe Projects Service
3. Make IBM AD Mainframe Projects Service available in IBM AD Configuration Server

Note: You have the following options when configuring **IBM AD Mainframe Projects Service**:

- By defining **Groups** and **Users** in **IBM AD Configuration Server** you can decide which projects are accessible to specific users.
- If no **Groups** or **Users** are defined in **IBM AD Configuration Server** the projects that are present in the related environment are accessible to all users.

For more information, see Managing workspaces' access rights.

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Mainframe Projects Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Mainframe Projects Service** listens to. The default value is 7650.

```
#port to listen to
port: 7650
```

2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

```
#if communication should be secured with TLS
https: false
```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

```
#if communication should be secured with TLS
https: true
```

Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/` and replace the following line:

```
set tlsoptions=
```

with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Mainframe Projects Service**.
- **Keystore password** is the keystore password.

3. Add the host of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server host
ccs.server.host: 127.0.0.1
```

4. Add the port of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server port
## default 2181
ccs.server.port: 2181
```

5. Add the environment ID under which the projects are created.

```
## Coordination and Configuration environment
ccs.environment: ce127609-197e-4136-af34-83b612689b09
```

Note: The current configuration is only available for one environment.

6. The default value of the **disableAuth** parameter is *true*. Leave the default value since **Authentication Server (DEX)** is not needed.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: true
```

7. Leave blank the line where the **authSrv** parameter is present since **Authentication Server (DEX)** is not needed.

```
#authentication server URL
authSrv:
```

2. Start IBM AD Mainframe Projects Service

- **On Windows**

  1. Go to `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/` and run `startServer.bat`.
  2. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery Mainframe Projects Service**.
  3. If the service does not start, check the `mfprojs.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/log` folder.

- **On Linux**

  1. Go to `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/` and locate the `startServer.sh` file.

2. In case that the `.sh` file is not executable, open a terminal and run the following command for flagging them as executable:

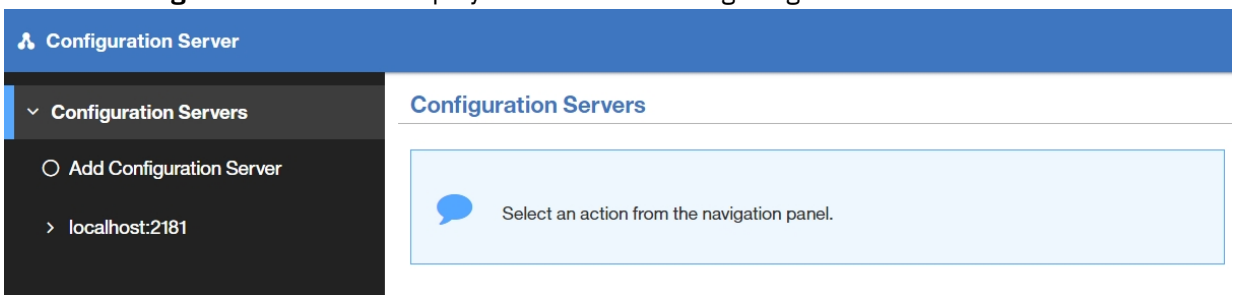
```
chmod +x startServer.sh
```

3. If the service does not start, check the `mfprojs.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/log` folder.

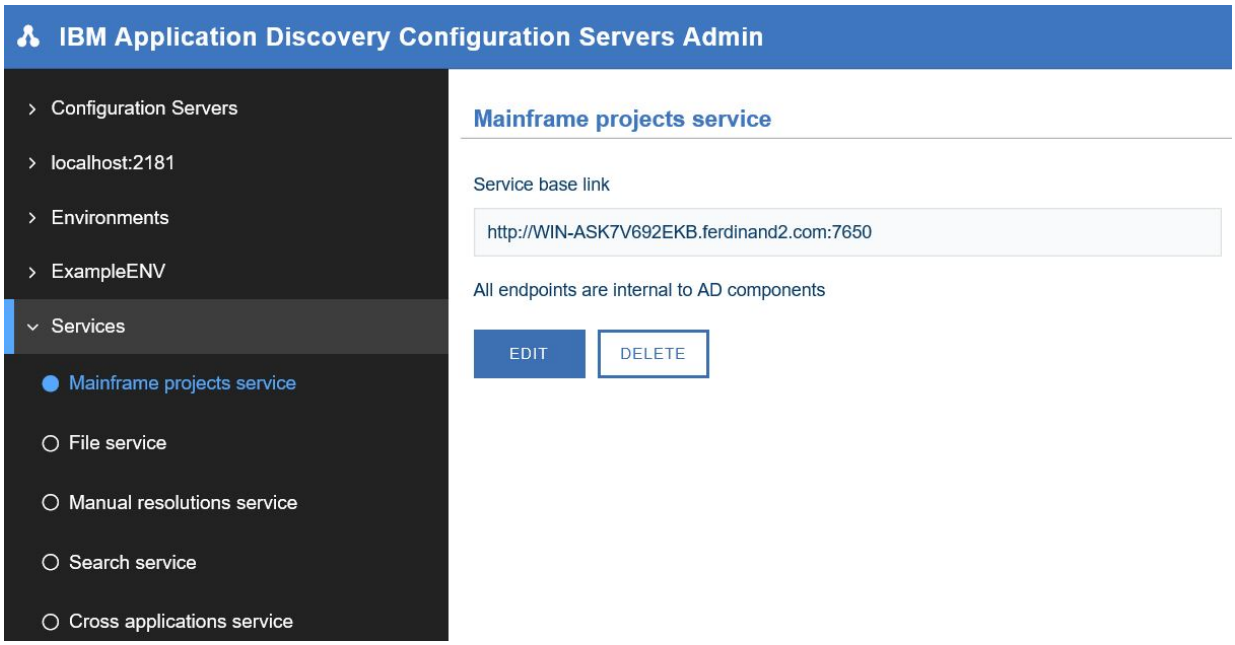
3. Make IBM AD Mainframe Projects Service available in IBM AD Configuration Server

After **IBM AD Mainframe Projects Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Mainframe Projects Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD Mainframe Projects Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Mainframe projects service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Mainframe Projects Service"** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Mainframe Projects Service** in the **Service base link** section. It represents the full computer name or IP of the machine that hosts the **Mainframe Projects Service** and the port to which it listens.

Example:

```
http://WIN-ASK7V692EKB.ferdinand2.com:7650
```

7. Click **Save** to save the parameters.

STEP 8. Configuring IBM AD Batch Server

About this task

Before running **IBM AD Batch Server**, some preliminary configurations must be performed. You need to specify on which projects you want **IBM AD Batch Server** to run the reports, which reports to generate, where to store the generated reports, and so on. Also, you need to specify the parameters for **IBM AD Web Service**.

The configuration parameters are stored in `server.properties` and `project.properties` files, which can be found in the configuration folder.

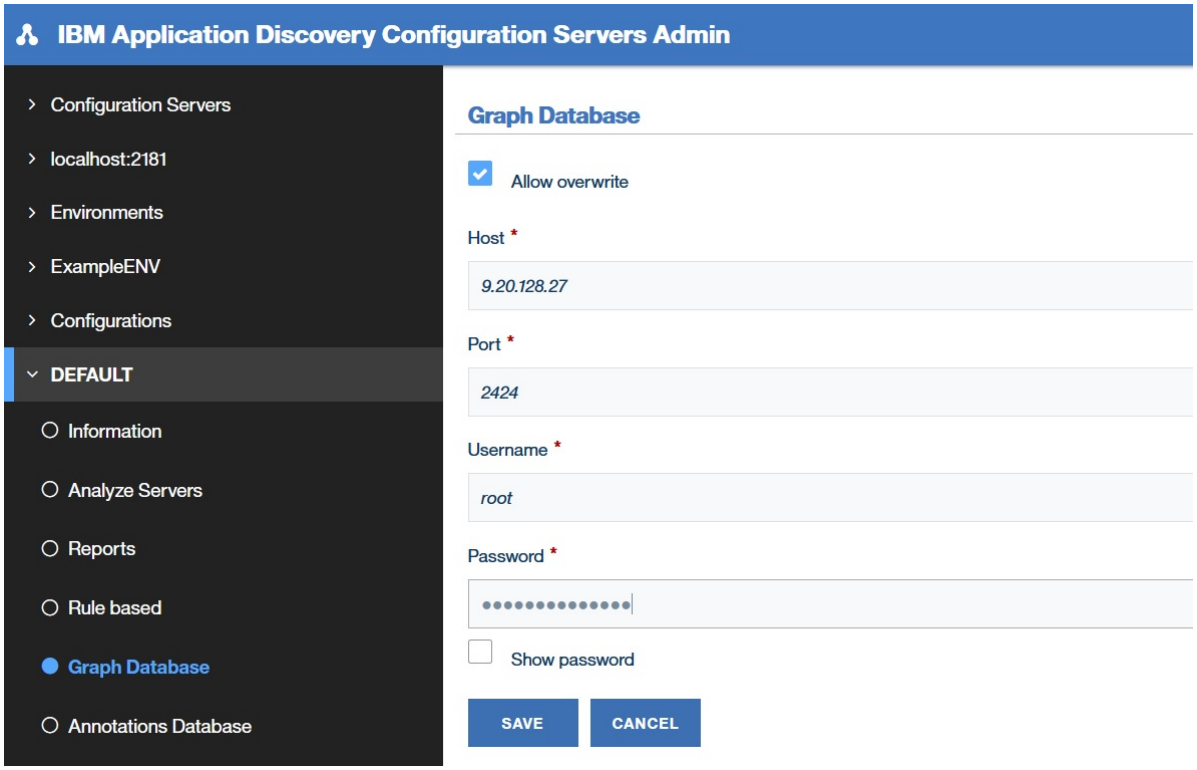
Below are the instructions on how to perform a minimal configuration in order to have source code analysis in **IBM AD Analyze Client**. For detailed instructions on how to configure **IBM AD Batch Server**, see `IBM AD Batch Server User Guide`.

Note: Under Linux, in case `.sh` files are not executable, navigate to their installation directory, open a terminal, and run the following command for flagging them as executable:

```
chmod +x filename.sh
```

Procedure

1. Copy from *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\sample-conf` all the configurations files and sub folders to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\Conf`.
2. Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server \orientdb\`*orientdb-community*`\bin\` and run `server.bat` on **Windows** or `server.sh` on **Linux**. A command prompt window opens, asking for the **root** user account password. Fill in a password of your choosing and press **ENTER**. The password is case-sensitive. A message indicating that the server is now active is displayed. Stop OrientDB by pressing the CTRL + C keys and by confirming with *"y"*. This action is required since **IBM Application Discovery GraphDB Service** is started in a later step.
3. The **Graph Database** can be configured as follows:
   a) **Without SSL**: Go to **IBM AD Configuration Server**, at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database** and enter the following information:

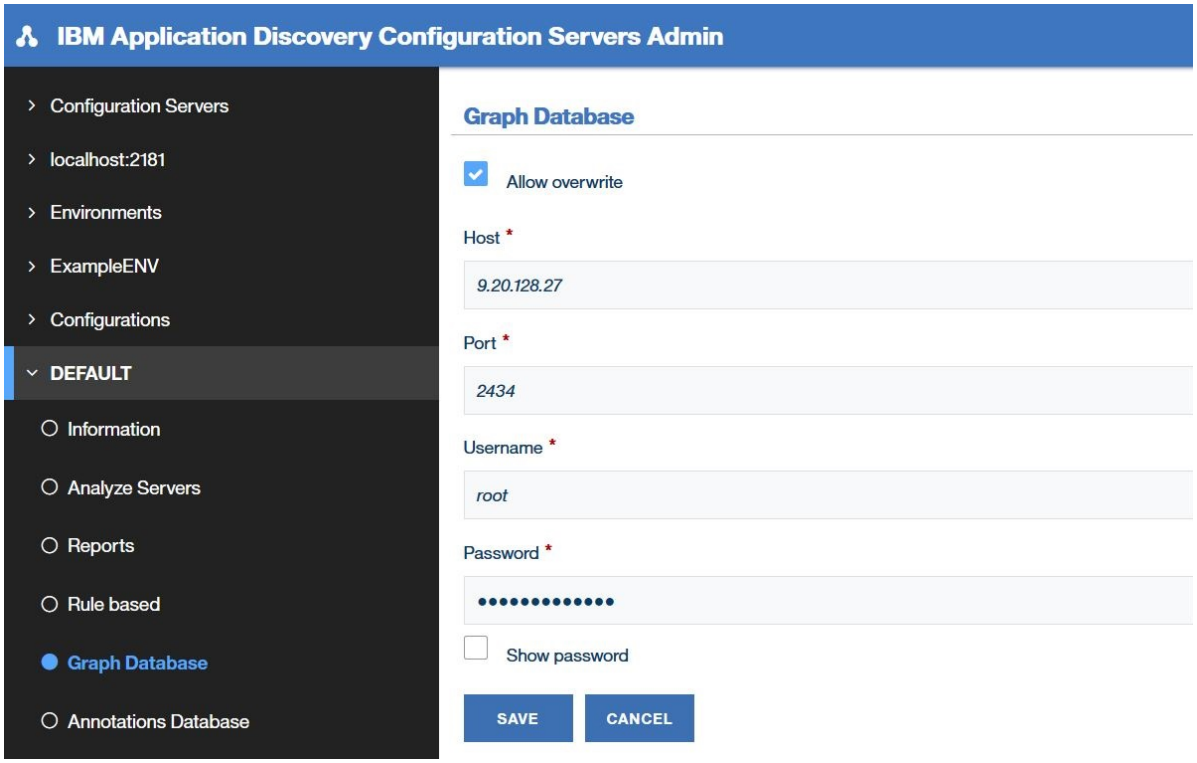


Where:

- **Host** - enter the host name or the IP where **IBM AD Batch Server** / OrientDB is installed.
- **Port** - this field is automatically completed by the application with the default value 2424.
- **Username** - enter the **root** username.
- **Password** - enter the same password configured in the previous step.

Note: At this point, OrientDB is configured to run with the **root** username and the password that is configured above.

b) **With SSL**: Go to **IBM AD Configuration Server**, at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database** and enter the following information:



Where:

- **Host** - enter the host name or the IP where **IBM AD Batch Server** / **OrientDB** is installed.
- **Port** - enter the default port **2434** for **OrientDB SSL**.
- **Username** - enter the **root** username.
- **Password** - enter the same password configured in the previous step.

Additional steps for configuring OrientDB SSL

Note: For more information about **OrientDB SSL** configuration, see Configuring OrientDB for SSL/TLS.

1) Go to <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\orientdb\orientdb-community\config, open the orientdb-server-config.xml file and make sure that **OrientDB SSL** is set to true.
2) In the listeners section of the orientdb-server-config.xml file, add a new line that includes the socket and the default port range for **OrientDB SSL** as follows:

```
<listener protocol="binary" socket="ssl" port-range="2434-2440" ip-address="0.0.0.0"/>
```

3) Go to <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\Conf, open the project.properties configuration file, and make sure that the default port for **GraphDB SSL** server is set to 2434:

```
### graphdb properties
#location of the graphdb server. By default, localhost:2424
gdb.serverUrl=localhost:2434
```

4) Go to <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\, open startServer.bat and set the **gdbOptions** parameter as follows:

```
set gdbOptions=-DgdbImport.client.ssl.enabled=true -DgdbImport.javax.net.ssl.trustStore=</path/to/orientdb.ks> -
DgdbImport.javax.net.ssl.trustStorePassword=password -DgdbImport.javax.net.ssl.keyStore=</path/to/orientdb.ks> -
DgdbImport.javax.net.ssl.keyStorePassword=password
```

Note: At this point, **OrientDB SSL** is configured to run with the **root** username and the password that is configured above.

4. In the `server.properties` file, set the following parameters.
   - **`ccs.server.host`**=<IP / hostname of the machine where the AD Configuration Server resides.>
   - **`ccs.environment`**=<the same environment ID defined in Configuration Server.>
5. The `project.properties` file contains a set of global settings, followed by the specific settings for each type of component. The global settings specify the projects on which the **IBM AD Batch Server** will operate and which components will run on the specified projects. In `project.properties` file, set the following parameters.
   a) Enter an asterisk *****, or a comma-separated list of project names that are the only ones considered for this service. VERY IMPORTANT: If no value is set for this parameter, no report is generated; ***** means all projects.

   ```
   projects.whitelist=*
   ```

   b) Comma-separated list of component names that must be considered for this service. Ex.: **index** must be added as a component.

   ```
   components=index,gdbImport,annUpdate
   ```

   Optional components can be considered for this service.

   Table 1. Optional Components

Component	Description
ruleBased	The **Rule Based** component generates reports for the resources that are specified in the configuration files according to the rules and parameters that are defined in the corresponding configuration files. **Note:** If the **Rule Based** component is used, make sure that the `ruleBased.properties` file is configured. For more information, go to IBM AD Batch Server User Guide, ruleBased.properties File chapter.
reports	The **Reports** component is used to generate the complexity reports. For more information, go to IBM AD Analyze User Guide, Complexity Reports chapter.
cobolPP	The **cobolPP**, **jclPP**, and **pl1PP** components generate the expanded sources for Cobol, JCL, and PL/I. For more information, go to IBM AD Analyze User Guide, View Expanded Source chapter.
jclPP	
pl1PP	
wsmetrics	The **wsmetrics** component is needed only if IBM ADDI Extension is used on the system. **Note:** Additionally, in order for the **wsmetrics** component to be executed, make sure that the **gdbImport** component is included in the components list of this service.
adidx	The **addix** component is needed only if IBM ADDI Extension is used on the system. The ADI Index component will index the resources of a project so that the Business Rules Discovery (BRD) feature can display code snippets.

   c) The Index component will index the resources of a project so that a Search in resources can be performed in **IBM AD Analyze Client**, using Search in Files analysis.

   ```
   index.indexFolder=\\\\path\\<Folder>\\Index
   ```

   Note: For the accessible path defined in the `project.properties` file, backslashes must be doubled (****) and spaces in the path must have a single backslash as a prefix.

   Examples for the *index.indexFolder* parameter:

- `index.indexFolder=\\\\path\\<Folder>\\Index`
- `index.indexFolder=C:\\ibm\\Index`

Important:

- The folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**.
- The Index location will be used when configuring **IBM AD Search Service**.

6. On **Linux** only, Open the `mount.properties` file, located under `<installation folder>\IBM Application Discovery Batch Server/conf` folder and specify how the windows shared folders are mounted on the local files system, using the following pattern:

```
\\\\machine IP\\WindowsSharedFolder=/home/user/LinuxFolder
```

Example:

```
\\\\192.168.56.57\\ProjectsSharedPathWindows=/home/user/ ProjectsSharedPathLinux
```

It is mandatory to mount, at least the default shared path for **AD Build** Projects as defined in STEP 3 and the shared path for the Indexes as defined in `project.properties` file (step 5c).

7. Optional step: for integration with ADI only, please follow this procedure to set up the **AD Batch Server Web Service**:

   a. Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server \`, and run `authConfigTool.bat` on **Windows** or `authConfigTool.sh` on **Linux**. A command prompt dialog window is displayed. Follow the directions and enter the username and the password that are used by the Web Service then press ENTER. `AuthConfigTool.bat` sets the user and password for Web Service basic access authentication.

   b. Go to `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf` folder, locate the `webService.properties` file and set the **keystore-file** parameter to enable an encrypted communication. Example:

```
## ssl keystore file
keystore-file=keystore.jks
```

Note: The `keystore` file needs to be added in the same `\conf` folder where `webService.properties` is present.

What to do next

- Start **IBM AD GraphDB (OrientDB)**.
  - Under Windows: click **Start** and then select **All Programs** > **IBM Application Discovery Servers \ IBM Application Discovery Batch Server** > **Start IBM Application Discovery GraphDB Service**. The service can also be started from Windows Services (`services.msc`) by locating **IBMApplicationDiscoveryGraphDBService** and clicking **Start**.
  - Under Linux: Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\orientdb\orientdb-community-2.1.25-ibm1\bin\` and run `server.sh`. Make sure this process remains alive.
- Start **IBM AD Batch Server**.
  - Under Windows: click **Start** and then select **All Programs** > **IBM Application Discovery Servers \ IBM Application Discovery Batch Server** > **Start IBM Application Discovery Batch Server**. The service can also be started from Windows Services (`services.msc`) by locating **IBMApplicationDiscoveryBatchService** and clicking **Start**.
  - Under Linux: Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\`, and run `StartServer.sh`. Make sure that this process remains alive.
- (Only in case step 7 from above has been taken) Start **IBM AD Web Service**.

- Under Windows: click **Start** and then select **All Programs** > **IBM Application Discovery Servers \ IBM Application Discovery Batch Server** > **Start IBM Application Discovery Web Service**. The service can also be started from Windows Services (`services.msc`) by locating **IBMApplicationDiscoveryWebService** and clicking **Start**.
- Under Linux: Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\`, and run `startWBServer.sh`. Make sure this process remains alive.

Note: Make sure to restart **IBM AD Batch Server** after modifying the configuration files.

Important: For monitoring the **IBM AD Batch Server** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 9. Configuring IBM AD Search Service

Follow the configuration steps that are needed to have up and running **IBM AD Search Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Search Service

   Note: IBM AD Search Service is necessary for the Search in Files functionality to work. It is mandatory to have **IBM AD File Service** installed, configured and up and running.
3. Make IBM AD Search Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Search Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Search Service** listens to. The default value is 7800.

   ```
   #port to listen to
   port: 7800
   ```
2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

   ```
   #if communication should be secured with TLS
   https: false
   ```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   #if communication should be secured with TLS
   https: true
   ```

   Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/` and replace the following line:

   ```
   set tlsoptions=
   ```

   with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Search Service**.
- **Keystore password** is the keystore password.

3. Leave blank the line where the **authSrv** parameter is present since **Authentication Server (DEX)** is not needed.

```
#authentication server URL
authSrv:
```

4. The default value of the **disableAuth** parameter is *true*. Leave the default value since **Authentication Server (DEX)** is not needed.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: true
```

5. Add the path where the **indexes** are created. This path needs to have as an endpoint the same folder where the **indexes** are stored. The path where the indexes are stored was set up under <IBM ADDI Installation Folder>/IBM Application Discovery Batch Server/conf/project.properties file, where the **index.indexFolder** parameter is present. The folder path where the indexes are generated needs to be accessible for both **IBM AD Batch Server** and **IBM AD Search Service**.

   Example:

```
#generic path setting for indexes
#project name will be automatically added to the path
indexPath: \\server01\Indexes
```

6. Optionally, the main path where the indexes are created for each project, can be overwritten by the following configuration. This path needs to be identical to the one present under <IBM ADDI Installation Folder>/IBM Application Discovery Batch Server/conf/project.properties, where the **project.projectName.index.indexFolder** parameter is present.

```
#optional
#overrides indexPath for a specific project.
projects:
   - project: Project1
     path: C:\Index\Indexes\Project1
```

2. Start IBM AD Search Service

- **On Windows**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/ and run startServer.bat.
2. Click **Start**, select **Run**, type **services.msc** and start **IBM Application Discovery Search Service**.
3. If the service does not start, check the search.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/log folder.

- **On Linux**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/ and locate the startServer.sh file.
2. In case that the .sh file is not executable, open a terminal and run the following command for flagging them as executable:

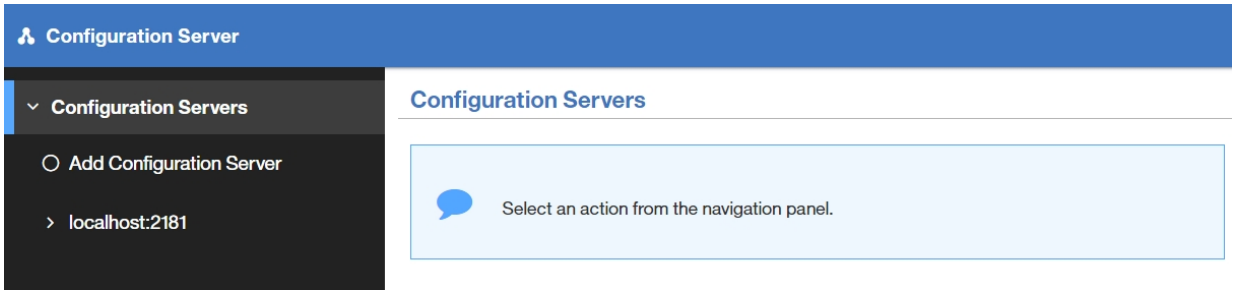
```
chmod +x startServer.sh
```

3. If the service does not start, check the `search.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/log` folder.

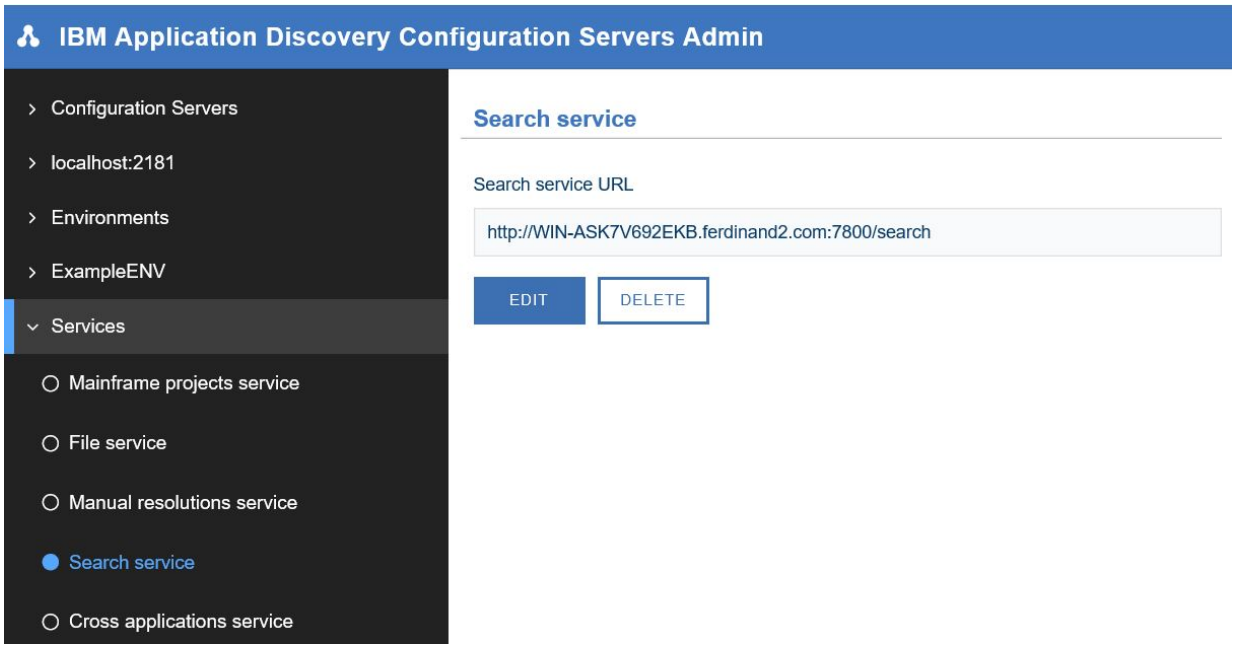
3. Make IBM AD Search Service available in IBM AD Configuration Server

After **IBM AD Search Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Search Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Search Service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Search Service"** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Search Service** in the **Search service URL** section. It represents the full computer name or IP of the machine that hosts the **Search Service**, the port to which it listens and the endpoint (`search`) .

Example:

```
http://WIN-ASK7V692EKB.ferdinand2.com:7800/search
```

7. Click **Save** to save the parameters.

STEP 10. Configuring IBM AD Cross Applications Service

Important: The **IBM AD Cross Applications Service** is still under development.

IBM AD Cross Applications Service is an **additional** service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance in **IBM AD Analyze Client**.

Follow the configuration steps that are needed to have up and running **IBM AD Cross Applications Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Cross Applications Service
3. Make IBM AD Cross Applications Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Cross Applications Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Cross Applications Service** listens to. The default value is 7850.

   ```
   #port to listen to
   port: 7850
   ```

2. Add the host of **IBM AD Configuration Server**.

   ```
   ## Coordination and Configuration Server host
   ccs.server.host: 127.0.0.1
   ```

3. Add the port of **IBM AD Configuration Server**.

   ```
   ## Coordination and Configuration Server port
   ## default 2181
   ccs.server.port: 2181
   ```

4. Add the environment ID under which the projects are created.

   ```
   ## Coordination and Configuration environment
   ccs.environment: ce127609-197e-4136-af34-83b612689b09
   ```

   Note: The current configuration is only available for one environment.

5. Add the **Relational database server** name. The name needs to be identical to the one that has been set up in Step 3, when configuring *IBM AD Build Client in IBM AD Configuration Server*.

   ```
   ## Relational database server name (name defined in the specified environment)
   ## used to create a new cross database
   db.server.name: exampleDB
   ```

6. Add the **Cross repository** name.

   ```
   ## cross repository name
   cross.db.name: YourPreferedName
   ```

7. Set the **https** parameter as follows:

a. If the **https** parameter is set to *false*, a non-secured communication is used.

```
#if communication should be secured with TLS
https: false
```

b. If the **https** parameter is set to *true*, a secured communication is used.

Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

```
#if communication should be secured with TLS
https: true
```

Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/` and replace the following line:

```
set tlsoptions=
```

with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Cross Applications Service**.
- **Keystore password** is the keystore password.

8. Leave blank the line where the **authSrv** parameter is present since **Authentication Server (DEX)** is not needed.

```
#authentication server URL
authSrv:
```

9. The default value of the **disableAuth** parameter is *true*. Leave the default value since **Authentication Server (DEX)** is not needed.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: true
```

10. Optionally, you can decide what project resolutions to display in the analysis, when more projects contain the same program definition.

```
#optional: force resolution target
#program name pattern from source project will be solved only in target project
restrictions:
 - pattern:  "Program1"
   from.project: Project1
   to.project: Project2
```

Where:

- **pattern** - represents the name of the program which has the source present in other projects.
- **from.project** - represents the project that contains the program without the source.
- **to.project** - represents the project resolution that you decide to show in the analysis.

2. Start IBM AD Cross Applications Service

- **On Windows**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/ and run startServer.bat.
2. Click **Start**, select **Run**, type **services.msc** and start **IBM Application Discovery Cross Applications Service**.
3. If the service does not start, check the cross.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/log folder.

- **On Linux**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/ and locate the startServer.sh file.
2. In case that the .sh file is not executable, open a terminal and run the following command for flagging them as executable:

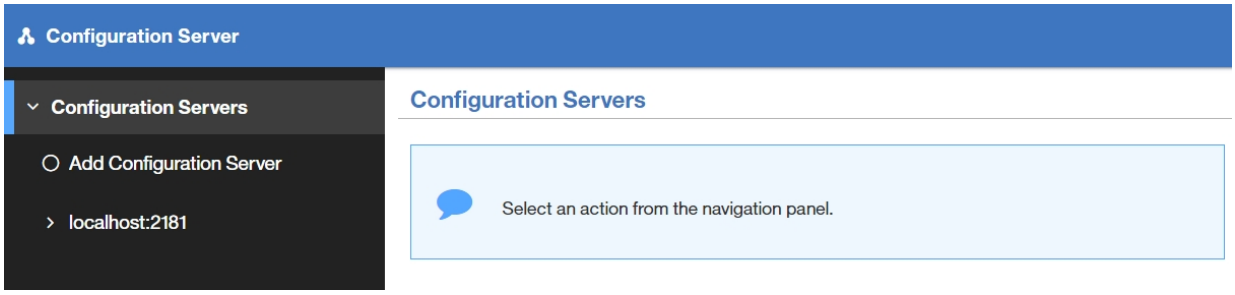
```
chmod +x startServer.sh
```

3. If the service does not start, check the cross.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/log folder.

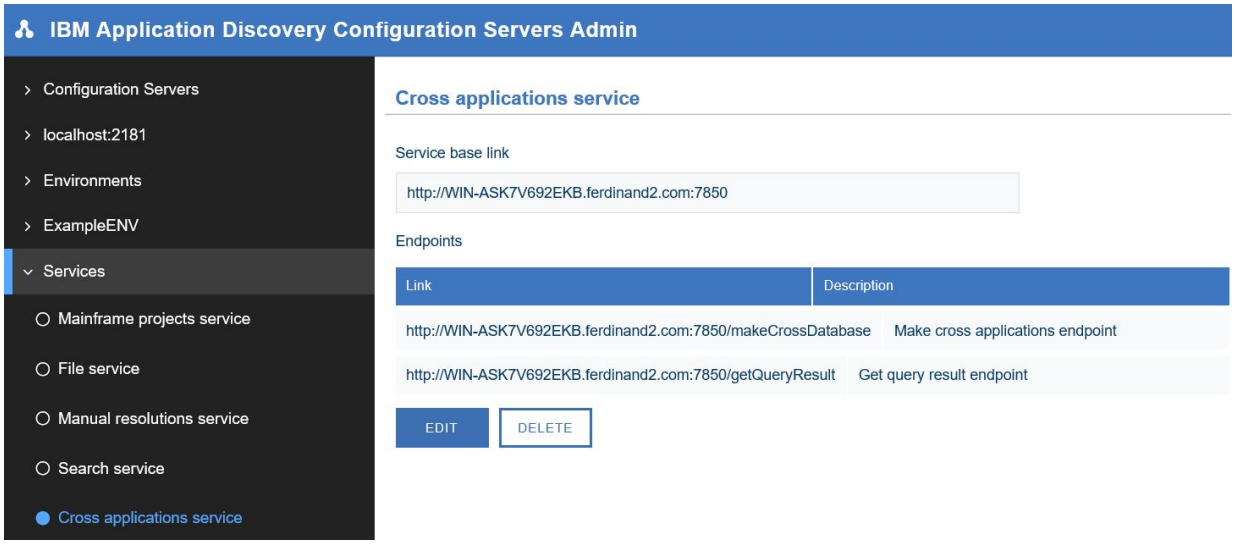
3. Make IBM AD Cross Applications Service available in IBM AD Configuration Server

After **IBM AD Cross Applications Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Cross Applications Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Cross applications service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Cross Applications Service** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Cross Applications Service** in the **Service base link** section. It represents the full computer name or IP of the machine that hosts the **Cross Applications Service** and the port to which it listens.

Example:

```
http://WIN-ASK7V692EKB.ferdinand2.com:7850
```

7. Click **Save** to save the parameters.

Important: At this installation and configuration point, everything is put in place for having analysis available in **IBM AD Analyze Client**. To take full advantage of the available analysis functionality, you need to install **IBM AD Analyze Client**. For more information see, "STEP 12. Installing IBM AD Analyze Client" on page 96.

STEP 11. (Optional) Configuring IBM AD Analyze Server

Before you begin

This step is optional and not necessary unless Java source code will be included in one or more projects in this environment.

On Linux only, Open the `servermount.properties` file, which is located under `<installation folder>\IBM Application Discovery Batch Server/conf` folder and specify how the windows shared folders are mounted on the local files system, by using the following pattern:

```
\\\\machine IP\\WindowsSharedFolder=/home/user/LinuxFolder
```

Example:

```
\\\\192.168.56.57\\ProjectsSharedPathWindows=/home/user/ ProjectsSharedPathLinux
```

It is mandatory to mount the Remote Path from **Analyze Server Manager** > **Server Settings**.

About this task

Following are the configuration steps that are needed after **IBM AD Analyze Server** was installed.

- **Under Windows**: to access the configuration parameters, select **Start** > **Programs** > **IBM Application Discovery Analyze Server** > **IBM Application Discovery Analyze Server Manager**.
- **Under Linux**: to access the configuration parameters, go to `<Installation Path>\IBM Application Discovery Servers\IBM Application Discovery Analyze Server` and run `manager.sh`.

In the **Server settings** tab, the **Server properties** and **Server arguments** sections display default data that was entered when **IBM AD Analyze Server** was installed.

To configure **IBM AD Analyze Server**, follow the instructions below.

Procedure

1. In **IBM AD Configuration Server**, go to **Configurations** > **Default** > **Analyze Servers** and fill in the following details:
   - **Host**: IP / Hostname where **IBM AD Analyze Server** is installed.
   - **RMI Registry Port**: 1099 (Default).
2. Configuring the server database – the Database settings tab:

   Select the **Database Settings** tab. In the Location area, fill in the following parameters:

   - **Server type** field is completed by default with *SQL server*.
   - **Server IP**: Enter the IP of the computer where SQL Server is installed.
   - **Server port**: Server port is the access port, by default, 1433 port is used.

   Important: Make sure that the IP address and the port number you set here are the same as the ones entered in the **Relational database servers** page of **IBM AD Configuration Server**. For more information, see " STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client " on page 60.

   Database instance, this field must be used in case the default database name was not chosen at SQL Server installation time. In the Authorization area, fill in the following parameters:

   - **Database name**: Enter a name for the database.
   - **User and password**: Give a user and password that can be used to create the database.

   After you completed the details of the database, click **Create database** to create the database with the selected parameters. If the database was configured correctly, after **Test database** is clicked, a message with the installed DB version will be displayed. Click **Save** to apply the settings.

   You can also select an existing database. If the selected database belongs to an older version of **IBM AD** and the database structure is now obsolete, a message is displayed indicating the current version of the selected database. The user is given the option to upgrade the existing database. Press **Upgrade** if applicable. After the upgrade process was performed, press again **Test database** to make sure that the upgraded database is functional. The version of the upgraded database is presented and **Upgrade** button is no longer available. For incomplete or corrupted databases one of the following messages may be displayed: **Database x is not a valid database** or **Cannot extract relevant data from the database. Database may be nonexistent, obsolete or invalid**.

   After modifying the settings in any of the tabs, do not forget to press **Save** to apply them. An asterisk at the beginning of the title of a tab indicates that parameters in that tab were modified but not saved.
3. Specifying allowed **IBM AD Analyze Clients**:

   Note: This configuration applies only to Java projects.

   - **IBM AD Analyze** clients can be of two types: manager and user.
   - **IBM AD Analyze** client of the **manager** type, can create shared projects, build shared projects, and delete shared projects.
   - **IBM AD Analyze** client of the "user" type, can only import the shared projects and perform analysis.

   Manager and user types are server-related attributes, which means that a server determines the type for a client connecting to that server by looking up the client IP in the configuration files. This means that a client can be a manager on one server and a user on another server.

   a) To add a Manager to the Managers list: Click **Add** in the upper right corner of the **Access Settings** tab: **New Access Data** dialog window is displayed. Enter the IP of the computer of the user who will access the server as a Manager (the type of owner is selected by default) then press **OK** to add the new manager to the list of Managers. To delete one of the Managers from the list, select it then

press **Delete**. If you want to allow access to all the projects on the server to all potential users, do not add any users to the List of Users. If you want to limit the access to the projects to a number of specific users, select **restrict user IP** then add all of them to the List of Users. Only users in the List of Users and List of Managers will have access to the projects shared on the server.

b) To add a user to the List of Users, click **Add** from the List of Users area of the **Access Settings** tab: the New Access Data dialog window is displayed. Enter the IP of the computer of the user who will access the projects as a User (the type of owner is selected by default) then press OK to add the new user to the list of Users.

What to do next

Under Windows: start **IBM AD Analyze Server**: Click **Start** and then select **All Programs** > **IBM Application Discovery Analyze Server** > **Start IBM Application Discovery Analyze Server**.

Alternatively, to start the server: From the Start menu, choose **Programs** > **IBM Application Discovery Analyze Server** > **Start IBM Application Discovery Analyze Server Monitor** then go to monitor icon from the taskbar, right-click on the icon, and select **Start service**. When the server is running, the green arrow from **Server Monitor** icon indicates that the server is started.

Under Linux: Go to `<Installation Path>\IBM Application Discovery Servers\IBM Application Discovery Analyze Server` and run `StartServer.sh`. Please make sure that this process remains alive.

Important: For monitoring the **IBM AD Analyze Server** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 12. Installing IBM AD Analyze Client

About this task

Attention:

- If you want to connect the **AD Analyze Client** software on a machine or operating system instance to multiple AD Server instances that are all running the **same** AD Server code level, one copy of the **AD Analyze Client** software can be installed into an `Eclipse/IDz` instance, but each AD server connection (IP/Hostname, port, and Unique ID, at a minimum) must be configured in a unique workspace that does not already contain an instance of the **AD Analyze Client** software's configuration settings.
- If you want to install multiple code levels of the **AD Analyze Client** software on the same machine or operating system instance (to connect to different AD Servers running **different** AD code levels), each level of the **AD Analyze Client** software can be installed into a separate `Eclipse/IDz` instance, and also must use a unique workspace that does not already contain the **AD Analyze Client** software's configuration settings. A workspace in use when the **AD Analyze Client** software is installed and configured contains the **AD Analyze Client** software's configuration settings in a folder named: `<workspace location>\.metadata\.ez\.settings`.

Procedure

1. To install **IBM AD Analyze Client**: In your Eclipse instance, select **Window** > **Preferences**.
2. From the Install /Update section to the left of the **Preferences** dialog window select **Available Software Sites**: A list of software sites available for update or install is displayed.
3. To select the location from where **IBM AD Analyze Client** is being installed click **Add**: The Add Site dialog window is displayed.
   - In the **Name** field enter a name for your **IBM AD Analyze Client** installation.
   - If you extracted the installation archive that you received from IBM and you stored it on your computer, use **Local** and point to the Repository folder generated after the extract operation.

- If you did not extract the installation archive received from IBM, use **Archive** button to select the installation archive stored on your computer.
- If you did not store the installation archive locally but in a location on your intranet, enter the full path to that location in the **Location** field.

Click **OK**: **IBM AD Analyze Client** will be added to the list of Available Software Sites.

Click **OK** to close the **Preferences** dialog window and proceed to the next step in the installation process.

4. In your Eclipse client select **Help** > **Install New Software**: The Install dialog window is displayed. In **Work with** field select the **IBM AD Analyze Client** site you have defined in the previous step. After you selected the **IBM AD Analyze Client** site, the corresponding **IBM AD Analyze** components are displayed in the central part of the dialog window. By default, all the components are selected.
   a) If you are installing **AD Analyze Client** into IBM IDz, you can choose all the features listed under **IBM AD Analyze**.
   b) If you are installing **AD Analyze Client** into an Eclipse package that is not IBM IDz, for example an Eclipse distribution downloaded from eclipse.org, you can choose the features listed under **IBM AD Analyze**, except you should deselect all features that start with *Application Discovery Integration with* to avoid errors during the installation process.
   c) Once you have selected the correct features to install in your environment, click **Next**.
5. The **Install details** dialog window is displayed.

   Select a component from the list to display a detailed description of it in the **Details** section of the dialog window. Click **Next**.
6. The **Review license** dialog window is displayed. Carefully read the License agreement then select **I accept the terms** and press **Finish** to start the installation process.
7. After the installation is completed, Eclipse will prompt you for a restart: Accept the restart operation to see the newly installed features.

STEP 13. Configuring IBM AD Analyze Client

About this task

To configure **IBM AD Analyze Client**, follow the instructions below.

Eclipse startup is controlled by the options in $ECLIPSE_HOME/`eclipse.ini`. If $ECLIPSE_HOME is not defined, the default `eclipse.ini` in your Eclipse installation directory is used.

Procedure

1. **OS-Dependent Configuration**: In case **Analyze Client** is installed on Windows Server (any version) or Windows 8/10, you need to edit the `eclipse.ini` configuration file and add the following line, in the `-vmargs` section. Avoid blank lines in the `-vmargs` section.

```
-Dorg.osgi.framework.os.name=win32
```

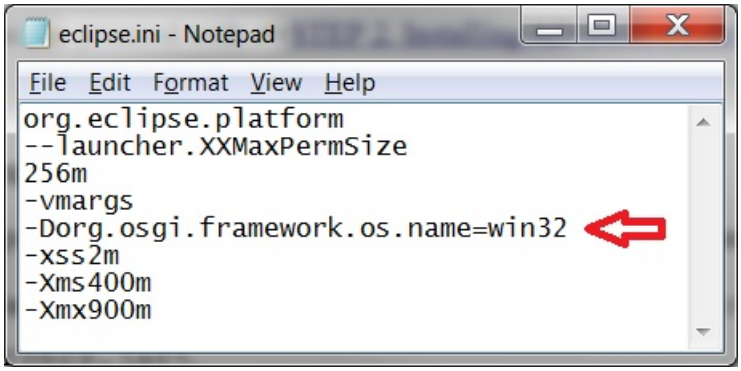


Figure 4. OS-Dependent Configuration

2. **Java-Dependent Configuration**: If an AD-supported IBM Java version is used as the system Java and you want to enable the TLS V1.2 connection, make sure to add the following lines in the `eclipse.ini` configuration file, in the `-vmargs` section. Avoid blank lines in the `-vmargs` section.

```
-Dcom.ibm.jsse2.overrideDefaultTLS=true
-Djsse.enableCBCProtection=false
```

3. **OrientDB SSL-Dependent Configuration**: If **OrientDB** is configured with **SSL** in the `orientdb-server-config.xml` file, make sure to add the following lines in the `eclipse.ini` configuration file, in the `-vmargs` section. Avoid blank lines in the `-vmargs` section.

```
-Dclient.ssl.enabled=true
-Djavax.net.ssl.keyStore=</path/to/orientdb.ks>
-Djavax.net.ssl.keyStorePassword=password
-Djavax.net.ssl.trustStore=</path/to/orientdb.ks>
-Djavax.net.ssl.trustStorePassword=password
```

Important:

Make sure that the `orientdb.ks` file is physically present on the machine where **IBM AD Analyze Client** is installed and configured, and that the correct path to `orientdb.ks` is added in the `eclipse.ini` configuration file.

4. **Memory Management Configuration**: Eclipse must be configured to allow for optimized memory consumption. To configure Eclipse, edit the `eclipse.ini` file under the Eclipse installation folder and set the minimum memory parameter (marked –Xms), the maximum memory parameter (marked –Xmx). Following is an example of an `eclipse.ini` file containing parameters for optimized memory consumption.

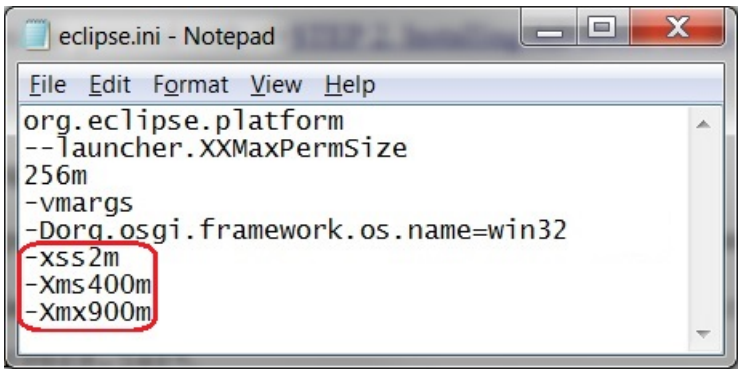


Figure 5. Memory Management Configuration

5. To use a specific language in the Eclipse interface, add the following parameter before the **`-startup`** parameter in the `eclipse.ini` file:

```
-nl
language
```

The **`-nl`** parameter has the following *language* values:

Language value	Language
de	German
es	Spanish
fr	French
it	Italian
ja	Japanese
ko	Korean
pt_BR	Brazilian Portuguese
zh	Simplified Chinese
zh_HK	Traditional Chinese, Hong Kong
zh_TW	Traditional Chinese, Taiwan

6. Go to **IBM AD Analyze Client** main window and select **Window** > **Preferences** > **Application Discovery** > **Environment settings**.

   The following Environment identification settings are available:

   - **Host**, enter the hostname or the IP address of the computer where **IBM AD Configuration Server** is installed.
   - **Port**, enter the communications port number for **IBM AD Configuration Server**. If you are using the default port, enter 2181.
   - **Unique id**, enter the unique ID assigned by **IBM AD Configuration Server** to the environment you want to work with.

     Attention: This ID must be identical to the environment ID declared in “ STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client ” on page 60, procedure step 2.

   - **Name**, enter the name of the environment with which you want to work, as defined in **IBM AD Configuration Server**.

     Attention: It is highly recommended that this name is identical to the one declared in “ STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client ” on page 60, procedure step 2.

7. Click **OK** and restart **IBM AD Analyze Client** (**File Menu** > **Restart**).
8. After restarting, a pop-up message displays the configurations that were made in **IBM AD Configuration Server**, and a restart is needed in order to be taken into account by **IBM AD Analyze Client**.

   Important: For monitoring the **IBM AD Analyze Client** tasks, see Chapter 7, “Log Files Location,” on page 153.
9. In order to see the **Mainframe Analysis** projects, go to . IBM AD Analyze User Guide, Explore Projects Tab chapter.

   Notice: At this point, all IBM AD components are up and running and ready for **Analysis**.

With Authentication

The authentication process is conducted through **DEX** or through any other **Authentication Server** that supports the **OAuth2** protocol. **Authentication Server (DEX)**, which is delivered through the **IBM ADDI** installer, is an identity service that uses **OpenID Connect** and it is used in the following configurations.

When you start **IBM AD Analyze Client**, you need to login by using login button that is present on the right bottom of the screen to observe the list of available projects. A browser page is opened into which the

user and password are filled in. The credentials reach the **Authentication Server (DEX)**, using the LDAP protocol, and it checks whether the credentials of the user are bounded to an account in **Secure Storage**. The **Secure Storage** can be an **Active Directory** or any other entity that stores users and groups and can communicate through LDAP. For more information, see the Authorization and Authentication section, in *IBM AD Analyze User Guide*.

Once authenticated, an authorization process is started to determine the list of available mainframe projects and whether the user can access all the source files that are used in the listed mainframe projects. Based on the configurations that are made, **File Service** maps the groups of users to a certain folder with the source files that can be on the same machine with **File Service** or not. Once you are authenticated and authorized, you can start the analysis on the available mainframe projects and on the source files.

STEP 1. Configuring IBM AD Configuration Server

About this task

The IBM AD Configuration Server component can run with the default settings. If the default settings are not compatible with your environment, you can configure the component and overwrite the default settings.

Procedure

1. Configure the settings in the `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/server.properties` file.
   a) Configure the port that AD Configuration Server listens on by setting the value of the **`server.port`** parameter.

      The default value is `2181`.

   b) Configure the number of the snapshots and the corresponding logs that are retained by AD Configuration Server. To configure the setting, set the value of the **`zookeeper.autopurge.snapRetainCount`** parameter.

      The default value is 4, and the minimum value is 3.

   c) Configure the time interval in hours for the purge task by setting the value of the **`zookeeper.autopurge.purgeInterval`** parameter.

      The purge task deletes old snapshots and the corresponding log files according to the time interval. The default value of the parameter is 24. To enable the purge task, you must set a value that is greater than `0`.
2. Configure the web server settings in the `<IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/webservice.log4j.properties` file.
   a) Configure the root logger level and the appenders by setting the **`log4j.rootLogger`** parameter with one of the following values:

      - `OFF`
      - `FATAL`
      - `ERROR`
      - `WARN`
      - `INFO`
      - `DEBUG`
      - `TRACE`
      - `ALL`

      The default log level is `INFO`. The default appenders are `file`, which indicates a rolling file appender, and `stdout`, which indicates a console appender.

Example

```
log4j.rootLogger=DEBUG
```

b) Configure the file roller appender log level by setting the **log4j.appender.file.threshold** parameter with one of the following values:

- OFF
- FATAL
- ERROR
- WARN
- INFO
- DEBUG
- TRACE
- ALL

Note: If you do not set the value of the **log4j.appender.file.threshold** parameter, the file roller appender log level is the same as the root logger level. To set the **log4j.appender.file.threshold** parameter, the value must be lower than or equal to the root logger level.

Example

```
log4j.appender.file.threshold=ERROR
```

c) Configure the file roller appender location by setting the value of the **log4j.appender.file.File** parameter.

Note: The value of the **log4j.appender.file.File** parameter must be a valid absolute or relative path.

Example

```
log4j.appender.file.File=/home/user/logs/webservice.log
```

d) Configure the file roller appender minimum number of backup files to keep by setting the value of the **log4j.appender.file.MaxBackupIndex** parameter.

Example

```
 log4j.appender.file.MaxBackupIndex=5
```

e) Configure the file roller appender maximum file size by setting the value of the **log4j.appender.file.MaxFileSize** parameter.

Example

```
log4j.appender.file.MaxFileSize=100M
```

3. Configure the web server settings in the <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/admin-ws.properties file.

The web server is attached to AD Configuration Server.

a) Configure the network interface that the web server listens on by setting the value of the **host** parameter.

The default value is localhost.

Note: To expose the web server, you must set the **host** parameter with one of the following values:

IP_address
One of the IP addresses that are attached to a network interface on the computer where AD Configuration Server is running.

0.0.0.0
Exposes the web server to all network interfaces.

b) Configure the port that the web server listens on by setting the value of the **port** parameter.

The default value is 8080.

Note: If the web server is exposed to the network, the communication on the specified port must be enabled by the firewall.

c) Configure the path to the configuration file of the logger by setting the value of the **log-conf-file** parameter.

The default value is <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/webservice.log4j.properties.

4. By default, the HTTP protocol is used to run the web service. To use the SSL/HTTPS protocol, follow the steps:

a) Generate a self-signed key pair and store it in a Java keystore by using the Java Keytool command-line interface. Run the following command:

Note: Java SDK or Java JRE must be installed, and the *JAVA_HOME* and *PATH* environment variables must be configured for the Java SDK or Java JRE.

```
keytool -genkeypair -keyalg RSA -alias {alias}
-ext SAN=DNS:localhost,IP:127.0.0.1 -dname {dname}
-validity {validity} -keysize 2048 -keypass {keypass}
-storepass {storepass} -keystore {keystore}
```

{alias}
The name that is used by the Java keystore to identify the generated key. The name must be unique within the Java keystore.

{dname}
The distinguished name from the X.500 standard. This name is associated with the alias for the key pair in the keystore. Also, the name is used as the value in the "issuer" and "subject" fields in the self-signed certificate.

{validity}
The number of days that the certificate that is attached to the key pair is valid.

{keypass}
The password that is needed to access the key pair within the keystore.

{storepass}
The password for the Java keystore.

{keystore}
The path to the keystore file, which is used to store the generated key pair. If the file does not exist, a keystore file is created.

Example

```
keytool -genkeypair -keyalg RSA -alias my-key-pair
-ext SAN=DNS:localhost,IP:127.0.0.1 -dname CN="IBM AD"
-validity 9999 -keysize 2048 -keypass my-key-password
-storepass my-store-password -keystore C:\my_keystore
```

b) Configure the web server that is attached to IBM AD Configuration Server to use the SSL/HTTPS protocol. In the <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/keystore-config.properties file, configure the following parameters:

path
Set the value to the path of the Java keystore that is generated in the preceding substep.

storepass
Set the value to the password for the Java keystore.

keypass
Set the value to the password that is needed to access the key pair within the keystore.

c) In the <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/conf/admin-ws.properties file, set the value of the **keystore-conf-file** parameter to the path of the keystore configuration file.

5. Start **IBM Application Discovery Configuration Admin Service** and **IBM Application Discovery Configuration Service**

   - **On Windows** the services start automatically after the installation of **IBM Application Discovery Configuration Service**. In case that they are not up and running follow these steps:

     a. Click **Start**, select **Run**, type **services.msc** and start **IBM Application Discovery Configuration Admin Service** and **IBM Application Discovery Configuration Service**.

     b. If the service does not start, check the server.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/ folder.

   - **On Linux**

     a. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/ and locate the startServer.sh and startWebServerUI.sh files.

     b. In case that the .sh files are not executable, open a terminal and run the following commands for flagging them as executable:

     ```
     chmod +x startServer.sh
     ```

     and

     ```
     chmod +x startWebServerUI.sh
     ```

     c. If the service does not start, check the server.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Configuration Service/ folder.

   Important: For monitoring the **IBM AD Configuration Server** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client

About this task

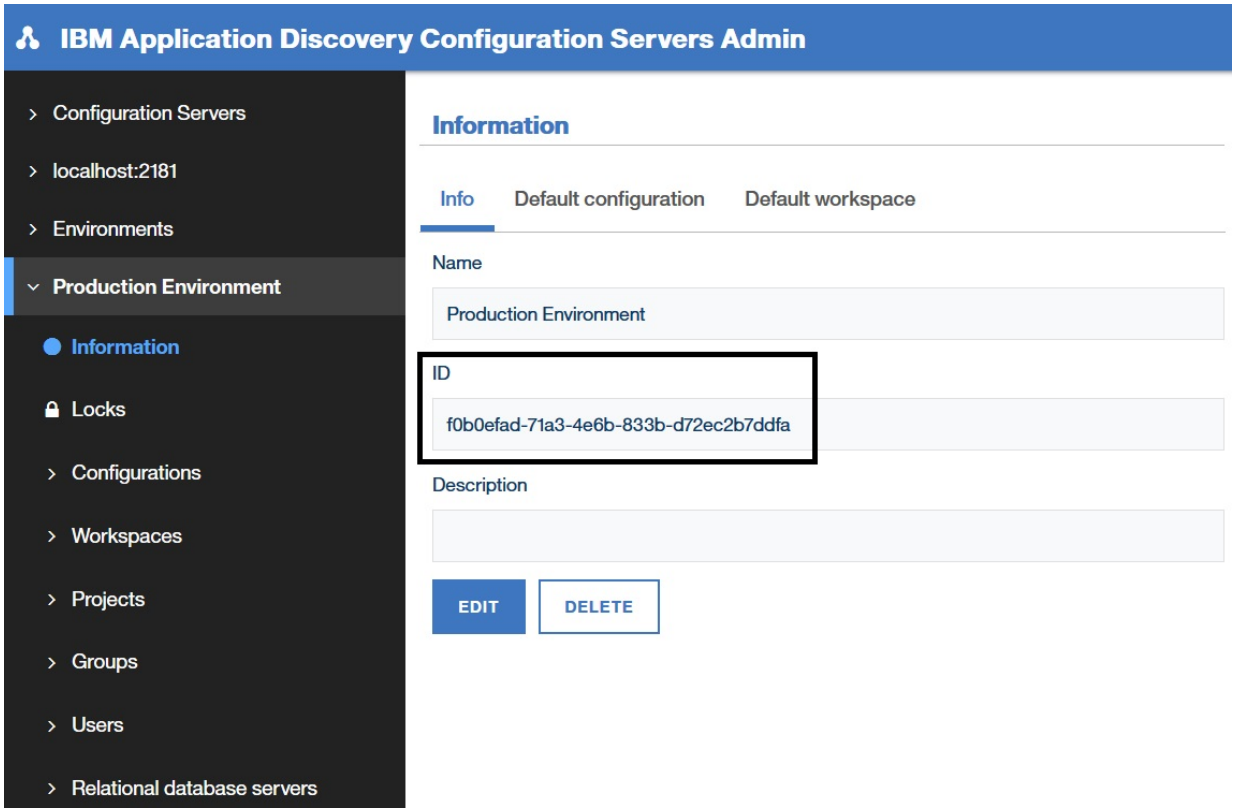
IBM AD Configuration Server ensures that the installation parameters are consistent throughout the different components of IBM AD by storing them in a central location, in a scalable, and fail-safe manner.

IBM AD Configuration Server additionally allows the system administrator to coordinate the access to the resources by creating workspaces and user groups.

Procedure

1. Start IBM AD Configuration Server, by selecting **Start** > **All Programs** > **IBM Application Discovery Configuration Service** > **Launch IBM Application Discovery Configuration Service Admin**.
2. Create an environment, on the **IBM AD Configuration Server** main page, by selecting the localhost server. From the available options, select **Environments** then click **Add Environment**. Enter a name and a description for the new environment then click **Save**. Select the newly defined environment. A **Default workspace** is automatically created for the new environment and is attached to it. Also, a **Default blank configuration** is automatically created and attached to the new environment.

   Note: The **environment ID** will be later used in configuring other components.



3. On the **IBM Application Discovery Configuration Servers Admin** page, click **localhost:2181 > Install Configurations > IBM Application Discovery Build Client**, and configure the following parameters.
   a) **`Default Project path`**: A default path where all **AD Build Client** projects are stored. Add the path so that it can be accessed by any **AD Build**, **Analyze Clients** and **AD Batch Server**. This default path can be changed while creating a Project in **AD Build Client**.
   b) **`zOS configuration folder`**: A default path where the z/OS Connections are stored. Add the path so that it can be accessed by any **AD Build Client** / **AD Build Configuration** Administration tool.
   c) **`Path for the retrieved members`**: A default path where all the members downloaded from a Mainframe system, are stored. Add the path so that it can be accessed by any **AD Build**, **Analyze Clients** and **AD Batch Server**.
4. To add a relational database server, in **IBM AD Configuration Server** main page, from the available servers, select the localhost server where you defined your environment. From the available options, select **Environments** > **your Environment** then click **Relational database servers**. Click **Add relational database server** and enter the following parameters:
   - **Name**: Enter a name for the relational database server.
   - **Host**: IP or name of the computer where the relational database server is installed.
   - **Port**: The relational database server port. The default port for SQL Server is 1433.
   - **Instance/Location**: The relational database server instance name (if exists).
   - **Username/Password**: User name and password for the **IBM AD SQL Identity** as defined in "Microsoft SQL Server Configurations" on page 10, or for the Db2 for z/OS instance.
5. At this point, you can create new projects in **AD Build Client**.

   Note: For more information on how to create new projects, please refer to *IBM AD Build User Guide*.

   Note: In order to activate your IBM AD Build Client copy, follow the procedure described in Chapter 9, "Activating Your IBM AD," on page 159.

   Important: For monitoring the **IBM AD Build Client** tasks, see Chapter 7, "Log Files Location," on page 153.

STEP 3. (Optional) Configuring IBM AD Web Services

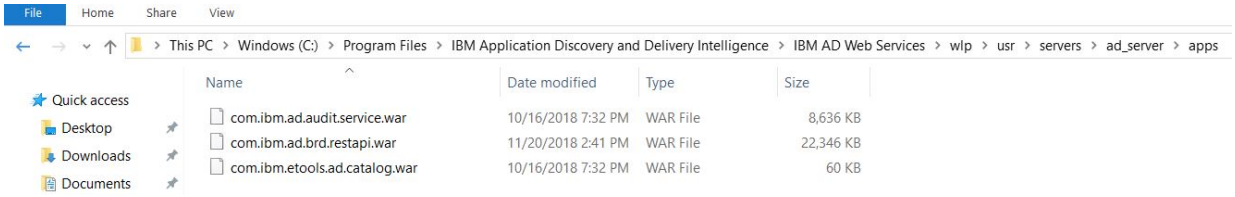
IBM AD Catalog

The **IBM AD Catalog** package is used to enable the impact analysis on the APIs published by a **z/OS Connect** server.

Configuring the Catalog Service

Procedure

1. Make sure IBM WAS Liberty Web Service is correctly installed. For more information about installing IBM WAS Liberty Web Server, visit "Installing WAS Liberty" on page 62.
2. From the `IBM AD Web Services` installation folder, copy file `com.ibm.etools.ad.catalog.war` to `\wlp\usr\servers\ad_server\apps`.



3. Open the `server.xml` file from `\wlp\usr\servers\ad_server`.
4. In the *<!-- Add the Catalog database connection details-->* area, enter the SQL database in the **databaseName** field.

```
databaseName="Catalog"
```

Note: The Catalog Service uses only a database created on a **SQL Server**.

5. In the same area, enter the IP of the server in the **serverName** field.

```
serverName=
```

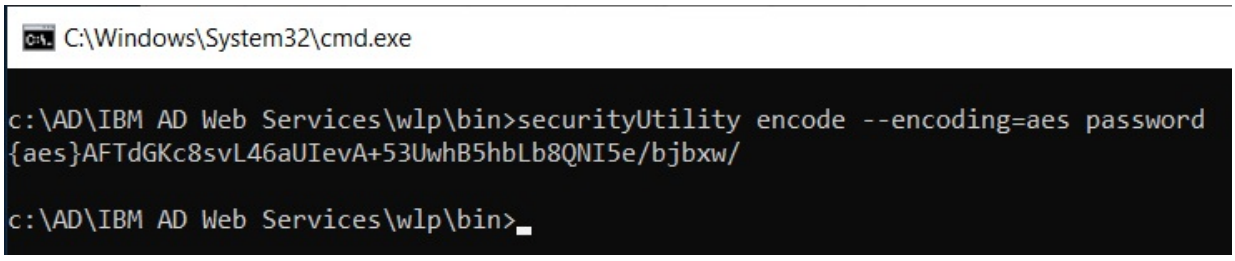
6. Enter the SQL port in the **portNumber** field (the default is 1433).

```
portNumber="1433"
```

7. Enter the user and password used to connect to the SQL database in the **user** and **password** fields.

```
<!-- Add the Catalog database connection details-->
<dataSource id="ADCatRDB" jndiName="jdbc/ad/catalog/relational" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource"/>
    <properties databaseName="catalog" serverName="127.0.0.1" portNumber="1433" user="sa" password="password"/>
</dataSource>
```

Important: The password used to content to the SQL database can be encrypted. The **securityUtility** command supports plain text encryption for Liberty.



The encrypted password needs to be added in the **password** field.

```
<!-- Add the Catalog database connection details -->
<dataSource id="ADCatRDB" jndiName="jdbc/ad/catalog/relational" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource" />
    <properties databaseName="catalog_db" serverName="127.0.0.1" portNumber="1433" user="sa" password="{aes}AC5GisUJCV5euhQeOaJBJnmfEjbfKeOxfdB4Epdsq961" />
</dataSource>
```

For more information, see the WebSphere Application Server Liberty base documentation.

Note: By default, the **Catalog Service** communicates through **port 9080**. However, you can change the port number by altering the **httpPort** field from the `server.xml` file.

```
<!-- To access this server from a remote client add a host attribute to the following element, e.g. host="*" -->
<httpEndpoint httpPort="9080" httpsPort="9443" id="defaultHttpEndpoint" host="*"/>
```

8. Once the configuration is done, make sure to start the IBM AD Web Services. For more information, see "Starting AD Web Services" on page 68.

   Note: The Catalog database will be automatically populated when **Data Collector** starts for the first time.

Configuring the Data Collector

About this task

Follow below steps to configure **Data Collector** that gathers the information related to the services exposed by the mainframe.

Procedure

1. Copy the files for **Data Collector** from `zoscDataCollector` to a new working directory.
2. Update the `DC.properties` file in this newly created working directory, by setting the following property values:

   Important: Please do not update other property values in the file, unless otherwise instructed by IBM Support.

   a. **ZoscURL**: Specify the protocol, the host name and the port for the **z/OS Connect** server as a URL.

      Note: You need to append `/zosConnect/apis` as the path part of the URL. An example value is *http://<zoscHost>:9081/zosConnect/apis*.

   b. **ZoscUser**: Specify the user name by which **Data Collector** connects to the **z/OS Connect** server. If user authentication is disabled on **z/OS Connect** server or **IBM AD Catalog**, you do not need to define this property value in the property file

   c. **ZoscPass**: Specify the password (in plain text) used by **Data Collector** to connect to the **z/OS Connect** server. If user authentication is disabled on **z/OS Connect** server or **IBM AD Catalog**, you do not need to define this property value in the property file

   d. **DataCollectorId**: Specify the **Data Collector** ID, for **AD** to identify an instance of **z/OS Connect** server.

      Note: For v5.0.4, the **DataCollectorId** string must be the same as the **ZoscURL** property value. Additionally, **DataCollectorId** must contain the *zosConnect/apis* string which can be either *zosConnect/apis* or the full URL of the *ZoscURL*.

   e. **ADCatalogURL**: Specify the protocol, the host name and the port used by the **AD Catalog**.

      Note: You need to append `com.ibm.etools.ad.catalog/cat/entity` to the URL path. An example value is *http://<catalogHost>:9080/com.ibm.etools.ad.catalog/cat/entity/*.

   f. **ADCatalogUser**: Specify the user name by which **Data Collector** connects to the **AD Catalog** If user authentication is disabled on **z/OS Connect** server or **IBM AD Catalog**, you do not need to define this property value in the property file.

   g. **ADCatalogPass**: Specify the password (in plain text) used by **Data Collector** to connect to the **IBM AD Catalog** If user authentication is disabled on **z/OS Connect** server or **AD Catalog**, you do not need to define this property value in the property file.

3. Check the PATH environment variable. You need to add the directory where `java.exe` resides in the *PATH environment* variable, in case it is missing.
4. Update `zoscdc.cmd`.

   Important: You need to specify the jar file of **JSON4J** that resides under `/WAS_Liberty_Library/lib/` with full path name, as a part of the *-classpath* argument. The file name of the jar file should look like `com.ibm.json4j_x.x.x.jar`.

Alternatively, you can specify the property values listed in **step 2** as the property values passed to the java command. For example, the **ZoscUser** property can be specified as an argument for **-DZoscUser=user1**.

How to Collect z/OS Connect API Information

About this task

Take the following steps to invoke **Data Collector** to collect **z/OS Connect** API information.

Procedure

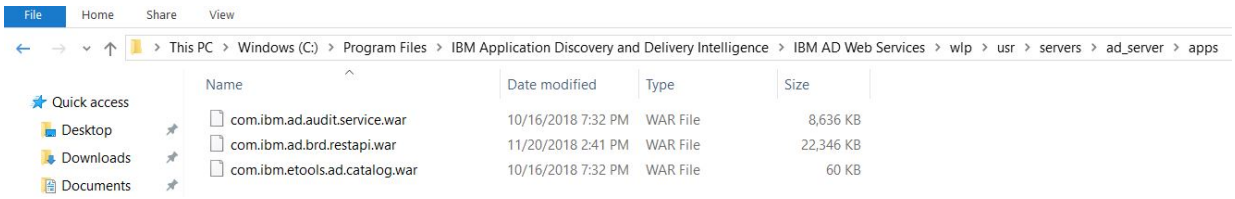
1. Open a windows command prompt and change the current directory to the /Data_Collector_Working_Directory/.
2. Run zoscdc.cmd.

IBM AD Audit

Configuring the Audit Service

Procedure

1. Make sure IBM WAS Liberty Web Service is correctly installed. For more information about installing IBM WAS Liberty Web Server, visit "Installing WAS Liberty" on page 62.
2. From the IBM AD Web Services installation folder, copy file com.ibm.ad.audit.service.war to \wlp\usr\servers\ad_server\apps.



3. Open the server.xml file from \wlp\usr\servers\ad_server.
4. In the *<!-- Add the Audit database connection details-->* area, enter the SQL database in the **databaseName** field.

```
databaseName="Audit"
```

Note: The Audit Service uses only a database created on a **SQL Server**.

5. In the same area, enter the IP of the server in the **serverName** field.

```
serverName=
```

Important: If the SQL Server has an instance name, the following parameter needs to be added after the serverName parameter.

```
instance="NameOfTheSQLServerInstance"
```

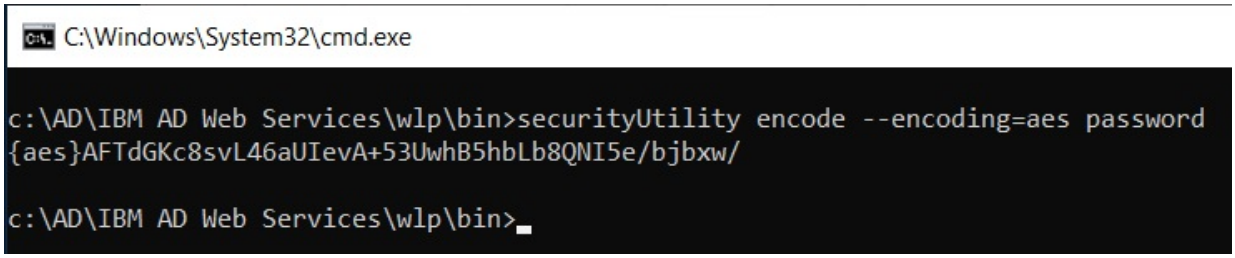
6. Enter the SQL port in the **portNumber** field (the default is 1433).

```
portNumber="1433"
```

7. Enter the user and password used to connect to the SQL database in the **user** and **password** fields.

```
<!-- Add the Audit database connection details-->
<dataSource id="DefaultDataSource" jndiName="jdbc/datasource" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource"/>
    <properties databaseName="audit" serverName="127.0.0.1" portNumber="1433" user="sa" password="password" ssl="request"/>
</dataSource>
```

Important: The password used to content to the SQL database can be encrypted. The **securityUtility** command supports plain text encryption for Liberty.



The encrypted password needs to be added in the **password** field.

```
<!-- Add the Audit database connection details -->
<dataSource id="DefaultDataSource" jndiName="jdbc/datasource" type="javax.sql.DataSource">
    <jdbcDriver libraryRef="JTDSLib" javax.sql.DataSource="net.sourceforge.jtds.jdbcx.JtdsDataSource" />
    <properties databaseName="audit_db" serverName="127.0.0.1" portNumber="1433" user="sa" password="{aes}AC5GisUJCV5euhQeOaJBJnmfEjbfKeOxfdB4Epdsq961" />
</dataSource>
```

For more information, see the WebSphere Application Server Liberty base documentation.

Note: By default, the **Audit Service** communicates through **port 9080**. However, you can change the port number by altering the **httpPort** field from the `server.xml` file.

```
<!-- To access this server from a remote client add a host attribute to the following element, e.g. host="*" -->
<httpEndpoint httpPort="9080" httpsPort="9443" id="defaultHttpEndpoint" host="*"/>
```

8. Once the configuration is done, make sure to start the IBM AD Web Services. For more information, see “Starting AD Web Services” on page 68.

   Note: The Audit database will be automatically populated when **IBM Application Discovery Web Service** starts.

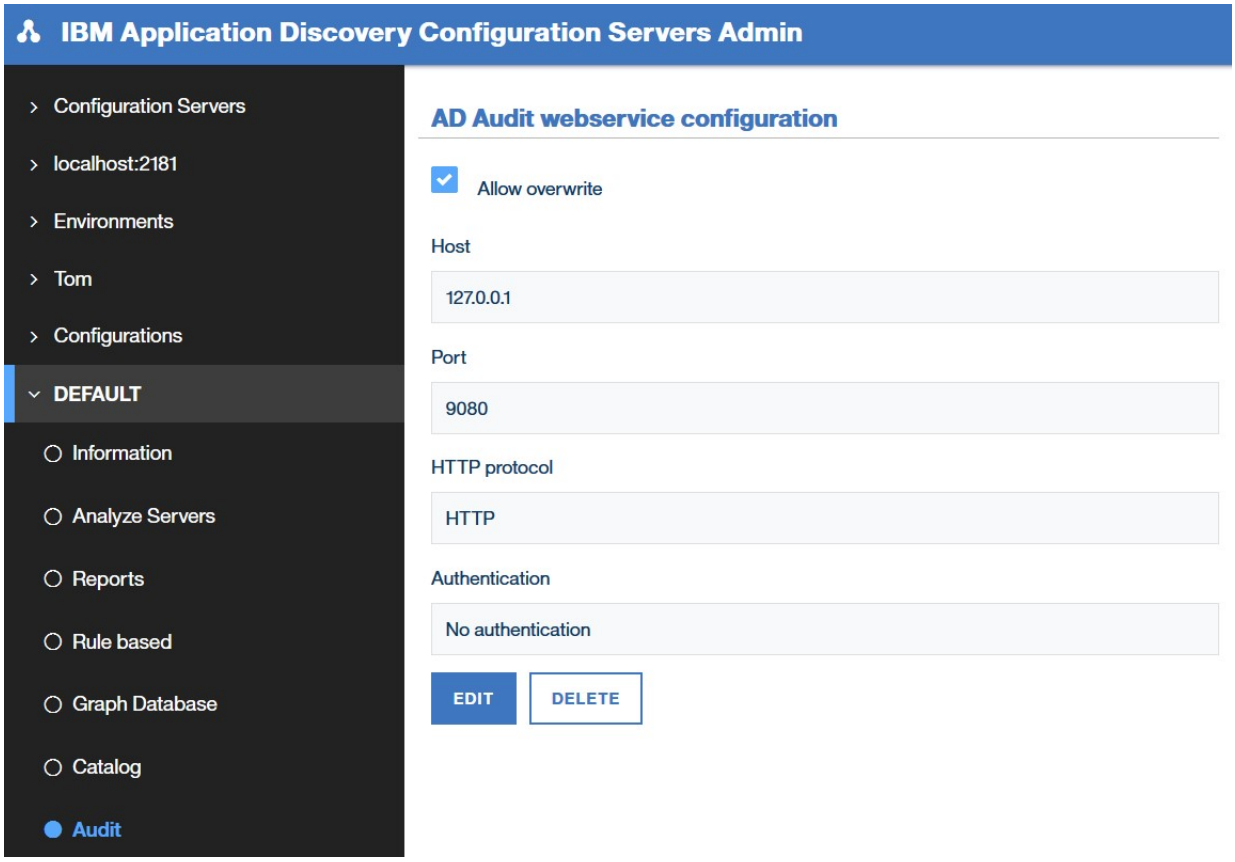
Configuring IBM AD Components to Use the Audit Service

About this task

IBM AD Build Client, **IBM AD Batch Server** and **IBM AD Analyze Client** can be configured to use the **Audit Service** by following these steps.

Procedure

1. Open the **IBM AD Configuration Server** application, and go to **Configurations** > **Audit page**.
2. Set the *hostname* and the *port* used to communicate with the **Audit Service**.



Note: The **Audit Service** for **IBM AD Batch Server** is set to be enabled by default. To stop using the **Audit Service**, set **`audit.enable=true`** to **`audit.enable=false`** in the `server.properties` file located in the `\conf` folder.

```
##Audit server
# default true
#audit.enable=true
```

Using the Audit Service Web GUI

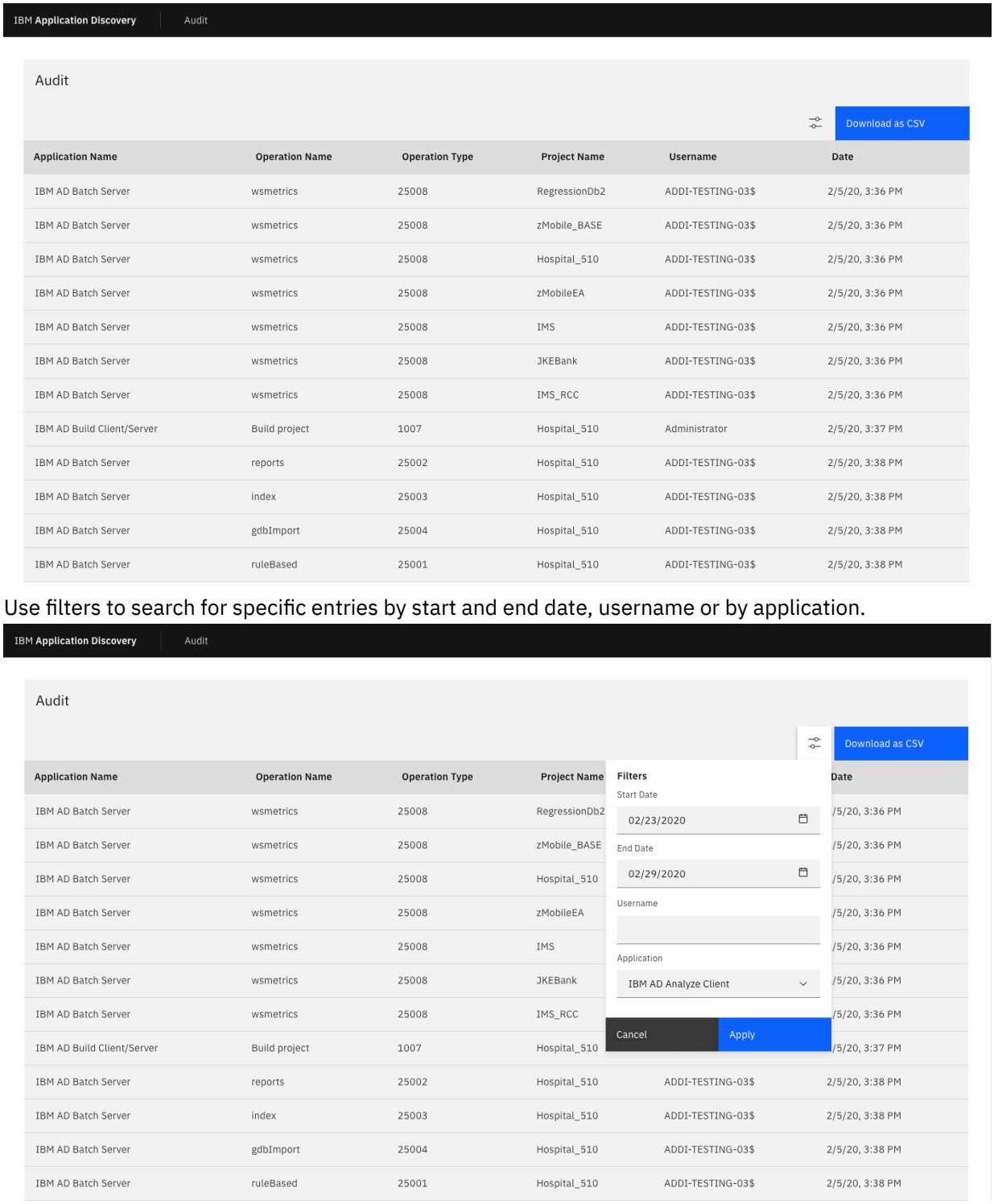
Procedure

1. Open a browser and access the following address: localhost:9080/ad-audit.

   Note:

   - Use the same port as the one configured in the **AD Web Service**.
   - The **Audit** page is available only after **Ad Server** is started. For more information, see “Starting AD Web Services” on page 68.

   As a result, the **Audit** page is displayed as in the following image.



2. Use filters to search for specific entries by start and end date, username or by application.

3. Alternatively, you can export the results by clicking **Download as CSV**.

```
Application Name, Operation Name, Operation Type, Project Name, Username, Date, IP, Instance Id
IBM AD Build Client/Server,Open Project,1000,SQL_Within,Username,03.03.2020 at 03:00:36,9.228.129.107,null
IBM AD Build Client/Server,Build project,1007,SQL_Within,Username,03.03.2020 at 03:11:05,9.228.129.107,null
IBM AD Build Client/Server,Build project,1007,SQL_Within,Username,03.03.2020 at 03:43:01,9.228.129.107,null
IBM AD Build Client/Server,Open Project,1000,Defect24633DBDFile,Username,03.03.2020 at 03:43:12,9.228.129.107,null
IBM AD Build Client/Server,Close project,1001,SQL_Within,Username,03.03.2020 at 03:43:15,9.228.129.107,null
IBM AD Batch Server,gdbImport,25004,Defect24633DBDFile,SYSTEM,03.03.2020 at 03:57:57,9.228.129.107,4ed6d264-441e-4f8d-bb9d-c8c7302e41fc
IBM AD Batch Server,index,25003,Defect24633DBDFile,SYSTEM,03.03.2020 at 03:57:57,9.228.129.107,4ed6d264-441e-4f8d-bb9d-c8c7302e41fc
IBM AD Batch Server,annUpdate,25005,Defect24633DBDFile,SYSTEM,03.03.2020 at 03:57:57,9.228.129.107,4ed6d264-441e-4f8d-bb9d-c8c7302e41fc
```

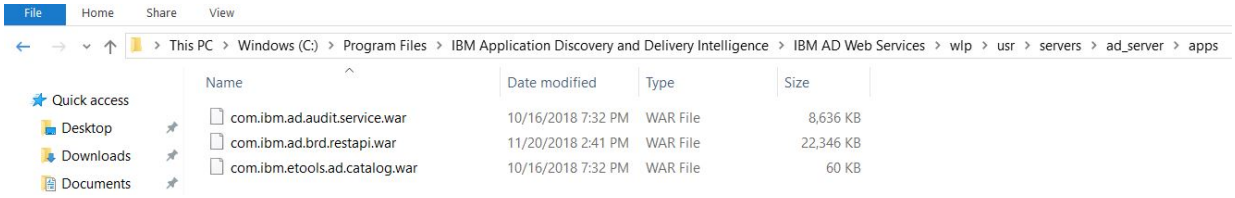
IBM AD BRD

IBM AD BRD allows IBM AD to save data that is used to define Business Rules within IBM Application Delivery Intelligence (ADI).

Configuring the BRD Service

Procedure

1. Make sure IBM WAS Liberty Web Service is correctly installed. For more information about installing IBM WAS Liberty Web Server, visit "Installing WAS Liberty" on page 62.
2. From the `IBM AD Web Services` installation folder, copy file `com.ibm.ad.brd.restapi.war` to `\wlp\usr\servers\ad_server\apps`.



3. From the `IBM AD Web Services` installation folder, copy folder `conf.brd-ws` to `\wlp\usr\servers\ad_server`.
4. Go to `\wlp\usr\servers\ad_server\conf.brd-ws` and in `application.properties` file, enter the desired values for the properties detailed below.
5. Fill in the username and the password defined for IBM AD BRD Service.
   - **`ad.user`**=<UserName>
   - **`ad.password`**=<Password>
6. Add the IP of the computer where the **IBM AD Configuration Server** host is installed.

```
## IBM AD Configuration Server host
ccs.server.host=
```

7. Add the port number to be used by **IBM AD Configuration Server**; the default port is 2181, if no other value is specified the default value will be used.

```
## IBM AD Configuration Server port
## default 2181
#ccs.server.port=
```

8. Add the ID of the Environment set in **IBM AD Configuration Server**.

```
## IBM AD Configuration Server environment
ccs.environment=
```

9. Once the configuration is done, make sure to start the IBM AD Web Services. For more information, see "Starting AD Web Services" on page 68.

Starting AD Web Services

About this task

Once the installation and configuration are done, you can start the IBM AD Catalog, IBM AD Audit and IBM AD BRD web services by following these steps.

Procedure

1. Go to `\wlp\bin` and execute the **`server.bat start ad_server`** command.

   Note: It takes roughly 30 seconds to 1 minute for the **Ad Server** to start.
2. Check the execution log file, accessible at `\wlp\usr\servers\ad_server\logs\console.log`.

STEP 4. (Optional) Configuring IBM AD Validation Service

About this task

IBM AD Validation Service component is specific only for ChangeMan ZMF users, therefore it is not part of the *must have* components installation.

IBM AD Validation Service is automatically installed during the **IBM AD Build** installation.

IBM AD Validation Service acts like a listener and is linked directly with **IBM AD Connect for Mainframe** component (Mainframe Agents).

After **IBM AD Validation Service** is installed, go to `<IBM AD Build Client installation folder>\Bin\Release\IBMApplicationDiscoveryValidationServer\SampleConf`.

Select all configuration files and copy them to `<IBM AD Build Client installation folder>\Bin\Release\IBMApplicationDiscoveryValidationServer.`

Next, perform the following configurations.

Procedure

1. Configure `ProjectsMapping.txt` to have a valid input. This is the configuration file for defining the mapping between the projects that are used to download mainframe members, applications, and subsystems.

   Note: Comparing with the `ProjectsMappingParallelBuild.txt` file, the projects that are specified in the `ProjectsMapping.txt` file do not need to contain the virtual folder that is specified in the `FoldersMapping.txt` file, as they are not used for builds. However, a z/OS connection must be attached and configured to the projects.

   Each line of the configuration file must have the following comma-separated values format:

   `<ProjectName>, <ApplicationName>, <Subsystem>`

   Note:

   - `<ProjectName>` represents the project that is defined in **IBM AD Build Client**.
   - `<ApplicationName>` and `<Subsystem>` are defined in **ChangeMan ZMF**.

   Example of the configuration file:

   ```
   Project1, App1, Subsys1
   ```

2. Configure `IncludesOrder.txt` to have a valid input. This is the configuration file for defining the ChangeMan Baseline Libraries Types and the order of COBOL Includes locations. This configuration file is used later on while you set up the path for the COBOL Include folders

   The configuration file must have the following comma-separated values format:

   `<Type1>, <Type2>,…, <Type`*`n`*`>`

   Example of the configuration file:

   ```
   CPY, INC, IND, CPA
   ```

   Note: It is EXTREMELY important to add the types in the order in which the include files must be looked after.

3. Configure `FoldersMapping.txt` to have a valid input. This is the configuration file for defining a mapping between a type of a mainframe member, that is defined in ChangeMan ZMF, and a virtual folder name of an **IBM AD** project. This configuration file is used during the synchronize phase of the validation process.

   Each line of the configuration file must have the following comma-separated values format:

   `<MemberType>, <VirtualFolderName>`

- <MemberType> is defined in **ChangeMan ZMF**.
- <VirtualFolderName> is defined in **IBM AD Build Client**.

Examples of the configuration file:

```
COB, zOS Cobol
```

```
ASM, Assembler
```

4. Configure ServicePort.txt to have a valid input. This is the configuration file for defining the Service's port.

   The configuration file must have the following format:

   <Port Number>

   Any available port can be used, for example:

   ```
   48000
   ```

5. Enable or disable sending feedback to the mainframe by configuring the LoopbackResults.txt file with one the following values:

   Y
   Enables sending feedback to the mainframe according to the weight of rules.

   N
   Disables sending feedback to the mainframe.

6. Set parallel validation parameters for the maximum-allowed values by configuring the ParallelValidationParameters.txt.

   The configuration file must have the following comma-separated values format:

   <Number_of_validations_in_parallel>,<Number_of_components_per_validation>

   Note:

   - Do not set the number of validations in parallel greater than the number of CPU cores. Otherwise, the validation process might be unstable.
   - Do not set the number of components per validation greater than 20. Otherwise, the performance might be negatively affected.

   Examples of the configuration file:

   ```
   4,10
   ```

   Allows a maximum of four validation instances in parallel, and a maximum of 10 stages or members that are allocated for each instance. You can set these values for a computer with 4 CPU cores.

   ```
   8,15
   ```

   Allows a maximum of eight validation instances in parallel, and a maximum of 15 members that are allocated for each instance. You can set these values for a computer with 8 CPU cores.

7. Configure the mapping between the projects that are used to compile the members to be validated in parallel, applications, and subsystems. Set the mapping values in the ProjectsMappingParallelBuild.txt file.

   Each line of the configuration file must have the following comma-separated values format:

   <ProjectName>, <ApplicationName>, <Subsystem>

   Note:

   - <ProjectName> represents the project that is defined in **IBM AD Build Client**.
   - <ApplicationName> and <Subsystem> are defined in **ChangeMan ZMF**.

- The number of the projects that are mapped to one pair of an application and a subsystem must be greater than or equal to the maximum number of validations in parallel, which is specified in the `ParallelValidationParameters.txt` file. Otherwise, the service cannot start.
- Comparing with the `ProjectsMapping.txt` file, the projects that are specified in the `ProjectsMappingParallelBuild.txt` file do not need to have a z/OS connection that is attached and configured, as they are used only for builds. However, the projects must contain the virtual folder that is specified in the `FoldersMapping.txt` file.

The following example shows the mapping configurations for eight validations in parallel:

```
Project1, App1, Subsys1
Project2, App1, Subsys1
Project3, App1, Subsys1
Project4, App1, Subsys1
Project5, App1, Subsys1
Project6, App1, Subsys1
Project7, App1, Subsys1
Project8, App1, Subsys1
Project9, App2, Subsys1
Project10, App2, Subsys1
Project11, App2, Subsys1
Project12, App2, Subsys1
Project13, App2, Subsys1
Project14, App2, Subsys1
Project15, App2, Subsys1
Project16, App2, Subsys1
```

8. Configure the completion code for messages by configuring the `CompletionCodeVsMessage.txt` file.

   Each line of the configuration file must have the following pipe-delimited format:

   `<CompletionCode>|<DescriptiveMessage>`

   Note: The descriptive message must have a maximum length of 23 **characters**.

   Example of the configuration file:

   ```
   0|Validation Success
   4|Validation Warning
   8|Validation Failed
   ```

   Each of the numbers in the example reflects the weight of the rule that is specified in the `ruleBased.properties` file.
9. Configure the approval request parameters in the `ApprovalRequestParameters.txt` file.

   Each line of the configuration file must have the following comma-separated values format:

   `<ProjectName>,<ProcLibrary>`

   Note:

   - `<ProjectName>` represents the project that is defined in **IBM AD Build Client**.
   - `<ProcLibrary>` is a PDS/E library that is defined in **ChangeMan ZMF**.
   - `<ProcLibrary>` must have a maximum length of 23 **characters**.

   Example of the configuration file:

   ```
   Project1,PJ.PROCLIB.S814
   ```

What to do next

1. Go to `<IBM AD Build Client installation folder\Bin\Release \IBMApplicationDiscoveryValidationServer\ReportsGenerator\sample-conf` folder. This `sample-conf` folder contains the templates for all the configuration files needed to customize the functioning of **ReportsGenerator**. To configure **ReportsGenerator**, copy the templates from the `sample-conf` folder, and place them in the `conf` folder.

Once this step is completed and before you start **IBM AD Validation Service**, some preliminary configurations are required. You need to specify on which projects you want **ReportsGenerator** to run the reports, which reports to generate, where to store the generated reports etc. The configuration parameters are stored in `server.properties`, `project.properties`, `ruleBased.properties` and `ruleBasedConfig.properties` files.

For more information, see the following sections from *IBM AD Batch Server Configuration Guide*, that contain a detailed description of the parameters available in these four files:

- Server Properties File
- Global Settings File
- ruleBased.properties File
- ruleBasedConfig.properties File

Note: ReportsGenerator is invoked by Validation Server after the Build process.

2. Start **IBM AD Validation Service**: Click **Start** and then select **All Programs** > **IBM Application Discovery Build Client** > **Start IBM Application Discovery Validation Service**.

   The service can also be started from Windows Services (`services.msc`) by locating `IBMApplicationDiscoveryValidationServer` and pressing **Start**.

   Important: For monitoring the **Validation Service** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 5. Configuring Authentication Server (DEX)

The current implementation of the **Authentication and Authorization** feature, is based on **OAuth2** authorization framework, and needs to have available an **Authentication Server (DEX)**. The next configurations are made in the context of using the **Authentication Server (DEX)**, which is provided in the IBM ADDI installer.

Note: These configurations are only made if the authentication of the users, who have access to the resources, is used.

The provided **Authentication Server** is based on DEX and provides an authentication solution, which connects through LDAP to **Secure Storage**. For more information about DEX, see https://github.com/dexidp/dex/blob/master/Documentation/connectors/ldap.md.

Note: DEX can be replaced by any other **Authentication Server** that supports the **OAuth2** protocol.

Follow the configuration steps that are needed to have up and running **Authentication Server (DEX)**:

1. Configure the parameters that are present in the `dex.yaml` file
2. Start Authentication Server (DEX)
3. Make Authentication Server (DEX) available in IBM AD Configuration Server
4. Configure OAuth2 Client in IBM AD Configuration Server

1. Configure the parameters that are present in the `dex.yaml` file

On the machine where **Authentication Server** is installed, go to `<IBM ADDI Installation Folder>/Authentication Server (DEX)/sample-conf/` and copy the `dex.yaml` file to `<IBM ADDI Installation Folder>/Authentication Server (DEX)/conf/`. Open the `dex.yaml` file by using a text editor and enter the desired values for the properties that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Set the **issuer** parameter as follows.

a. If the communication to and from **DEX** is done through **https**, the **issuer** parameter has the following format:

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   https://<machine name where DEX is installed>.<machine domain>:<port>/dex
   ```

   Example:

   ```
   issuer: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

b. If the communication to and from **DEX** is done through **http**, the **issuer** parameter has the following format:

   ```
   http://<machine name where DEX is installed>.<machine domain>:<port>/dex
   ```

   Example:

   ```
   issuer: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

2. The next section can be configured as follows:

   a. If the communication to and from **DEX** is done through **https**, generate the TLS certificates for **Authentication Server (DEX)** and add the paths for the `certificate(.crt)` and the `key(.key)` files in the TLSCert and TLSKey fields. The default port is 7600.

   ```
   storage:
     type: sqlite3
     config:
       file: dex.db
   frontend:
     theme: addi
   web:
     https: 0.0.0.0:7600
     TLSCert: C:\certs\dex.crt
     TLSKey: C:\certs\dex.key
   ```

   b. If the communication to and from **DEX** is done through **http**, comment the TLSCert and TLSKey fields.

   ```
   storage:
     type: sqlite3
     config:
       file: dex.db
   frontend:
     theme: addi
   web:
     http: 0.0.0.0:7600
     #TLSCert:
     #TLSKey:
   ```

3. The **skipApprovalScreen** parameter can be set to *true* or *false*. The *true* value offers the possibility to skip the **"Grant access screen"** after the user logs in.

   ```
   oauth2:
     skipApprovalScreen: true
   ```

4. The **connectors** section can be configured as follows:

   a. Set the **host** parameter, including the default port 389 or 636.

   The **host** parameter has the following format:

   ```
   host: << IP:PORT >>
   ```

   Example:

```
config:
    host: WIN-NSSMI7A1KJQ.ferdinand2.com:636
```

b. The **InsecureNoSSL** parameter can be set as follows:

- If the **host** parameter was set using the default port 389, set the **InsecureNoSSL** to *true*.

```
insecureNoSSL: true
```

- If the **host** parameter was set using the default port 636, set the **InsecureNoSSL** to *false*.

```
insecureNoSSL: false
```

c. Set the **bindDN** parameter by adding the account that has the rights for the LDAP bind action.

Note: To add the account that has rights for LDAP bind action run `adsiedit.msc` on the Active Directory machine and load the current domain. Right click on *CN=Users* and *CN=Administrator*, select *Properties* and search for *distinguishedName* attribute. For more information, see ADSI Edit (adsiedit.msc).

```
# This would normally be a read-only user.
    bindDN: CN=Administrator,CN=Users,DC=ferdinand2,DC=com
```

d. Set the **bindPW** parameter by adding the account's password that has the rights for the LDAP bind action.

```
bindPW: password
```

e. Do not modify the value of the **usernamePrompt** parameter.

```
usernamePrompt: email address
```

5. Under the **userSearch** section, only modify the value of the **baseDN** parameter:

Note: The **baseDN** parameter contains the base location of all **User Accounts**.

```
userSearch:
      baseDN: dc=ferdinand2,dc=com
      filter: "(objectClass=person)"
      username: userPrincipalName
      # "DN" (case sensitive) is a special attribute name. It indicates that
      # this value should be taken from the entity's DN not an attribute on
      # the entity.
      idAttr: DN
      emailAttr: userPrincipalName
      nameAttr: cn
```

6. Under the **groupSearch** section, only modify the value of the **baseDN** parameter:

Note: The **baseDN** parameter contains the base distinguished name of the groups in LDAP registry.

```
groupSearch:
      baseDN: cn=Users,dc=alpaca,dc=com
      filter: "(objectClass=group)"

      # A user is a member of a group when their DN matches
      # the value of a "member" attribute on the group entity.
      userAttr: DN
      groupAttr: member

      # The group name should be the "cn" value.
      nameAttr: cn
```

7. The **StaticClients** section, can be configured as follows:

```
staticClients:
- id: analyze-client
  redirectURIs:
  - 'http://127.0.0.1:9999/callback'
  name: 'AD Client'
  secret: 38fcbc1a-3a65-11e9-b210-d663bd873d93
```

Where:

- **id** is the generic name that is given for the **IBM AD Analyze Client**.
- **redirectURLs** takes as value the **localhost IP** and a generic **port** that is used for callback to **Authentication Server (DEX)**.
- **name** takes as value **'AD Client'**.
- **secret** is a secret that is shared among application.

Configuration Examples:

- When the communication to and from **DEX** is done through **https** the `dex.yaml` file is configured as follows:

```
issuer: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
storage:
  type: sqlite3
  config:
    file: dex.db

frontend:
  theme: addi

web:
  https: 0.0.0.0:7600
  TLSCert: C:\certs\dex.crt
  TLSKey: C:\certs\dex.key

oauth2:
  skipApprovalScreen: true

connectors:
- type: ldap
  name: ADLDAP
  id: ldap
  config:
    host: WIN-NSSMI7A1KJQ.ferdinand2.com:636


    # No TLS for this setup.
    insecureNoSSL: false

    # This would normally be a read-only user.
    bindDN: CN=Administrator,CN=Users,DC=ferdinand2,DC=com
    bindPW: Admin15_

    usernamePrompt: email address

    userSearch:
      baseDN: dc=ferdinand2,dc=com
      filter: "(objectClass=person)"
      username: userPrincipalName
      # "DN" (case sensitive) is a special attribute name. It indicates that
      # this value should be taken from the entity's DN not an attribute on
      # the entity.
      idAttr: DN
      emailAttr: userPrincipalName
      nameAttr: cn

    groupSearch:
      baseDN: dc=ferdinand2,dc=com
      filter: "(objectClass=group)"
      # A user is a member of a group when their DN matches
      # the value of a "member" attribute on the group entity.
      userAttr: DN
      groupAttr: member

      # The group name should be the "cn" value.
      nameAttr: cn

staticClients:
- id: analyze-client
  redirectURIs:
  - 'http://127.0.0.1:9999/callback'
  name: 'AD Client'
  secret: 38fcbc1a-3a65-11e9-b210-d663bd873d93
```

- When the communication to and from **DEX** is done through **http** the `dex.yaml` file is configured as follows:

```
issuer: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
storage:
  type: sqlite3
  config:
    file: dex.db

frontend:
  theme: addi

web:
  http: 0.0.0.0:7600
  #TLSCert:
  #TLSKey:

oauth2:
  skipApprovalScreen: true

connectors:
- type: ldap
  name: ADLDAP
  id: ldap
  config:
    host: WIN-NSSMI7A1KJQ.ferdinand2.com:389


    # No TLS for this setup.
    insecureNoSSL: true

    # This would normally be a read-only user.
    bindDN: CN=Administrator,CN=Users,DC=ferdinand2,DC=com
    bindPW: Admin15_

    usernamePrompt: email address

    userSearch:
      baseDN: dc=ferdinand2,dc=com
      filter: "(objectClass=person)"
      username: userPrincipalName
      # "DN" (case sensitive) is a special attribute name. It indicates that
      # this value should be taken from the entity's DN not an attribute on
      # the entity.
      idAttr: DN
      emailAttr: userPrincipalName
      nameAttr: cn

    groupSearch:
      baseDN: dc=ferdinand2,dc=com
      filter: "(objectClass=group)"
      # A user is a member of a group when their DN matches
      # the value of a "member" attribute on the group entity.
      userAttr: DN
      groupAttr: member

      # The group name should be the "cn" value.
      nameAttr: cn

staticClients:
- id: analyze-client
  redirectURIs:
  - 'http://127.0.0.1:9999/callback'
  name: 'AD Client'
  secret: 38fcbc1a-3a65-11e9-b210-d663bd873d93
```

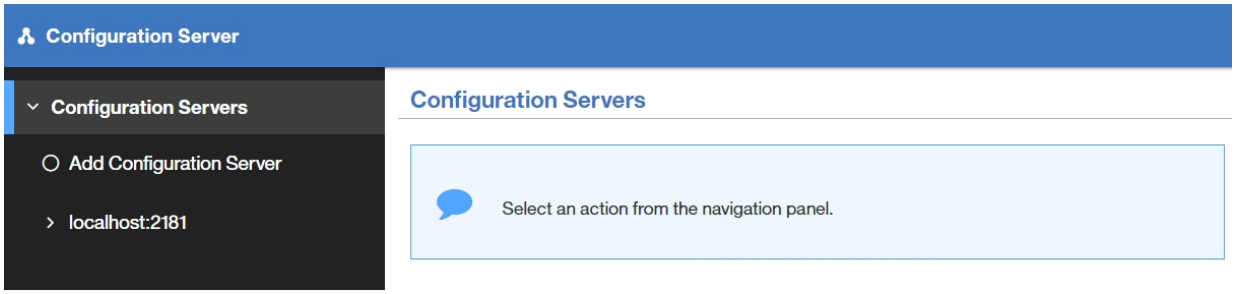
2. Start Authentication Server (DEX)

1. Click **Start**, select **Run**, type **`services.msc`** and start **Authentication Server (DEX)**.
2. If the service does not start, check the `dex.log` file under `<IBM ADDI Installation Folder>/Authentication Server/` folder.

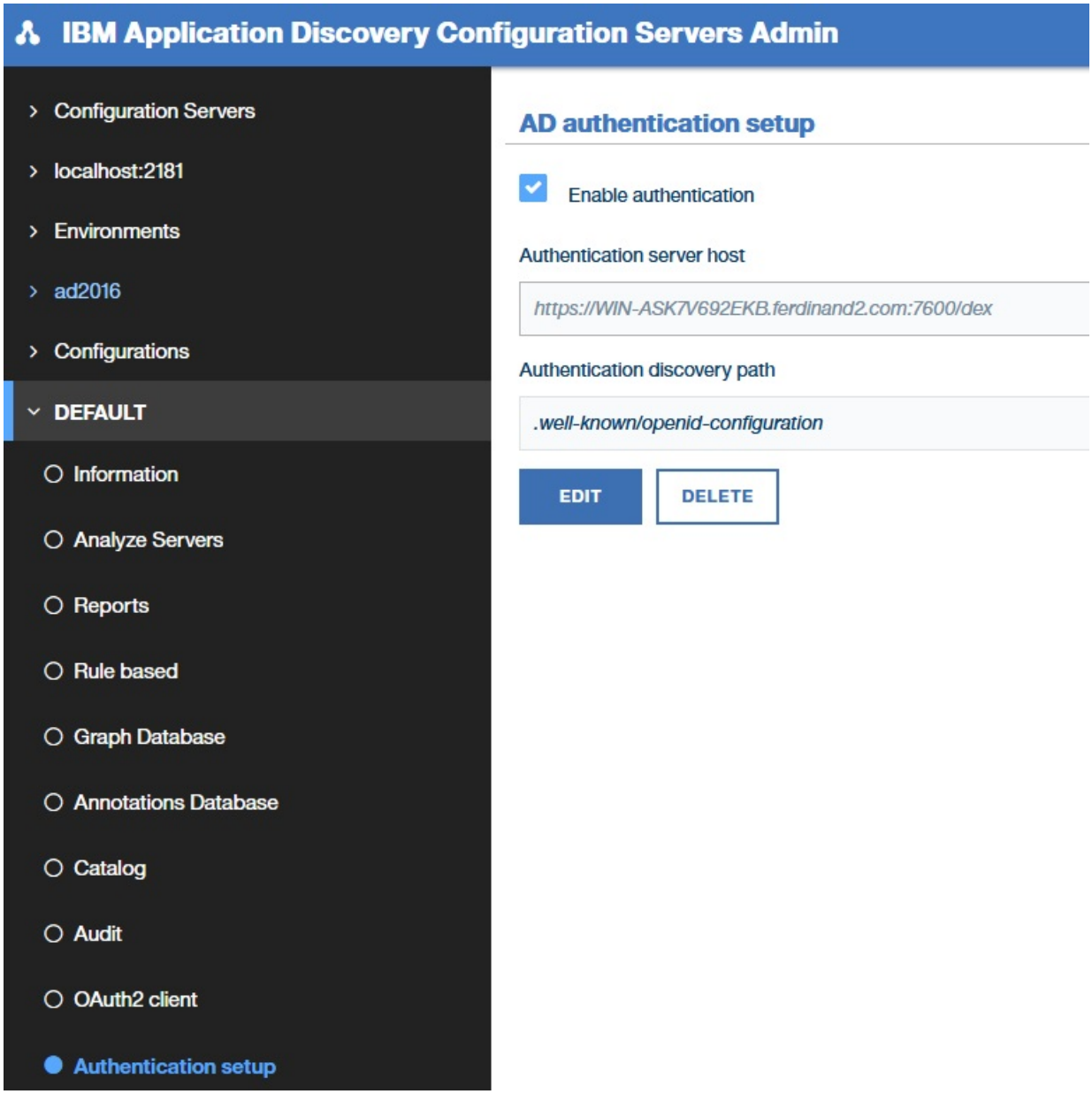
3. Make Authentication Server (DEX) available in IBM AD Configuration Server

After **Authentication Server (DEX)** is up and running, go to **IBM AD Configuration Server** and make **Authentication Server (DEX)** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Configurations**.
4. The **Configurations** page is displayed. Select the **DEFAULT** configuration.
5. The parameters that can be defined for the selected configuration are displayed in the list to the left of the page. Select **Authentication Setup**.
6. The **"AD authentication setup"** page is displayed as in the following image.



Enable authentication option is selected when **Authentication Server (DEX)** is used.

Click **Edit** and enter the following information:

- **Authentication server host**: Expects the authentication server host that is used by **Authentication Server (DEX)**.
- **Authentication discovery path**: Expects the authentication discovery path that is used by **Authentication Server (DEX)**.

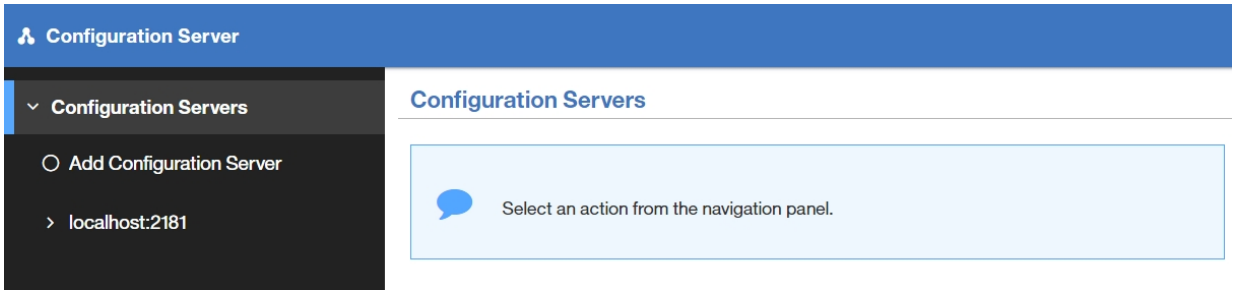
7. Click **Save** to save the parameters.

4. Configure OAuth2 Client in IBM AD Configuration Server

Configure **OAuth2 Client** in **IBM AD Configuration Server** as follows:

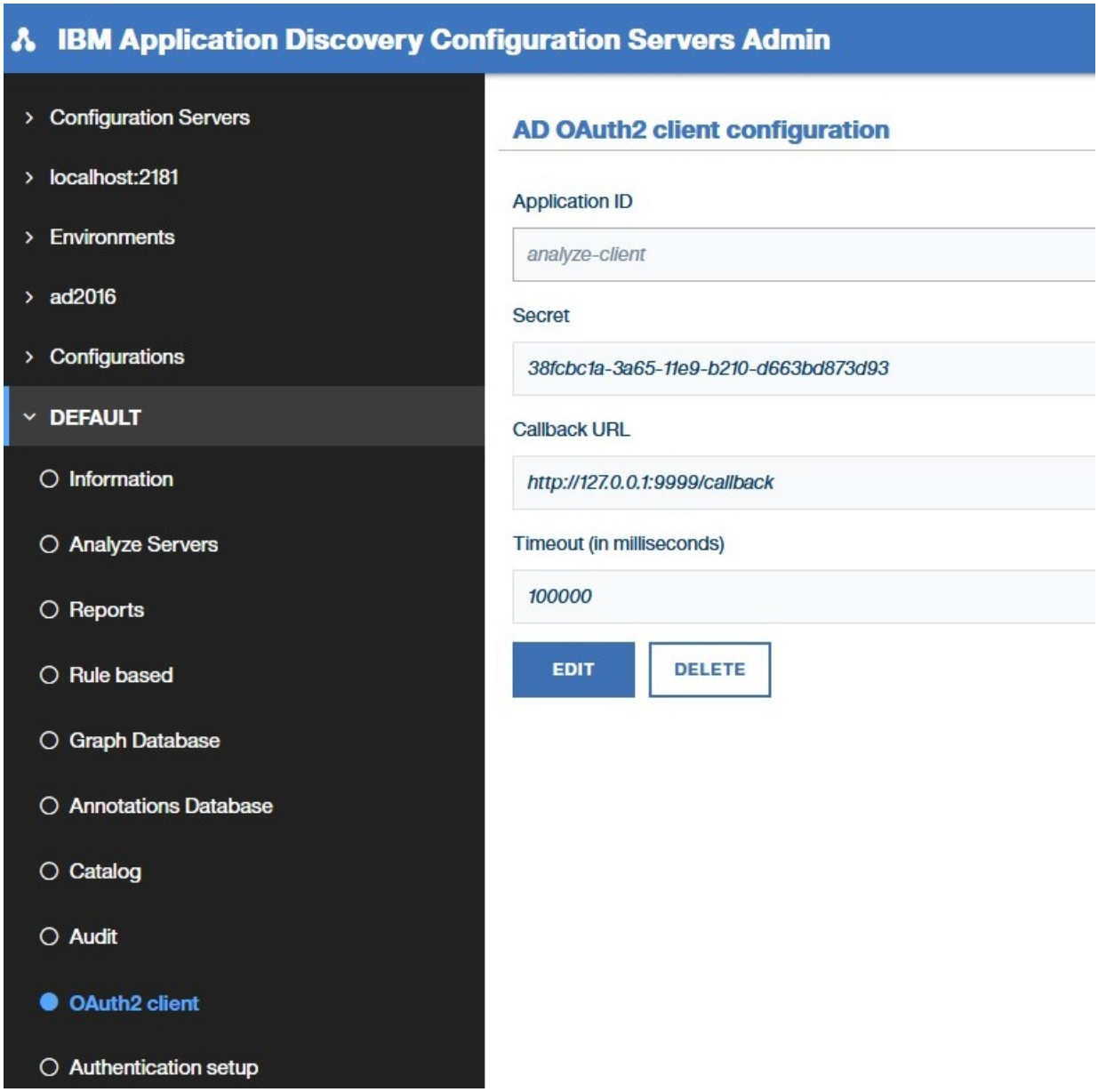
Note: If **Authentication Server (DEX)** is not used, make sure that your authentication server supports **Oauth2**. The following configuration is done assuming that **Authentication Server (DEX)** is used.

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Configurations**.
4. The **Configurations** page is displayed. Select the **DEFAULT** configuration.
5. The parameters that can be defined for the selected configuration are displayed in the list to the left of the page. Select **OAuth2 Client**.
6. The **"AD OAuth2 client configuration"** page is displayed as in the following image.

   Note: In the configuration example, the parameters are set according to the configurations made in **Authentication Server (DEX)** (step where StaticClients is set).



Click **Edit** and enter the following information:

- **Application ID**: Expects the generic name that is given for **IBM AD Analyze Client**.
- **Secret**: Expects a secret that is shared between **Authentication Server (DEX)** and **IBM AD Analyze Client**.
- **Callback URL**: Expects a URL composed by localhost IP and a generic port that is used for callback to **Authentication Server (DEX)**.
- **Timeout (in milliseconds)**: Expects the time for the client to respond.

7. Click **Save** to save the parameters.

STEP 6. Configuring IBM AD File Service

Follow the configuration steps that are needed to have up and running **IBM AD File Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD File Service
3. Make IBM AD File Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD File Service** is installed, go to <IBM ADDI Installation Folder>/IBM Application Discovery File Service/sample-conf/ and copy the `conf.yaml` file to <IBM ADDI Installation Folder>/IBM Application Discovery File Service/conf/. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD File Service** listens to. The default value is 7700.

   ```
   #port to listen to
   port: 7700
   ```

2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

   ```
   #if true, tls information (key, cert) must be specified
   https: false
   ```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   #if true, tls information (key, cert) must be specified
   https: true
   ```

3. If the **https** parameter is set to *true* and the TLS certificate for **IBM AD File Service** are generated, enter the paths of the `certificate(.crt)` and the `key(.key)` files. If the **`https`** parameter is set to *false* leave blank the following lines. Example:

   ```
   #mandatory if https: true
   tls:
       key: C:\certs\file.service.key
       cert: C:\certs\file.service.crt
   ```

4. Set the **authSrv** parameter as follows:

   a. If the value of the **https** parameter is set to *true*, add the URL of **Authentication Server (DEX)** where **authSrv** parameter is present. **Authentication Sever (DEX)** that belongs to the **IBM AD** package is used. For more information, see “STEP 5. Configuring Authentication Server (DEX)” on page 115. Example:

   ```
   #authentication server URL
   authSrv: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

   b. If the value of the **https** parameter is set to *false* and the **Authorization and Authentication** feature is *enabled*, add the URL of **Authentication Server (DEX)**. Example:

   ```
   #authentication server URL
   authSrv: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

5. In the **mapping** section, configure the **remote** parameter as follows:

   - Add the **Default project path** where all **AD Build Client** projects are stored. For more information see, Step 3.a from “ STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client ” on page 60.

- Add the **Path for the retrieved members** where all the members downloaded from a Mainframe system are stored. For more information, see Step 3.c from " STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client " on page 60.

Note:

- In case you have multiple physical folders that resides resources or projects, an entry for each folder needs to be added in the **mapping** section.
- In order to see **Flow Chart** analysis in **IBM AD Analyze Client** for a specific project, you need to add the path of the project folder or the path of the folder that contains all projects.

  Examples:

  – `remote: \\9.20.128.222\Projects` - path to all projects.
  – `remote: \\9.20.128.222\ADProject` - path to a specific project.

```
#mapping specifies path query prefixes to local paths as a list
#of entries with the following keys:
#   remote: a remote path that can be used to query this service
#           for example a UNC path or a local path where the resources/projects resides.
#   local:  local path that mirrors the remote path. If missing, it is
#           identical to remote.
#   groups: a list of group names that are allowed in all subfolders
#           of the local path. Since paths are matched by remote
#           the most specific remote will be used to obtain the groups
#           If groups are not specified, all authorized users have access.
Examples for the mapping section:
Example 1
mapping:
   -  remote: \\9.20.128.222\Resources
      local: C:\Resources
      groups:

  -   remote: \\9.20.128.222\Resources2
      local: C:\Resources2
      groups:

  -   remote: \\9.20.128.222\ADProject
      local: C:\ADProject
      groups:


Example 2
mapping:
   -  remote: C:\Resources
      local: C:\Resources
      groups:

  -   remote: C:\Resources2
      local: C:\Resources2
      groups:

  -   remote: C:\Projects
      local: C:\Projects
      groups:
```

6. The **caseSensitive** parameter can be set to *true* or *false*. Through this parameter, you set the mapping type (case-sensitive) of the folders under which the resources are located.

```
caseSensitive: false
```

7. Set the **disableAuth** parameter to *false*. The *false* value keeps enabled the authentication.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: false
```

8. The default value of the **matchUsers** parameter is *false*, which means that the matching is made by **group names**. If you want to authorize users and not groups, set the **matchUsers** to true and define users in **IBM AD Configuration Server**. For more information, see Adding a User

```
matchUsers: false
```

Note: It is not recommended to import the list of users in **IBM AD Configuration Server** because it may be time consuming to keep the list synchronized with the one from **Secure Storage**.

9. Configure the **groups** section as follows:

```
groups:

  - type: ccs
    #addrs - (mandatory) a list of servers that serve as CCS endpoints
    addrs: [127.0.0.1]
    #env (mandatory) the environment in CCS server
    env: a8155844-be04-4193-a389-32993beccb0f
```

Where:

- **Type** is **ccs**.
- **Addrs** is the IP address of the machine where **IBM AD Configuration Server** is installed.
- **Env** is the environment ID defined in **IBM AD Configuration Server**.

Note: When configuring **IBM AD File Service** you need to add in **IBM AD Configuration Server** the **group names** that are defined in **Secure Storage** and use these group names to configure the mapping section.

10. Optionally, add the refresh time to check periodically the groups that are present in **IBM AD Configuration Server**.

```
#groupsPolling (optional) - refresh period expressed as a time duration
GroupsPolling: 2h
```

2. Start IBM AD File Service

- **On Windows**
  1. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery File Service**.
  2. If the service does not start, check the `.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/` folder.
- **On Linux**
  1. Go to `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/` folder and locate the `micro-srcd-`$x.x.x$`.bin` file.
  2. In case that the `.bin` file is not executable, open a terminal and run the following command for flagging them as executable:

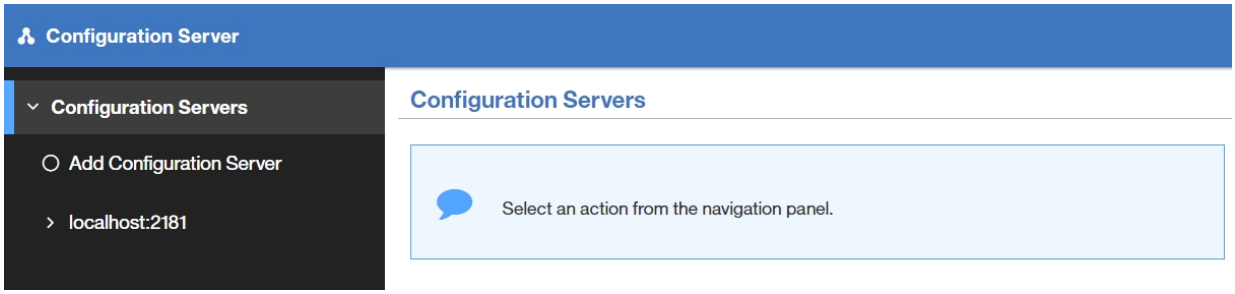
     ```
     chmod +x micro-srcd-x.x.x.bin
     ```

  3. If the service does not start, check the `.log` file under `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/` folder.

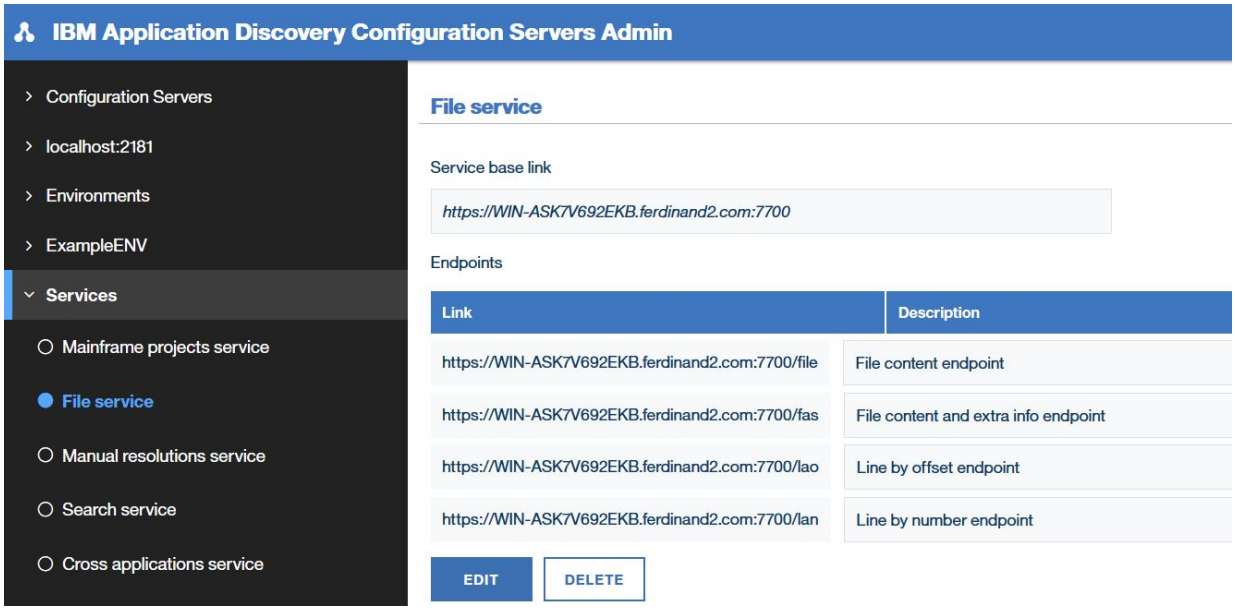
3. Make IBM AD File Service available in IBM AD Configuration Server

After **IBM AD File Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD File Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **File Service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"File Service"** page is displayed as in the following image.



Click **Edit** and enter the following information:

- **Service base link**: Expects the URL of the **File Service**. It represents the full computer name or IP of the machine that hosts the **File Service** and the port to which it listens.

  Example:

  ```
  https://WIN-ASK7V692EKB.ferdinand2.com:7700
  ```

- **Endpoints**
  - **File Content endpoint**: Expects the URL of **File Service** and the endpoint (`file`) used to obtain the file content.

    Example:

    ```
    https://WIN-ASK7V692EKB.ferdinand2.com:7700/file
    ```

  - **File Content and extra info endpoint**: Expects the URL of **File Service** and the endpoint (`fas`) used to obtain the file contents and to return a status.

    Example:

```
https://WIN-ASK7V692EKB.ferdinand2.com:7700/fas
```

- **Line by offset endpoint**: Expects the URL of **File Service** and the endpoint (`lao`) used to obtain the corresponding text for a given list of offsets.

  Example:

  ```
  https://WIN-ASK7V692EKB.ferdinand2.com:7700/lao
  ```

- **Line by number endpoint**: Expects the URL of **File Service** and the endpoint (`lan`) used to obtain the corresponding text for a given list of line numbers.

  Example:

  ```
  https://WIN-ASK7V692EKB.ferdinand2.com:7700/lan
  ```

7. Click **Save** to save the parameters.

STEP 7. Configuring IBM AD Manual Resolutions Service

Follow the configuration steps that are needed to have up and running **IBM AD Manual Resolutions Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Manual Resolutions Service
3. Make IBM AD Manual Resolutions Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Manual Resolution Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Manual Resolutions Service** listens to. The default value is 7900.

   ```
   #port to listen to
   port: 7900
   ```

2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

   ```
   #if communication should be secured with TLS
   https: false
   ```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   #if communication should be secured with TLS
   https: true
   ```

Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/` and replace the following line:

```
set tlsoptions=
```

with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Manual Resolutions Service**.
- **Keystore password** is the keystore password.

3. Set the **authSrv** parameter as follows:
   a. If the value of the **https** parameter is set to *true*, add the URL of **Authentication Server (DEX)** where **authSrv** parameter is present. **Authentication Sever (DEX)** that belongs to the **IBM AD** package is used. For more information, see "STEP 5. Configuring Authentication Server (DEX)" on page 115. Example:

   ```
   #authentication server URL
   authSrv: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

   b. If the value of the **https** parameter is set to *false* and the **Authorization and Authentication** feature is *enabled*, add the URL of **Authentication Server (DEX)**. Example:

   ```
   #authentication server URL
   authSrv: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

4. Set the **disableAuth** parameter to *false*. The *false* value keeps enabled the authentication.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: false
```

5. Add the path where the **journal files** are created. The path where these files are generated is separated from the project's path and needs to be accessible only for **IBM AD Manual Resolutions Service**. Once a project is imported, a folder with the same name is generated in the related path and it hosts all the files that are needed to manage dynamic call resolutions.

```
#generic path setting for journal files
#project name will be automatically added to the path
projectPath: C:\Resolutions
```

Note: On Linux, mount the Windows folder where the journal files are present (generated at the project's level) and add the path.

```
projectPath: /LinuxUser/Resolutions
```

6. Add the host of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server host
ccs.server.host: 127.0.0.1
```

7. Add the port of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server port
## default 2181
ccs.server.port: 2181
```

8. Add the environment ID under which the projects are created.

```
## Coordination and Configuration environment
ccs.environment: ce127609-197e-4136-af34-83b612689b09
```

Note: The current configuration is only available for one environment.

9. Optionally, the main path where the manual resolutions are created for each project, can be overwritten by the following configuration.

```
#optional
#overrides projectPath for a specific project.
projects:
   - project: Project1
     path: C:\Resolutions\Projects\Project1
```

2. Start IBM AD Manual Resolutions Service

- **On Windows**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/ and run `startServer.bat`.
2. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery Manual Resolutions Service**.
3. If the service does not start, check the `manualres.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/log folder.

- **On Linux**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/ and locate the `startServer.sh` file.
2. In case that the `.sh` file is not executable, open a terminal and run the following command for flagging them as executable:

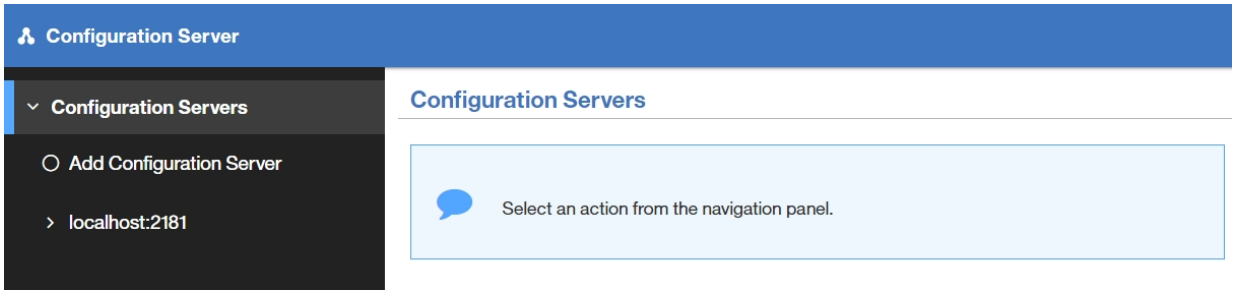
```
chmod +x startServer.sh
```

3. If the service does not start, check the `manualres.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/log folder.

3. Make IBM AD Manual Resolutions Service available in IBM AD Configuration Server

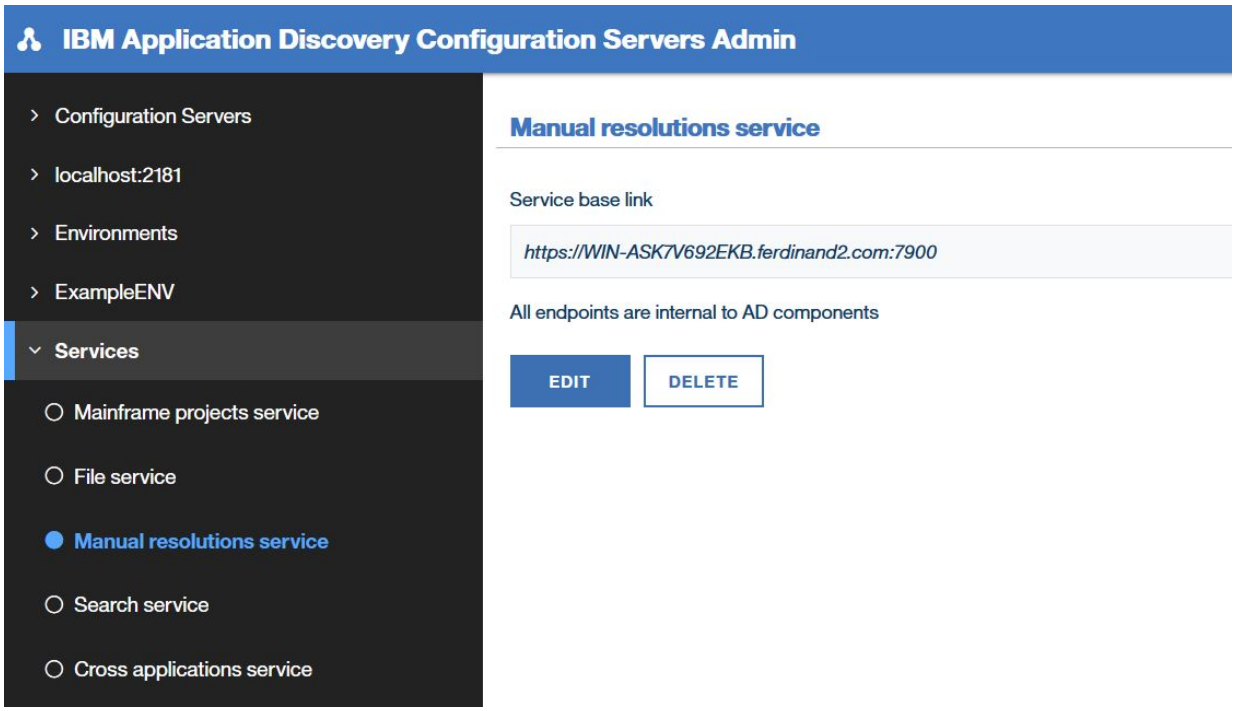
After **IBM AD Manual Resolutions Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Manual Resolutions Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Manual resolutions service**.

5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Manual Resolutions Service"** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Manual Resolutions Service** in the **Service base link** section. It represents the full computer name or IP of the machine that hosts the **Manual Resolutions Service** and the port to which it listens.

Example:

```
https://WIN-ASK7V692EKB.ferdinand2.com:7900
```

7. Click **Save** to save the parameters.

STEP 8. Configuring IBM AD Mainframe Projects Service

Follow the configuration steps that are needed to have up and running **IBM AD Mainframe Projects Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Mainframe Projects Service
3. Make IBM AD Mainframe Projects Service available in IBM AD Configuration Server

Note: When configuring **IBM AD Mainframe Projects Service** you need to add in **IBM AD Configuration Server** the **group names** that are defined in **Secure Storage** to decide which projects are accessible to specific users.

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Mainframe Projects Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Mainframe Projects Service** listens to. The default value is 7650.

```
#port to listen to
port: 7650
```

2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

```
#if communication should be secured with TLS
https: false
```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

```
#if communication should be secured with TLS
https: true
```

Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/` and replace the following line:

```
set tlsoptions=
```

with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Mainframe Projects Service**.
- **Keystore password** is the keystore password.

3. Add the host of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server host
ccs.server.host: 127.0.0.1
```

4. Add the port of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server port
## default 2181
ccs.server.port: 2181
```

5. Add the environment ID under which the projects are created.

```
## Coordination and Configuration environment
ccs.environment: ce127609-197e-4136-af34-83b612689b09
```

Note: The current configuration is only available for one environment.

6. Set the **disableAuth** parameter to *false*. The *false* value keeps enabled the authentication.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: false
```

7. Set the **authSrv** parameter as follows:

   a. If the value of the **https** parameter is set to *true*, add the URL of **Authentication Server (DEX)** where **authSrv** parameter is present. **Authentication Sever (DEX)** that belongs to the **IBM AD**

package is used. For more information, see “STEP 5. Configuring Authentication Server (DEX)” on page 115. Example:

```
#authentication server URL
authSrv: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
```

b. If the value of the **https** parameter is set to *false* and the **Authorization and Authentication** feature is *enabled*, add the URL of **Authentication Server (DEX)**. Example:

```
#authentication server URL
authSrv: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
```

2. Start IBM AD Mainframe Projects Service

- **On Windows**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/ and run `startServer.bat`.
2. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery Mainframe Projects Service**.
3. If the service does not start, check the `mfprojs.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/log folder.

- **On Linux**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/ and locate the `startServer.sh` file.
2. In case that the `.sh` file is not executable, open a terminal and run the following command for flagging them as executable:

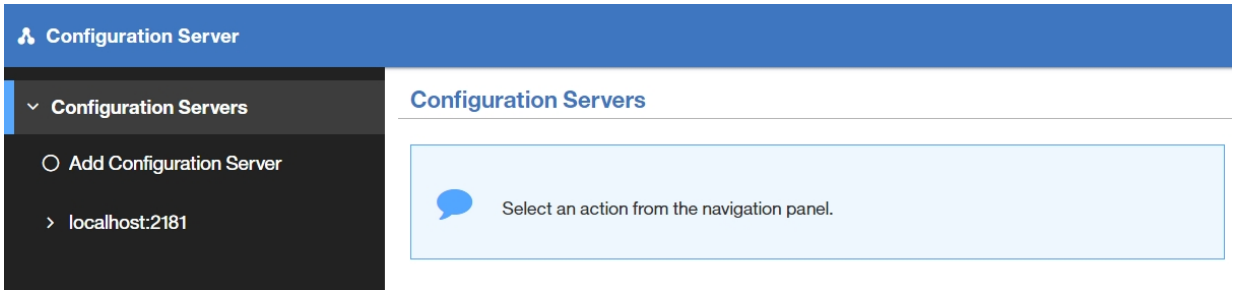
```
chmod +x startServer.sh
```

3. If the service does not start, check the `mfprojs.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/log folder.

3. Make IBM AD Mainframe Projects Service available in IBM AD Configuration Server

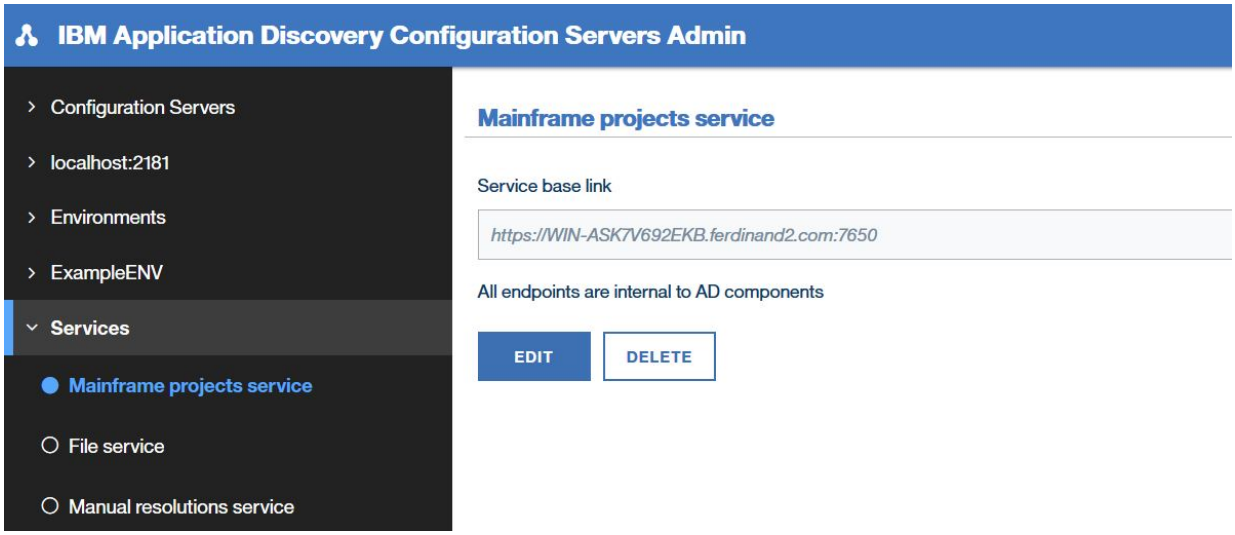
After **IBM AD Mainframe Projects Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Mainframe Projects Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD Mainframe Projects Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Mainframe projects service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.

6. The **"Mainframe Projects Service"** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Mainframe Projects Service** in the **Service base link** section. It represents the full computer name or IP of the machine that hosts the **Mainframe Projects Service** and the port to which it listens.

Example:

```
https://WIN-ASK7V692EKB.ferdinand2.com:7650
```

7. Click **Save** to save the parameters.

STEP 9. Configuring IBM AD Batch Server

About this task

Before running **IBM AD Batch Server**, some preliminary configurations must be performed. You need to specify on which projects you want **IBM AD Batch Server** to run the reports, which reports to generate, where to store the generated reports, and so on. Also, you need to specify the parameters for **IBM AD Web Service**.

The configuration parameters are stored in `server.properties` and `project.properties` files, which can be found in the configuration folder.

Below are the instructions on how to perform a minimal configuration in order to have source code analysis in **IBM AD Analyze Client**. For detailed instructions on how to configure **IBM AD Batch Server**, see `IBM AD Batch Server User Guide`.

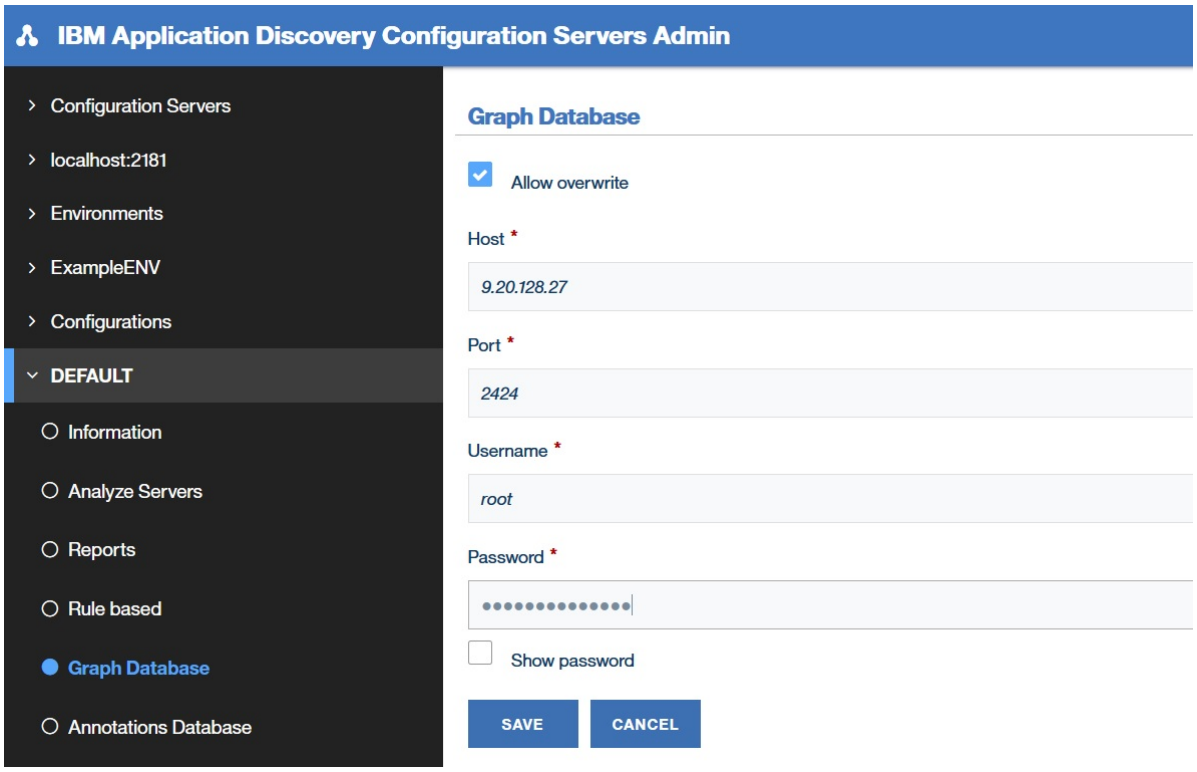
Note: Under Linux, in case `.sh` files are not executable, navigate to their installation directory, open a terminal and run the following command for flagging them as executable:

```
chmod +x filename.sh
```

Procedure

1. Copy from *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\sample-conf` all the configurations files and sub folders to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\Conf`.
2. Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server \orientdb\`*orientdb-community*`\bin\` and run `server.bat` on **Windows** or `server.sh` on **Linux**. A command prompt window will open, asking for the **root** user account password. Fill in a password of your choosing and press **ENTER**. The password is case-sensitive. A message indicating that the server is now active is displayed.
3. The **Graph Database** can be configured as follows:

a) **Without SSL**: Go to **IBM AD Configuration Server**, at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database** and enter the following information:

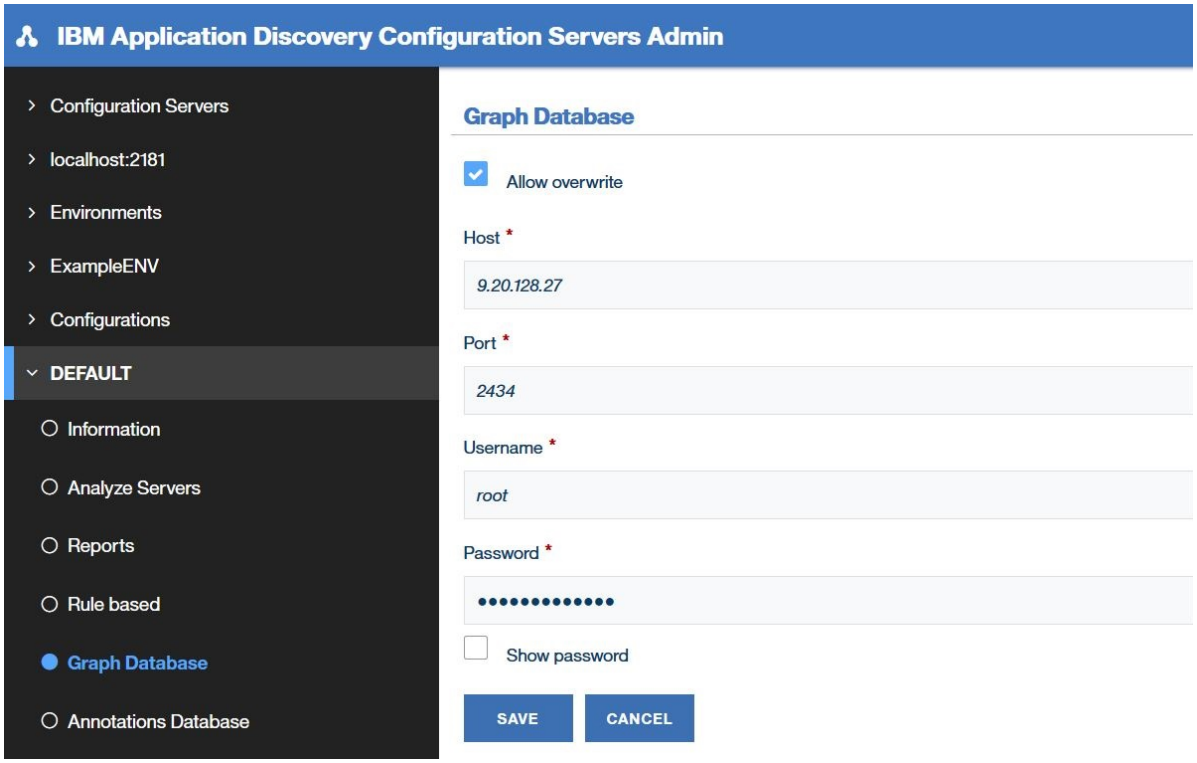


Where:

- **`Host`** - enter the host name or the IP where **IBM AD Batch Server** / OrientDB is installed.
- **`Port`** - this field is automatically completed by the application with the default value 2424.
- **`Username`** - enter the **root** username.
- **`Password`** - enter the same password configured in the previous step.

Note: At this point, OrientDB is configured to run with the **root** username and the password that is configured above.

b) **With SSL**: Go to **IBM AD Configuration Server**, at the following location: **Home Page** > **Configuration server name** > **Environments** > **"MyEnvironment"** > **Configurations** > **"MyDefaultConfiguration"** > **Graph Database** and enter the following information:



Where:

- **Host** - enter the host name or the IP where **IBM AD Batch Server** / **OrientDB** is installed.
- **Port** - enter the default port **2434** for **OrientDB SSL**.
- **Username** - enter the **root** username.
- **Password** - enter the same password configured in the previous step.

Additional steps for configuring OrientDB SSL

Note: For more information about **OrientDB SSL** configuration, see Configuring OrientDB for SSL/TLS.

1) Go to <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\orientdb\orientdb-community\config, open the orientdb-server-config.xml file and make sure that **OrientDB SSL** is set to true.
2) In the listeners section of the orientdb-server-config.xml file, add a new line that includes the socket and the default port range for **OrientDB SSL** as follows:

```
<listener protocol="binary" socket="ssl" port-range="2434-2440" ip-address="0.0.0.0"/>
```

3) Go to <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\Conf, open the project.properties configuration file, and make sure that the default port for **GraphDB SSL** server is set to 2434:

```
### graphdb properties
#location of the graphdb server. By default, localhost:2424
gdb.serverUrl=localhost:2434
```

4) Go to <IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\, open startServer.bat and set the **gdbOptions** parameter as follows:

```
set gdbOptions=-DgdbImport.client.ssl.enabled=true -DgdbImport.javax.net.ssl.trustStore=</path/to/orientdb.ks> -
DgdbImport.javax.net.ssl.trustStorePassword=password -DgdbImport.javax.net.ssl.keyStore=</path/to/orientdb.ks> -
DgdbImport.javax.net.ssl.keyStorePassword=password
```

Note: At this point, **OrientDB SSL** is configured to run with the **root** username and the password that is configured above.

4. In `server.properties` file, set the following parameters.
   - **`ccs.server.host`**=<IP / hostname of the machine where the AD Configuration Server resides.>
   - **`ccs.environment`**=<the same environment ID defined in Configuration Server.>
5. The `project.properties` file contains a set of global settings, followed by the specific settings for each type of component. The global settings specify the projects on which the **IBM AD Batch Server** will operate and which components will run on the specified projects. In `project.properties` file, set the following parameters.
   a) Enter an asterisk *****, or a comma-separated list of project names that are the only ones considered for this service. VERY IMPORTANT: If no value is set for this parameter, no report is generated; ***** means all projects.

   ```
   projects.whitelist=*
   ```

   b) Comma-separated list of component names that must be considered for this service. Ex.: **index** must be added as a component.

   ```
   components=index,gdbImport,annUpdate
   ```

   Optional components can be considered for this service.

   Table 2. Optional Components

Component	Description
ruleBased	The **Rule Based** component generates reports for the resources specified in the configuration files according to the rules and parameters defined in the corresponding configuration files. **Note:** If the **Rule Based** component is used, make sure that the `ruleBased.properties` file is configured. For more information, go to IBM AD Batch Server User Guide, ruleBased.properties File chapter.
reports	The **Reports** component is used to generate the complexity reports. For more information, go to IBM AD Analyze User Guide, Complexity Reports chapter.
cobolPP	The **cobolPP**, **jclPP**, and **pl1PP** components generate the expanded sources for Cobol, JCL, and PL/I. For more information, go to IBM AD Analyze User Guide, View Expanded Source chapter.
jclPP	
pl1PP	
wsmetrics	The **wsmetrics** component is needed only if IBM ADDI Extension is used on the system. **Note:** Additionally, in order for the **wsmetrics** component to be executed, make sure that the **gdbImport** component is included in the components list of this service.
adidx	The **addix** component is needed only if IBM ADDI Extension is used on the system. The ADI Index component will index the resources of a project so that the Business Rules Discovery (BRD) feature can display code snippets.

   c) The Index component will index the resources of a project so that a Search in resources can be performed in **IBM AD Analyze Client**, using Search in Files analysis.

   ```
   index.indexFolder=\\\\path\\<Folder>\\Index
   ```

   Note: For the accessible path defined in the `project.properties` file, backslashes must be doubled (****) and spaces in the path must have a single backslash as a prefix.

   Examples for the index.indexFolder parameter:

- `index.indexFolder=\\\\path\\<Folder>\\Index`
- `index.indexFolder=C:\\ibm\\Index`

Important:

- The folder path in which the indexes are generated needs to be accessible both for **IBM AD Batch Server** and **IBM AD Search Service**.
- The Index location will be used when configuring **IBM AD Search Service**.

6. On **Linux** only, Open the `mount.properties` file, located under `<installation folder>\IBM Application Discovery Batch Server/conf` folder and specify how the windows shared folders are mounted on the local files system, using the following pattern:

```
\\\\machine IP\\WindowsSharedFolder=/home/user/LinuxFolder
```

Example:

```
\\\\192.168.56.57\\ProjectsSharedPathWindows=/home/user/ ProjectsSharedPathLinux
```

It is mandatory to mount, at least the default shared path for **AD Build** Projects as defined in STEP 3 and the shared path for the Indexes as defined in `project.properties` file (step 5c).

7. Optional step: for integration with ADI only, please follow this procedure to set up the **AD Batch Server Web Service**:

   a. Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server \`, and run `authConfigTool.bat` on **Windows** or `authConfigTool.sh` on **Linux**. A command prompt dialog window is displayed. Follow the directions and enter the username and the password that are used by the Web Service then press ENTER. `AuthConfigTool.bat` sets the user and password for Web Service basic access authentication.

   b. Go to `<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \conf` folder, locate the `webService.properties` file and set the **keystore-file** parameter to enable an encrypted communication. Example:

```
## ssl keystore file
keystore-file=keystore.jks
```

Note: The `keystore` file needs to be added in the same `\conf` folder where `webService.properties` is present.

What to do next

- Start **IBM AD GraphDB (OrientDB)**.
  - Under Windows: click **Start** and then select **All Programs** > **IBM Application Discovery Servers \ IBM Application Discovery Batch Server** > **Start IBM Application Discovery GraphDB Service**. The service can also be started from Windows Services (`services.msc`) by locating **IBMApplicationDiscoveryGraphDBService** and clicking **Start**.
  - Under Linux: Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\orientdb\orientdb-community-2.1.25-ibm1\bin\` and run `server.sh`. Make sure this process remains alive.
- Start **IBM AD Batch Server**.
  - Under Windows: click **Start** and then select **All Programs** > **IBM Application Discovery Servers \ IBM Application Discovery Batch Server** > **Start IBM Application Discovery Batch Server**. The service can also be started from Windows Services (`services.msc`) by locating **IBMApplicationDiscoveryBatchService** and clicking **Start**.
  - Under Linux: Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\`, and run `StartServer.sh`. Make sure this process remains alive.
- (Only in case step 7 from above has been taken) Start **IBM AD Web Service**.

– Under Windows: click **Start** and then select **All Programs** > **IBM Application Discovery Servers \ IBM Application Discovery Batch Server** > **Start IBM Application Discovery Web Service**. The service can also be started from Windows Services (`services.msc`) by locating **IBMApplicationDiscoveryWebService** and clicking **Start**.
– Under Linux: Go to *<IBM ADDI Installation Folder>*`\IBM Application Discovery Batch Server\`, and run `startWBServer.sh`. Make sure this process remains alive.

Note: Make sure to restart **IBM AD Batch Server** after modifying the configuration files.

Important: For monitoring the **IBM AD Batch Server** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 10. Configuring IBM AD Search Service

Follow the configuration steps that are needed to have up and running **IBM AD Search Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Search Service

   Note: IBM AD Search Service is necessary for the Search in Files functionality to work. It is mandatory to have **IBM AD File Service** installed, configured and up and running.
3. Make IBM AD Search Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Search Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Search Service** listens to. The default value is 7800.

   ```
   #port to listen to
   port: 7800
   ```
2. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

   ```
   #if communication should be secured with TLS
   https: false
   ```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   #if communication should be secured with TLS
   https: true
   ```

   Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/` and replace the following line:

   ```
   set tlsoptions=
   ```

   with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Search Service**.
- **Keystore password** is the keystore password.

3. Set the **authSrv** parameter as follows:
   a. If the value of the **https** parameter is set to *true*, add the URL of **Authentication Server (DEX)** where **authSrv** parameter is present. **Authentication Sever (DEX)** that belongs to the **IBM AD** package is used. For more information, see "STEP 5. Configuring Authentication Server (DEX)" on page 115. Example:

```
#authentication server URL
authSrv: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
```

   b. If the value of the **https** parameter is set to *false* and the **Authorization and Authentication** feature is *enabled*, add the URL of **Authentication Server (DEX)**. Example:

```
#authentication server URL
authSrv: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
```

4. Set the **disableAuth** parameter to *false*. The *false* value keeps enabled the authentication.

```
#disable authentication/authorization. allow all files to be sent
disableAuth: false
```

5. Add the path where the **indexes** are created. This path needs to have as an endpoint the same folder where the **indexes** are stored. The path where the indexes are stored was set up under <IBM ADDI Installation Folder>/IBM Application Discovery Batch Server/conf/project.properties file, where the **index.indexFolder** parameter is present. The folder path where the indexes are generated needs to be accessible for both **IBM AD Batch Server** and **IBM AD Search Service**.

   Example:

```
#generic path setting for indexes
#project name will be automatically added to the path
indexPath: \\server01\Indexes
```

6. Optionally, the main path where the indexes are created for each project, can be overwritten by the following configuration. This path needs to be identical to the one present under <IBM ADDI Installation Folder>/IBM Application Discovery Batch Server/conf/project.properties, where the **project.projectName.index.indexFolder** parameter is present.

```
#optional
#overrides indexPath for a specific project.
projects:
   - project: Project1
     path: C:\Index\Indexes\Project1
```

2. Start IBM AD Search Service

- **On Windows**
  1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/ and run startServer.bat.
  2. Click **Start**, select **Run**, type **services.msc** and start **IBM Application Discovery Search Service**.
  3. If the service does not start, check the search.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/log folder.
- **On Linux**

1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/ and locate the startServer.sh file.
2. In case that the .sh file is not executable, open a terminal and run the following command for flagging them as executable:

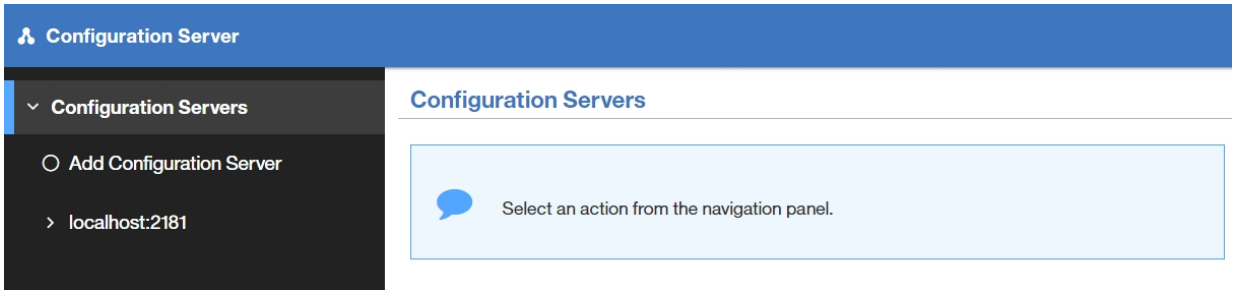
```
chmod +x startServer.sh
```

3. If the service does not start, check the search.log file under <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/log folder.

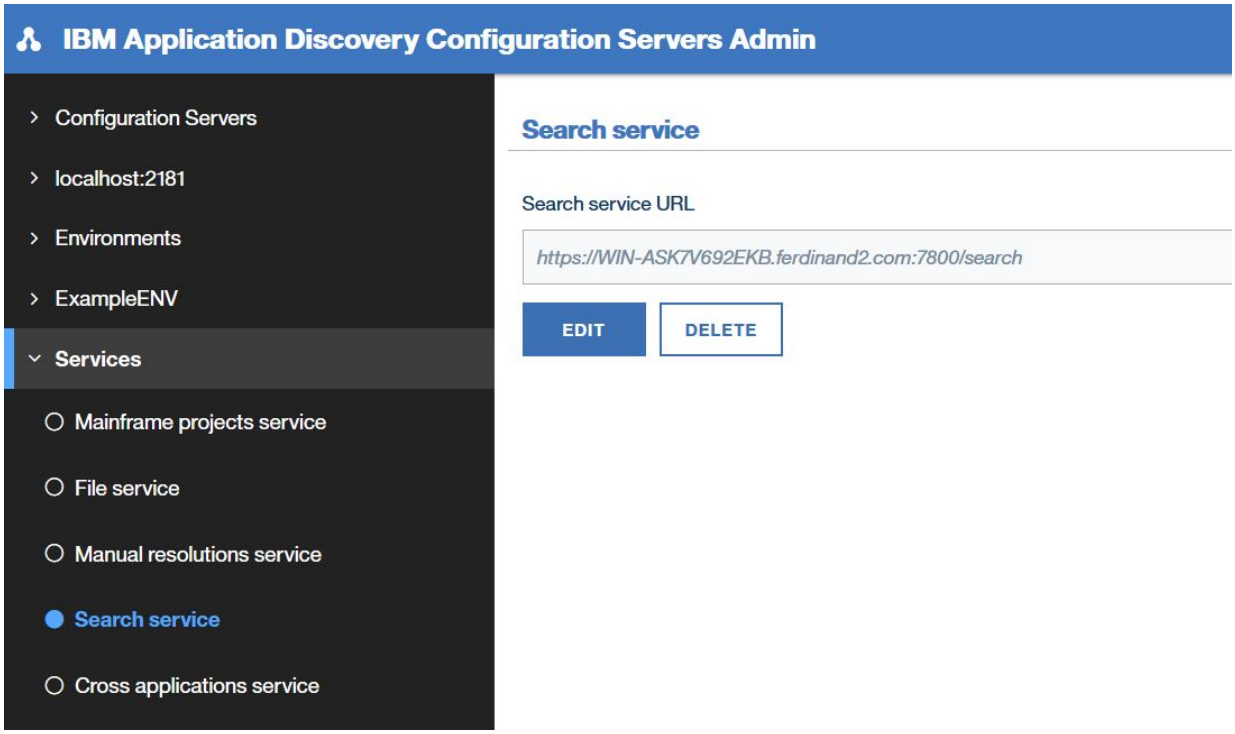
3. Make IBM AD Search Service available in IBM AD Configuration Server

After **IBM AD Search Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Search Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD File Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Search Service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Search Service"** page is displayed as in the following image.



Click **Edit** and enter the URL of the **Search Service** in the **Search service URL** section. It represents the full computer name or IP of the machine that hosts the **Search Service**, the port to which it listens and the endpoint (`search`) .

Example:

```
https://WIN-ASK7V692EKB.ferdinand2.com:7800/search
```

7. Click **Save** to save the parameters.

STEP 11. Configuring IBM AD Cross Applications Service

Important: The **IBM AD Cross Applications Service** is still under development.

IBM AD Cross Applications Service is an **additional** service that needs to be configured to show calls between different mainframe projects that have their databases on the same DB instance in **IBM AD Analyze Client**.

Follow the configuration steps that are needed to have up and running **IBM AD Cross Applications Service**:

1. Configure the parameters that are present in the `conf.yaml` file
2. Start IBM AD Cross Applications Service
3. Make IBM AD Cross Applications Service available in IBM AD Configuration Server

1. Configure the parameters that are present in the `conf.yaml` file

On the machine where **IBM AD Cross Applications Service** is installed, go to `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/sample-conf/` and copy the `conf.yaml` file to `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/conf/`. Open the `conf.yaml` file by using a text editor and enter the desired values for the parameters that are detailed below.

Note: The parameters are represented in *YAML* as strings terminated by a trailing colon. Values are represented by either a string following the colon, separated by a space. Example:

```
my_parameter: my_value
```

1. Enter the port on which **IBM AD Cross Applications Service** listens to. The default value is 7850.

```
#port to listen to
port: 7850
```

2. Add the host of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server host
ccs.server.host: 127.0.0.1
```

3. Add the port of **IBM AD Configuration Server**.

```
## Coordination and Configuration Server port
## default 2181
ccs.server.port: 2181
```

4. Add the environment ID under which the projects are created.

```
## Coordination and Configuration environment
ccs.environment: ce127609-197e-4136-af34-83b612689b09
```

Note: The current configuration is only available for one environment.

5. Add the **Relational database server** name. The name needs to be identical to the one that has been set up in Step 3, when configuring *IBM AD Build Client in IBM AD Configuration Server*.

```
## Relational database server name (name defined in the specified environment)
## used to create a new cross database
db.server.name: exampleDB
```

6. Add the **Cross repository** name.

```
## cross repository name
cross.db.name: YourPreferedName
```

7. Set the **https** parameter as follows:

   a. If the **https** parameter is set to *false*, a non-secured communication is used.

   ```
   #if communication should be secured with TLS
   https: false
   ```

   b. If the **https** parameter is set to *true*, a secured communication is used.

   Note: This step implies the use of certificates. If you want to set the communication to be secured, make sure that a certificate authority issues a signed certificate (`.crt`) and a private key for the certificate (`.key`).

   ```
   #if communication should be secured with TLS
   https: true
   ```

Note: If the **https** parameter is set to *true*, an additional step needs to be performed. Locate `startServer.bat` file under `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/` and replace the following line:

```
set tlsoptions=
```

with:

```
SET keystorepath=<"path_to_keystore">
SET keystorepass=<"password_of_keystore">
set tlsoptions=-Djavax.net.ssl.keyStore="%keystorepath%" -
Djavax.net.ssl.keyStorePassword="%keystorepass%"
```

Where:

- **Path to keystore** is the path to the keystore that holds the certificate for **IBM AD Cross Applications Service**.

- **Keystore password** is the keystore password.

8. Set the **authSrv** parameter as follows:

   a. If the value of the **https** parameter is set to *true*, add the URL of **Authentication Server (DEX)** where **authSrv** parameter is present. **Authentication Sever (DEX)** that belongs to the **IBM AD** package is used. For more information, see "STEP 5. Configuring Authentication Server (DEX)" on page 115. Example:

   ```
   #authentication server URL
   authSrv: https://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

   b. If the value of the **https** parameter is set to *false* and the **Authorization and Authentication** feature is *enabled*, add the URL of **Authentication Server (DEX)**. Example:

   ```
   #authentication server URL
   authSrv: http://WIN-ASK7V692EKB.ferdinand2.com:7600/dex
   ```

9. Set the **disableAuth** parameter to *false*. The *false* value keeps enabled the authentication.

   ```
   #disable authentication/authorization. allow all files to be sent
   disableAuth: false
   ```

10. Optionally, you can decide what project resolutions to display in the analysis, when more projects contain the same program definition.

    ```
    #optional: force resolution target
    #program name pattern from source project will be solved only in target project
    restrictions:
     - pattern:  "Program1"
       from.project: Project1
       to.project: Project2
    ```

    Where:

    - **pattern** - represents the name of the program which has the source present in other projects.
    - **from.project** - represents the project that contains the program without the source.
    - **to.project** - represents the project resolution that you decide to show in the analysis.

2. Start IBM AD Cross Applications Service

- **On Windows**

  1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/ and run `startServer.bat`.
  2. Click **Start**, select **Run**, type **`services.msc`** and start **IBM Application Discovery Cross Applications Service**.
  3. If the service does not start, check the `cross.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/log folder.

- **On Linux**

  1. Go to <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/ and locate the `startServer.sh` file.
  2. In case that the `.sh` file is not executable, open a terminal and run the following command for flagging them as executable:

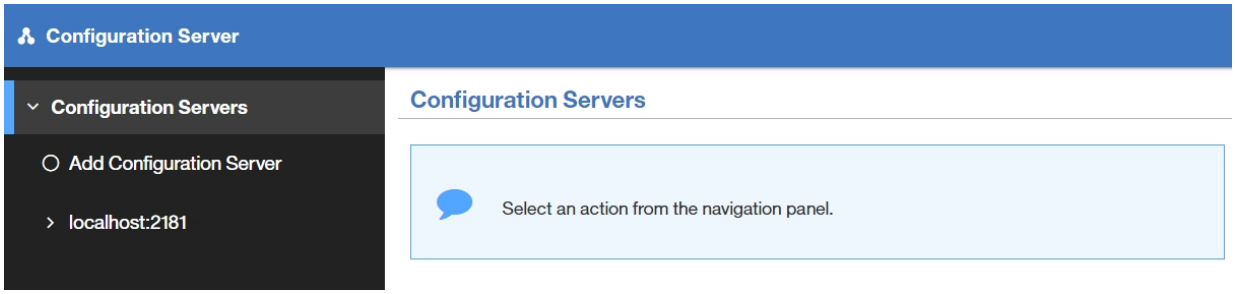
     ```
     chmod +x startServer.sh
     ```

  3. If the service does not start, check the `cross.log` file under <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/log folder.

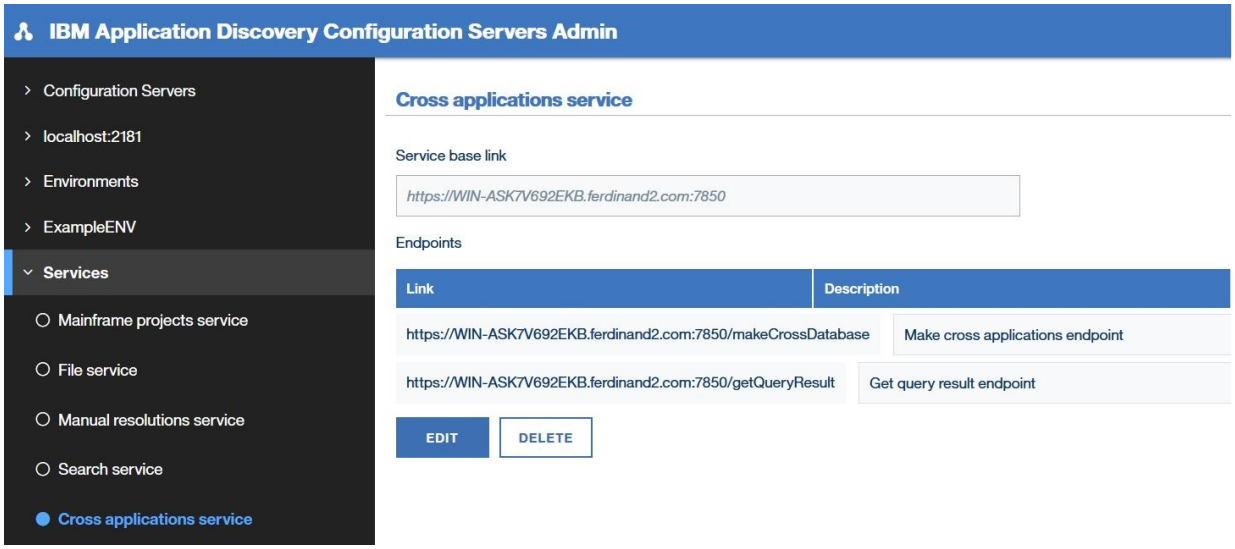
3. Configure IBM AD Cross Applications Service in IBM AD Configuration Server

After **IBM AD Cross Applications Service** is up and running, go to **IBM AD Configuration Server** and make **IBM AD Cross Applications Service** available for the other IBM AD components as follows:

1. To access **IBM AD Configuration Server**, go to **Start** > **All Programs** > **IBM Application Discovery Configuration Server** > **Launch IBM Application Discovery Configuration Server**. The main page of **IBM AD Configuration Server** is displayed as in the following image.



2. From the available configuration servers, select the server where you defined the environment for which you define the **IBM AD Cross Applications Service** configuration. From the options that are displayed under the selected server, click **Environments**.
3. The Environments page is displayed. From the options available for the selected environment, select **Services**.
4. The **Services** page is displayed. Select **Cross applications service**.
5. The parameters that can be defined for the selected service are displayed in the right of the page.
6. The **"Cross Applications Service** page is displayed as in the following image.



   Click **Edit** and enter the URL of the **Cross Applications Service** in the **Service base link** section. It represents the full computer name or IP of the machine that hosts the **Cross Applications Service** and the port to which it listens.

   Example:

```
https://WIN-ASK7V692EKB.ferdinand2.com:7850
```

7. Click **Save** to save the parameters.

Important: At this installation and configuration point, everything is put in place for having analysis available in **IBM AD Analyze Client**. To take full advantage of the available analysis functionality, you need to install **IBM AD Analyze Client**. For more information see, “STEP 12. Installing IBM AD Analyze Client” on page 96.

STEP 12. (Optional) Configuring IBM AD Analyze Server

Before you begin

This step is optional and not necessary unless Java source code will be included in one or more projects in this environment.

On Linux only, Open the `servermount.properties` file, which is located under `<installation folder>\IBM Application Discovery Batch Server/conf` folder and specify how the windows shared folders are mounted on the local files system, by using the following pattern:

```
\\\\machine IP\\WindowsSharedFolder=/home/user/LinuxFolder
```

Example:

```
\\\\192.168.56.57\\ProjectsSharedPathWindows=/home/user/ ProjectsSharedPathLinux
```

It is mandatory to mount the Remote Path from **Analyze Server Manager** > **Server Settings**.

About this task

Following are the configuration steps that are needed after **IBM AD Analyze Server** was installed.

- **Under Windows**: to access the configuration parameters, select **Start** > **Programs** > **IBM Application Discovery Analyze Server** > **IBM Application Discovery Analyze Server Manager**.
- **Under Linux**: to access the configuration parameters, go to `<Installation Path>\IBM Application Discovery Servers\IBM Application Discovery Analyze Server` and run `manager.sh`.

In the **Server settings** tab, the **Server properties** and **Server arguments** sections display default data that was entered when **IBM AD Analyze Server** was installed.

To configure **IBM AD Analyze Server**, follow the instructions below.

Procedure

1. In **IBM AD Configuration Server**, go to **Configurations** > **Default** > **Analyze Servers** and fill in the following details:
   - **`Host`**: IP / Hostname where **IBM AD Analyze Server** is installed.
   - **`RMI Registry Port`**: 1099 (Default).
2. Configuring the server database – the Database settings tab:
   Select the **Database Settings** tab. In the Location area, fill in the following parameters:
   - **Server type** field is completed by default with *SQL server*.
   - **Server IP**: Enter the IP of the computer where SQL Server is installed.
   - **Server port**: Server port is the access port, by default, 1433 port is used.

   Important: Make sure that the IP address and the port number you set here are the same as the ones entered in the **Relational database servers** page of **IBM AD Configuration Server**. For more information, see “ STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client ” on page 60.

   Database instance, this field must be used in case the default database name was not chosen at SQL Server installation time. In the Authorization area, fill in the following parameters:
   - **Database name**: Enter a name for the database.
   - **User and password**: Give a user and password that can be used to create the database.

   After you completed the details of the database, click **Create database** to create the database with the selected parameters. If the database was configured correctly, after **Test database** is clicked, a message with the installed DB version will be displayed. Click **Save** to apply the settings.

You can also select an existing database. If the selected database belongs to an older version of **IBM AD** and the database structure is now obsolete, a message is displayed indicating the current version of the selected database. The user is given the option to upgrade the existing database. Press **Upgrade** if applicable. After the upgrade process was performed, press again **Test database** to make sure that the upgraded database is functional. The version of the upgraded database is presented and **Upgrade** button is no longer available. For incomplete or corrupted databases one of the following messages may be displayed: **Database x is not a valid database** or **Cannot extract relevant data from the database. Database may be nonexistent, obsolete or invalid**.

After modifying the settings in any of the tabs, do not forget to press **Save** to apply them. An asterisk at the beginning of the title of a tab indicates that parameters in that tab were modified but not saved.

3. Specifying allowed **IBM AD Analyze Clients**:

   Note: This configuration applies only to Java projects.

   - **IBM AD Analyze** clients can be of two types: manager and user.
   - **IBM AD Analyze** client of the **manager** type, can create shared projects, build shared projects, and delete shared projects.
   - **IBM AD Analyze** client of the “user” type, can only import the shared projects and perform analysis.

   Manager and user types are server-related attributes, which means that a server determines the type for a client connecting to that server by looking up the client IP in the configuration files. This means that a client can be a manager on one server and a user on another server.

   a) To add a Manager to the Managers list: Click **Add** in the upper right corner of the **Access Settings** tab: **New Access Data** dialog window is displayed. Enter the IP of the computer of the user who will access the server as a Manager (the type of owner is selected by default) then press **OK** to add the new manager to the list of Managers. To delete one of the Managers from the list, select it then press **Delete**. If you want to allow access to all the projects on the server to all potential users, do not add any users to the List of Users. If you want to limit the access to the projects to a number of specific users, select **restrict user IP** then add all of them to the List of Users. Only users in the List of Users and List of Managers will have access to the projects shared on the server.

   b) To add a user to the List of Users, click **Add** from the List of Users area of the **Access Settings** tab: the New Access Data dialog window is displayed. Enter the IP of the computer of the user who will access the projects as a User (the type of owner is selected by default) then press OK to add the new user to the list of Users.

What to do next

Under Windows: start **IBM AD Analyze Server**: Click **Start** and then select **All Programs** > **IBM Application Discovery Analyze Server** > **Start IBM Application Discovery Analyze Server**.

Alternatively, to start the server: From the Start menu, choose **Programs** > **IBM Application Discovery Analyze Server** > **Start IBM Application Discovery Analyze Server Monitor** then go to monitor icon from the taskbar, right-click on the icon, and select **Start service**. When the server is running, the green arrow from **Server Monitor** icon indicates that the server is started.

Under Linux: Go to `<Installation Path>\IBM Application Discovery Servers\IBM Application Discovery Analyze Server` and run `StartServer.sh`. Please make sure that this process remains alive.

Important: For monitoring the **IBM AD Analyze Server** tasks, see Chapter 7, “Log Files Location,” on page 153.

STEP 13. Installing IBM AD Analyze Client

About this task

Attention:

- If you want to connect the **AD Analyze Client** software on a machine or operating system instance to multiple AD Server instances that are all running the **same** AD Server code level, one copy of the **AD Analyze Client** software can be installed into an `Eclipse/IDz` instance, but each AD server connection (IP/Hostname, port, and Unique ID, at a minimum) must be configured in a unique workspace that does not already contain an instance of the **AD Analyze Client** software's configuration settings.
- If you want to install multiple code levels of the **AD Analyze Client** software on the same machine or operating system instance (to connect to different AD Servers running **different** AD code levels), each level of the **AD Analyze Client** software can be installed into a separate `Eclipse/IDz` instance, and also must use a unique workspace that does not already contain the **AD Analyze Client** software's configuration settings. A workspace in use when the **AD Analyze Client** software is installed and configured contains the **AD Analyze Client** software's configuration settings in a folder named: `<workspace location>\.metadata\.ez \.settings`.

Procedure

1. To install **IBM AD Analyze Client**: In your Eclipse instance, select **Window** > **Preferences**.
2. From the Install /Update section to the left of the **Preferences** dialog window select **Available Software Sites**: A list of software sites available for update or install is displayed.
3. To select the location from where **IBM AD Analyze Client** is being installed click **Add**: The Add Site dialog window is displayed.
   - In the **Name** field enter a name for your **IBM AD Analyze Client** installation.
   - If you extracted the installation archive that you received from IBM and you stored it on your computer, use **Local** and point to the Repository folder generated after the extract operation.
   - If you did not extract the installation archive received from IBM, use **Archive** button to select the installation archive stored on your computer.
   - If you did not store the installation archive locally but in a location on your intranet, enter the full path to that location in the **Location** field.

   Click **OK**: **IBM AD Analyze Client** will be added to the list of Available Software Sites.

   Click **OK** to close the **Preferences** dialog window and proceed to the next step in the installation process.
4. In your Eclipse client select **Help** > **Install New Software**: The Install dialog window is displayed. In **Work with** field select the **IBM AD Analyze Client** site you have defined in the previous step. After you selected the **IBM AD Analyze Client** site, the corresponding **IBM AD Analyze** components are displayed in the central part of the dialog window. By default, all the components are selected.
   a) If you are installing **AD Analyze Client** into IBM IDz, you can choose all the features listed under **IBM AD Analyze**.
   b) If you are installing **AD Analyze Client** into an Eclipse package that is not IBM IDz, for example an Eclipse distribution downloaded from eclipse.org, you can choose the features listed under **IBM AD Analyze**, except you should deselect all features that start with *Application Discovery Integration with* to avoid errors during the installation process.
   c) Once you have selected the correct features to install in your environment, click **Next**.
5. The **Install details** dialog window is displayed.

   Select a component from the list to display a detailed description of it in the **Details** section of the dialog window. Click **Next**.
6. The **Review license** dialog window is displayed. Carefully read the License agreement then select **I accept the terms** and press **Finish** to start the installation process.
7. After the installation is completed, Eclipse will prompt you for a restart: Accept the restart operation to see the newly installed features.

STEP 14. Configuring IBM AD Analyze Client

About this task

To configure **IBM AD Analyze Client**, follow the instructions below.

Eclipse startup is controlled by the options in `$ECLIPSE_HOME/eclipse.ini`. If `$ECLIPSE_HOME` is not defined, the default `eclipse.ini` in your Eclipse installation directory is used.

Procedure

1. **OS Dependent Configuration**: In case **Analyze Client** is installed on Windows Server (any version) or Windows 8/10, you need to edit the `eclipse.ini` configuration file and add the following line, in the `-vmargs` section. Avoid blank lines in the `-vmargs` section.

```
-Dorg.osgi.framework.os.name=win32
```

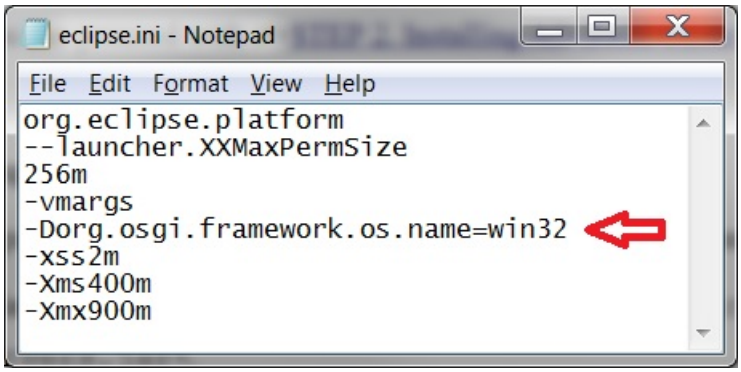


Figure 6. OS Dependent Configuration

2. **Java-Dependent Configuration**: If an AD-supported IBM Java version is used as the system Java and you want to enable the TLS V1.2 connection, make sure to add the following lines in the `eclipse.ini` configuration file, in the `-vmargs` section. Avoid blank lines in the `-vmargs` section.

```
-Dcom.ibm.jsse2.overrideDefaultTLS=true
-Djsse.enableCBCProtection=false
```

3. **OrientDB SSL-Dependent Configuration**: If **OrientDB** is configured with **SSL** in the `orientdb-server-config.xml` file, make sure to add the following lines in the `eclipse.ini` configuration file, in the `-vmargs` section. Avoid blank lines in the `-vmargs` section.

```
-Dclient.ssl.enabled=true
-Djavax.net.ssl.keyStore=</path/to/orientdb.ks>
-Djavax.net.ssl.keyStorePassword=password
-Djavax.net.ssl.trustStore=</path/to/orientdb.ks>
-Djavax.net.ssl.trustStorePassword=password
```

Important:

Make sure that the `orientdb.ks` file is physically present on the machine where **IBM AD Analyze Client** is installed and configured, and that the correct path to `orientdb.ks` is added in the `eclipse.ini` configuration file.

4. **Memory Management Configuration**: Eclipse must be configured to allow for optimized memory consumption. To configure Eclipse, edit the `eclipse.ini` file under the Eclipse installation folder and set the minimum memory parameter (marked –Xms), the maximum memory parameter (marked –Xmx). Following is an example of an `eclipse.ini` file containing parameters for optimized memory consumption.

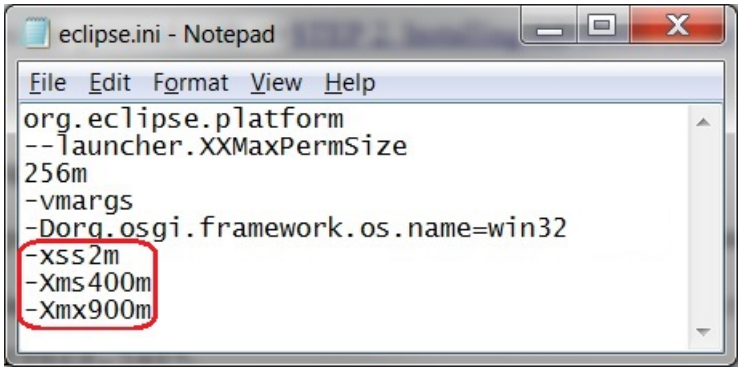


Figure 7. Memory Management Configuration

5. To use a specific language in the Eclipse interface, add the following parameter before the **-startup** parameter in the `eclipse.ini` file:

```
-nl
language
```

The **-nl** parameter has the following *language* values:

***Language* value**	**Language**
de	German
es	Spanish
fr	French
it	Italian
ja	Japanese
ko	Korean
pt_BR	Brazilian Portuguese
zh	Simplified Chinese
zh_HK	Traditional Chinese, Hong Kong
zh_TW	Traditional Chinese, Taiwan

6. Go to **IBM AD Analyze Client** main window and select **Window** > **Preferences** > **Application Discovery** > **Environment settings**.

   The following Environment identification settings are available:

   - **Host**, enter the host name or the IP address of the computer where **IBM AD Configuration Server** is installed.
   - **Port**, enter the communications port number for **IBM AD Configuration Server**. If you are using the default port, enter 2181.
   - **Unique id**, enter the unique ID assigned by **IBM AD Configuration Server** to the environment you want to work with.

     Attention: This ID must be identical to the environment ID declared in “ STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client ” on page 60, procedure step 2.

   - **Name**, enter the name of the environment with which you want to work, as defined in **IBM AD Configuration Server**.

     Attention: It is highly recommended that this name is identical to the one declared in “ STEP 2. IBM AD Configuration Server: Configurations for IBM AD Build Client ” on page 60, procedure step 2.

7. Click **OK** and restart **IBM AD Analyze Client** (**File Menu** > **Restart**).
8. After restarting, a pop-up message displays the configurations that were made in **IBM AD Configuration Server**, and a restart is needed in order to be taken into account by **IBM AD Analyze Client**.

   Important: For monitoring the **IBM AD Analyze Client** tasks, see Chapter 7, “Log Files Location,” on page 153.
9. In order to see the **Mainframe Analysis** projects you need to be **authenticated and authorized** in **IBM AD Analyze Client**. For more information, see the Authorization and Authentication section, in *IBM AD Analyze User Guide*.

   Notice: At this point, all IBM AD components are up and running and ready for **Analysis**.

Chapter 7. Log Files Location

The following table summarizes a list of log files that are generated by a specific component. For monitoring any component's tasks, check the logs that are located in their specific location.

Table 3. Log files Location

Component	Logs location	Log files name format
IBM AD Configuration Server	<IBM ADDI Installation Folder>\IBM Application Discovery Configuration Service\log\	• server.log • ibmapplicationdiscoveryconfigurationadminservice-stderr.<date>.log • ibmapplicationdiscoveryconfigurationadminservice-stdout.<date>.log • ibmapplicationdiscoveryconfigurationservice-stderr.<date>.log • ibmapplicationdiscoveryconfigurationservice-stdout.<date>.log • ezservice-daemon.<date>.log • ws-service-daemon.<date>.log
IBM AD Build Client	<IBM AD Build Client installation folder>\Bin\Release\	**IBM AD Build Client** can be invoked in batch mode to create a new project in background. The log for the **New project in background** has the following name format NewProjInBackLog_timestamp.log.
	<Project's Folder>	**IBM AD Build Client** can be invoked in batch mode to run a build (full build). The log for the **Build in background** process has the following name format Project'sName_timestamp.txt.
		IBM AD Build Client can be invoked in batch mode to keep the information stored in repository up-to-date. The logs for the **Make** process have the following format: • BatchMakeStatusFile_timestamp.txt • Project'sName_timestamp.txt
		IBM AD Build Client can automatically add all files from a given physical folder to a virtual one (similar to Add all files from folder option that can be found in GUI Mode). The log for this process has the following format UpdateInBackgroundLog_timestamp.txt.
		IBM AD Build Client can be invoked in batch mode to update **API Resolutions**. The log for this process has the following format UpdateApiResolutions_timestamp.txt.
	<Project's Folder>\Synchronize\	• ConfigFileValidation<timestamp>.log • SynchronizeMembersExtendedInfo<timestamp> • SynchronizeMembersProgress<timestamp> • SynchronizeMembersSummary<timestamp>
	<Project's Folder>\MVS\Logs\<zOS Connection's Name>	• MFImport<timestamp>.log • MFErrors<timestamp>.log
	<IBM ADDI Installation Folder>\IBM Application Discovery Build Client\Bin\Release\CCS_Interaction_Logs\	The log for the interaction with **IBM AD Configuration Server** can be found under CCSErrors_<timestamp>.log.
IBM AD Build Configuration	<IBM AD Build Client installation folder>\Bin\Release\Log\	ADBuildConfiguration_timestamp.log

Table 3. Log files Location (continued)

Component	Logs location	Log files name format
IBM Application Discovery GraphDB	<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \orientdb\log\	ezservice-daemon.<date>.log
	<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server \orientdb-community-*x.x.x*_ezpatch1\log\	orient-server.log
IBM AD Validation Server	<IBM AD Build Client installation path>\bin \Release\IBMApplication DiscoveryValidationServer \Logs\	• ValidationServiceActivity<number>.log • ValidationServiceStatus<date>.log
	<Project's Folder>\Validation \	ValidationThroughPDS_GenerateIncludePaths<date>.log
	<Project's Folder> \Synchronize\	
Authentication Server (DEX)	<IBM ADDI Installation Folder>\Authentication Server (DEX)\	dex.log
IBM AD File Service	<IBM ADDI Installation Folder>\IBM Application Discovery File Service\	.log
IBM AD Manual Resolution Service	<IBM ADDI Installation Folder>\IBM Application Discovery Manual Resolutions Service\log\	manualres.log
IBM AD Mainframe Projects	<IBM ADDI Installation Folder>\IBM Application Discovery Mainframe Projects Service\log\	mfprojs.log
IBM AD Batch Server	<IBM ADDI Installation Folder>\IBM Application Discovery Batch Server\log\	• server.log • ibmapplicationdiscoverybatchservice - stdout.<date>.log • ibmapplicationdiscoverybatchservice - stderr.<date>.log • ibmapplicationdiscoverywebservice - stdout.<date>.log • ibmapplicationdiscoverywebservice - stderr.<date>.log • server-daemon.<date>.log • webservice.log • webservice-daemon.<date>.log • status.log • ProjectName-projectDBVersion.log • gdbTool.log • rb.log
IBM AD Search Service	<IBM ADDI Installation Folder>\IBM Application Discovery Search Service\log\	search.log
IBM AD Cross Applications Service	<IBM ADDI Installation Folder>\IBM Application Discovery Cross Applications Service\log\	cross.log

Table 3. Log files Location (continued)

Component	Logs location	Log files name format
IBM AD Analyze Server	<IBM ADDI Installation Folder>\IBM Application Discovery Analyze Server\log \log_service\	• ezservice-daemon.<date>.log • ibmapplicationdiscoveryanalyzeservice-stderr.<date>.log • ibmapplicationdiscoveryanalyzeservice-stdout.<date>.log
	<IBM ADDI Installation Folder>\IBM Application Discovery Analyze Server\log \server\	• server.log • server.<date>.log
	<IBM ADDI Installation Folder>\IBM Application Discovery Analyze Server\log \manager\	• manager.log • manager.<date>.log
IBM AD Analyze Client	<Local Workspace>\.metadata\.ez\log\	• ez.log • ez.<date>.log
	<Local Workspace>\.metadata\	.log

Chapter 8. IBM AD Connect for Mainframe Installation and Configuration

After all the steps in the Configuring IBM AD chapter are completed, you can install IBM AD Connect for Mainframe.

- Install **IBM AD Connect for Mainframe** using SMP/E, following the instructions in the IBM AD Connect for Mainframe Program Directory. Instructions for installing additional PTFs provided with the **IBM AD Connect for Mainframe** can be found in the installation package at:

`IBM AD v.X Suite\IBM AD Build\IBM AD Connect for Mainframe\Install instructions`.

- Configure **IBM AD Connect for Mainframe** by following the instructions in *IBM AD Connect for Mainframe Configuration Guide*.

Chapter 9. Activating Your IBM AD

A free **IBM AD** version is offered for evaluation purposes. This *for evaluation* version allows you to create a maximum of 5 projects and compile a maximum of 100 programs and 100 JCLs. After you purchase the full version, you will receive an activation tool. Following are the steps you need to take for unlocking the full functionality of IBM AD.

Before you begin

Stop **IBM AD Build Client** and **IBM AD Administration Tool** before using the activation tool and make sure you run it on all machines where **IBM AD Build Client** is installed.

Procedure

1. Double-click the `ADActivation.exe` received from IBM. (Highly recommended to use *Run as Administrator* method)
2. **Application Discovery License Activation** dialog window is displayed. Click **Activate** then click **Exit** to finalize the activation.

Chapter 10. Uninstalling IBM AD Components

Important:

- Before starting the uninstall process, make sure that all IBM AD Build and IBM AD Analyze clients are closed.
- Uninstall the products in the exact order in which they are presented below.
- As a general note, understand that **Force the Deletion** option deletes all the contents of a specific folder, meaning that configurations are lost.
- After **IBM AD Build Client** is uninstalled **make sure to reboot** the workstation.
- In case you are upgrading and need to uninstall first, make sure to back up the configuration information. For more details on upgrading, go to Chapter 4, "Upgrading Components from Earlier Versions," on page 19.

1. Uninstall IBM AD:

   Under Windows

   - Stop all services that are related to IBM AD Batch Server, IBM AD Configuration Server, and IBM AD Analyze Server:
     - IBM Application Discovery Analyze Service
     - IBM Application Discovery Batch Service
     - IBM Application Discovery Configuration Admin Service
     - IBM Application Discovery Configuration Service
     - IBM Application Discovery GraphDB Service
   - Click **Start** and then select **All Programs** > **IBM Application Discovery and Delivery Intelligence** > **Unistall IBM Application Discovery and Delivery Intelligence**.
   - **Alternative CLI uninstall**: open a command line in *`Installation Path`*`\IBM Application Discovery and Delivery Intelligence\Uninstall` and run the following command:

     ```
     java –jar uninstaller.jar -cki
     ```

   Under Linux/zLinux

   - Stop all the processes that are related to IBM AD Batch Server, IBM AD Configuration Server, and IBM AD Analyze Server.
   - Stop all Java™ processes related to IBM AD Batch Server, IBM AD Configuration Server, and IBM AD Analyze Server.
   - Go to the installation folder (By default, the installation folder is *`Installation Path`*`\IBM Application Discovery and Delivery Intelligence\Uninstall`), execute `uninstaller.sh` and follow the uninstalling steps.
   - **Alternative CLI uninstall**: open a command line in *`Installation Path`*`\IBM Application Discovery and Delivery Intelligence\Uninstall` and run the following command:

     ```
     ./uninstaller.sh -cki
     ```

2. Uninstall IBM AD Analyze Client: To uninstall IBM AD Analyze Client: Go to **Eclipse client** > **Help** > **About Eclipse SDK**. In the **About Eclipse SDK** dialog window: Click **Installation Details**. In the Eclipse SDK Installation Details dialog window: From the **Installed Software** tab, select all the components that start with **Application Discovery** then click **Uninstall**. The **Uninstall** dialog window presents the list of components that will be uninstalled: Click **Finish** to start the uninstall process.

Chapter 11. Disaster Recovery

Backing Up Steps for Components

I. AD Configuration Server

Note:

- Before you start to back up on Windows, make sure that the IBMApplicationDiscoveryConfigurationAdminService and IBMApplicationDiscoveryConfigurationService services are stopped.
- Before you start to back up on Linux, make sure that the `startServer.sh` and `startWebServerUI.sh` files, corresponding to AD Configuration Server, are not running.

Procedure

1. Back up folder *<IBM AD Configuration Server Installation Path>*`\store`. The database and data of Configuration Server are stored in the `store` folder.
2. Back up folder *<IBM AD Configuration Server Installation Path>*`\conf`. The configuration files are stored in the `conf` folder.

II. AD Build Client

Procedure

1. Back up AD Build projects.
   a. Back up project folders.
      1) Include the default path for AD Build projects in the backing up procedure. The default path is defined in the **Default projects path** field. To see the value, click the **AD Build Client** tab in IBM AD Configuration Server. See the following figure for illustration:

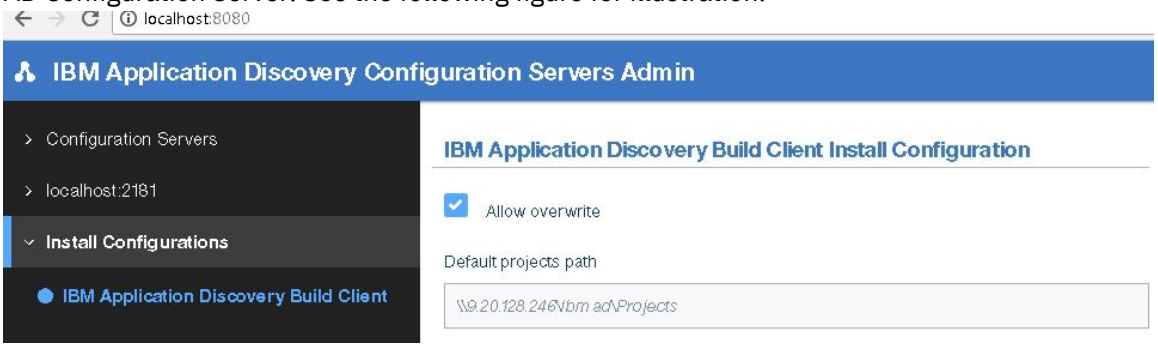


*Figure 8. **Default projects path** field*

      2) If project folders exist in the paths that are not the default path for AD Build projects, make sure to include those paths in the backing up procedure. To identify the paths, run the following query on the SQL Server where AD Build projects exist:

```
SET NOCOUNT ON;
DECLARE @t TABLE (DB VARCHAR(100), PathStrFull VARCHAR(1000)) ;
DECLARE @SQL NVARCHAR(MAX);

SELECT @SQL = STUFF((
    SELECT CHAR(13) + 'SELECT ''' + name + ''', PropValue FROM [' + name + '].[dbo].[Pj_ProjectProp] WHERE
ID_PropType = 27'
    FROM sys.databases
    WHERE OBJECT_ID('[' + name + '].[dbo].[Pj_ProjectProp]') IS NOT NULL
    FOR XML PATH(''), TYPE).value('.', 'NVARCHAR(MAX)'), 1, 1, '');
```

```
INSERT INTO @t(DB, PathStrFull)
EXEC sys.sp_executesql @SQL ;

SELECT ProjectsPaths
FROM (
       SELECT DISTINCT
       CASE WHEN CHARINDEX('EZ_', DB) = 1 THEN SUBSTRING(PathStrFull, 1, PATINDEX( '%[\]' + SUBSTRING(DB, 4,
LEN(DB) - 3) + '[\]%', PathStrFull))
            ELSE NULL
        END AS ProjectsPaths
       FROM @t t
      ) src
WHERE LEN(src.ProjectsPaths) > 0 ;
```

b. Back up the relational databases of AD Build Client projects.

Every AD Build Client project has its own corresponding relational database. Include all the relational databases with names that start with string "EZ_" in the backing up procedure, and make sure that they can be restored at any time. See the following figure for illustration:

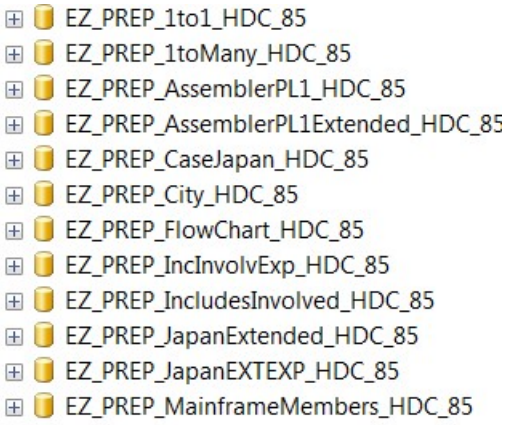


Figure 9. Relational database examples

2. Back up the source code files that are loaded in AD Build Client.

a. Include the path where source code files are automatically downloaded from a Mainframe system using AD Connect for Mainframe and stored in the backing up procedure. This path is defined in the **Path for the retrieved members** field. To see the value, click **Install Configurations > IBM Application Discovery Build Client** in IBM AD Configuration Server. See the following figure for illustration:

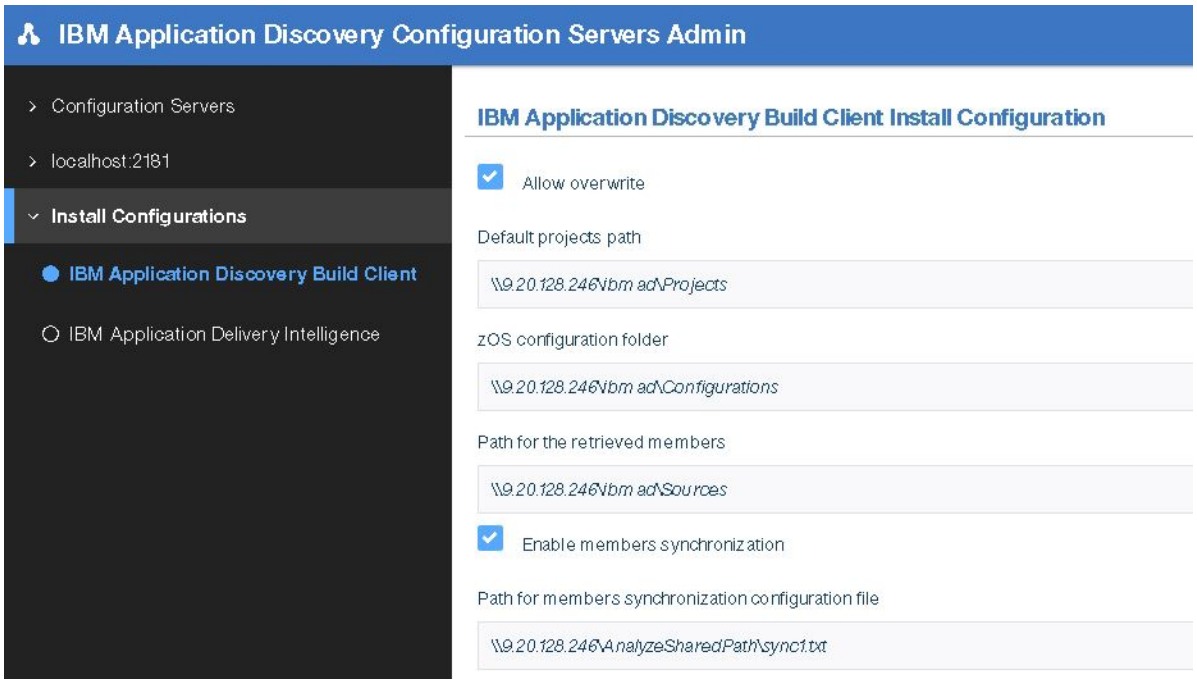


*Figure 10. **Path for the retrieved members** field*

b. For the source code files that are manually added or loaded in AD Build projects, make sure to include the paths where those files exist in the backing up procedure.

3. Back up AD Build configurations.

a. Back up z/OS configurations. The folder where z/OS configurations are stored is defined in the **zOS configuration folder** field. To see the value, click **Install Configurations > IBM Application Discovery Build Client** in IBM AD Configuration Server. See the following figure for illustration:

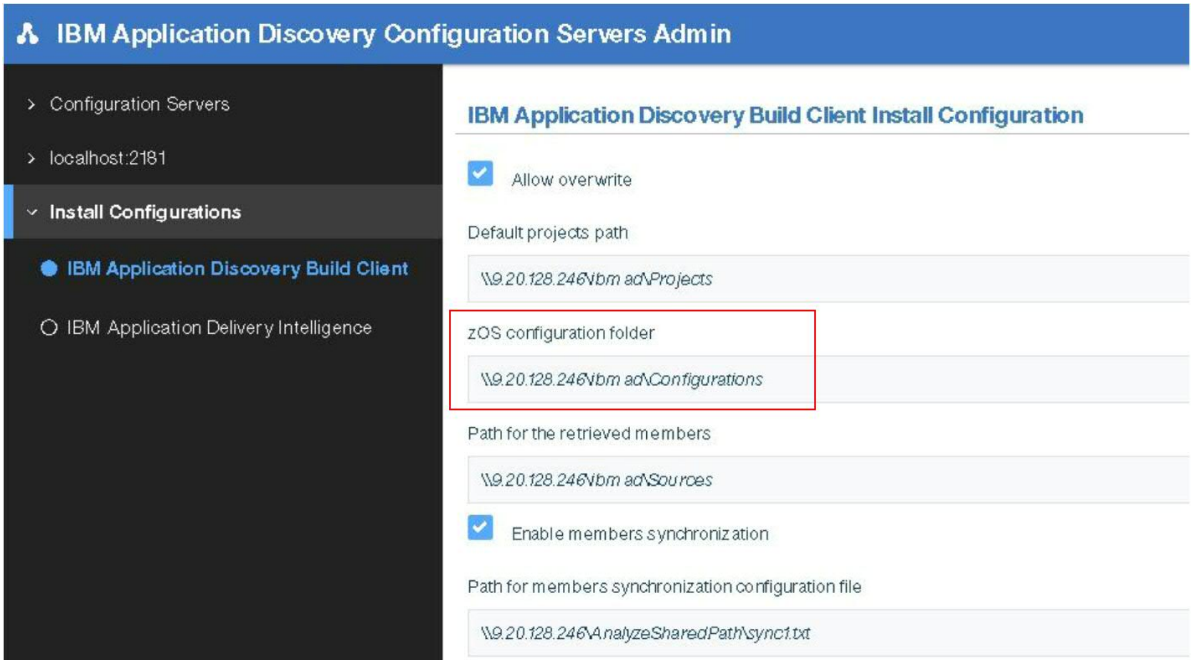


*Figure 11. **zOS configuration folder** field*

b. Back up the Synchronization configuration file. This file is used for the mainframe members synchronization process, and is defined in the **Path for members synchronization configuration file** field. To see the value, click **Install Configurations > IBM Application Discovery Build Client** in IBM AD Configuration Server. See the following figure for illustration:

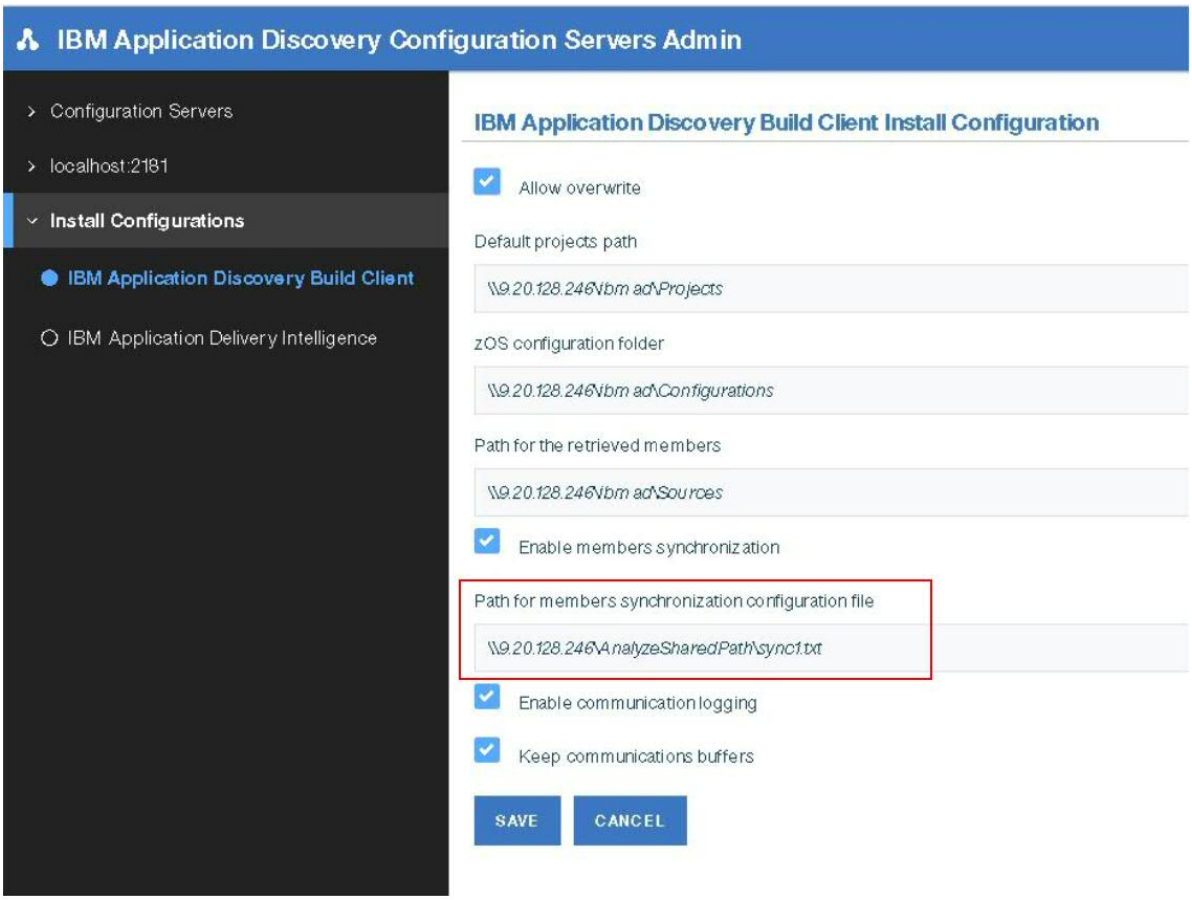


Figure 12. ***Path for members synchronization configuration file*** *field*

c. For environments that download assets from Endevor via IBM AD Connect for Mainframe, back up the following Endevor configuration files:

- Promotion routes configuration file
- Types list configuration file

The two files are configured for Endevor source code download. To see the file paths, click the **ENDEVOR Info** tab in the "zOS configuration" window. See the following figure for illustration:

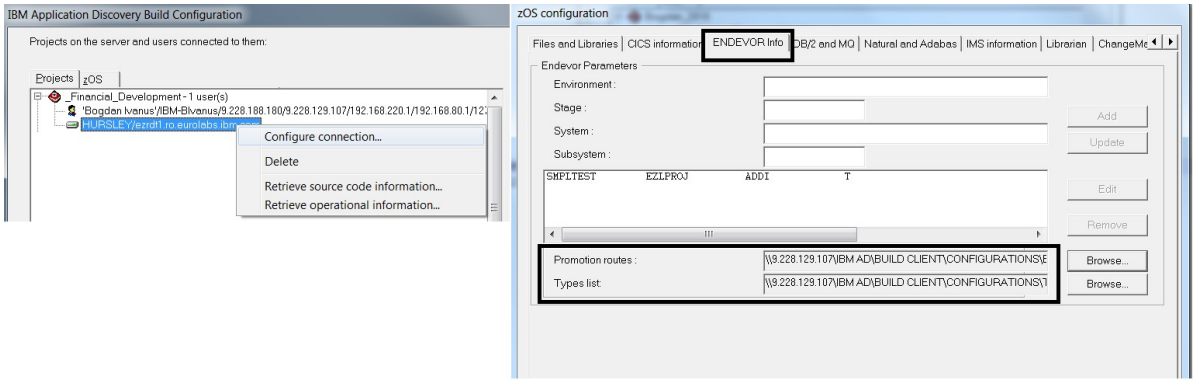


Figure 13. ***ENDEVOR Info*** *tab*

4. Back up the following AD Validation Service configuration files. They are stored in the *<IBM AD Build Client InstallationFolder>\IBMApplicationDiscoveryValidationServer* folder.

- `ApprovalRequestParameters.txt`
- `CompletionCodeVsMessage.txt`

- FoldersMapping.txt
- IncludesOrder.txt
- LoopbackResult.txt
- ParallelValidationParameters.txt
- ProjectsMapping.txt
- ProjectsMappingParallelBuild.txt
- ServicePort.txt

5. Back up the *<IBM AD Build Client InstallationFolder>\IBMApplicationDiscoveryValidationServer\ReportsGenerator* folder. By default, the conf, data, and tmp folders are contained by the ReportsGenerator folder. If the paths for the three folders are changed in the server.properties configuration file, back up accordingly.
6. If the Rule Based component is used, back up Rule Based reports and queries.
   a. Back up Rule Based reports.

      By default, the rule-based data is generated and stored in the data folder, which is already included in the backing up procedure. For more information about the data folder, see Step 5.

      If the default folders that are related to the Rule Based component are changed in the project.properties file, back up the folders as configured. If folders for specific projects are defined, back up the corresponding folders as well.

```
## output folder for rule based reports generated by source based rules. Default, data
folder
ruleBased.reportsFolder=

## output folder for csv files generated by data based rules. Default, data folder
#ruleBased.csvFolder=

## output folder for controlTotals files generated by source based rules. Default, data
folder
## used only if generateTotals is true
#ruleBased.totalsFolder=

## output folder for rule based reports generated by source based rules. Default, data
folder
#project.<projectName>.ruleBased.reportsFolder=

## output folder for csv files generated by data based rules. Default, data folder
#project.<projectName>.ruleBased.csvFolder=

## output folder for controlTotals files generated by source based rules. Default, data
folder
## used only if generateTotals is true
#project.<projectName>.ruleBased.totalsFolder=
```

   b. Back up Rule Based queries.

      If you use Rule Based global settings, check the paths where input and queries are stored in the ruleBasedConfig.properties file.

      If you use Rule Based project settings, check the paths where input and queries are stored in the rule properties file of each project. Also, if the rule properties files are not stored in the conf folder, back up the folders where they are stored.

III. AD Batch Server

Note:

- Before you start to back up on Windows, make sure that the IBMApplicationDiscoveryBatchService, IBMApplicationDiscoveryGraphDBService, and IBMApplicationDiscoveryWebService services are stopped.
- Before you start to back up on Linux, make sure that the server.sh (corresponding to GraphDB), startServer.sh (corresponding to AD Batch Server), and startWBServer.sh (corresponding to AD Web Service) files are not running.

- Generally, the `data` and `conf` folders that are distributed by the AD Batch Server installation must be included in the backing up procedure. See the following detailed description for the folders.

```
## path to the directory where configuration files are placed
## default: ${install.dir}/conf
conf.dir=<path>\conf

## path to the directory where data files are placed
## default: ${install.dir}/data
data.dir=<path>\data

## path to the directory where temporary data is placed
## default: ${data.dir}/tmp
tmp.dir=<path>\tmp
```

If the default paths for the `data`, `conf`, and `tmp` folders are changed in the `server.properties` configuration file, back up accordingly.

Procedure

1. Back up configurations.
   a. Back up the *<Batch Server Installation Path>*\Conf configuration folder.
   b. Back up the following configuration folders from the `tmp` folder:
      - *<Batch Server Installation Path>**data*\tmp\mfp
      - *<Batch Server Installation Path>**data*\tmp\ver
2. Back up OrientDB databases (graph databases).

   Back up the default folder *<Batch Server Installation Path>**data*\tmp\gdb. The size of this folder might be large, depending on the number and size of AD Build Client projects.
3. Back up the index folders as defined in the `project.properties` configuration file. The indexes that are generated by AD Batch Server and used for Search In Files analysis in AD Analyze Client are stored in these folders. If indexes for specific projects are defined, back up the corresponding index folders as well.

```
## index global settings
## output folder where indexes are stored. (project name will be added by default)
## this setting does not override database entry!
## Note that index folder should be a shared folder in order for all Analyze client to be able to use it
index.indexFolder=\\9.20.128.211\\IBM AD\\Batch Server\\Indexes

### index project settings
## output folder where index for this project is stored. must be unique per project
## this setting does not override database entry!
project.
project.<projectName>.index.indexFolder==\\9.20.128.211\\IBM AD\\Batch Server\\Indexes\\<projectName>
```

4. Back up the *<Batch Server Installation Path>**data*\tmp\wsmetrics folder. The Web Services data is stored in this folder.
5. If the Rule Based component is used, back up Rule Based reports and queries.
   a. Back up Rule Based reports.

   By default, the rule-based data is generated and stored in the `data` folder, which is already included in the backing up procedure. For more information about the `data` folder, see the preceding Note.

   If the default folders that are related to the Rule Based component are changed in the `project.properties` file, back up the folders as configured. If folders for specific projects are defined, back up the corresponding folders as well.

```
## output folder for rule based reports generated by source based rules. Default, data
folder
ruleBased.reportsFolder=

## output folder for csv files generated by data based rules. Default, data folder
#ruleBased.csvFolder=
```

```
## output folder for controlTotals files generated by source based rules. Default, data
folder
## used only if generateTotals is true
#ruleBased.totalsFolder=

## output folder for rule based reports generated by source based rules. Default, data
folder
#project.<projectName>.ruleBased.reportsFolder=

## output folder for csv files generated by data based rules. Default, data folder
#project.<projectName>.ruleBased.csvFolder=

## output folder for controlTotals files generated by source based rules. Default, data
folder
## used only if generateTotals is true
#project.<projectName>.ruleBased.totalsFolder=
```

b. Back up Rule Based queries.

If you use Rule Based global settings, check the paths where input and queries are stored in the `ruleBasedConfig.properties` file.

If you use Rule Based project settings, check the paths where input and queries are stored in the rule properties file of each project. Also, if the rule properties files are not stored in the `conf` folder, back up the folders where they are stored.

6. Back up the annotation database.

In earlier versions of IBM AD, IBM AD Batch Server creates a database that is called EZ#Annotations in Microsoft SQL Server. This database is created on the SQL Server as defined in the `server.properties` configuration file.

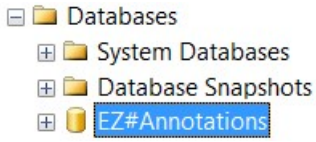


Figure 14. EZ#Annotations database

Starting with IBM AD V5.1.0, IBM AD Batch Server reads the configurations that are made in **IBM AD Configuration Sever**, under **Annotations Database** and create the annotations database in the relational database server that is specified there, by using the database name and the schema set by the user.

You can still add EZ#Annotations in database name field, together with dbo schema and associate the relational database server in which the annotation database was created, the one defined in the `server.properties` configuration file.

Using the configurations set in **Annotations Database** configurations area you can find out the name of your annotations database, the schema and the associated relational database server in order to know what database to back up.

IV. AD Analyze Server

Note:

- Before you start to back up on Windows, make sure that the IBMApplicationDiscoveryAnalyzeService service is stopped.
- Before you start to back up on Linux, make sure that the `StartServer.sh` file, corresponding to IBM AD Analyze Server, is not running.

Procedure

If the IBM AD Analyze Server component is used, follow the steps to back up:

1. Back up the IBM AD Analyze Server database.

IBM AD Analyze Server creates a database in Microsoft SQL Server. To identify the IBM AD Analyze Server database, start IBM AD Analyze Server, and click the **Database settings** tab. See the following figure for the illustration of the details about the SQL Server location and the database:

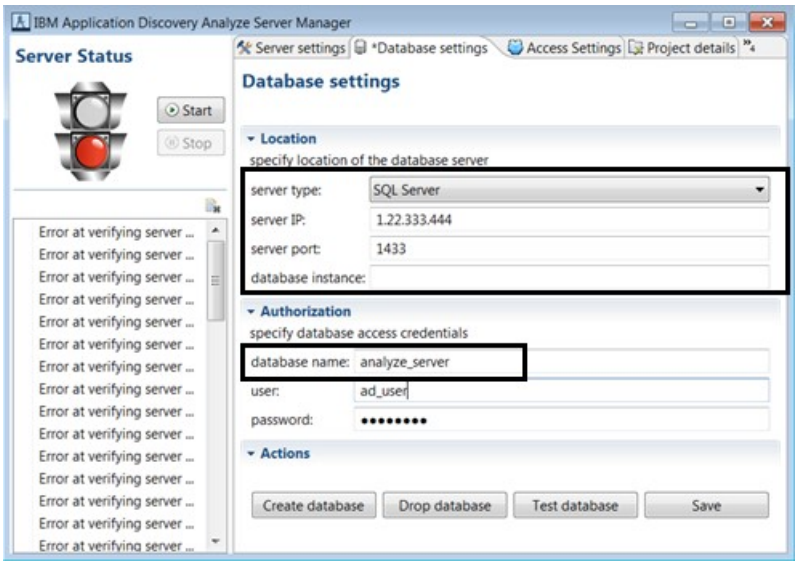


Figure 15. IBM AD Analyze Server database details

2. Back up the following configuration files. These three files are required for IBM AD Analyze Server Service, and they are stored in folder *<IBM AD Analyze Server Installation Folder>*.
   - `server.properties`
   - `client.properties`
   - `database.properties`

V. AD Analyze Client

Procedure

Back up the Analyze Client workspace. All information about configuration settings is stored in the Analyze Client workspace. To see the workspace location, click **Windows > Preferences > Workspace**.

VI. AD Web Services

Note:

- The IBM AD Catalog, IBM AD Audit, and IBM AD BRD web services are deployed on the same IBM WAS Liberty Web Server. Back up the web services together because they are using the same configuration file.
- The `server.xml` file is the only file that is changed and can be configured after the deployment of the IBM AD Catalog, IBM AD Audit, and IBM AD BRD web services.

Procedure

1. Back up the IBM AD Catalog and IBM AD Audit databases.

   Both IBM AD Catalog and IBM AD Audit require a database. To back up the databases that are used by the IBM AD Catalog and IBM AD Audit, see the `server.xml` file and get the database connection details.

   - For the Audit web service, search for the following data source:

     ```
     <dataSource id="DefaultDataSource" jndiName="jdbc/datasource" type="javax.sql.DataSource">
     ```

   - For the Catalog web service, search for the following data source:

```
<dataSource id="ADCatRDB" jndiName="jdbc/ad/catalog/relational"
type="javax.sql.DataSource">
```

2. Back up the `server.xml` configuration file.

   Add the `server.xml` file in the backup directory for web services. The `server.xml` file is under the web service installation path: *<was_liberty_path>*\usr\servers\ad_server.
3. For the IBM AD Catalog web service, back up the DataColector configuration files `DC.properties` and `zoscdc.cmd`. The files are stored under the `zoscDataCollector` directory in the same location as the IBM WAS Liberty.
4. For the IBM AD BRD web service, back up the `conf.brd-ws` folder that includes the `application.properties` file.

VII. AD Services

Procedures

Back up the configuration files for the following **IBM AD Services** as follows:

- **Authentication Server (DEX)**

  Back up the `dex.yaml` file that is stored in the `<IBM ADDI Installation Folder>/Authentication Server (DEX)/conf/` folder.
- **IBM AD File Service**

  Back up the `conf.yaml` file that is stored in the `<IBM ADDI Installation Folder>/IBM Application Discovery File Service/conf/` folder.
- **IBM AD Search Service**

  Back up the `conf.yaml` file that is stored in the `<IBM ADDI Installation Folder>/IBM Application Discovery Search Service/conf/` folder.
- **IBM AD Manual Resolutions Service**

  1. Back up the `conf.yaml` file that is stored in the `<IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions Service/conf/` folder.
  2. Back up the folder where the journals were created by following the same path that is set in the `conf.yaml`, both the default path and the overridden path. The values of the **projectPath** parameter and the **projects** section present in the `conf.yaml` need to be taken into consideration.
- **IBM AD Mainframe Projects Service**

  Back up the `conf.yaml` file that is stored in the `<IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/conf/` folder.
- **IBM AD Cross Applications Service**

  Back up the `conf.yaml` file that is stored in the `<IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/conf/` folder.

Restoring Steps for Components

Important:

- All the following components must be installed, and their corresponding services (Windows) and processes (Linux) must be stopped before you start to restore.
- Make sure that you restore in the same order as mentioned in this document. Restoring in a different order might make the components not work properly because the components have dependencies.
- Make sure to maintain the same IP/Hostname values for the AD components and AD SQL Server machines when you restore, considering that AD components are using IP/Hostname values for some of their configurations.

I. AD Configuration Server

Note:

- Before you start to restore on Windows, make sure that the IBMApplicationDiscoveryConfigurationAdminService and IBMApplicationDiscoveryConfigurationService services are stopped.
- Before you start to restore on Linux, make sure that the `startServer.sh` and `startWebServerUI.sh` files, corresponding to AD Configuration Server, are not running.

Procedure

1. Restore the database and data of Configuration Server. For more information about the database and data, see step 1 in section backing up steps for AD Configuration Server.
2. Restore the configuration files. For more information about the files, see step 2 in section backing up steps for AD Configuration Server.

   Note: At this point, IBM AD Configuration Server is configured and up and running.

II. AD Build Client

Note: Before you start to restore AD Build Client, AD Configuration Server must be restored, and AD Build Client is highly recommended to be installed.

Procedure

1. Restore AD Build projects.
   a. Restore the project folders. For more information about the folders, see substep a of step 1 in section backing up steps for AD Build Client.

      Note: Make sure to keep the same security/share level for each folder as they were defined.

   b. Restore the relational databases of AD Build Client projects. For more information about the databases, see substep b of step 1 in section backing up steps for AD Build Client.

      Note: Make sure to maintain the same ownership for each database as they were defined, and that the owner has all the necessary rights as defined during installation and configuration.
2. Restore the source code files that are loaded in AD Build Client. For more information about the files, see step 2 in section backing up steps for AD Build Client.

   Note: Make sure to keep the same security/share level for each folder as they were defined.
3. Restore AD Build configurations. For more information about the configurations, see step 3 in section backing up steps for AD Build Client.

   Note:

   - Make sure to keep the same security/share level for each folder as they were defined.
   - At this point, IBM AD Build Client is configured and up and running, and all the projects are available and can be used.
4. If AD Validation Service is used, restore AD Validation Service configuration files. For more information about the files, see step 4 and 5 in section backing up steps for AD Build Client.
5. If the Rule Based component is used, restore Rule Based reports and queries. For more information about the reports and queries, see step 6 in section backing up steps for AD Build Client.

   Note: At this point, IBM AD Validation Service is configured, and the corresponding service can be started.

III. AD Batch Server

Note:

- Before you start to restore on Windows, make sure that the IBMApplicationDiscoveryBatchService, IBMApplicationDiscoveryGraphDBService, and IBMApplicationDiscoveryWebService services are stopped.
- Before you start to restore on Linux, make sure that the `server.sh` (corresponding to GraphDB), `startServer.sh` (corresponding to AD Batch Server), and `startWBServer.sh` (corresponding to AD Web Service) files are not running.
- Before you start to restore AD Batch Server, AD Configuration Server and AD Build Client must be restored or up and running.

Procedure

1. Restore the configuration folders. For more information about the folders, see step 1 in section backing up steps for AD Batch Server.
2. Restore OrientDB databases (graph databases).
   a. Restore the default folder. For more information about the folder, see step 2 in section backing up steps for AD Batch Server.
   b. To re-create the symbolic links, go to `<IBM AD Batch Server Installation folder>` and run `recoverGDBSymbolicLinks.bat` on Windows and `recoverGDBSymbolicLinks.sh` on Linux.

      Note: Both of the files must be executed with the following two parameter values:

      Location of the graph databases
      "<IBM AD Batch Server Installation path>\data\tmp\gdb"

      Location where the symbolic links must be created
      "<IBM AD Batch Server Installation path>\orientdb\orientdb-community\databases"

      Example: `recoverGDBSymbolicLinks.bat "<IBM AD Batch Server Installation path>\data\tmp\gdb" "<IBM AD Batch Server Installation path>\orientdb\orientdb-community\databases"`
3. Restore the index folders. For more information about the folders, see step 3 in section backing up steps for AD Batch Server.

   Note: Make sure to keep the same security/share level for each folder as they were defined.
4. Restore the Web Services data. For more information about the data, see step 4 in section backing up steps for AD Batch Server.
5. If the Rules Based component is used, restore Rules Based reports. For more information about the reports, see step 5 in section backing up steps for AD Batch Server.
6. Restore the annotation database: EZ#Annotations. For more information about the database, see step 6 in section backing up steps for AD Batch Server.

   Note:

   - Make sure to maintain the same ownership for the annotation database as it was defined, and that the owner has all the necessary rights as defined during installation and configuration.
   - At this point, IBM AD Batch Server is configured, and all the corresponding services (Windows) and processes (Linux) can be started.

IV. AD Analyze Server

Note:

- Before you start to restore on Windows, make sure that the IBMApplicationDiscoveryAnalyzeService service is stopped.
- Before you start to restore on Linux, make sure that the `StartServer.sh` file, corresponding to Analyze Server, is not running.

Procedure

1. Restore the Analyze Server database. For more information about the database, see step 1 in section backing up steps for AD Analyze Server.

   Note: Make sure to maintain the same ownership for the Analyze Server database as it was defined, and that the owner has all the necessary rights as defined during installation and configuration.
2. Restore the Analyze Server configuration files. For more information about the files, see step 2 in section backing up steps for AD Analyze Server.

   Note: At this point, IBM AD Analyze Server is configured, and all the corresponding services (Windows) and processes (Linux) can be started.

V. AD Analyze Client

Procedure

1. Restore the Analyze Client workspace. For more information about the workspace, see the procedure in section backing up steps for AD Analyze Client.
2. Set the Analyze Client Eclipse to use the backup workspace.
   a. Open the Analyze Client instance.
   b. Click **File > Switch Workspace > Other...**.
   c. Select the backup workspace.

Note: At this point, IBM AD Analyze Client is configured and ready to use for analysis.

VI. AD Web Services

Procedure

1. Restore the IBM AD Catalog and IBM AD Audit databases. For more information about the databases, see step 1 in section backing up steps for AD Web Services.

   Note: Make sure to maintain the same ownership for each database as it was defined, and that the owner has all the necessary rights as defined during installation and configuration.
2. Restore the `server.xml` configuration file. For more information about the file, see step 2 in section backing up steps for AD Web Services.

   If the database connection details were changed, edit the `server.xml` file to point to the correct location of the SQL/Db2 server, and change the credentials accordingly.
3. For IBM AD Catalog, restore the DataCollector configuration files `DC.properties` and `zoscdc.cmd`. For more information about the files, see step 3 in section backing up steps for AD Web Services.

   Create a directory *<was_liberty_path>*`\zoscDataCollector`, and put the DataCollector configuration files in it.
4. For IBM AD BRD, restore the `conf.brd-ws` folder which includes the `application.properties` file.

   Note: At this point, IBM AD Catalog, IBM AD Audit and IBM AD BRD are configured, and all their services (Windows) and processes (Linux) can be started.

VII. AD Services

Procedures

Restore the configuration files for the following **IBM AD Services** as follows:

- **Authentication Server (DEX)**

Restore the dex.yaml file and place it under the <IBM ADDI Installation Folder>/Authentication Server (DEX)/conf/ folder.

- **IBM AD File Service**

  Restore the conf.yaml file and place it under the <IBM ADDI Installation Folder>/IBM Application Discovery File Service/conf/ folder.

- **IBM AD Search Service**

  Restore the conf.yaml file and place it under the <IBM ADDI Installation Folder>/IBM Application Discovery Search Service/conf/ folder.

- **IBM AD Manual Resolutions Service**

  1. Restore the conf.yaml file and place it under the <IBM ADDI Installation Folder>/IBM Application Discovery Manual Resolutions/conf/ folder.
  2. Restore the folders where the journals were created by following the same path that is set in the conf.yaml file.

     Note: If the path to the folders where the journals are placed is different from the previous one, make sure that you add the new path in the conf.yaml configuration file.

- **IBM AD Mainframe Projects Service**

  Restore the conf.yaml file and place it under the <IBM ADDI Installation Folder>/IBM Application Discovery Mainframe Projects Service/conf/ folder.

- **IBM AD Cross Applications Service**

  Restore the conf.yaml file and place it under the <IBM ADDI Installation Folder>/IBM Application Discovery Cross Applications Service/conf/ folder.

Chapter 12. Integration with IBM License Metric Tool

IBM AD generates IBM Software License Metric Tag (SLMT) files. The versions of IBM License Metric Tool that support IBM Software License Metric Tag can generate License Consumption Reports.

Each instance of a running environment generates an IBM Software License Metric Tag file. The **USER** metrics are monitored. The values are refreshed every 10 minutes.

IBM AD generates an SLMT tag file that records the active user count at 10-minute intervals. The recorded information is:

- **USER**: containing the name of the system account that started IBM AD Analyze Client.
- **INSTANCE**: containing the workspace of IBM AD Analyze Client.
- **APPLICATION_INSTANCE**: a unique identifier of the current workspace of IBM AD Analyze Client.

IBM SLM tag files are found at `work/.metadata/.ez/.slmtag` for Linux and `work\.metadata\.ez\.slmtag` for Windows. This is a relative path where `work` is the name of the workspace used for the IBM AD Analyze Client installation.

Following is an example of the content of an SLM tag file:

```
<SchemaVersion>2.1.1</SchemaVersion>
    <SoftwareIdentity>
        <PersistentId>e1874f9ed93d4a3fb9cda4c1c442b1b1</PersistentId>
        <Name>IBM Application Discovery</Name>
        <InstanceId>/eviewer/workspace/.metadata/.ez/.slmtag</InstanceId>
    </SoftwareIdentity>
    <Metric logTime="2017-11-14T16:02:39+02:00">
        <Type>USER</Type>
        <SubType>adriana</SubType>
        <Value>13</Value>
        <Period>
            <StartTime>2017-11-14T16:02:39+02:00</StartTime>
            <EndTime>2017-11-14T16:02:39+02:00</EndTime>
        </Period>
    </Metric>
    <Metric logTime="2017-11-14T16:02:39+02:00">
        <Type>INSTANCE</Type>
        <SubType>/eviewer/workspace</SubType>
        <Value>13</Value>
        <Period>
            <StartTime>2017-11-14T16:02:39+02:00</StartTime>
            <EndTime>2017-11-14T16:02:39+02:00</EndTime>
        </Period>
    </Metric>
    <Metric logTime="2017-11-14T16:08:10+02:00">
        <Type>USER</Type>
        <SubType>adriana</SubType>
        <Value>13</Value>
        <Period>
            <StartTime>2017-11-14T16:08:10+02:00</StartTime>
                    <EndTime>2017-11-14T16:08:10+02:00</EndTime>
        </Period>
    </Metric>
    <Metric logTime="2017-11-14T16:08:10+02:00">
        <Type>INSTANCE</Type>
        <SubType>/eviewer/workspace</SubType>
        <Value>13</Value>
        <Period>
            <StartTime>2017-11-14T16:08:10+02:00</StartTime>
            <EndTime>2017-11-14T16:08:10+02:00</EndTime>
        </Period>
    </Metric>
```

Documentation Notices for IBM Application Discovery for IBM Z

This edition applies to version 5.1.0 of IBM Application Discovery for IBM Z with the corresponding fix packs.

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