ThinApp User's Guide

ThinApp 4.0.4

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About This Book

The *ThinApp User's Guide* provides information about how to install ThinApp, capture applications, deploy applications, and upgrade applications. You can refer to this guide to customize parameters and perform scripting.

Intended Audience

This book is intended for anyone who installs ThinApp and deploys captured applications. Typical users are system administrators responsible for the distribution and maintenance of corporate software packages.

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1 Installing ThinApp

The ThinApp software isolates and contains applications, simplifies application customization and deployment to different operating systems, and eliminates application conflict.

This information includes the following topics:

ThinApp Requirements

Review the requirements for operating systems and captured applications before installing ThinApp.

Operating Systems, Applications, and Systems That ThinApp Supports

ThinApp supports the following operating systems, applications, and systems:

- 32-bit platforms include Windows NT, Windows 2000, Windows XP, Windows XPE, Windows 2003 Server, Windows Vista, Windows Server 2008
- 64-bit platforms include Windows XP 64 bit, Windows 2003 64 bit, Windows Vista 64 bit, Windows Server 2008 64 bit
- 16-bit applications running on 32-bit Windows operating systems
- 32-bit applications running on 32-bit and 64-bit Windows operating systems
- Terminal Server and Citrix Xenapp

ThinApp supports Japanese applications captured and run on Japanese operating systems.

ThinApp does not support these operating systems and applications:

- 16-bit or non-x86 platforms such as Windows CE
- 64-bit applications running on 32-bit or 64-bit Windows operating systems
- 16-bit applications running on 64-bit Windows operating systems

Applications That ThinApp Cannot Virtualize

ThinApp cannot convert some applications into virtual applications and might block certain application functions.

You must use traditional installation technologies to deploy the following types of applications:

- Applications requiring installation of kernel-mode device drivers

  ODBC drivers work because they are user mode drivers.
- Antivirus and personal firewalls
- Scanner drivers and printer drivers
- Some VPN clients

Device Drivers

Applications that require device drivers do not work when packaged with ThinApp. You must install those device drivers in their original format on the host computer. Because ThinApp does not support virtualized device drivers, you cannot use ThinApp to virtualize antivirus, VPN clients, personal firewalls, and disk and volume mounting-related utilities.

If you capture Adobe Acrobat, you can open, edit, and save PDF files, but you cannot see or use the PDF printer driver that allows you to save documents to PDF format.

Shell Integration

Some applications that provide shell integration have reduced functions when they exist in a ThinApp package. For example, a virtual application that integrates with Windows Explorer cannot add specific entries to the Windows Explorer context menus.

DCOM Services that are Accessible on a Network

ThinApp isolates COM and DCOM services. Applications that install DCOM services are accessible on the local computer only by other captured applications running in the same ThinApp sandbox. ThinApp supports virtual DCOM and COM on the same computer but does not support network DCOM.

Global Hook DLLs

Some applications use the `SetWindowsHookEx` API function to add a DLL to all processes on the host computer. The added DLL intercepts Windows messages to capture keyboard and mouse input from other applications. ThinApp ignores requests from applications that use the `SetWindowsHookEx` function to try to install global hook DLLs. ThinApp might reduce the application functions.

Recommendations for Installing ThinApp

When you install ThinApp, keep in mind the recommendations and best practices.

Using a Clean Computer

VMware recommends using a clean computer to install ThinApp because the environment affects the application capture process. A clean computer is a physical or virtual machine with only a Windows operating system. In a corporate environment where you have a base desktop image, the base desktop image is your clean computer. The desktop computer might already have some components and libraries installed.

Application installers skip files that already exist on the computer. If the installer skips files, the ThinApp package does not include them during the application capture process. The application might fail to run on other computers where the files do not exist. A clean computer allows the capture process to scan the computer file system and registry quickly.

If you install ThinApp and capture an application on a computer that has Microsoft .NET 2.0 already installed, .NET 2.0 is not included in the ThinApp package. The captured application runs only on computers that have .NET 2.0 already installed.

Using Virtual Machines for Clean Computers

The easiest way to set up a clean computer is to create a virtual machine. You can install Windows on the virtual machine and take a snapshot of the entire virtual machine in its clean state. After you capture an application, you can restore the snapshot and revert it to a clean virtual machine state that is ready for the next application capture.

You can use VMware Workstation or other VMware products to create virtual machines. For information about VMware products, see the VMware Web site.

Using the Earliest Operating System Required For Users

Install ThinApp on a clean machine with the earliest version of the operating system you plan to support. In most cases, the earliest platform is Windows 2000 or Windows XP. Most packages captured on Windows XP work on Windows 2000. In some cases, Windows XP includes some DLLs that Windows 2000 does not have. ThinApp excludes these DLLS from the captured application package if the application typically installs these DLLs.

After you create a ThinApp application package, you can overwrite files in the package with updated versions and rebuild the application without the capture process.

Install ThinApp

Use the ThinApp executable file to install ThinApp.

To install ThinApp software

1 Download ThinApp to a clean physical or virtual Windows machine.

2 Double-click the ThinApp executable file.

3 In the **Patent Lists** dialog box, click **Next**.

4 Accept the license, enter the serial number, and enter a license display name that appears when you start applications that ThinApp captures.

5 Click **Install**.

ThinApp is installed.

Locating ThinApp Installation Files

The ThinApp installation generates the `VMware ThinApp` directory in `C:\Program Files\VMware`. You might need to locate files in this directory to view license information or perform operations such as starting the Log Monitor utility to view recent activity.

The following key files in the `VMware ThinApp` directory affect ThinApp operations:

- **AppSync.exe** – Keeps captured applications up to date with the latest available version.
- **logging.dll** – Generates `.trace` files.
- **dll_dump.exe** – Lists all captured applications that are currently running on a system.
- **log_monitor.exe** – Displays the execution history and errors of an application.
- **sbmerge.exe** – Merges runtime changes recorded in the application sandbox with the ThinApp project and updates the captured application.
- **Setup Capture.exe** – Captures and configures applications through a wizard.
- **snapshot.exe** – Compares the preinstallation environment and postinstallation environment during the application capture process.

  ThinApp starts this utility during the setup capture process.

- **snapshot.ini** – Stores entries for the virtual registry and virtual file system that ThinApp ignores during the process of capturing an application.

  The `snapshot.exe` file references the `snapshot.ini` file. Advanced users might modify the `snapshot.ini` file to ensure ThinApp does not capture certain entries when creating an application package.

- **template.msi** – Builds the MSI files.

  You can customize this template to ensure the `.msi` files generated by ThinApp adhere to company deployment procedures and standards. For example, you can add registry settings that you want ThinApp to add to client computers as part of the installation.

- **thinreg.exe** – Registers captured applications on a computer.

  This registration includes setting up shortcuts and the **Start** menu and setting up file type associations that allow you to start applications.

- **tlink.exe** – Links key modules during the build process of the captured application.
- **vftool.exe** – Compiles the virtual file system during the build process of the captured application.
- **vregtool.exe** – Compiles the virtual registry during the build process of the captured application.

Capturing Applications 2

You can capture applications with the Setup Capture wizard. The capture process packages an application into a virtual environment and sets initial application parameters. For information about capturing applications from the command line, see Appendix C, "Snapshot Commands and Customization," on page 99.

This information uses Mozilla Firefox as a key example for application capture and includes the following topics:

Reviewing the Capture Process

The capture process involves the following phases:

- Scan of a baseline image of the clean machine.
- Installation of the application that ThinApp needs to capture.
- Configuration of settings specific to the application.

  For example, setting Firefox as a default browser, setting a home page, and setting default security settings.
- Scan of the machine after the application installation.

  ThinApp assesses the differences between the initial baseline image and this image.
- Configuration of ThinApp parameters to customize such areas as executable file compression, sandbox location, and domain user access to applications.
- Build of the virtual application package for distribution.

Assessing Application Dependencies Before the Capture Process

Before capturing an application, assess whether the application has any dependencies on other applications, libraries, or frameworks and whether to capture these dependencies. VMware recommends using the Application Link utility to link separate components at runtime. See Chapter 4, "Updating Applications," on page 39.

Closing Applications Before the Capture Process

To protect the file system, VMware recommends shutting down applications, such as virus scans, that might change the file system while ThinApp takes snapshots.

Capture an Application with the Setup Capture Wizard

The Setup Capture process packages an application and sets initial application parameters. If you use a virtual machine, consider taking a snapshot before you run the wizard. A snapshot of the original clean state allows you to revert to the snapshot when you want to capture another application.

Initiate the Capture Process with Prescan and Postscan Images

The Setup Capture wizard starts the capture process by taking multiple scans of the system to assess the environment before and after the application installation.

To start the capture process with prescan and postscan images

1 Download the applications to capture.

For example, download `Firefox Setup 2.0.0.3.exe` and copy it to the clean machine you are working with.

2 From the desktop, select **Start > Programs > VMware > ThinApp Setup Capture**.

3 (Optional) In the **Prescan System** dialog box, click **Advanced scan locations** to select the drives and registry hives to scan.

You might want to scan a particular location other than the `C:\` drive if you install applications to a different drive. In rare cases, you might want to avoid scanning a registry hive if you know that the application installer does not modify the registry.

4 Click **Scan** to establish a baseline system image of the hard drive and registry files.

The scanning process takes about 10 seconds for Windows XP.

5 When the **Install Application** page appears, minimize the Setup Capture wizard and install the applications to capture.

For example, double-click `Firefox Setup 2.0.0.3.exe to` install Firefox. If the application needs to reboot after the installation, reboot the system. The reboot restarts the Setup Capture wizard.

6 Make any necessary configuration changes to comply with your company policies, such as using specific security settings or a particular home page.

If you do not make configuration changes at this time, each user must make changes.

7 (Optional) Start the application and respond to any prompts for information before you continue with the Setup Capture wizard.

If you do not respond to any prompts at this time, each user who uses the application must do so during the initial start.

8 Close the application.

9 Maximize the Setup Capture wizard, click **Postscan** to proceed with another scan of the machine, and click **OK** to confirm the postscan operation.

ThinApp stores the differences between the first baseline image and this image in a virtual file system and virtual registry.

Specify Application Shortcuts and Tracking Names

Entry points are the executable files that start and provide access to the virtual application. The entry points you can choose from depend on the executable files that your captured application creates during installation. For example, if you install Microsoft Office, you can select entry points for Microsoft Word, Microsoft Excel, and other applications that are installed during a Microsoft Office installation. If you install Firefox, you might select `Mozilla Firefox.exe` and `Mozilla Firefox (SafeMode).exe` if users require safe mode access.

During the build process that occurs at the end of the Setup Capture wizard, ThinApp generates one executable file for each selected entry point. If you deploy the application as an MSI file or use the `thinreg.exe` utility, the desktop and **Start** menu shortcuts created on end-user desktops point to these entry points.

ThinApp provides the following entry points to troubleshoot or debug your environment:

- `cmd.exe` – Starts a command prompt in a virtual context that allows you to view the virtual filesystem.
- `regedit.exe` – Starts the registry editor in a virtual context that allows you to view the virtual registry.
- `iexplore.exe` – Starts `iexplore.exe` in a virtual context that allows you to test virtualized ActiveX controls.

Entry points start native executable files in a virtual context. Entry points do not create virtual packages of `cmd.exe`, `regedit.exe`, or `iexplore.exe`.

If you cannot predict the need for debugging or troubleshooting the environment, you can instead use the `Disabled` parameter in the `Package.ini` file at a later time to active these entry points. See "Disabled" on page 81.

Unlike entry points, the primary data container is the only file that contains the read-only virtual file system and virtual registry. You can determine the primary data container file by selecting an entry point or by entering a name for the container. This name appears in the `Package.ini` file followed by a `ReadOnlyData` parameter line. See "ReadOnlyData" on page 81.

The inventory name facilitates internal tracking of the application in the `Package.ini` file.

To specify application shortcuts and tracking names in the Setup Capture wizard

1 In the **Select Application Access Shortcuts** page, select the check boxes for user-accessible entry points.

   The wizard populates the list with executable files that ThinApp installed during the capture process, and automatically selects the executable files that were directly accessible through the desktop or **Start** menu shortcuts.

2 (Optional) If you want to debug your environment, select the **Show entry points used for debugging** check box to select the `iexplore.exe`, `regedit.exe`, and `cmd.exe` entry points in the list.

3 Select the primary data container, the file that stores virtual files and registry information, from the list based on the selected entry points.

   - If the size of the primary container is smaller than 200MB, ThinApp creates a `.exe` file as the primary container. For a small application such as Firefox, any `.exe` file can serve as the main data container.
   - If the size of the primary container is larger than 200MB, ThinApp creates a separate `.dat` file as the primary container because Windows XP and Windows 2000 cannot show shortcut icons for large `.exe` files. Generating separate small `.exe` files along with the `.dat` file fixes the problem.
   - If the size of the primary container is between 200MB and 1.5GB, ThinApp creates the default `.dat` file unless you select a `.exe` file to override the default `.dat` file.

4 If you select a `.exe` file to override the default `.dat` file when size of the primary container is between 200MB and 1.5GB, ignore the generated warning.

   Selecting a `.exe` file allows all applications to work properly but might prevent the proper display of icons.

5 If you cannot select a primary data container, type a primary data container name.

   If you plan to use the Application Sync utility to update a captured application, ThinApp uses the primary data container name during the process. You must use the same name across multiple versions of the application. You might not be able to select the same primary data container name from the list. For example, Microsoft Office 2003 and Microsoft Office 2007 do not have common entry point names.

6 (Optional) Change the inventory name that ThinApp uses for internal tracking of the application in the `Package.ini` file.

   Using the `thinreg.exe` utility or deploying the captured application as an MSI file causes the inventory name to appear in the Add or Remove Programs dialog box for Windows.

Specify User Groups and Sandbox Data Locations

ThinApp can use Active Directory groups to authorize access to the application and sandbox location. For example, you might restrict access to an application to ensure users do not pass it to unauthorized users. ThinApp does not support nested Active Directory groups. For example, if a user is a member of group A, and group A is a member of group B, ThinApp can only detect the user as a member of group A rather than group A and group B.

The sandbox is the directory where all changes that the captured application makes are stored. The next time you launch the application, those changes are incorporated from the sandbox. When you delete the sandbox directory, the application reverts to its captured state. You might delete a sandbox when an application has a problem and you want to revert the application back to the working original state. For more information about the sandbox, see Appendix B, "ThinApp Sandbox," on page 95.

To specify user groups and sandbox locations in the Setup Capture wizard

1 (Optional) In the **Set Up User Groups and Sandbox Location** page, click **Add** to specify Active Directory information.

Option	Action
Object Types	Specifies objects.
Locations	Specifies a location in the forest.
Object names (manually enter)	Searches for object names.
Advanced	Locates user names in the Active Directory forest.
Common Queries (under **Advanced**)	Searches for groups according to names, descriptions, disabled accounts, passwords, and days since last login.

2 Select the ThinApp sandbox location.

You can deploy it to a local user machine, carry it on a mobile USB stick, or store it in a network location.

If you deploy the sandbox to a local machine, use the user's profile. If you store the sandbox in a network drive, enter the absolute path to the location where you want the sandbox created. A sample path is `\\thinapp\sandbox\Firefox`. You can select a network location even if an application is installed on a local machine.

Specify File System Access

Isolation modes help determine the changes that affect the virtual environment and the physical environment. During the capture process, you can set Merged and WriteCopy isolation modes to determine different levels of write access to the physical file system. The wizard does not provide the Full isolation mode option. For information about the Full isolation mode that is available outside of the wizard, see "Modifying Isolation Modes" on page 23.

The key effect of the selection of Merged and WriteCopy isolation modes within the Setup Capture wizard is on the value of the `DirectoryIsolationMode` parameter in the `Package.ini` file. This parameter controls the default isolation mode for the files created by the capture process except when a different isolation mode exists in the `##Attributes.ini` file for an individual directory. For information about the `DirectoryIsolationMode` parameter, see "DirectoryIsolationMode" on page 64.

Merged isolation mode allows the application to modify elements on the physical file system outside of the virtual application package. Some applications rely on DLLs and registry information in the local system image. The advantage of using Merged mode is that documents saved by users end up on the physical system in the location expected by users, instead of in the sandbox. The disadvantage is that this mode might clutter the system image. An example of the residue might be first-execution markers by shareware applications written to random computer locations as part of the licensing process.

When you select the Merged isolation mode in the Setup Capture wizard, ThinApp completes the following operations:

- ThinApp sets the `DirectoryIsolationMode` parameter in the `Package.ini` file to `Merged`.
- ThinApp assigns the Merged isolation mode to the following directories:
  - %Personal%
  - %Desktop%
  - %SystemSystem%\spool

  If you save documents to the desktop and `My Documents` folder, ThinApp saves the documents to the physical system regardless of the Merged mode selection because Merged mode affects documents saved to global locations such as `C:\myfiles`.
- ThinApp excludes some locations from the Merged isolation mode and assigns the WriteCopy isolation mode to the following directories and their subdirectories:
  - `%AppData%`
  - `%Common AppData%`
  - `%Local AppData%`
  - `%Program Files Common%`
  - `%ProgramFilesDir%`
  - `%SystemRoot%`
  - `%SystemSystem%`
- ThinApp assigns the Full isolation mode to any new directories that the application creates during the installation.

The **Merged** option in the Setup Capture wizard has the same effect as the Merged mode setting in the `Package.ini` file, but the directory exceptions that use WriteCopy isolation mode apply only to the wizard option. The wizard configures the directory exceptions for you and adds `##Attributes.ini` files within the directories. To achieve the same result outside of the wizard, you must configure these directory exceptions manually.

WriteCopy isolation mode allows ThinApp to intercept write operations and redirect them to the sandbox. VMware recommends WriteCopy mode for legacy or untrusted applications. Although this mode might make it difficult to locate user data files that reside in the sandbox instead of the actual system, this mode is useful for locked down desktops where you want to prevent users from affecting the operating file system and registry files.

When you select the WriteCopy isolation mode in the Setup Capture wizard, ThinApp completes the following operations:

- ThinApp sets the `DirectoryIsolationMode` parameter in the `Package.ini` file to `WriteCopy`.
- ThinApp assigns the WriteCopy isolation mode to the following directories:
  - `%AppData%`
  - `%Common AppData%`
  - `%Local AppData%`
  - `%Program Files Common%`
  - `%ProgramFilesDir%`
  - `%SystemRoot%`
  - `%SystemSystem%`

- ThinApp assigns the Merged isolation mode to the following directories:
  - %Personal%
  - %Desktop%
  - %SystemSystem%\spool
- ThinApp assigns the Full isolation mode to any new directories that the application creates during the installation.

The **WriteCopy** option in the Setup Capture wizard has the same effect as the WriteCopy isolation mode setting in the `Package.ini` file, but the directory exceptions apply only to the wizard option. The wizard configures the directory exceptions for you and adds `##Attributes.ini` files within the directories. To achieve the same result outside of the wizard, you must configure these directory exceptions manually.

Regardless of the selected isolation mode, ThinApp treats write operations to network drives according to the `SandboxNetworkDrives` parameter in the `Package.ini` file. This parameter has a default value of 0 that directs write operations to the physical drive. ThinApp treats write operations to removable disks according to the `SandboxRemovableDrives` parameter in the `Package.ini`. This parameter has a default value of 0 that directs write operations to the physical drive.

All runtime modifications to virtual elements in the captured application are stored in the sandbox, regardless of the isolation mode setting. At runtime, virtual and physical registry elements are indistinguishable to an application, but virtual registry elements always supersede physical registry elements when both exist in the same location. If virtual and physical entries exist at the same location, isolation modes do not affect access to these entries because the application always interacts with virtual elements. If external group policy updates occur separately from the package through the physical registry, you might need to remove virtual registry elements from a package and verify that the parent element of these virtual registry elements does not use Full isolation. Because child elements inherit isolation modes from parent elements, Full isolation in a parent element can block the visibility of physical child elements to an application.

To specify file system access in the Setup Capture wizard

In the **Specify File System Access** page, select the isolation mode to determine which files and registry keys are visible and written by the virtual application you create.

Option	Action
Merged	Allows the application to read resources on and write to the local machine
WriteCopy	Allows the application to read resources on the local machine and restrict most modifications to the sandbox. ThinApp copies physical file system changes to the sandbox to ensure ThinApp only modifies copies of files instead of the actual files.

Specify Application Delivery Settings

You can specify the file format of an application, the size of the package, and the location of a ThinApp project. The project is the data created by the capture process. You cannot run or deploy the captured application until you build a package from the project files. The package is the executable file or MSI file with executable files that you use to run or deploy a captured application.

A typical Firefox application does not require an MSI installation. But other applications, such as Microsoft Office, that integrate with application delivery tools, work well as an MSI package. MSI generation requires you to install the MSI on the target device before you can use the application package.

MSI packages automate the process of registering file-type associations, registering desktop and **Start** menu shortcut, and displaying control panel extensions. If you plan to deploy ThinApp executables directly on each machine, you can accomplish the same registration using the `thinreg.exe` utility.

For more information about MSI files, see "Building an MSI Database" on page 29.

To specify application delivery settings in the Setup Capture wizard

1 (Optional) Change the directory where you want to save the ThinApp project.

If you keep the default directory and capture Firefox 2.0.0.3, the path might appear as `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox (2.0.0.3)`. The inventory name selected during the wizard determines the default project directory name.

2 (Optional) Select the **Build MSI package** check box and change the MSI filename.

3 (Optional) To create a smaller executable file for locations such as a USB stick, select the **Compress virtual package** check box.

In typical circumstances, compression reduces the on-disk storage requirement by 50 percent but slows the application performance when ThinApp uncompresses initial blocks that start the application.

4 Click **Save** to create the project.

Build Virtual Applications

The application package is the executable file or MSI file that you use to run or deploy a captured application. Before you build the package from the ThinApp project, you can review the project files to update settings. For example, if you capture Firefox 2.0.0.3, the location of the project files might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3`. You might browse the project before you build the application executable file or MSI file to update a setting, such as an Active Directory specification, in the `Package.ini` file that contains the parameters set during the capture process. For information about advanced configuration of the `Package.ini` file, see "Modifying Settings in the Package.ini File" on page 22.

The project includes folders, such as `%AppData%`, that represent file system paths that might change locations when running on different operating systems or computers. Most folders have `##Attributes.ini` files that specify the isolation mode at the folder level. The isolation mode setting at the granular folder level overrides the overall isolation mode setting of the `Package.ini` file.

If you capture an application on a 32-bit operating system and want to build it on a 64-bit operating system, you must set the `THINSTALL_BIN` environment variable on the machine with the 64-bit operating system to `C:\Program Files (x86)\VMware\VMware ThinApp`. You do not need to build the package on the same machine on which you captured the application. You can copy the project to another computer and discard the capture machine.

To build virtual applications in the Setup Capture wizard

1 (Optional) In the **Build Application Package** page, click **Edit Package.ini** to modify application parameters.

2 (Optional) To look at the ThinApp project files in Windows Explorer, click **Open project folder**.

3 (Optional) To prevent a build, select the **Skip the build process** check box.

You can build the package at a later time with the `build.bat` file in the captured application folder. For example, a Firefox 2.0.0.3 path to the `build.bat` file might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\build.bat`.

4 Click **Build** to build an executable file or MSI file containing the files you installed during the Setup Capture process.

5 Click **Finish**.

You can rebuild the package at any time after clicking **Finish** if you need to make changes.

Advanced Package Configuration

Advanced users might modify configuration files outside of the Setup Capture wizard, such as the `Package.ini` or `##Attributes.ini` files.

Modifying Settings in the Package.ini File

The `Package.ini` file contains configuration settings and resides in the captured application folder. For example, a Firefox 2.0.0.3 path might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\Package.ini`.

The following parameters are examples of settings that you might modify:

- `DirectoryIsolationMode` – Sets the isolation mode to `Merged`, `WriteCopy`, or `Full`.

  ThinApp caches the isolation modes for the registry and the file system at runtime in the sandbox. If you change the isolation mode for the project and rebuild the executable file, you might need to delete the sandbox for the change to take effect.

- `PermittedGroups` – Restricts use of an application package to a specific set of Active Directory users.
- `SandboxName` – Names the ThinApp sandbox.

  You might keep the name for incremental application updates and change the name for major updates.

- `SandboxPath` – Sets the sandbox location.

  You can set the sandbox in a USB location if the application executable file resides in that location.

- `SandboxNetworkDrives` – Specifies whether to direct write operations on the network share to the sandbox.
- `RequiredAppLinks` – Specifies a list of external ThinApp packages to import to the current package at runtime.

  If ThinApp cannot import a package, ThinApp stops the base application.

- `OptionalAppLinks` – Specifies a list of external ThinApp packages to import to the current package at runtime.

  If ThinApp cannot import a package, ThinApp allows the base application to start.

For information about all `Package.ini` parameters, see Appendix A, "Configuring Package Parameters," on page 61.

Edit the Package.ini File

Use a text editor to update the `Package.ini` file.

To edit the Package.ini parameters

1 Open the `Package.ini` file located in the captured application folder.

  For example, a Firefox 2.0.0.3 path might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\Package.ini`.

2 Activate the parameter to edit by removing the semicolon at the beginning of the line.

  For example, activate the `RemoveSandboxOnExit` parameter for Firefox.

  ```
  RemoveSandboxOnExit=1
  ```

  Another example might involve commenting out the `Protocols` parameter if you do not want Firefox to take over the protocols.

3 Delete or change the value of the parameter and save the file.

4 Double-click the `build.bat` file in the captured application folder to rebuild the application package.

  For example, a Firefox 2.0.0.3 path to the `build.bat` file might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\build.bat`.

Modifying Settings in the ##Attributes.ini File

The `##Attributes.ini` file applies configuration settings at the directory level. The `Package.ini` file applies settings at the overall application level.

For example, you can set the isolation mode at the directory or application level to determine which files and registry keys are visible and written by the virtual application you create. The detailed setting in the `##Attributes.ini` file overrides the overall `Package.ini` setting. The `Package.ini` setting determines the isolation mode only when ThinApp does not have `##Attributes.ini` information.

To compress only certain folders with large files rather than an entire application, you can compress files at the folder level with the `CompressionType` parameter in the `##Attributes.ini` file.

The `##Attributes.ini` file appears in most folders for the captured application. For example, the `Attributes.ini` file might be located in `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\%AppData%\##Attributes.ini`.

Edit the ##Attributes.ini File

Use a text editor to update the `##Attributes.ini` file.

To edit the ##Attributes.ini parameters

1 In the `##Attibutes.ini` file, uncomment, update, or delete the parameter.

2 Double-click the `build.bat` file in the captured application folder to rebuild the application package.

Modifying Isolation Modes

ThinApp provides the Merged and WriteCopy isolation mode choices in the Setup Capture wizard. For information about those modes, see "Specify File System Access" on page 18.

You can use a third isolation mode, Full, outside the wizard in the ThinApp configuration files. The Full isolation mode secures the virtual environment by blocking visibility to system elements outside the virtual application package. This mode restricts any changes to files or registry keys to the sandbox and ensures that no interaction exists with the environment outside the virtual application package. Full isolation prevents application conflict between the virtual application and applications installed on the physical system.

ThinApp caches the isolation modes for the registry and the file system at runtime in the sandbox. If you change the isolation mode for the project and rebuild the executable file, you might need to delete the sandbox for the change to take effect.

You can modify isolation modes in the `Package.ini` and `##Attributes.ini` files. See "Edit the Package.ini File" on page 22 and "Edit the ##Attributes.ini File" on page 23. For information about the effect of application updates on isolation modes, see "Affecting Isolation Modes with Application Link" on page 44.

Deploying Applications 3

Working with captured applications might involve working with deployment tools, the `thinreg.exe` utility, MSI files, and Active Directory.

This information includes the following topics:

ThinApp Deployment Options

You can deploy captured applications with deployment tools, in a VMware View environment, on a network share, or as basic executable files.

Deploying ThinApp With Deployment Tools

Medium and large enterprises often use major deployment tools, such as Symantec, BMC, and SMS tools. ThinApp works with all major deployment tools.

When you use any of these tools, you can create MSI files for the captured applications and follow the same process you use to deploy native MSI files. See deployment instructions from the tool vendors. For information about MSI files, see "Building an MSI Database" on page 29.

Deploying ThinApp in the VMware View Environment

If you work with VMware View, the workflow involves the following tasks:

- Creating executable files for the captured applications.
- Storing the executable files on a network share.
- Creating a login script that queries applications entitled to the user and runs the `thinreg.exe` utility with the option that registers the applications on the local machine. Login scripts are useful for nonpersistent desktops. See "Establishing File Type Associations with the thinreg.exe Utility" on page 26.
- Controlling user access to fileshares. IT administrators might control access by organizing network shares based on function and associating permissions with network shares based on those functional boundaries.

Deploying ThinApp on Network Shares

Small and medium enterprises tend to use a network share. You can create executable files for the captured application and store them on a network share. Each time you deploy a new application or an update to an existing package, you can notify client users to run the `thinreg.exe` utility with an appropriate option.

IT administrators can control user access to fileshares by organizing network shares based on function and associating permissions with network shares based on those functional boundaries.

The differences between the network share option and the VMware View option are that the network share option assumes a mix of physical and virtual (persistent) desktops and involves users running the `thinreg.exe` utility directly instead of relying on login scripts.

Deploying ThinApp Using Executable Files

You use this basic option in an environment where disk usage is limited. You can create executable files for the captured applications, copy them from a central repository, and run the `thinreg.exe` utility manually to register file type associations, desktop shortcuts, and the application package on the system.

Establishing File Type Associations with the thinreg.exe Utility

ThinApp requires you to use the `thinreg.exe` utility to open files, such as a `.doc` document or an `.html` page. For example, if you click a URL in an email message, ThinApp must be set to start Firefox. You do not have to run the `thinreg.exe` utility for MSI files because MSI files start the utility automatically during the application installation.

The `thinreg.exe` utility creates the **Start** menu and desktop shortcuts, sets up file type associations, adds uninstall information to the system control panel, and unregisters previously registered packages. The utility allows you to see the control panel extensions for applications, such as Quicktime or the mail control panel applet for Microsoft Outlook 2007. When you right-click a file, such as a `.doc` file, the `thinreg.exe` utility allows you to see the same menu options for a `.doc` file in a native environment.

If an application runs SMTP or HTTP protocols, such as an email link on a Web page that needs to open Microsoft Outlook 2007, the `thinreg.exe` utility starts available virtual applications that can handle those protocols. If virtual applications are not available, the `thinreg.exe` utility starts native applications that can handle those protocols.

The default location of the utility is `C:\Program Files\VMware\VMware ThinApp`.

Application Sync Effect on the thinreg.exe Utility

ThinApp provides the Application Sync utility to update an application package. The Application Sync utility has the following effect on the `thinreg.exe` utility:

- If you add, modify, or remove executable files, the `thinreg.exe` utility reregisters the file type associations, shortcuts, and icons.
- If you install protocols, MIME types, control panel applets, and templates other than executable files, the `thinreg.exe` utility reregisters these elements.

For information about the Application Sync utility, see "Application Sync Updates" on page 39.

Run the thinreg.exe Utility

This example provides some sample `thinreg.exe` commands. The package name in the `thinreg.exe` commands can appear in the following ways:

- `C:\<absolute_path_to_.exe>`
- Relative path to `.exe` file
- `\\<server>\<share>\<path_to_.exe>`

  As a variation, you can use a wildcard specification, such as `*.exe`.

  If the path or filename contains spaces, enclose the path in double quotation marks. The following command shows the use of double quotation marks.

  ```
  thinreg.exe "\\DEPLOYSERVER\ThinApps\Microsoft Office Word 2007.exe"
  ```

For information about `thinreg.exe` parameters, see "Optional thinreg.exe Parameters" on page 27.

To run the thinreg.exe utility

1 Determine the executable files that ThinApp must register with the local environment.

2 From the command line, type the `thinreg.exe` command.

  `thinreg.exe [<optional_parameters>] [<package1.exe>][<package2.exe>][<packages_by_wildcard>]`

  If the server name is DEPLOYSERVER and the share is `ThinApps`, use the following example to register Microsoft Word for the logged-in user.

  `ThinReg.exe "\\DEPLOYSERVER\ThinApps\Microsoft Office 2007 Word.exe"`

  Use the following example to register all Microsoft Office applications in the specified directory for the logged-in user.

  `ThinReg.exe "\\DEPLOYSERVER\ThinApps\Microsoft Office *.exe"`

Optional thinreg.exe Parameters

The `thinreg.exe` utility monitors the `PermittedGroups` setting in the `Package.ini` file, registering and unregistering packages as needed. When the `thinreg.exe` utility registers a package for the current user, the utility creates only the shortcuts and file type associations that the current user is authorized for in the `PermittedGroups` setting. If this setting does not exist, the current user is authorized for all executable files.

When the `thinreg.exe` utility registers a package for all users with the `/allusers` parameter, ThinApp creates all shortcuts and file type associations regardless of the `PermittedGroups` setting. When you double-click a shortcut icon that you are not authorized for, you cannot run the application.

If the package name you want to register or unregister contains spaces, you must enclose it in double quotation marks.

For information about the `PermittedGroups` setting and support for Active Directory groups, see "PermittedGroups" on page 67.

Table 3-1 lists optional parameters for the `thinreg.exe` utility. Any command that uses the `/a` parameter requires administrator rights.

Table 3-1. Optional thinreg.exe parameters

Parameter	Purpose	Sample Usage
/a, /allusers	Registers a package for all users. If an unauthorized user attempts to run the application, a message informs the user that he or she cannot run the application.	`thinreg.exe /a "\\<server>\<share>\Microsoft Office 2007 Word.exe"`
/q, /quiet	Prevents the display of an error message for an unrecognized command-line parameter.	`thinreg.exe /q <unknown_option>`

/u, /unregister, /uninstall	Unregisters a package.
	This command removes the software from the Add/Remove Programs control panel applet.
		Unregister Microsoft Word for the current user.
		`thinreg.exe /u "\\<server>\<share>\Microsoft Office 2007 Word.exe"`
		Unregister all Microsoft Office applications for the current user and remove the Add/Remove Programs entry.
		`thinreg.exe /u "\\server\share\Microsoft Office *.exe"`
		If a user registers the package with the /a parameter, you must use the /a parameter when unregistering the package.
		`thinreg.exe /u /a *.exe`

/r, /reregister	Reregisters a package.
	Under typical circumstances, the thinreg.exe utility can detect whether a package is already registered and skips it. The /r option forces the thinreg.exe utility to reregister the package.
		`thinreg.exe /r "\\<server>\<share>\Microsoft Office 2007 Word.exe"`
		If a user registers the package with the /a parameter, you must use the /a when reregistering the package.
		`thinreg.exe /r /a *.exe`

/k, /keepunauthorized, /keep	Prevents the removal of registration information even if you are no longer authorized to access an application package. Without this option, the thinreg.exe utility removes the registration information for that package if it detects you are no longer authorized to access the package. ThinApp stores authorization information in the PermittedGroups parameter of the Package.ini file.	`thinreg.exe /k "\\<server>\<share>\Microsoft Office 2007 Word.exe"`
/noarp	Prevents the creation of an entry in the Add/Remove Programs control panel applet.	`thinreg.exe /q /noarp "\\<server>\<share>\Microsoft Office 2007 Word.exe"`
/norelaunch	Starts the thinreg.exe utility on Microsoft Vista without elevated privileges. Standard users can start the utility without a user account control (UAC) pop-up window. When the thinreg.exe utility detects a need for more privileges, such as the privileges required for the /allusers parameter, the utility restarts itself as a privileged process and generates a UAC pop-up window. The /norelaunch option blocks this restart process and causes the registration to fail.	`thinreg.exe /q /norelaunch "\\<server>\<share>\Microsoft Office 2007 Word.exe"`

Building an MSI Database

If you do not create MSI files with the Setup Capture wizard, you can still create these files after building an application. An MSI database is useful for delivering captured applications through traditional desktop management systems to remote locations and automatically creating shortcuts and file type associations. Basic Active Directory group policies provide ways to distribute and start MSI packages.

ThinApp creates an MSI database that contains certain files depending on the database size:

- For databases smaller than 2GB, the MSI database consists of captured executable files, installer logic, and the `thinreg.exe` utility.
- For databases larger than 2GB, the MSI database consists of installer logic and the `thinreg.exe` utility. ThinApp stores the captured executable files in cabinet files. For example, the files might be `<inventory_name>_1.CAB` and `<inventory_name>_2.CAB`. The `.CAB` files must be in the same directory as the MSI files. ThinApp must distribute these files with the MSI file to have a complete installer.

Customizing MSI Files with Package.ini Parameters

You can customize the behavior of MSI files by modifying `Package.ini` parameters, such as the following parameters, and rebuilding the application package:

- The `MSIInstallDirectory` parameter sets the installation directory for the package.

  For example, include `MSIInstallDirectory=C:\Program Files\` in the `Package.ini` file.

- The `MSIDefaultInstallAllUsers` parameter sets installation of the package for individual users. ThinApp installs the package in the `%AppData%` user directory.

  For example, include `MSIDefaultInstallAllUsers=0` in the `Package.ini` file.

  For more information about this parameter, see "Specifying a Database Installation for Individual Users and Machines" on page 30.

- The `MSIFileName` parameter names the package.

  For example, include `MSIFilename=Firefox30.msi` in the `Package.ini` file.

- The `MSIRequireElevatedPrivileges` parameter indicates whether an installer needs elevated privileges for deployment on Microsoft Vista. Installations for individual users do not usually need elevated privileges but per-machine installations require such privileges.

  For example, include `MSIRequireElevatedPrivileges=1` in the `Package.ini` file.

- The `MSIProductCode` parameter makes it easier to install a new version of the application. An MSI database contains a product code and an upgrade code. When you update a package, keep the original value of the `MSIUpgradeCode` parameter.

  If the parameter value of the new version is the same as the value of the old version, the installation prompts you to remove the old version. If the values for the parameter are different, the installation uninstalls the old version and installs the new version.

  VMware recommends that you avoid specifying an `MSIProductCode` value and allow ThinApp to generate a different product code for each build.

Regardless of the parameter values specified at build time, you can override the settings at deployment time. See "Force MSI Deployments for Each User or Each Machine" on page 30. For more information about MSI parameters, see "Configuring MSI Files" on page 88.

Modify the Package.ini File to Create MSI Files

You must enter a value for the `MSIFilename` parameter to generate MSI files. For more information about MSI parameters, see "Customizing MSI Files with Package.ini Parameters" on page 29 and "Configuring MSI Files" on page 88.

To edit the MSI parameters

1 In the `Package.ini` file, enter the MSI filename.

```
MSIFilename=<filename>.msi
```

For example, the filename for Firefox might be `Mozilla Firefox 2.0.0.3.msi`.

2 (Optional) Update other MSI parameters.

3 Double-click the `build.bat` file in the captured application folder to rebuild the application package.

Specifying a Database Installation for Individual Users and Machines

ThinApp installs the MSI database across all machines. You can change the default installation with the following parameter values:

- To create a database installation for individual users, use a value of 0 for the `MSIDefaultInstallAllUsers` parameter in the `Package.ini` file. This value creates `msiexec` parameters for each user.
- To create a database installation for individual machines for administrators and individual user installations for other users, use a value of 2 for the `MSIDefaultInstallAllUsers` parameter. Administrators belong to the Administrators Active Directory group.

For more information about the `MSIDefaultInstallAllUsers` parameter, see "MSIDefaultInstallAllUsers" on page 88.

Force MSI Deployments for Each User or Each Machine

Regardless of the parameter values specified at build time, you can override the settings at deployment time. For example, if you created the database with a value of 1 for the `MSIDefaultInstallAllUsers` parameter, you can still force individual user deployments for Firefox 3.0 with the `msiexec /i Firefox30.msi ALLUSERS=""` command.

If you use the `ALLUSERS=""` argument for the `msiexec` command, ThinApp extracts the captured executable files to the `%AppData%` user directory.

To force MSI deployments for individual users

From the command line, type the `msiexec /i <database>.msi ALLUSERS=""` command.

To force MSI deployments for all users on a machine

From the command line, type the `msiexec /i <database>.msi ALLUSERS=1` command.

Override the MSI Installation Directory

When ThinApp performs an individual machine MSI deployment, the default installation directory is the localized equivalent of `%ProgramFilesDir%\<inventory_name> (VMware ThinApp)`. If you install a Firefox package for each machine, the package resides in `%ProgramFilesDir%\Mozilla Firefox (VMware ThinApp)`.

When ThinApp performs an MSI deployment for individual users, the default installation directory is `%AppData%\<inventory_name> (VMware ThinApp)`.

In both cases, you can override the installation directory by passing an INSTALLDIR property to the `msiexec` command.

To override the MSI installation directory

From the command line, type the `msiexec /i <database>.msi INSTALLDIR=C:\<my_directory>\<my_package>` command.

Deploying MSI Files on Microsoft Vista

When you deploy MSI files on Vista, you must indicate whether an installer needs elevated privileges. Typical individual user installations do not require elevated privileges but individual machine installations require such privileges. ThinApp provides the `MSIRequireElevatedPrivileges` parameter in the `Package.ini` file that specifies the need for elevated privileges when the value is set to 1. Specifying a value of 1 for this parameter or forcing an individual user installation from the command line can generate UAC prompts. Specifying a value of 0 for this parameter prevents UAC prompts but the deployment fails for machine-wide installations.

Controlling Application Access with Active Directory

You can control access to applications using Active Directory groups. When you build a package, ThinApp converts Active Directory group names into Security Identifier (SID) values. A SID is a small binary value that uniquely identifies an object. SID values are not unique for a few groups, such as the administrator group. Because ThinApp stores SID values in packages for future validation, the following considerations apply to Active Directory use:

- You must be connected to your Active Directory domain during the build process and the groups you specify must exist. ThinApp looks up the SID value during the build.
- If you delete a group and recreate it, the SID might change. In this case, rebuild the package to authenticate against the new group.
- When users are offline, ThinApp can authenticate them using cached credentials. If the users can log into their machines, authentication still works. Use a group policy to set the period when cached credentials are valid.
- Cached credentials might not refresh on clients until the next Active Directory refresh cycle. You can force a group policy on a client by using the `gpupdate` command. This command refreshes local group policy, group policy, and security settings stored in Active Directory. You might need to log off before Active Directory credentials are recached.
- Certain groups, such as the Administrators group and Everyone group, have the same SID on every Active Directory domain and workgroup. Other groups you create have a domain-specific SID. Users cannot create their own local group with the same name to bypass authentication.

Package.ini Entries for Active Directory Access Control

ThinApp provides the `PermittedGroups` parameter in the `Package.ini` file to control Active Directory access. When you start a captured application, the `PermittedGroups` parameter checks whether a user is a member of a specified Active Directory group. If the user is not a member of the Active Directory group, Thinapp does not start the application. For information about restricting packages to Active Directory groups, see "PermittedGroups" on page 67.

In the following `Package.ini` entry, App1 and App2 inherit `PermittedGroups` values.

```
[BuildOptions]
PermittedGroups=Administrators;OfficeUsers
[App1.exe]
                ...
                ..
[App2.exe]
                ...
                ...
```

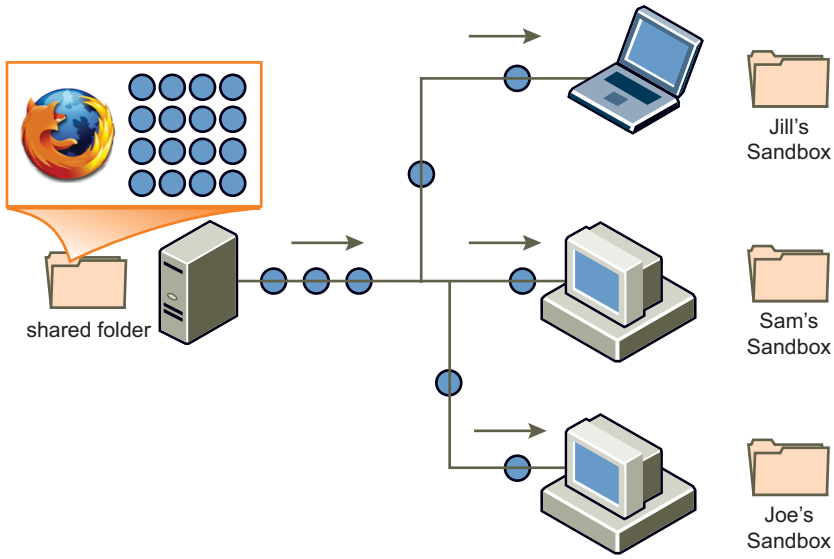
In the following entry, only users belonging to the `App1users` group can use the `App1.exe` file, and members of the `Everyone` group can use the `App2.exe` file. The default message for denied users changes for App1.

```
[BuildOptions]
PermittedGroups=Everyone
[App1.exe]
PermittedGroups=App1Users
AccessDeniedMsg=Sorry, you can't run this application
..
[App2.exe]
...
...
```

Using ThinApp Packages Streamed from the Network

Any network storage device can serve as a streaming server for hundreds or thousands of client computers. See Figure 3-1.

Figure 3-1. Data Block Streaming over a Network Share



On the end-user desktop, you can create shortcuts that point to the centrally hosted executable file packages. When the user clicks the shortcut, the application begins streaming to the client computer. During the initial streaming startup process, the ThinApp status bar informs the user of the progress.

How ThinApp Application Streaming Works

When you place compressed ThinApp executable files on a network share or USB flash drive, the contents from the executable file stream to client computers in a block-based fashion. As an application requests specific parts of data files, ThinApp reads this information in the compressed format over the network using standard Windows file sharing protocol. For a view of the process, see Figure 3-2.

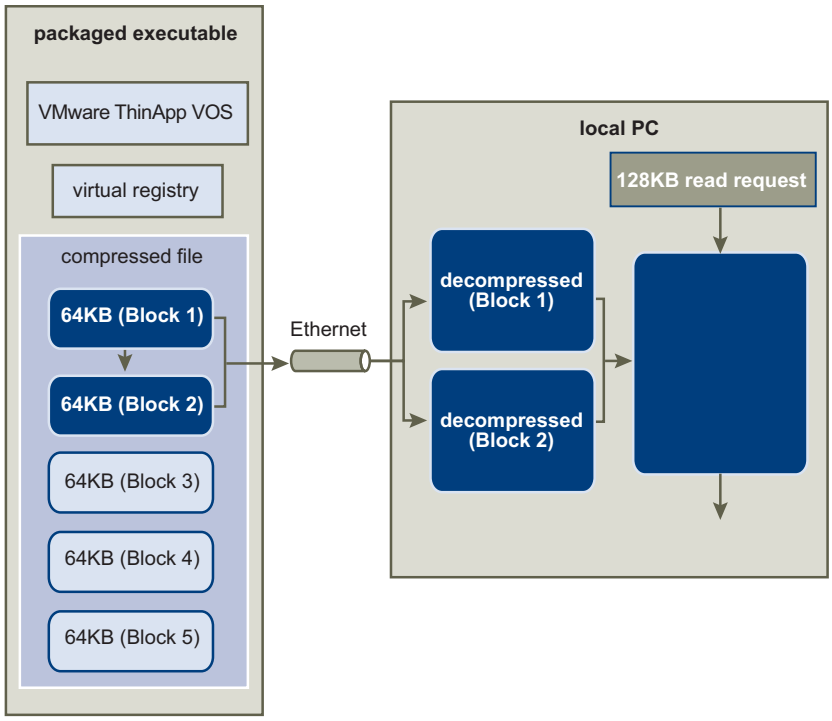
After a client computer receives data, ThinApp decompresses the data directly to memory. Because ThinApp does not write data to the disk, the process is fast. A large package does not necessarily take a long time to load over the network and the package size does not affect the startup time of an application. If you add an extra 20GB file to a package that is not in use at runtime, the package loads at the same speed. If the application opens and reads 32KB of data from the 20GB file, ThinApp only requests 32KB of data.

The ThinApp runtime client is a small part of the executable file package. When ThinApp loads the runtime client, it sets up the environment and starts the target executable file. The target executable file accesses other parts of the application stored in the virtual operating system. The runtime client intercepts such requests and serves them by loading DLLs from the virtual operating system.

The load time of the runtime client across a network is a few milliseconds. After ThinApp loads the runtime client to memory on the client computer, the end-user computer calculates which blocks of data are required from the server and reads them based on application activity.

When the application makes subsequent read requests for the same data, the Windows disk cache provides data without requiring a network read operation. If the client computer runs low on memory, Windows discards some of its disk cache and provides the memory resource to other applications.

Figure 3-2. Application Streaming



Requirements and Recommendations for Streaming Packages

ThinApp does not require specific server software to provide streaming capability. Any Windows file share, NAS device, or SMB share can provide this capability. The amount of data that needs to transfer before the application can begin running varies for each application. Microsoft Office requires that only a fraction of the package contents stream before an application can run.

VMware recommends that you use ThinApp streaming in a LAN-based environment with a minimum of 100MB networks. For WAN and Internet deployments that involve frequent or unexpected disconnections, VMware recommends one of the following solutions:

- Use a URL to deploy the applications.
- Use a desktop deployment solution to push the package to the background. Allow the application to run only after the entire package downloads.

These solutions reduce failures and eliminate situations in which the application requires unstreamed portions during a network outage. A company with many branch offices typically designates one application repository that mirrors a central shared folder at each branch office. This setup optimizes local performance for client machines located at each branch office.

Security Recommendations for Streaming Packages

VMware recommends that you make a central shared directory for the package read-only. Users can read the package contents but not change the executable file contents. When a package streams from a shared location, ThinApp stores application changes in the user sandbox. The default sandbox location is `%AppData%\Thinstall\<application_name>`. You can configure the sandbox location at runtime or at package time.

A common configuration is to place the user sandbox on another central storage device. The user can use any computer and retain individual application settings at a central share. When packages stream from a central share, they remain locked until all users exit the application.

Stream ThinApp Packages from the Network

Users can access packaged applications through the network.

To stream packages from the network

1 Place the ThinApp package in a location accessible to client computers.

2 Send a link to users to run the application directly.

Using Captured Applications with Other System Components

Captured applications can interact with other components installed on the desktop.

Performing Paste Operations

Review the following paste operations and limitations with ThinApp:

- **Pasting content from system installed applications to captured applications** – This paste operation is unlimited. The virtual application can receive any standard clipboard formats, such as text, graphics, and HTML. The virtual application can receive OLE objects.
- **Pasting from captured applications to system applications** – ThinApp converts OLE objects created in virtual applications to system native objects when you paste them into native applications.

Accessing Printers

A captured application has access to any printer installed on the computer that it is running on. Captured applications and applications installed on the physical system have the same printing ability.

You cannot use ThinApp to virtualize printer drivers. You must manually install printer drivers on a computer.

Accessing Drivers

A captured application has full access to any device driver installed on the computer that it is running on. Captured applications and applications installed on the physical system have the same relationship with device drivers. If an application requires a device driver, you must install the driver separately from the ThinApp package.

In some cases, an application without an associated driver might function with some limitations. For example, Adobe Acrobat installs a printer driver that allows applications system wide to render PDF files using a print mechanism. When you use a captured version of Adobe Acrobat, you can use it to load, edit, and save PDF files without the printer driver installation. Other applications do not detect a new printer driver unless the driver is installed.

Accessing the Local Disk, the Removable Disk, and Network Shares

When you create a project structure, ThinApp configures isolation modes for directories and registry subtrees. The isolation modes control which directories the application can read and write to on the local computer. Review the default configuration options:

- **Hard disk** – An example of a hard disk is `C:\`. Isolation modes selected during the capture process affect access. Users can write to their `Desktop` and `My Documents` folders. Other modifications that the application makes go into the user sandbox. The default location of the sandbox is in the `Application Data` directory.
- **Removable disk** – By default, any user who has access rights can read or write to any location on a removable disk.
- **Network mapped drives** – By default, any user who has access rights can read or write to any location on a network mapped disk.
- **UNC network paths** – By default, any user who has access rights can read or write to any location on a UNC network path.

Accessing the System Registry

By default, captured applications can read the full system registry as permitted by access permissions. Specific parts of the registry are isolated from the system during the package creation process. This isolation reduces conflicts between different versions of virtual applications and system-installed applications. By default, ThinApp saves all registry modifications from captured applications in an isolated sandbox and the system remains unchanged.

Accessing Networking and Sockets

Captured applications have standard access to networking capability. Captured applications can bind to local ports and make remote connections if the user has access permissions to perform these operations.

Using Shared Memory and Named Pipes

Captured applications can interact with other applications on the system by using shared memory, named pipes, mutex objects, and semaphores.

ThinApp can isolate shared memory objects and synchronization objects. This isolation makes them invisible to other applications, and other application objects are invisible to a captured application.

Using COM, DCOM, and Out-of-Process COM Components

Captured applications can create COM controls from the virtual environment and the system. If a COM control is installed as an out-of-process COM, the control runs as a virtual process when a captured application uses it. You can control modifications that the captured applications make.

Starting Services

Captured applications can start and run system-installed services and virtual services. System services run in the virtual environment that controls the modifications that the services can make.

Using File Type Associations

Captured applications can run system-installed applications by using file type associations. You can add file type associations to the local computer registry to point to captured executable files for individual users and machines.

Sample Isolation Mode Configuration Depending on Deployment Context

Isolation modes control the read and write access for specific system directories and system registry subkeys. See "Modifying Isolation Modes" on page 23.

You can adjust isolation modes to resolve the problems in Table 3-2.

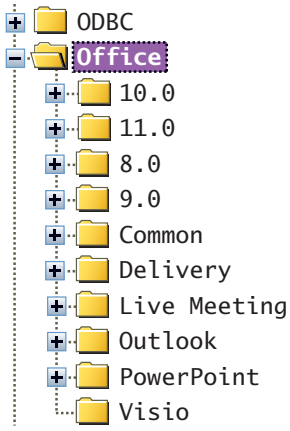
Table 3-2. Sample Problems and Solutions That Use Isolation Modes

Problem	Solution
An application fails to run because previous or future versions exist simultaneously or fail to uninstall properly.	Use the Full isolation mode. ThinApp hides host computer files and registry keys from the application when the host computer files are located in the same directories and subkeys that the application installer creates. For directories and subkeys that have Full isolation, the applications only detect virtual files and subkeys. Any system values that exist in the same location are invisible to the application.
An application fails because users did not design or test it for a multiuser environment. The application fails to modify files and keys without affecting other users.	Use the WriteCopy isolation mode. ThinApp makes copies of registry keys and files that the application writes and performs all the modifications in a user-specific sandbox. For directories and subkeys that have WriteCopy isolation, the application recognizes the host computer files and virtual files. All write operations convert host computer files into virtual files in the sandbox.
An application fails because it has write permission to global locations and is not designed for a locked-down desktop environment found in a corporate setting or on Windows Vista.	Use the WriteCopy isolation mode. ThinApp makes copies of registry keys and files that the application writes and performs all the modifications in a user-specific sandbox. For directories and subkeys that have WriteCopy isolation, the application recognizes the host computer files and virtual files. All write operations convert host computer files into virtual files in the sandbox.

View of Isolation Mode Effect on the Windows Registry

Figure 3-3 shows a section of the Windows registry for a computer that has older Microsoft Office applications installed. Microsoft Office 2003 creates the `HKEY_LOCAL_MACHINE\Software\Microsoft\Office\11.0` registry subtree.

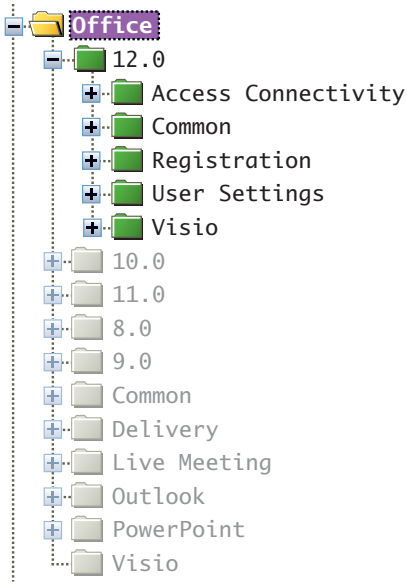
Figure 3-3. Windows Registry as seen by Windows Regedit



When ThinApp runs a captured version of Microsoft Visio 2007, ThinApp sets the `HKLM\Software\Microsoft\Office` registry subtree to full isolation. This setting prevents Microsoft Visio 2007 from failing because of registry settings that might preexist on the host computer at the same location.

Figure 3-4 shows the registry from the perspective of the captured Microsoft Visio 2007.

Figure 3-4. Windows Registry as seen by the captured Microsoft Visio 2007



Updating Applications 4

You can update captured applications with different utilities depending on the extent of change and dependencies on other applications.

This information includes the following topics:

Application Updates That the End User Triggers

ThinApp provides the Application Sync and Application Link utilities to update applications with new versions or new components. The Application Sync utility updates an entire application package. The Application Link utility keeps shared components or dependent applications in separate packages.

Application Sync Updates

The Application Sync utility keeps deployed virtual applications up to date. When an application starts with this utility enabled, the application queries a Web server to determine if an updated version of the executable file is available. If an update is available, the differences between the existing package and the new package are downloaded and used to construct an updated version of the package. The updated package is used for future launches.

The Application Sync utility is useful for major configuration updates to the application. For example, you might need to update Firefox to the next major version.

Using Application Sync in a Managed or Unmanaged Environment

If you use virtual applications that update automatically in a managed computer environment, do not use the Application Sync utility because it might clash with other update capabilities.

If an automatic update feature updates an application, the update exists in the sandbox. If the Application Sync utility attempts to update the application after an automatic application update, the version update stored in the sandbox take precedence over the files contained in the Application Sync version. The order of precedence for updating files is the files in the sandbox, the virtual operating system, and the physical machine.

If you have an unmanaged environment that does not update applications automatically, use the Application Sync utility to update applications.

Update Firefox 2.0.0.3 to Firefox 3 with Application Sync

This example shows the Application Sync update process for Firefox.

The update process involves editing the `Package.ini` file. The `AppSyncURL` parameter requires a URL path. ThinApp supports HTTP, HTTPS, and file protocols. For information about all Application Sync parameters, see "Configuring Application Updates with Application Sync" on page 85.

To update Firefox 2.0.0.3 to Firefox 3

1 Capture Firefox 2.0.0.3 and Firefox 3 into separate packages.

2 Verify that the primary data container name is the same for both packages.

The primary data container, determined during the setup capture process, is the file that contains the virtual file system and virtual registry. If you have a Firefox 2.0.0.3 package that has `Mozilla Firefox 2.0.0.3.exe` as the name of the primary data container, and you have a Firefox 3 package that has `Mozilla Firefox 3.dat` as the name of the primary data container, change the name in the `Shortcut` parameter to a common name. For example, you can use `Firefox.exe` as a name.

3 Edit the `Package.ini` file in each package.

a Open the `Package.ini` file located in the captured application folder.

For example, a Firefox 2.0.0.3 path to the `Package.ini` file might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\Package.ini`.

b Uncomment the Application Sync parameters you want to edit by removing the semicolon at the beginning of the line.

You must uncomment the `AppSyncURL` parameter to enable the utility.

c Change the value of the parameters and save the file.

For example, you can copy an executable file of the latest Firefox version to a mapped network drive and enter a path to that location as the value of the `AppSyncURL` parameter. If `Z:` is the mapped drive and `Firefox` is the name of the directory that stores the executable file, a sample path is `file:///Z:/Firefox/Firefox.exe`.

Make sure the `AppSyncURL` path is the same in both `Package.ini` files and points to the updated version.

4 In the captured application folder, double-click the `build.bat` file to rebuild the application package.

For example, a Firefox 2.0.0.3 path to the `build.bat` file might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\build.bat`.

5 To update Firefox 2.0.0.3 to Firefox 3, start the executable file, such as `Mozilla Firefox 2.0.0.3.exe`, in the `\bin` directory.

When you start the application before the expiration time set in the `AppSyncExpirePeriod` parameter of the `Package.ini` file, ThinApp downloads the update in the background as you work with the application. The next time you start the application, you can see the updated version.

When you start the application after the package expires, ThinApp downloads the update in the foreground and prevents you from working with the application. When the download is ready, ThinApp restarts the application with the new version.

Fix an Incorrect Update with Application Sync

If you have multiple Application Sync download updates, such as multiple Microsoft Office updates, and a certain update has an adverse affect or needs to be withdrawn, you can address the problem.

To fix an incorrect update

Place the correct update on the server that ThinApp can access.

The update is applied the next time the application is started on a client machine.

Application Sync Effect on Entry Point Executable Files

The Application Sync utility updates entry point executable files. For example, assume you deploy a Microsoft Office 2007 package that does not include Microsoft PowerPoint. The `Microsoft Office PowerPoint 2007.exe` entry point does not exist for the original package. If you rebuild the Microsoft Office 2007 package to include Microsoft PowerPoint, and you use the Application Sync utility to update client machines, the end users can access an entry point executable file for Microsoft PowerPoint.

Updating thinreg.exe Registrations with Application Sync

If you register virtual applications on the system using `thinreg.exe` and update applications with the Application Sync utility, you can update registrations by placing a copy of `thinreg.exe`, located in `C:\Program Files\VMware\VMware ThinApp`, alongside the updated package on the server.

Maintaining the Primary Data Container Name with Application Sync

The Application Sync utility requires that the name of the primary data container, the file that stores virtual files and registry information, is the same for the old and new versions of an application. For example, you cannot have an old version with `Microsoft Office Excel 2003.exe` as the primary data container name while the new version has `Microsoft Office 2007.dat` as the primary data container name. To verify the name of the primary data container, see the `ReadOnlyData` parameter in the `Package.ini` file. For more information about the primary data container, see "Specify Application Shortcuts and Tracking Names" on page 16.

Application Link Updates

The Application Link utility connects dependent applications at runtime. You can package, deploy, and update component pieces separately rather than capture all components in the same package. ThinApp supports linking up to 250 packages at a time. Each package can be any size.

The Application Link utility is useful for the following objects:

- **Large shared libraries and frameworks** – Link runtime components, such as .NET, JRE, or ODBC drivers, with dependent applications.

  For example, you can link .NET to an application even if the local machine for the application does not allow the installation of .NET or already has a different version of .NET.

- **Add-on components and plug-ins** – Package and deploy application-specific components and plug-ins separately from the base application.

  For example, you might separate Adobe Flash Player or Adobe Reader from a base Firefox application and link the components.

  The Application Link utility allows you to deploy a single virtualized Microsoft Office to all users and deploy individual add-on components for each user.

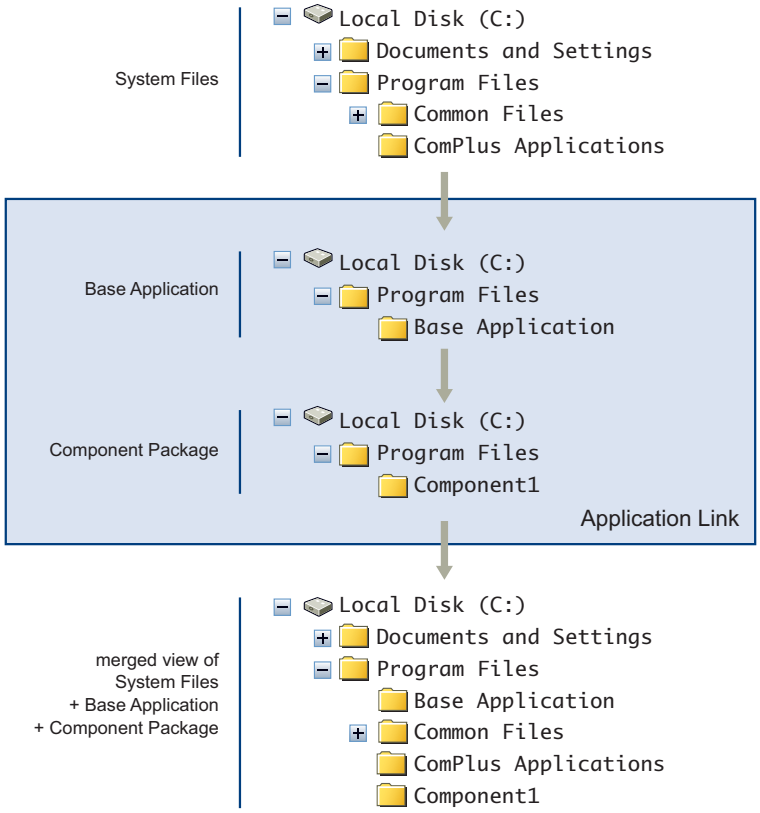
- **Hot fixes and service packs** – Link updates to an application and roll back to a previous version if users experience significant issues with the new version. You can deploy minor patches to applications as a single file and reduce the need for rollbacks.

  The Application Link utility provides bandwidth savings. For example, if you have Microsoft Office 2007 Service Pack 1 and you want to update to Service Pack 2 without Application Link, you would need to transfer 1.5Gb of data per computer with the deployment of a new Office 2007 Service Pack 2 package. The Application Link utility transfers just the updates and not the whole package to the computers.

View of the Application using Application Link

Figure 4-1 shows the running application with a merged view of the system, the base application, and all linked components. Files, registry keys, services, COM objects, and environment variables from dependency packages are visible to the base application.

Figure 4-1. View of the System, Base Application, and Linked Components Using Application Link



Link a Base Application to the Microsoft .NET Framework

Review this sample workflow to link a base application, `MyApp.exe`, to a separate package that contains the Microsoft .NET 2.0 Framework. Make sure the base application capture process does not include the Microsoft .NET 2.0 Framework. For information about the process of capturing an application, see Chapter 2, "Capturing Applications," on page 15.

For information about required and optional Application Link parameters in the `Package.ini` file, see "Configuring Dependent Applications with Application Link" on page 84.

To link an application to Microsoft .NET

1 Capture the installation of the .NET 2.0 Framework.

   During the capture process, you must select at least one user-accessible entry point.

2 Rename the `.exe` file that ThinApp produces to a `.dat` file.

   This renaming prevents users from accidentally running the application.

   The name of the `.dat` file you select does not matter because users do not run the file directly. For example, use `dotnet.dat`.

3 Save the .NET project to `C:\Captures\dotnet`.

4 Capture the base application by using the same physical system or virtual machine with the .NET framework already installed.

5 Save the project to `C:\Captures\MyApp`.

6 Open the `Package.ini` file in the captured application folder for the base application.

7 Enable the `RequiredAppLinks` parameter for the base application by adding the following line after the `[BuildOptions]` entry.

```
RequiredAppLinks=dotnet.dat
```

Application Link parameters must reference the primary data container of the application you want to link to. You cannot reference shortcut `.exe` files because these files do not contain any applications, files, or registry keys.

8 Rebuild the .NET 2.0 and base application packages.

a Double-click the `build.bat` file in `C:\Captures\MyApp`.

b Double-click the `build.bat` file in `C:\Captures\dotnet`.

Running these batch files builds separate ThinApp packages.

9 Deploy the applications to an end-user desktop in `C:\Program Files\MyApp`.

a Copy `C:\Captures\MyApp\bin\MyApp.exe` to `\\<end_user_desktop>\<Program_Files_share>\MyApp\MyApp.exe`.

b Copy `C:\Captures\dotnet\bin\cmd.exe` to `\\<end_user_desktop>\<Program_Files_share>\MyApp\dotnet.dat`.

Set up Nested Links with Application Link

ThinApp supports nested links with the Application Link utility. For example, if Microsoft Office links to a service pack, and the service pack links to a hot fix, ThinApp supports all these dependencies.

This procedure refers to AppA that requires AppB and AppB that requires AppC. Assume the following folder layout for the procedure:

- `c:\AppFolder\AppA\AppA.exe`
- `c:\AppFolder\AppB\AppB.exe`
- `c:\AppFolder\AppC\AppC.exe`

For information about setting up required and optional Application Link parameters in this procedure, see "Configuring Dependent Applications with Application Link" on page 84.

To set up nested links

1 Capture Application A.

2 In the `Package.ini` file, specify Application B as a required or optional application link.

For example, add `RequiredLinks=\AppFolder\AppB\AppB.exe` to the file.

3 Capture Application B.

4 In the `Package.ini` file for Application B, specify Application C as a required or optional application link.

For example, add `RequiredLinks=\AppFolder\AppC\AppC.exe` to the file.

5 Capture Application C.

If you start Application A, it can access the files and registry keys of Application B and Application B can access the files and registry keys of Application C.

Affecting Isolation Modes with Application Link

ThinApp loads an Application Link layer during application startup and merges registry entries and file system directories. If ThinApp finds a registry subkey or file system directory that did not previously exist in the main package or layer that is already merged, ThinApp uses the isolation mode specified in the layer being loaded. If the registry subkey or file system directory exists in the main package and a layer that is already merged, ThinApp uses the most restrictive isolation mode specified in any of the layers or main package. The order of most restrictive to least restrictive isolation modes is Full, WriteCopy, and Merged.

PermittedGroups Effect on Linked Packages

If you link two applications and you specify a value for the `PermittedGroups` parameter, the user account used for starting the application must be a member of at least one of the Active Directory groups for this parameter in the `Package.ini` files of both applications. For information about the `PermittedGroups` parameter, see "Configuring Permissions and Security" on page 66.

Sandbox Changes for Standalone and Linked Packages

Sandbox changes from linked packages are not visible to the base executable file. For example, you can install Acrobat Reader as a standalone virtual package and as a linked package to the base Firefox application. When you start Acrobat Reader as a standalone application by running the virtual package and you make changes to the preferences, ThinApp stores the changes in the sandbox for Acrobat Reader. When you start Firefox, Firefox cannot detect those changes because Firefox has its own sandbox. Opening a `.pdf` file with Firefox does not reflect the preference changes that exist in the standalone Acrobat Reader application.

Import Order for Linked Packages

ThinApp imports linked applications according to the order of applications in the `RequiredAppLinks` or `OptionalAppLinks` parameter. If either parameter specifies a wildcard character that triggers the import of more than one file, alphabetical order determines which package is imported first.

The `OptionalAppLinks` parameter might appear as `OptionalAppLinks=a.exe;b.exe;plugins\*.exe`.

Using `a.exe` and `b.exe` as sample executable files, ThinApp imports linked packages in the following order:

- Base application
- `a.exe`
- `b.exe`
- Plug-ins loaded in alphabetical order
- Nested plug-ins for `a.exe`
- Nested plug-ins for `b.exe`
- Nested plug-ins for the first set of plug-ins in this list

For information about nested links, see "Set up Nested Links with Application Link" on page 43.

File and Registry Collisions in Linked Packages

If the base application and a dependent package linked to the base application contain file or registry entries at the same location, a collision occurs. When this happens, the order of import operations determines which package has priority. The last package imported has priority in such cases and the file or registry contents from that package are visible to the running applications.

VBScript Collisions in Linked Packages

VBScript name collisions might prevent scripts in other imported packages from running. If you link packages with Application Link and those packages have scripts with the same name, ThinApp places the VBScripts from the linked packages into a single pool. For scripts with the same name, ThinApp runs the script from the last imported package and disregards the other script.

For example, a base package might contain the `a.vbs` and `b.vbs` files and a dependent package might contain the `b.vbs` and `c.vbs` files. Because a filename collision exists between the `b.vbs` files, the VBScript in the last imported package specified in a `RequiredAppLinks` or `OptionalAppLinks` parameter overrides any previously imported scripts with the same name. In this case, ThinApp condenses the pool of four `.vbs` files into a single pool with the `a.vbs` file from the base package and `b.vbs` and `c.vbs` files from the dependent package.

VBScript Function Order in Linked Packages

In a pool of VBScripts for packages linked with Application Link, functions in the main bodies of the scripts run in alphabetical order of the script names. ThinApp callback functions in the scripts run in reverse alphabetical order of the script names in the pool.

Storing Multiple Versions of a Linked Application in the Same Directory

If the directory holds a linked package, and you add an updated version of the linked package in the same directory, the Application Link utility detects and uses the updated version.

Using Application Sync For a Base Application and Linked Packages

If you use Application Link to link packages to a base package, and you start the base package, Application Sync can update only the base package. For example, if you build a Microsoft Office 2007 package with Application Sync entries in the `Package.ini` file, build an Adobe Reader package with Application Sync entries in the `Package.ini` file, use Application Link to link the two packages, and start Microsoft Office 2007, Application Sync only updates Microsoft Office 2007. You can update both Microsoft Office 2007 and Adobe Reader by starting each application separately.

If you do not update all the applications and link a base application to an expired plug-in, the base application can still load and use the plug-in.

Application Updates That the Administrator Triggers

ThinApp provides the `AppSync.exe` and `sbmerge.exe` utilities for administrators.

The `AppSync.exe` utility forces an Application Sync update on a client machine.

The `sbmerge.exe` utility make incremental updates to applications. For example, an administrator might use the utility to incorporate a plug-in for Firefox or to change the home page of a Web site to point to a different default site.

Forcing an Application Sync Update on Client Machines

You can use the `AppSync` command to force an Application Sync update on a client machine. You might want to update a package stored in a location where standard users do not have write access. In this situation, you cannot use Application Sync parameters to check for updates when an application starts because users do not have the required rights to update the package. You can schedule a daily `AppSync.exe` run under an account with sufficient privileges. The Application Sync parameters, such as `AppSyncUpdateFrequency`, in the `Package.ini` file do not affect the `AppSync` command.

To force an Application Sync update, use the `AppSync <Application_Sync_URL> <executable_file_path>` command. The value of the URL is the same as the Application Sync URL in the `Package.ini` file and the executable file path is the path to the executable file that requires the update.

Updating Applications with Runtime Changes

The `sbmerge.exe` utility merges runtime changes recorded in the application sandbox back into a ThinApp project. A typical workflow for this utility involves the following tasks:

- Capturing an application.
- Building the application with the `build.bat` file.

- Running a captured application and customizing the settings and virtual environment. ThinApp stores the changes in the sandbox.
- Running the `sbmerge.exe` utility to merge registry and file system changes from the sandbox into the ThinApp project.
- Rebuilding the captured application with the `build.bat` file
- Deploying the updated application.

Merge Sandbox Changes with Firefox

This procedure for the `sbmerge.exe` utility uses Firefox 2.0.0.3 as an example of a captured application.

To merge sandbox changes with Firefox 2.0.0.3

1 Capture Firefox 2.0.0.3.

2 Double-click the `build.bat` file in the captured application folder to rebuild the application package.

For example, a Firefox 2.0.0.3 path to the `build.bat` file might be `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3\build.bat`.

3 Create a `Thinstall` directory in the `bin` directory for the sandbox location.

4 Start Firefox and make a change to the settings.

For example, change the home page.

5 From the command line, navigate to the directory where the ThinApp project folder resides.

For example, navigate to `C:\Program Files\VMware\VMware ThinApp\Captures\Mozilla Firefox 2.0.0.3`.

6 From the command line, type the `"C:\Program Files\VMware\VMware ThinApp\sbmerge" Print` command.

ThinApp prints the changes that affected the sandbox folder when using the captured application.

7 From the command line, type the `"C:\Program Files\VMware\VMware ThinApp\sbmerge" Apply` command.

ThinApp empties the Thinstall folder and merges the sandbox changes with the application.

sbmerge.exe Commands

The `sbmerge.exe Print` command displays sandbox changes and does not make modifications to the sandbox or original project.

The `sbmerge.exe Apply` command merges changes from the sandbox with the original project. This command updates the project registry and file system to reflect changes and deletes the sandbox directory.

Usage

```
"C:\Program Files\VMware\VMware ThinApp\sbmerge" Print [<optional_parameters>]
"C:\Program Files\VMware\VMware ThinApp\sbmerge" Apply [<optional_parameters>]
```

Optional Parameters

The optional `sbmerge.exe` parameters specify project and sandbox paths and block progress messages and merging of sandbox files.

Parameter	Description
`–ProjectDir <project_path>`	If you start the `sbmerge.exe` command from a location other than the application project folder, use the absolute or relative path to the project directory using the `–ProjectDir <project_path>` parameter. A sample command is `"C:\Program Files\VMware\VMware ThinApp\sbmerge" Print -ProjectDir "C:\<project_folder_path>""`.
`–SandboxDir <sandbox_path>`	When you start a captured application, it searches for the sandbox in a particular order. See "Search Order for the Sandbox" on page 95. If you use a custom location for the sandbox, use the `–SandboxDir <sandbox_path>` parameter to specify the location.
`–Quiet`	Blocks the printing of progress messages.
`–Exclude <excluded_file>.ini`	Prevents the merging of specific files or registry entries from the sandbox. You can specify a `.ini` file to determine the content for exclusion. This file contains separate sections to specify files, such as the `FileSystemIgnoreList` and the `RegistryIgnoreList`. The `sbmerge.exe` utility uses the `snapshot.ini` file in the ThinApp installation folder by default to exclude certain content from the merge process. This option allows you to specify another `.ini` file to ensure additional exclusion of content.

Automatic Application Updates

If an application can update automatically, its update mechanism functions with ThinApp. If the application downloads the update and runs an installer or patching program, this activity occurs inside the virtual environment and ThinApp stores the changes from the update software in the sandbox. When the application restarts, it uses the version of the executable file in the sandbox and not the executable file from the original package.

For example, if you capture Firefox 1.5, your autoupdate mechanism might prompt you to upgrade to Firefox 2.0. If you proceed with the upgrade, the application downloads the updates, writes the updates to the sandbox, and prompts you to restart the application. When you run the captured application again, Firefox 2.0 starts. If you delete the sandbox, Firefox reverts back to version 1.5.

To merge changes that an auto-update mechanism makes with the original package to build an updated executable file, use the `sbmerge.exe` utility. See "Application Updates That the Administrator Triggers" on page 45.

NOTE If you use the Application Sync utility to perform application updates, disable the auto-update capabilities of the application. See "Using Application Sync in a Managed or Unmanaged Environment" on page 39.

Dynamic Updates Without Administrator Rights

You can update applications dynamically without requiring administrator rights. For example, .NET-based applications that download new DLL files from the Internet as part of their update process must run the `ngen.exe` file to generate native image assemblies for startup performance. In typical circumstances, the `ngen.exe` file writes to `HKLM` and `C:\WINDOWS`, both of which are only accessible with administrator accounts. With ThinApp, the `ngen.exe` file can install native image assemblies on guest user accounts but stores changes in a user-specific directory.

You can update the package on a central computer and push the changes to client machines or central network shares as a new captured executable file. Use one of the following options for applying updates:

- During the setup capture process.
- Inside the virtual environment.

  Applications with auto-update capabilities can undergo updates. If the update is a `patch.exe` file, the patch program can run in the virtual environment and run from a `cmd.exe` file entry point. Changes occur in the sandbox during automatic updates or manual updates to allow you to revert to the original version by deleting the sandbox.

  If you apply patches in the virtual environment on a central packaging machine, you can use the `sbmerge.exe` utility to merge sandbox changes made by the update with the application. See "Application Updates That the Administrator Triggers" on page 45.
- In the captured project.

  If you must update a small set of files or registry keys, replace the files in the captured project. This approach is useful for software developers who integrate ThinApp builds with their workflow.

Upgrading Running Applications on a Network Share

ThinApp allows you to upgrade or roll back an application that is running on a network share for multiple users. The upgrade process occurs when the user quits the application and starts it a second time. In Terminal Server environments, you can have multiple users executing different versions at the same time during the transition period.

File Locks

Starting an application locks the executable file package. You cannot replace, delete, or move the application. This file lock ensures that any computer or user who accesses a specific version of an application continues to have that version available as long as the application processes and subprocesses are running.

If you store an application in a central location for many users, this file lock prevents administrators from replacing a packaged executable file with a new version until all users exit the application and release their locks.

Upgrade a Running Application

You can copy a new version of an application into an existing deployment directory with a higher filename extension, such as .1 or .2. This procedure uses Firefox as a sample application.

You do not need to update shortcuts.

To upgrade a running application

1 Deploy the original version of the application, such as `Firefox.exe`.

2 Copy the application to a central share at `\\<server>\<share>\Firefox.exe`.

  A sample location is `C:\Program Files\Firefox\Firefox.exe`.

3 Create a desktop or **Start** menu shortcut to the user's desktop that points to a shared executable file location at `\\<server>\<share>\Firefox.exe`.

  Assume two users start `Firefox.exe` and lock the application.

4 Copy the updated version of `Firefox.exe` to the central share at `\\<server>\<share>\Firefox.1`.

  If you are a new user, ThinApp launches the application with the new package data in `Firefox.1`. If you are a user working with the original version, you can see the new version after you exit the application and restart the application.

5 If you must deploy a more current update of Firefox, place it in the same directory with a higher number at the end.

6 Copy Version 2.0 of `Firefox.exe` to central share at `\\<server>\<share>\Firefox.2`

After `Firefox.1` is unlocked, you can delete it, but `Firefox.exe` should remain in place because the user shortcuts continue to point there. ThinApp always uses the filename that has the highest version number. If you must roll back to an earlier version and the most recent version is still locked, copy the old version so that it has the highest version number.

Sandbox Considerations for Upgraded Applications

When you upgrade an application, you can control whether users continue to use their previous settings by keeping the sandbox name consistent in the `Package.ini` file. You can prevent users from using an older sandbox with an upgraded application by packaging the upgraded application with a new name for the sandbox. Starting the upgraded application the first time creates the sandbox with the new name.

Monitoring and Troubleshooting ThinApp

5

You can use Log Monitor to generate trace files and troubleshoot the ThinApp environment. Log Monitor is compatible only with an application captured using the same version of ThinApp.

This information includes the following topics:

Providing Information to Technical Support

VMware Technical support requires the following information from you to troubleshoot a ThinApp environment:

- Step-by-step reproduction of the procedure you performed when you encountered the problem.
- Information on the host configuration. Specify the Windows operating system, the use of Terminal Server or Citrix Xenapp, and any prerequisite programs that you installed on the native machine.
- Copies of the Log Monitor trace files. See "Log Monitor Operations" on page 51.
- Exact copy of the capture folder and all content. Do not include the compiled executable files from the `/bin` subfolder.
- Description of the expected and accurate behavior of the application.
- (Optional) Copies of the applications that you captured. Include the server components configuration for Oracle Server or Active Directory.
- (Optional) Native or physical files or registry key settings that might be relevant to the problem.
- (Optional) System services or required device drivers.
- (Optional) Virtual machine that reproduces the defect. VMware support might request this if the support contact is unable to reproduce the problem.
- (Optional) One or more WebEx sessions to facilitate debugging in your environment.

Log Monitor Operations

Log Monitor captures detailed chronological activity for executable files that the captured application starts. Log Monitor intercepts and logs names, addresses, parameters, and return values for each function call by target executable files or DLLs. Log Monitor captures the following activity:

- Win32 API calls from applications running in the ThinApp virtual operating system.
- Potential errors, exceptions, and security events within the application.
- All DLLs loaded by the application and address ranges.

The generated log files can be large and over 100MB depending on how long the application runs with Log Monitor and how busy an application is. The only reason to run Log Monitor for an application is to capture trace files. Trace files are critical for troubleshooting problems by analyzing and correlating multiple entries within the trace file.

Troubleshoot Activity with Log Monitor

You can use Log Monitor to perform basic troubleshooting.

To troubleshoot ThinApp logs

1 Shut down the captured application to investigate.

2 On the computer where you captured the application, select **Start > Programs > VMware > ThinApp Log Monitor**.

To start Log Monitor on a deployment machine, copy the `log_monitor.exe`, `logging.dll`, and `Setup Capture.exe` files from `C:\Program Files\VMware\VMware ThinApp` to the deployment machine and double-click the `log_monitor.exe` file.

3 Start the captured application.

As the application starts, a new entry appears in the Log Monitor list. Log Monitor shows one entry for each new trace file. Each file does not necessarily correspond with a single process.

4 Terminate the application as soon as it encounters an error.

5 Generate logs for each trace file you want to investigate.

a Select the `.trace` file in the list.

b Click **Generate text trace report**.

Child processes that the parent process generates reside in the same log. Multiple independent processes do not reside in the same log.

ThinApp generates a `.trace` file. Log Monitor converts the binary `.trace` file into a `.txt` file.

6 (Optional) Open the `.txt` file with a text editor and scan the information. In some circumstances, the `.txt` file is too large to open with the text editor.

7 Zip the `.txt` files and send the files to VMware support.

Perform Advanced Log Monitor Operations

Advanced operations in Log Monitor include stopping applications or deleting trace files. If an application is busy or experiencing slow performance with a specific action, you can perform suspend and resume operations to capture logs for a specific duration. The resulting log file is smaller than the typical log file and easier to analyze. Even when you use the suspend and resume operations, the root cause of an error might occur outside of your duration window. Suspend and resume operations are global and affect all applications.

For more information about using these options, contact VMware support.

To perform advanced Log Monitor operations

1 Shut down the captured application to investigate.

2 On the computer where you captured the application, select **Start > Programs > VMware > ThinApp Log Monitor**.

To start Log Monitor on a deployment machine, copy the `log_monitor.exe`, `logging.dll`, and `Setup Capture.exe` files from `C:\Program Files\VMware\VMware ThinApp` to the deployment machine and double-click the `log_monitor.exe` file.

3 (Optional) Capture logs for a specific duration to troubleshoot an exact issue.

   a Select the **Suspend** check box.

   b Start the captured application and let it run to the point where the error occurs or the performance problem starts.

   c In Log Monitor, deselect the **Suspend** check box to resume the logging process.

      You can check the application behavior to isolate the issue.

   d Select the **Suspend** check box to stop the logging process.

4 (Optional) Select a file in the trace file list to delete and click **Delete File**.

5 (Optional) Click **Kill App** to stop a running process.

6 (Optional) Click the **Compress** check box to decrease the size of a trace file.

   This operation slows the performance of the application.

7 (Optional) Generate a trace file report.

   a Select a trace file in the file list, enter a trace filename, or click **Browse** to select a trace file on your system.

   b (Optional) Enter or change the name of the output report.

   c Click **Generate text trace report** to create a report.

      You can view the file with a text editor that supports UNIX-style line breaks.

Locating Errors

ThinApp logging provides a large amount of information. The following tips might help advanced users investigate errors:

- Look at the `Potential Errors Detected` section of the `.txt` trace file.

  Entries might not indicate errors. ThinApp lists each Win32 API call where the Windows error code changed.

- Look at exceptions that the applications generate.

  Exceptions can indicate errors. Exception types include C++ and .NET. The trace file records the exception type and DLL that generates the exception. If the application, such as a .NET or Java application, creates an exception from self-generating code, the trace file indicates an unknown module.

  The following example is a `.trace` entry for an exception.

  ```
  *** Exception EXCEPTION_ACCESS_VIOLATION on read of 0x10 from unknown_module:0x7c9105f8
  ```

  If you find an exception, scan the earlier part of the trace file for the source of the exception. Ignore the floating point exceptions that Virtual Basic 6 applications generate during typical use.

- Look at child processes.

  Log Monitor produces one `.trace` file for each process. If an application starts several child processes, determine which process is causing the problem. In some cases, such as circumstances involving out-of-process COM, a parent application uses COM to start a child process, runs a function remotely, and continues to run functions.

- When you run applications from a network share that generates two processes, ignore the first process.

  ThinApp addresses the slow performance of Symantec antivirus applications by restarting processes.

- Search for the error message displayed in dialog boxes.

  Some applications call the MessageBox Win32 API function to display unexpected errors at runtime. You can search a trace file for `MessageBox` or the contents of the string displayed in the error and determine what the application was running just before the dialog box appeared.

- Narrow the focus on calls originating from a specific DLL and thread.

  The log format specifies the DLL and thread that makes a call. You can often ignore the calls from system DLLs.

Log Format

A trace file includes the following sections:

- System configuration

  This section includes information about the operating system, drives, installed software, environment variables, process list, services, and drivers.

  The information starts with a `Dump started on` string and ends with a `Dump ended on` string.

- Header

  This section shows contextual information for the instance of the process that Log Monitor tracks. Some of the displayed attributes show logging options, address ranges when the operating system runtime is loaded, and macro mapping to actual system paths.

  ThinApp marks the beginning of the header section with sequence number 000001. In typical circumstances, ThinApp marks the end of this section with a message about the Application Sync utility.

- Body

  This section includes trace activity as the application starts and performs operations. Each line represents function calls that target executable files or one of the DLLs make.

  The section starts with a `New Modules detected in memory` entry followed by the `SYSTEM_LOADED` modules list. The section ends with a `Modules Loaded` entry.

- Summary

  This section includes modules that the captured application loads, potential errors, and a profile of the 150 slowest calls.

  The section starts with the `Modules Loaded` message.

General API Log Message Format

The following message shows a format example for API calls.

```
000257 0a88 mydll.dll :4ad0576d–>kernel32.dll:7c81b1f0 SetConsoleMode (IN HANDLE
hConsoleHandle=7h, IN DWORD dwMode=3h)
000258 0a88 mydll.dll :4ad0576d<–kernel32.dll:7c81b1f0 SetConsoleMode –>BOOL=1h ()
```

This example includes the following entries:

- `000257` indicates the log entry number. Each log entry has a unique number.
- `0a88` indicates the current running thread ID. If the application has one thread, this number does not change. If two or more threads record data to the log file, you might use the thread ID to follow thread-specific sequential actions because ThinApp records log entries in the order in which they occur.
- `mydll.dll` indicates the DLL that makes the API call.
- `4ad0576d` indicates the return address for the API call that `mydll.dll` makes. In typical circumstances, the return address is the address in the code where the call originates.
- `–>` indicates the process of entering the call. For the call entry log element, ThinApp displays the input parameters. These parameters are in and in/out parameters.

- <– indicates the process of the call returning to the original caller. For call exit log entries, ThinApp displays the output parameters. These parameters are out and in/out parameters.
- `kernel32.dll` indicates the DLL where the API call lands.
- `7c81b1f0` indicates the address of the API inside kernel32 where the call lands. If you disassemble `kernel32.dll` at the `7c81b1f0` address, you locate the code for the SetConsoleMode function.
- `–>BOOL=1h` indicates the API returns the value of 1 and the return code has the BOOL type.

Application Startup Information

The following entries shows basic information about the application, such as the module name and process ID (PID), and about Log Monitor, such as the version and options.

```
000001 0a88 Logging started for Module=C:\test\cmd_test\bin\cmd.exe
Using archive=
PID=0xec
CommandLine = cmd
000002 0a88 Logging options: CAP_LEVEL=9 MAX_CAP_ARY=25 MAX_CAP_STR=150
MAX_NEST=100
VERSION=3.090

000003 0a88 System Current Directory = C:\test\cmd_test\bin Virtual Current Directory =
C:\test\cmd_test\bin

000004 0a88 |start_env_var| =::=::\
000005 0a88 |start_env_var| =C:=C:\test\cmd_test\bin
000006 0a88 |start_env_var| =ExitCode=00000000
000007 0a88 |start_env_var| ALLUSERSPROFILE=C:\Documents and Settings\All Users.WINDOWS
...
...
...
```

List of DLLs Loaded into Memory During Runtime

The `Modules loaded` section is located near the end of the log file and describes the DLLs that are loaded into memory at runtime and the DLL addresses. The information shows whether Windows or ThinApp loads the DLLs.

This example includes a summary of the length of the longest calls and the following entries:

- `SYSTEM_LOADED` indicates that Windows loads the DLL. The file must exist on the disk.
- `MEMORY_MAPPED_ANON` indicates that ThinApp loads the DLL. ThinApp might load the file from the virtual file system.
- `46800000–46873fff` indicates the address range in virtual memory where the DLL resides.
- `PRELOADED_BY_SYSTEM` and `PRELOADED_MAP` are duplicate entries and refer to the memory address range where the executable image file is mapped into memory.

```
---Modules loaded --
PRELOADED_MAP 00400000–00452fff, C:\Program Files\Adobe\Reader
8.0\Reader\AcroRd32.exe
PRELOADED_BY_SYSTEM 00400000–00452fff, C:\Program Files\Adobe\Reader
8.0\Reader\AcroRd32.exe
SYSTEM_LOADED 00400000–00452fff, C:\test\AcroRd32.exe
MEMORY_MAPPED_ANON 013b0000–020affff, C:\Program Files\Adobe\Reader
8.0\Reader\AcroRd32.dll

----Timing Report: list of slowest 150 objects profiled ---

8255572220 total cycles (2955.56 ms): |sprof| thinapp_LoadLibrary2

765380728 cycles (274.01 ms) on log entry 21753
428701805 cycles (153.48 ms) on log entry 191955
410404281 cycles (146.93 ms) on log entry 193969
.
```

```
.
... 438 total calls
7847975891 total cycles (2809.64 ms): |sprof| ts_load_internal_module
764794646 cycles (273.80 ms) on log entry 21753
426837866 cycles (152.81 ms) on log entry 191955
408570540 cycles (146.27 ms) on log entry 193969
.
.
... 94 total calls
4451728477 total cycles (1593.76 ms): |sprof| ts_lookup_imports
544327945 cycles (194.87 ms) on log entry 21758
385149968 cycles (137.89 ms) on log entry 193970
187246661 cycles (67.04 ms) on log entry 190210
.
.
... 34 total calls
1099873523 total cycles (393.76 ms): |sprof| new_thread_start
561664565 cycles (201.08 ms) on log entry 151922
531551734 cycles (190.30 ms) on log entry 152733
1619002 cycles (0.58 ms) on log entry 72875
```

Potential Errors

The `Potential Errors Detected` section marks log entries that might post problems with three asterisks (***). For information about interpreting this section, see "Locating Errors" on page 53.

```
----Potential Errors Detected ---

006425 0000075c        LoadLibraryExW 'C:\Program Files\Adobe\Reader
8.0\Reader\Microsoft.Windows.Common-Controls.DLL' flags=2 -> 0 (failed ***)
006427 0000075c        LoadLibraryExW 'C:\Program Files\Adobe\Reader
8.0\Reader\Microsoft.Windows.Common-Controls\Microsoft.Windows.Common-Controls.DLL' flags=2
-> 0 (failed ***)
006428 0000089c nview.dll :1005b94b<-kernel32.dll:7c80ae4b *** LoadLibraryW -
>HMODULE=7c800000h () *** GetLastError() returns 2 [0]: The system cannot find the file
specified.
007062 0000075c        LoadLibraryExW 'C:\Program Files\Adobe\Reader
8.0\Reader\en-US\Microsoft.Windows.Common-Controls.DLL' flags=2 -> 0 (failed ***)
010649 0000075c        LoadLibraryExW 'C:\Program Files\Adobe\Reader
8.0\Reader\en-US\Microsoft.Windows.Common-Controls\Microsoft.Windows.Common-Controls.DLL'
flags=2 -> 0 (failed ***)
019127 0000075c MSVCR80.dll :781348cc<-msvcrt.dll :77c10396 *** GetEnvironmentVariableA -
>DWORD=0h (OUT LPSTR lpBuffer=*0h <bad ptr>) *** GetLastError() returns 203 [0]: The system
could not find the environment option that was entered.
019133 0000075c MSVCR80.dll :78133003<-nview.dll :1000058c *** GetProcAddress -
>FARPROC=*0h () *** GetLastError() returns 127 [203]: The specified procedure could not be found.
019435 0000075c MSVCR80.dll :78136e08<-dbghelp.dll :59a60360 *** Getfile type ->DWORD=0h ()
*** GetLastError() returns 6 [0]: The handle is invalid.
019500 0000075c MSVCR80.dll :78134481<-nview.dll :1000058c *** GetProcAddress -
>FARPROC=*0h () *** GetLastError() returns 127 [0]: The specified procedure could not be found.
019530 0000075c MSVCR80.dll :78131dcd<-dbghelp.dll :59a603a1 *** GetModuleHandleA -
>HMODULE=0h () *** GetLastError() returns 126 [0]: The specified module could not be found.
```

Troubleshooting Example for cmd.exe Utility

In the troubleshooting example, ThinApp packages the `cmd.exe` utility with logging turned on. The example shows how you can simulate application failure by running an invalid command. If you request the `cmd.exe` utility to run the `foobar` command, the utility generates the `foobar is not recognized as an internal or external command` message. You can scan the trace file and check the `Potential Errors Detected` section to locate the API functions that modified the `GetLastError` code.

The example shows the `C:\test\cmd_test\bin\foobar.*`, `C:\WINDOWS\system32\foobar.*`, and `C:\WINDOWS\foobar` paths as the locations where the `cmd.exe` utility looks for the `foobar` command.

The example shows the %drive_C%\test\cmd_test\bin, %SystemSystem%\foobar, and %SystemRoot%\foobar paths as the locations in the virtual file system that ThinApp probes.

```
----Potential Errors Detected ---
*** Unable to determine if any services need to be auto-started, error 2
001550 *** FindFirstFileW 'C:\test\cmd_test\bin\foobar.*' -> INVALID_HANDLE_VALUE *** failed
[system probe C:\test\cmd_test\bin\foobar.* -> ffffffffh][no virtual or system matches]
*** FindFirstFileW ->HANDLE=ffffffffh .. *** GetLastError() returns 2 [203]: The system cannot
find the file specified.
*** FindFirstFileW 'C:\test\cmd_test\bin\foobar' -> INVALID_HANDLE_VALUE *** failed [FS
missing in view 0][fs entry not found %drive_C%\test\cmd_test\bin\foobar][fs entry not found
%drive_C%\test\cmd_test\bin]
*** FindFirstFileW 'C:\WINDOWS\system32\foobar.*' -> INVALID_HANDLE_VALUE *** failed [system
probe C:\WINDOWS\system32\foobar.* -> ffffffffh][no virtual or system matches]
*** FindFirstFileW 'C:\WINDOWS\system32\foobar' -> INVALID_HANDLE_VALUE *** failed [FS missing
in view 0][fs entry not found %SystemSystem%\foobar]
*** FindFirstFileW 'C:\WINDOWS\foobar.*' -> INVALID_HANDLE_VALUE *** failed [system probe
C:\WINDOWS\foobar.* -> ffffffffh][no virtual or system matches]
*** FindFirstFileW 'C:\WINDOWS\foobar' -> INVALID_HANDLE_VALUE *** failed [FS missing in view
0][fs entry not found %SystemRoot%\foobar]
```

Perform Advanced Examination for cmd.exe Log Entries

A more thorough examination of an entry from the Potential Errors section of a trace file might involve searching the full body of the Log Monitor trace file for that specific entry and reviewing the system calls and conditions leading to the potential error.

For example, the following entry for the cmd.exe utility in the Potential Errors section might require a more thorough examination throughout the Log Monitor trace file.

```
001550 *** FindFirstFileW 'C:\test\cmd_test\bin\foobar.*' -> INVALID_HANDLE_VALUE *** failed
[system probe
```

To perform an advanced examination of the cmd.exe entry

1 To determine why the cmd.exe utility probes c:\test\cmd_test\bin, scan the log for this log entry number and determine what occurs before this call.

2 To determine the locations where the cmd.exe utility obtains the c:\test\cmd_test path, scan the log for GetCurrentDirectoryW and GetFullPathNameW entries.

```
000861 0a88 cmd.exe  :4ad01580->USERENV.dll :769c0396 GetCurrentDirectoryW (IN DWORD
nBufferLength=104h)
000862 0a88                    GetCurrentDirectoryW -> 0x14 (C:\test\cmd_test\bin)
000863 0a88 cmd.exe  :4ad01580<-USERENV.dll :769c0396 GetCurrentDirectoryW ->DWORD=14h
(OUT LPWSTR lpBuffer=*4AD34400h->L"C:\test\cmd_test\bin")
000864 0a88 cmd.exe  :4ad05b74->ole32.dll :774e03f0 Getfile type (IN HANDLE hFile=7h)
000865 0a88                    Getfile type 7 -> 0x2
000866 0a88 cmd.exe  :4ad05b74<-ole32.dll :774e03f0 Getfile type ->DWORD=2h ()
.
.
001533 0a88 cmd.exe  :4ad01b0d<-kernel32.dll:7c80ac0f SetErrorMode ->UINT=0h ()
001534 0a88 cmd.exe  :4ad01b13->kernel32.dll:7c80ac0f SetErrorMode (IN UINT uMode=1h)
001535 0a88 cmd.exe   :4ad01b13<-kernel32.dll:7c80ac0f SetErrorMode ->UINT=0h ()
001536 0a88 cmd.exe  :4ad01b24->IMM32.DLL :7639039b GetFullPathNameW (IN LPCWSTR
lpFileName=*1638C0h->L"," IN DWORD nBufferLength=208h)
001537 0a88                    GetFullPathNameW . -> 20 (buf=C:\test\cmd_test\bin,
file_part=bin)
001538 0a88 cmd.exe  :4ad01b24<-IMM32.DLL :7639039b GetFullPathNameW ->DWORD=14h
(OUT LPWSTR lpBuffer=*163D60h->L"C:\test\cmd_test\bin," OUT *lpFilePart=*13D8D4h-
>*163D82h->L"bin")
.
.
001549 0a88 cmd.exe   :4ad01b5f->USERENV.dll :769c03fa FindFirstFileW (IN LPCWSTR
lpFileName=*1638C0h->L"C:\test\cmd_test\bin\foobar.*")
001550 0a88                    FindFirstFileW 'C:\test\cmd_test\bin\foobar.*' ->
INVALID_HANDLE_VALUE *** failed [system probe C:\test\cmd_test\bin\foobar.* -> ffffffffh][no
virtual or system matches]
```

The cmd.exe utility obtains the first location by calling GetCurrentDirectoryW and the second location by calling GetFullPathNameW with "." as the path specifies. These calls return the path for the current working directory. The log file shows that the cmd.exe utility creates the c:\test\cmd_test\bin> prompt. The utility queries the PROMPT environment variable that returns PG and uses the WriteConsoleW API function to print the prompt to the screen after internally expanding PG to c:\test\cmd_test\bin>.

Troubleshooting Specific Applications

Troubleshooting tips are available for capturing Microsoft Outlook, Explorer.exe, and Java Runtime Environment.

Troubleshoot Registry Setup for Microsoft Outlook

Microsoft Outlook stores account settings in registry keys and files. When you start Microsoft Outlook for the first time, it checks that the keys exist. If Microsoft Outlook cannot locate the keys, it prompts you to create a new account.

This process works properly in the virtual environment when Microsoft Outlook is not installed on the physical system. If the user already has Microsoft Outlook installed on the physical system, the captured version finds the registry keys in the system registry and uses those settings. You must use Full isolation mode for the registry keys and files where Microsoft Outlook stores its settings.

To set up Full isolation mode for Microsoft Outlook registry keys

1 Add the following entries to the HKEY_CURRENT_USER.txt file:

```
isolation_full HKEY_CURRENT_USER\Identities
isolation_full HKEY_CURRENT_USER\Software\Microsoft\Windows
NT\CurrentVersion\Windows Messaging Subsystem\Profiles
```

2 Create a ##Attributes.ini file with the following entries:

```
[Isolation]
DirectoryIsolationMode=Full
```

3 Place the ##Attributes.ini file in each of the following subdirectories:

```
%AppData%\Microsoft\AddIns
%AppData%\Microsoft\Office
%AppData%\Microsoft\Outlook
%Local AppData%\Microsoft\FORMS
%Local AppData%\Microsoft\Outlook
```

4 (Optional) If the subdirectories do not exist, create the directories.

Viewing Attachments in Microsoft Outlook

Microsoft Outlook creates a default directory to store attachments when you open an attachment for viewing. The typical location is C:\Documents and Settings\<user_name>\Local Settings\Temp\Temporary Internet Files\OLK<xxxx>. The last xxxx is replaced by a random entry.

You can view attachments when the viewing application runs in the same virtual sandbox as Microsoft Outlook. External applications might not be able to find the file to display because Microsoft Outlook stores the file in the sandbox. You must use the Merged isolation mode for the directory that stores the attachments.

To set up Merged isolation mode to view Microsoft Outlook attachments

1 Add a value to the HKEY_CURRENT_USER.txt file that sets the name of the attachment directory:

```
isolation_full
HKEY_CURRENT_USER\Software\Microsoft\Office\11.0\Outlook\Security
Value=OutlookSecureTempFolder
REG_SZ~%Profile%\Local Settings\OutlookTempxxxx#2300
```

In this example, 11.0 in the key name is for Microsoft Outlook 2003.

2 Replace the last four xxxx characters with random alphanumeric entries to increase security.

3 Create a directory that is named in the `OutlookSecureTempFolder` registry key in your ThinApp project.

   For example, create the `%Profile%\Local Settings\OutlookTempxxxx` directory.

4 In the `%Profile%\Local Settings\OutlookTempxxxx` directory, create a `##Attributes.ini` file with the following entries:

```
[Isolation]
DirectoryIsolationMode=Merged
```

Starting Explorer.exe in the Virtual Environment

Running one instance of the `explorer.exe` utility on a Windows operating system makes it difficult to add an entry point to Windows Explorer and launch it inside the virtual environment.

You can use the following methods to launch a Windows Explorer window inside the virtual environment:

- Add an entry point to iExplorer and launch it with the `–E` parameter.

  For example, add the following entries to the `Package.ini` file:

```
[iexplore.exe]
Shortcut=xxxx.exe
Source=%ProgramFilesDir%\Internet Explorer\iexplore.exe
CommandLine=%ProgramFilesDir%\Internet Explorer\iexplore.exe –E
```

- Add the following virtual registry key:

```
isolation_full HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer
Value=DesktopProcess
REG_DWORD=#01#00#00#00
```

- Add the following entries to the `Package.ini` file:

```
[explorer.exe]
Shortcut=xxxxxx.exe
Source=%SystemROOT%\explorer.exe
```

  Use this method to browse the virtual file system with a familiar interface and enable accurate file type associations without system changes, especially when using portable applications. You can access shell-integrated components without system changes.

Troubleshooting Java Runtime Environment Version Conflict

A conflict might occur if one version of Java is installed on the physical system and another version is included in a captured executable file. Updated versions of Java install a plug-in DLL that Internet Explorer loads. This plug-in DLL overwrites virtual registry keys and conflicts with a virtualized copy of older Java runtimes.

To prevent Internet Explorer from loading plug-in DLLs

Add the following entry to the beginning of the `HKEY_LOCAL_MACHINE.txt` file:

```
isolation_full HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\Browser
Helper Objects
```

Configuring Package Parameters

A

Advanced users can customize the parameters of the virtual application outside of the capture process. The `Package.ini` file is located in the project folder and contains parameters that configure a captured application during the build process. You must save the `Package.ini` file and build the project to have the parameters changes take effect.

Parameters can affect the configuration of isolation modes and build options that include MSI, Application Link, Application Sync, and application entry point settings. The Setup Capture wizard sets the initial values of certain `Package.ini` parameters. See "Capture an Application with the Setup Capture Wizard" on page 16.

This information includes the following topics:

Package.ini File Structure

The [BuildOptions] section of the Package.ini file applies to all applications. Individual applications inherit these parameters unless the application-specific entries overrides these settings. For example, the [Adobe Reader 8.exe] section of the Package.ini file for an Adobe Reader application might have settings that override the larger [BuildOptions] parameters. The application-specific parameters show the application entry points that you create during the build process.

Package.ini Parameter Placement

The square bracket sections of the Package.ini file require parameters to exist under the proper section. These sections have the following headings:

- [BuildOptions]
- [<application>.exe]
- [FileList]
- [Compression]
- [Isolation]

Parameters that do not apply to these sections do not need to reside under a particular heading. Parameters do not have to be in alphabetical order. The [FileList], [Compression], and [Isolation] parameters act as [BuildOptions] parameters but are grouped separately for backward compatibility reasons. You can add the [FileList] heading manually to the file when you need to add the ExcludePattern parameter.

Parameters that Apply to Package.ini or ##Attributes.ini Files

You can use the DirectoryIsolationMode, Compression, and ExcludePattern parameters in an ##Attributes.ini file if you want to override the Package.ini settings at the directory level. The ##Attributes.ini file exists in the folder macros of the project folder. For more information about the ##Attributes.ini file, see "Modifying Settings in the ##Attributes.ini File" on page 23.

Configuring the ThinApp Runtime

Runtime configuration tasks involve parameters that address application startup performance and virtual computer names.

NetRelaunch

The NetRelaunch parameter determines whether to restart an application from the local disk when you run the application from a network share or removable disk, such as a USB disk. This parameter is useful when you need to address the slow startup or performance of applications.

ThinApp detects whether an application runs from a network drive or a removable disk, and uses a stub executable file on the local hard disk to restart the application. This process addresses performance problems that Symantec AntiVirus generates when it tries to perform a complete scan of executable files that start from a network share or removable disk and on executable files that make the initial network connections. The scan can affect start times for large executable files.

Because a large number of desktops have Symantec AntiVirus, ThinApp allows applications to start from a network share without incurring lengthy scan times. When the application runs from a network share or removable disk, ThinApp creates a stub executable file in the directory that the CachePath parameter sets on the local disk and restarts the application from this stub executable file. The stub executable file can load the runtime from the large package and read the rest of the application from its original network location. Symantec AntiVirus perceives that the application is local and does not scan the larger executable file on the network share or removable disk.

Examples

If the application starts from a network drive or a removable disk, the default value of the NetRelaunch parameter creates a local stub file to restart the application.

```
[BuildOptions]
NetRelaunch=1
```

If your application is small or you know that Symantec AntiVirus is not installed on the desktops to which you are deploying the application, you might want to turn off the NetRelaunch parameter for stronger initial startup performance.

```
[BuildOptions]
NetRelaunch=0
```

RuntimeEULA

The RuntimeEULA parameter controls the End User License Agreement (EULA) display for the package. This parameter addresses legacy EULA requirements.

VMware does not require a runtime EULA for ThinApp packages. Do not alter the value of this parameter.

Examples

The default value for the RuntimeEULA parameter prevents the display of the EULA.

```
[BuildOptions]
;Default: do not show an Eula
RuntimeEULA=0
```

You can display a EULA.

```
[BuildOptions]
;Turn on display of EULA
RuntimeEULA=1
```

VirtualComputerName

The VirtualComputerName parameter virtualizes the computer name. This is useful for a deployment machine that does not have the same name as the capture machine.

Applications can use the name of the machine on which they are installed or connect to a database and use the name of the computer in the connection string. For captured applications, the computer name is virtual to ensure that the application runs on any machine.

This parameter is a string that GetComputerName and GetComputerNameEx API functions return in a captured application.

Examples

If the capture machine does not have the LOCALHOST name, ThinApp comments out the parameter.

```
;VirtualComputerName=<original_machine_name>
```

If you rename a clean machine as LOCALHOST before performing the capture process, the Package.ini file activates the VirtualComputerName entry.

```
VirtualComputerName=LOCALHOST
```

If you enter a GetComputerName or GetComputerNameEx command, the machine returns LOCALHOST. If the Windows system requires the GetComputerName and GetComputerNameEx API functions to operate in a standard way and return the actual name of the computer where the application runs, do not rename the machine as LOCALHOST.

Besides specifying a literal string, such as LOCALHOST, you can specify an environment variable.

```
VirtualComputerName=%VCOMPNAME%
```

When you specify an environment variable, the value returned is the value of the environment variable. If the value of the `VirtualComputerName` parameter is %VCOMPNAME%, and the %VCOMPNAME% environment variable is set to `EnvCompName`, the `GetComputerName` API returns `EnvCompName`.

Wow64

The `Wow64` parameter simulates a 32-bit environment for 32-bit applications that cannot run on a 64-bit Windows operating system. If a 32-bit application tries to handle its own 64-bit registry redirection, you can enable this parameter before building a project.

Examples

You can leave the parameter commented out to prevent Windows on Windows 64-bit (WOW64) emulation.

```
[BuildOptions]
;Wow64=0
```

You can simulate a 32-bit environment for 32-bit applications on a 64-bit operating system. For example, a virtualized 32-bit Oracle application might not work on a 64-bit operating system.

```
[BuildOptions]
Wow64=0
```

Configuring File System and Registry Isolation

Isolation mode parameters determine the write access to the file system and registry keys.

DirectoryIsolationMode

The `DirectoryIsolationMode` parameter specifies the level of write access for directories to the physical file system. ThinApp provides the Merged, WriteCopy, and Full isolation modes. This parameter controls the default isolation mode for application package directories that do not have specific settings. The default setting depends on the application capture process.

The `Package.ini` file sets the default isolation mode for the project. Individual `##Attributes.ini` files override the `Package.ini` file and specify the isolation mode for specific directories and child directories. Any unspecified directories, such as `C:\myfolder`, inherit the isolation mode from the `Package.ini` file. You must add the `[Isolation]` heading before this parameter entry.

Do not use the Full isolation mode in the `Package.ini` file because that mode blocks the ability to detect and load system DLLs. You can use Full isolation mode as an override mechanism in the `##Attributes.ini` files.

For information about the definitions and effect of isolation modes, see "Specify File System Access" on page 18.

Examples

WriteCopy isolation mode allows the application to read resources on the local machine but not write to the host computer. This is the default setting for the `snapshot.exe` utility.

```
[Isolation]
DirectoryIsolationMode=WriteCopy
```

Merged isolation mode allows the application to read resources on and write to any location on the computer except where the package specifies otherwise. This is the default setting for the Setup Capture wizard.

```
[Isolation]
DirectoryIsolationMode=Merged
```

RegistryIsolationMode

The `RegistryIsolationMode` parameter controls the default isolation mode for registry keys in the package. This setting applies to the registry keys that do not have explicit settings.

For more information about the definitions of isolation modes, see "Specify File System Access" on page 18. Registry isolation modes only exist in the `Package.ini` file. You cannot configure this setting in the Setup Capture wizard.

Examples

You can use the `RegistryIsolationMode` parameter to ensure that the application can read keys from the host computer but not write to the host computer. If you do not specify the registry isolation mode in the `Package.ini` file, the default value is `WriteCopy`.

```
[Isolation]
RegistryIsolationMode=WriteCopy
```

You can use the `RegistryIsolationMode` parameter to ensure that the application can write to any key on the computer, except where the package specifies otherwise.

```
[Isolation]
RegistryIsolationMode=Merged
```

Configuring File and Protocol Associations

File and protocol parameters associate file extensions with applications and specify protocols that are visible to the physical environment.

FileTypes

The `FileTypes` parameter lists file extensions that the `thinreg.exe` utility associates with an executable file. The capture process generates default values that you cannot add to. You can remove extensions that you do not want to associate with the virtual package. Do not use separators between the file extensions in the list.

Examples

The default value for a Microsoft Word 2007 package is `.doc.docx`. If you virtualize Microsoft Office 2007 and have Microsoft Office 2003 installed in the physical environment, you can remove the `.doc` extension from the `FileTypes` list and leave the `.docx` extension to ensure that Microsoft Word 2003 opens `.doc` files and Microsoft Word 2007 opens `.docx` files.

```
[Microsoft Office Word 2007.exe]
FileTypes=.docx
```

The capture process can create file type associations for `.doc` and `.dot` extensions and link them to Microsoft Word.

```
[Microsoft Office Word 2003.exe]
ReadOnlyData=bin\Package.ro.tvr
Source=%ProgramFilesDir%\Microsoft Office\OFFICE11\WINWORD.EXE
FileTypes=.doc.dot
```

Protocols

The `Protocols` parameter specifies the protocols, such as HTTP, that are visible to applications in the physical environment. This parameter is similar to the `FileTypes` parameter but deals with applications that handle protocols rather than file types. The capture process generates default values that you cannot add to. You can remove entries for browers or other applications.

Examples

The capture process can specify protocols, such as the `mailto` protocol, for a Microsoft Outlook package.

```
[Microsoft Office Outlook 2007.exe]
Protocols=feed;feeds;mailto;Outlook.URL.mailto;stssync;webcal;webcals
```

Configuring Build Output

Build parameters specify the location of the build output and the files to exclude from the package.

OutDir

The `OutDir` parameter specifies the directory that stores the `build.bat` output. Do not change the value of this parameter.

Examples

The default and required value specifies the `bin` directory of the project.

```
[BuildOptions]
OutDir=bin
```

ExcludePattern

The `ExcludePattern` parameter excludes files or directories during the application build process. You must add a `[FileList]` heading before this parameter entry.

You can use a comma to separate patterns in the list. Wildcards (*) match none of the characters or at least one of the characters and question marks (?) match exactly one character. The syntax is similar to the DOS `dir` command, but you can apply wildcard characters to directory names and filenames.

You can specify the `ExcludePattern` parameter in the `Package.ini` file, where the pattern exclusion applies to the entire directory structure, and the `##Attributes.ini` file, where ThinApp adds the pattern exclusion to the current list of exclusions but applies settings only to the specific directory and subdirectories. You can create a different exclusion list for different directories in your project.

Examples

If you store packages in a version control system and you want to exclude version control info from the virtual filesystem, you can exclude any directories called `.svn` or `.cvs` and all the subdirectories.

```
[FileList]
ExcludePattern=\.svn,\.cvs
```

The pattern does not match filenames or directories that contain `.svn` or `.cvs` in the middle of the string.

You can exclude any path that ends with `.bak` or `.msi`.

```
[FileList]
ExcludePattern=*.bak,*.msi
```

Configuring Permissions and Security

Security tasks involve parameters that define user access to packages and change Data Execution Prevention (DEP) protection.

AccessDeniedMsg

The `AccessDeniedMsg` parameter contains an error message to display to users who do not have permission to run a package. The default setting is `You are not currently authorized to run this application. Please contact your Administrator`.

Examples

You can customize the AccessDeniedMsg string with a technical support number.

```
[BuildOptions]
PermittedGroups=Administrator;OfficeUsers
AccessDeniedMsg=You do not have permission to execute this application, please call support @
1-800-822-2992
```

AddPageExecutePermission

The AddPageExecutePermission parameter addresses applications that do not work in a Data Execution Prevention (DEP) environment.

The DEP feature of Windows XP SP2, Windows Server 2003, and later operating system versions protects against some security exploits that occur with buffer overflow. This feature creates some compatibility issues. Windows turns off the feature by default on Windows XP SP2 and you can use a machine-specific opt-in or opt-out list of the applications to which to apply DEP protection. Opt-in and opt-out policies can be difficult to manage when a large number of machines and applications are involved. The AddPageExecutePermission parameter instructs ThinApp to add execution permission to pages that an application allocates. The application can run on machines that have DEP protection enabled without modifying the opt-out list.

Examples

The default value of the AddPageExecutePermission parameter prevents any change to the DEP protections.

```
[BuildOptions]
AddPageExecutionPermission=0
```

You can add execution permission to pages that an application allocates. ThinApp executes code from memory pages that the application specifies. This is useful for applications that combine the program and its data into one area of memory.

```
[BuildOptions]
;Disable some Data Execution protections for this particular application
AddPageExecutionPermission=1
```

PermittedGroups

The PermittedGroups parameter restricts a package to a specific set of Active Directory users. You can use this parameter under the [BuildOptions] heading to affect the package or under the [<application>.exe] heading to affect a specific application. The [<application>.exe] value overrides the default [BuildOptions] value for the specific application.

You can specify group names, SID strings, or a mix of group names and SID strings in the same line of the PermittedGroups parameter. If you use a domain-based group name, you must be connected to that domain when you build the application package. If you enter a SID directly in the parameter value, you do not need to connect to the domain where the SID is defined.

The parameter does not support nested Active Directory groups. For example, if a user is a member of group A, and group A is a member of group B, ThinApp can only detect the user as a member of group A rather than group A and group B.

When ThinApp builds an application, ThinApp assumes any specified group names are valid and converts the names to SID values. ThinApp can resolve group ownership at runtime using cached credentials. You can continue to authenticate laptop users even when they are offline.

If the user does not have access to run the package, you can customize the AccessDeniedMsg parameter to instruct the user.

Examples

You can specify a list of Active Directory user group names separated by semicolons. The [BuildOptions] parameters set global settings for the entire project.

```
[BuildOptions]
PermittedGroups=Administrator;OfficeUsers
AccessDeniedMsg=You do not have permission to execute this application, please call support @
1-800-822-2992
```

You can specify a user group setting for a specific application that overwrites the global `PermittedGroups` setting.

```
[App1.exe]
PermittedGroups=Guest
AccessDeniedMsg=You do not have permission to execute this application, please call support @
1-800-822-2992
```

If you do not specify a `PermittedGroups` setting for an application, the application inherits the global `PermittedGroups` value in the `[BuildOptions]` section.

```
[App2.exe]
...
```

You can mix group names and SID strings in the same entry for the `PermittedGroups` parameter.

```
PermittedGroups=S-1-5-32-544;Office Users
```

UACRequestedPrivilegesLevel

The `UACRequestedPrivilegesLevel` parameter specifies privileges for programs requiring User Account Control (UAC) information. This parameter affects users working on Windows Vista or later operating system versions.

You can use the following values:

- asInvoker

  This value uses the profile in Vista.

- requireAdministrator
- highestAvailable

  This value uses the highest available privilege that can avoid the UAC prompt.

If you do not specify privileges, ThinApp does not assign a default value but operates according to the asInvoker setting.

Examples

You can specify that a program requires administrator privileges.

```
[BuildOptions]
UACRequestedPrivilegesLevel=requireAdministrator
```

UACRequestedPrivilegesUIAccess

Windows Vista or later operating system versions protect some elements of the user interface. In typical circumstances, virtual applications do not require access to protected elements.You can assign a `true` or `false` value to the `UACRequestedPrivilegesUIAccess` parameter to specify user interface access.

The `UACRequestedPrivilegesUIAccess` parameter exists to provide parallel features to the Microsoft application manifest rather than to alter the value.

Examples

The default value of `false` ensures that the virtual application cannot access protected elements.

```
[BuildOptions]
UACRequestedPrivilegesUiAccess=false
```

Configuring Objects and DLL Files

You can use ThinApp parameters to specify COM object access and DLL loading requirements.

ExternalCOMObjects

The `ExternalCOMObjects` parameter controls whether ThinApp or Windows creates a specific COM object CLSID key.

By default, ThinApp creates all COM objects in the virtual environment. COM supports out-of-process executable servers and service-based COM objects. If an application can create COM objects that generate modifications on the host computer, the integrity of the host computer is at risk. If ThinApp runs out-of-process and service-based COM objects in the virtual environment, ThinApp stores in the sandbox all changes that the COM objects make.

Examples

You can instruct ThinApp to run two COM objects outside of the virtual environment if the application creates the objects.

```
[BuildOptions]
ExternalCOMObjects={8BC3F05E-D86B-11D0-A075-00C04FB68820};{7D096C5F-AC08-4F1F-BEB7-5C22C517CE39}
```

ExternalDLLs

The `ExternalDLLs` parameter can force Windows to load DLL files from the virtual file system.

ThinApp loads DDL files from the virtual file system and passes the loading process to Windows for DLL files on the physical file system. In some circumstances, Windows must load a DLL file in the virtual file system. For example, you might have a DLL file that inserts itself into other processes using Windows hooks. The DLL file that implements the hook must be available on the host file system and Windows must load that file. When you specify a DLL file in the `ExternalDLLs` parameter, ThinApp extracts the file from the virtual file system to the sandbox and instructs Windows to load it.

The `ExternalDLLs` parameter does not support a DLL file that depends on other DLL files inside the virtual file system. In this case, Windows cannot load the DLL file.

Examples

You can instruct ThinApp to pass on to Windows the loading process of the `inject.dll` and `injectme2.dll` files.

```
[BuildOptions]
ExternalDLLs=inject.dll;injectme2.dll
```

IsolatedMemoryObjects

The `IsolatedMemoryObjects` parameter lists the shared memory objects to isolate from other applications.

Applications that use `CreateFileMapping` and `OpenFileMapping` Windows functions create shared memory objects. Shared memory objects can have names or remain anonymous. Named objects are visible to other applications running in the same user account. You might want to isolate shared memory objects to ensure that virtual applications and system objects cannot detect each other.

ThinApp isolates shared memory objects that embedded Internet Explorer instances use. A conflict occurs between the `explorer.exe` and `iexplore.exe` utilities when the utilities map sandbox files. You can use the `IsolatedMemoryObjects` parameter to isolate additional named shared memory objects to ensure that the objects are visible only to other virtual applications using the same sandbox.

The `IsolatedMemoryObjects` parameter accepts a list of entries that are separated by the semicolon (;). Each entry can contain asterisk (*) and question mark (?) wildcard characters to match variable patterns.

Examples

You can isolate two shared memory objects, match an object with `outlook` in the name, and match an object with the exact `My Shared Object` name.

```
[BuildOptions]
IsolatedMemoryObjects=*outlook*;My Shared Object
```

IsolatedSynchronizationObjects

The `IsolatedSynchronizationObjects` parameter lists specific synchronization objects to isolate from other applications.

Windows has the following named synchronization objects:

- `Mutex`

  Use OpenMutex and CreateMutex to access this object.

- `Semaphore`

  Use OpenSemaphore and CreateSemaphore to access this object.

- `Events`

  Use OpenEvent and CreateEvent to access this object.

If an application fails or an error occurs, you might need to isolate these objects in the virtual environment to avoid a collision with synchronization objects that native applications create. You can isolate synchronization objects from applications that do not run in the same virtual namespace. If two applications share the same sandbox path, the applications have the same namespace for isolated synchronization objects. If two applications have the same sandbox name but different sandbox paths, the applications have separate namespaces.

The `IsolatedSynchronizationObjects` parameter accepts a list of entries that are separated by the semicolon (;). Each entry can use the asterisk (*) and question mark (?) as wildcard characters to match variable patterns.

Examples

You can isolate two synchronization objects, match an object with `outlook` in the name, and match an object with the exact `My Shared Object` name.

```
[BuildOptions]
IsolatedSynchronizationObjects=*outlook*;My Shared Object
```

ObjectTypes

The `ObjectTypes` parameter specifies a list of virtual COM object types that are visible to other applications in the physical environment. You can use scripts, such as VBScripts, to call objects that start captured applications.

An object type is registered to only one native or virtual application at a time. If you install Office 2003 on the native machine and want to use a virtual Office 2007 package, you must choose whether to have the virtual or native application handle the object types.

If you want the virtual Office 2007 to handle the object types, you can leave the `ObjectTypes` setting in the `Package.ini` file, build the package, and register it using the `thinreg.exe` utility. If you want the native Office 2003 to handle the object types, you must remove the `ObjectTypes` setting from the `Package.ini` file before building and registering the package. You cannot add random entries to the `ObjectTypes` parameter. You can only remove entries generated by the setup capture process.

Examples

If a script or a native application creates an `Excel.Application` COM object or other COM objects listed in the `ObjectTypes` parameter, ThinApp starts the virtual package.

```
[Microsoft Office Excel 2007.exe]
ObjectTypes=Excel.Application;Excel.Application.12;Excel.Chart;
               Excel.Macrosheet;Excel.Sheet; Excel.Workspace
```

SandboxCOMObjects

The `SandboxCOMObjects` parameter indicates whether applications in the physical environment can access COM objects that the virtual application registers at runtime.

Examples

You can prevent native applications in the physical environment from accessing COM objects that the virtual application registers. ThinApp places in the sandbox the COM objects that the virtual application registers.

```
SandboxCOMObjects=1
```

You can make visible COM objects that the virtual application registers outside the sandbox.

```
SandboxCOMObjects=0
```

VirtualizeExternalOutOfProcessCOM

The `VirtualizeExternalOutOfProcessCOM` parameter controls whether external out-of-process COM objects can run in the virtual environment.

Captured applications can create COM objects from the host system and COM objects that ThinApp registers in the virtual environment.

The `VirtualizeExternalOutOfProcessCOM` parameter determines how to address out-of-process COM objects that are not part of a ThinApp package and are not registered in the virtual registry. ThinApp runs external out-of-process COM objects in the virtual environment to ensure that COM objects cannot modify the host computer. If a compatibility problem exists with an external COM object running in the virtual environment, you can use the `VirtualizeExternalOutOfProcessCOM` parameter to create and run COM objects on the host system. To run only specific COM objects outside of the virtual environment, you can use the `ExternalCOMObjects` parameter to explicitly list the CLSID of each COM object.

Examples

You can run all external out-of-process COM objects in the physical environment rather than the virtual environment.

```
[BuildOptions]
VirtualizeExternalOutOfProcessCOM=0
```

Use the default value to run all external out-of-process COM objects in the virtual environment.

```
[BuildOptions]
VirtualizeExternalOutOfProcessCOM=1
```

Configuring Storage

You can use ThinApp parameters to configure file storage and set up virtual drives.

CachePath

The `CachePath` parameter sets the path to the cache directory that stores font files and stub executable files. You can use this parameter to force the cache directory to reside on a different drive.

This parameter can contain macros, such as `%Local AppData%`, that expand before use. If the path is relative, ThinApp interprets the path relative to the directory where the package is stored.

You can use the `THINSTALL_CACHE_DIR` environment variable to override this parameter at runtime.

If neither the `CachePath` parameter nor the `THINSTALL_CACHE_DIR` environment variable is present, ThinApp uses a default location. The default location depends on the presence of a `SandboxPath` parameter in the `Package.ini` file. If the `SandboxPath` parameter exists and the path setting is relative, `CachePath` defaults to the same path. If the `SandboxPath` setting exists and the path setting is absolute, `CachePath` defaults to `%Local AppData%\Thinstall\Cache\Stubs`.

Examples

You can set the cache directory to `C:\VirtCache`.

```
CachePath=C:\VirtCache
```

If the package resides in `C:\VirtApps` and the `CachePath` parameter has a value of `Cache`, the cache directory is `C:\VirtApps\Cache`.

Using a USB key might involve forcing the sandbox on to the USB key. If you store packages in the `\VirtApps` directory on the USB key, you can force the cache directory to reside on the USB key.

```
CachePath=Sandbox
```

UpgradePath

The `UpgradePath` parameter specifies the location of information and files for updates. Application Sync and integer updates use this location.

By default, the Application Sync utility places its log and cache files in the same location as the application executable file on the local machine. Integer updates operate in a similar way. If the default location has limited space or you want to isolate upgrades from the application executable file, use the `UpgradePath` parameter to specify an alternative location. You can use environment variables in the path. Do not use folder macros.

When the Application Sync utility downloads an update from a server, it stores the update with a temporary name in the `UpgradePath` location. The next time the application starts, ThinApp renames the temporary file with a .1 extension or a .2 extension depending on whether .1 already exists. ThinApp attempts to change the name with the .1 extension to the original name of the file that might reside in another directory. If ThinApp cannot make this change, the file keeps the .1 extension in the `UpgradePath` location. Running the original application accesses that file.

For information about the Application Sync utility, see "Application Sync Updates" on page 39.

Examples

Instead of storing update files in the default location with the application executable file, you can instruct ThinApp to detect application updates in `C:\Program Files\MyAppUpgrades`.

```
[BuildOptions]
UpgradePath=C:\Program Files\MyAppUpgrades
```

VirtualDrives

The `VirtualDrives` parameter specifies additional drive letters that are available to the application at runtime.

Virtual drives are useful when applications rely on hard-coded paths to drive letters that might not be available on the client computers. For example, certain legacy applications might expect that the `D:` drive is a CD-ROM and that data files are available at `D:\media`.

Virtual drives are visible only to applications running in the virtual environment. Virtual drives do not affect the physical Windows environment. Virtual drives inherit isolation modes from the default isolation mode of the project unless you specifically override the mode. If you configure your virtual drive with the `IsolationMode` parameter set to `Merged`, any write operations to that drive fail if it does not exist on the physical system.

A project lists virtual drive information for drives that are present at the time of application capture. The `VirtualDrives` parameter uses semicolons to separate information assigned to different drive letters and commas to separate parameters for individual drive letters. The `VirtualDrives` parameter includes this information:

- `Drive` is a single character between A and Z.
- `Serial` is an eight digit hex number.
- `Type` is `FIXED`, `REMOVABLE`, `CD–ROM`, or `RAMDISK`.
  - `FIXED`—Indicates fixed media.

    For example, a hard drive or internal Flash drive.
  - `REMOVABLE`—Indicates removable media.

    For example, a disk drive, thumb drive, or flash card reader.
  - `CD–ROM`—Indicates a CD-ROM drive.
  - `RAMDISK`—Indicates a RAM disk.

Examples

The `VirtualDrives` parameter is a single string that can hold information for multiple drive letters, and optional parameters for those drive letters.

```
VirtualDrives= Drive=A, Serial=12345678, Type=REMOVABLE; Drive=B, Serial=9ABCDEF0, Type=FIXED
```

Basic usage involves specifying a single virtual drive letter. By default, ThinApp assigns a serial number and the `FIXED` type to the drive.

You can specify the `X`, `D`, and `Z` virtual drive letters.

```
[BuildOptions]
VirtualDrives=Drive=X, Serial=ff897828, Type=REMOVABLE; Drive=D, Type=CDROM; Drive=Z
```

Drive `X` is a removable disk with the ff797828 serial number.

Drive `D` is a CD-ROM drive with an assigned serial number,

Drive `Z` is a `FIXED` disk with an assigned serial number.

Change Virtual Drive Isolation Settings

You might need to use the `##Attributes.ini` file to change the isolation mode of a virtual drive.

To specify the isolation mode for a virtual drive

1 Add the `%Drive_X%` folder to your ThinApp project.

2 In the new directory, add the `##Attributes.ini` file to specify the isolation mode for the drive letter.

Configuring Processes and Services

Process and service configuration involve parameters that specify write access to a native process or the startup and shutdown of virtual services.

AllowExternalProcessModifications

The `AllowExternalProcessModifications` parameter determines whether captured applications can write to a native process. For example, you might capture a speech recognition application that must inject itself into native applications to voice the text.

When ThinApp blocks a captured application from injecting itself into a native application, Log Monitor generates trace logs that refer to the `AllowExternalProcessModifications` parameter.

Examples

The default value of the `AllowExternalProcessModifications` parameter blocks any attempt by the captured application to inject itself into a native application. The captured application can still inject itself into virtual applications running in the same sandbox. ThinApp does not display the default parameter in the `Package.ini` file.

```
[BuildOptions]
AllowExternalProcessModifications=0
```

You can add the `AllowExternalProcessModifications` parameter manually to the `Package.ini` file with a value of 1 to prevent the default blocking behavior.

```
[BuildOptions]
AllowExternalProcessModifications=0
```

AllowUnsupportedExternalChildProcesses

The `AllowUnsupportedExternalChildProcesses` parameter specifies whether to prevent the virtualized application from creating a child 64-bit process. You can create child 64-bit processes in the physical environment rather than the virtual environment.

If you do not specify a value, the default behavior facilitates unsupported external processes.

Examples

The default setting of the `AllowUnsupportedExternalChildProcesses` parameter causes ThinApp to run 64-bit applications in the physical environment. You can run 64-bit child process tasks on applications that run on 64-bit systems. Running the print spooler is an example of a 64-bit child process task.

```
[BuildOptions]
AllowUnsupportedExternalChildProcesses=1
```

You can block ThinApp from generating 64-bit child processes outside of the virtual environment.

```
AllowUnsupportedExternalChildProcesses=0
```

AutoShutdownServices

The `AutoShutdownServices` parameter controls whether to shut down virtual services when the last nonservice process exits.

The default behavior shuts down virtual services when the last nonservice child process exits.
The `AutoShutdownServices` parameter instructs ThinApp to keep virtual services running even when all other processes exit. The parameter does not affect services outside the virtual context.

Examples

You can keep virtual services running when the application exits.

```
[BuildOptions]
AutoShutdownServices=0
```

You can stop virtual services when the last nonservice application exits. This is the default behavior.

```
[BuildOptions]
AutoShutdownServices=1
```

AutoStartServices

The `AutoStartServices` parameter controls whether to start virtual service when the first application starts.

The default behavior starts virtual services that are installed with the startup type of Automatic. The virtual services start when the user runs the first parent process. You can use the `AutoStartServices` parameter to disable the automatic starting of virtual services.

Examples

You can prevent the start of virtual services.

```
[BuildOptions]
AutoStartServices=0
```

You can start virtual services when the first process starts. This is the default behavior.

```
[BuildOptions]
AutoStartServices=1
```

ChildProcessEnvironmentDefault

The `ChildProcessEnvironmentDefault` parameter determines whether ThinApp runs all child processes in the virtual environment.

You can create specific exceptions with the `ChildProcessEnvironmentExceptions` parameter.
See "ChildProcessEnvironmentExceptions" on page 75.

Examples

The default entry creates all child processes in the virtual environment.

```
[BuildOptions]
ChildProcessEnvironmentDefault=Virtual
```

The `External` value creates child processes outside of the virtual environment.

```
[BuildOptions]
ChildProcessEnvironmentDefault=External
```

ChildProcessEnvironmentExceptions

The `ChildProcessEnvironmentExceptions` parameter notes exceptions to the `ChildProcessEnvironmentDefault` parameter.

If the `ChildProcessEnvironmentDefault` parameter value is set to `Virtual`, the `ChildProcessEnvironmentExceptions` parameter lists the applications that run outside of the virtual environment. If the `ChildProcessEnvironmentDefault` parameter value is set to `External`, the `ChildProcessEnvironmentExceptions` parameter lists the applications that run inside the virtual environment.

Examples

You can specify exceptions to running child processes in the virtual environment. When the virtual application starts a `notepad.exe` child process, the child process runs outside the virtual environment.

```
[BuildOptions]
ChildProcessEnvironmentExceptions=AcroRd.exe;notepad.exe
ChildProcessEnvironmentDefault=Virtual
```

Configuring File and Block Sizes

You can use ThinApp parameters to compress file and block sizes for applications.

BlockSize

The `BlockSize` parameter controls the size of compression blocks when ThinApp compresses files for a build.

Using a larger block size can achieve higher compression. Larger block sizes might slow the performance because of the following reasons:

- The build process slows down with larger block sizes.
- The startup time and read operations for applications slow down with large block sizes.
- More memory is required at runtime when you use larger block sizes.

You can specify the `BlockSize` parameter in the `Package.ini` file, where the block size becomes the default for all files in the project unless otherwise specified, and in the `##Attributes.ini` file, where the block size overrides the block size for the present directory and all subdirectories. You can use different block sizes for different directories within a single project.

Examples

You can set the default block size of 64KB.

```
[Compression]
BlockSize=64k
```

You can use other block sizes.

```
BlockSize=128k
BlockSize=256k
BlockSize=512k
BlockSize=1M
```

CompressionType

The `CompressionType` parameter sets the compression value to `None` or `Fast`.

`None` is the default value when you capture an application. This value is useful for building your application quickly for testing purposes. Avoiding compression improves application startup time on older computers or in circumstances where you start the application multiple times and depend on the Windows disk cache to provide data for each start.

Fast compression has a quick rate of decompression and little effect on application startup time and memory consumption at runtime. Fast compression achieves similar compression ratios as the ZIP algorithm.

Table A-1 lists sample compression ratios and startup times for a Microsoft Office 2003 package that runs from a local hard drive.

Table A-1. Sample Compression Ratios and Startup Times

Compression Type	None	Fast
Size	448,616KB	257,373KB
Compression ratio	100%	57%
Startup time (first run)	6 seconds	6 seconds
Startup time (second run)	0.1 seconds	1 seconds
Build time (first build)	3 minutes	19 minutes
Build time (second build)	2 minutes	1.2 minutes

You can specify the `CompressionType` parameter in the `Package.ini` file, where the compression type becomes the default for all files in the project unless otherwise specified, and the `##Attributes.ini` file, where the compression type overrides the compression algorithm for the present directory and all subdirectories. You can use different compression algorithms for different directories within a single project.

Examples

You can prevent compression to facilitate fast build and load time. This is the default behavior.

```
[Compression]
CompressionType=None
```

You can use fast compression for a slow build time and fast load time.

```
[Compression]
CompressionType=Fast
```

Configuring Icons

You can use ThinApp parameters to add or remove icons.

Icon

The `Icon` parameter specifies the icon file to use for the generated executable file.

By default, each generated application uses the main group icon from its source executable file and the individual icon resource that the group icon points to. You can specify a `.ico` file or executable file to use an alternative icon.

Examples

You can specify a `NULL` value to generate an executable file without icons. Do not use a `NULL` value when you use the file types directive. The executable file image allocates one icon for each file type.

```
[myapp.exe]
Source=%ProgramFilesDir%\myapp\app.exe
Icon=NULL
```

You can specify the application icon by using an executable file that is different from the `Source` executable file.

```
[myapp.exe]
Source=%ProgramFilesDir%\myapp\app.exe
Icon=%ProgramFilesDir%\myapp\app2.exe
```

You can specify the set to use by appending `,1 ,2` to the end of the icon path.

```
[myapp.exe]
Source=%ProgramFilesDir%\myapp\app.exe
Icon=%ProgramFilesDir%\myapp\app2.exe,1
```

You can use a `.ico` file to specify the application icon.

```
[myapp.exe]
Source=%ProgramFilesDir%\myapp\app.exe
Icon=%ProgramFilesDir%\myap\myicon.ico
```

RetainAllIcons

The `RetainAllIcons` parameter keeps all of the original icons of the source executable file in the captured executable file.

By default, the `tlink.exe` utility constructs a new executable file using a source executable file. To reduce disk space, the new executable file image contains only icons that you can view from the system shell. The package contains all the other icons. The icons remain accessible to the application while it runs. The icons that the system can access have a larger disk size because ThinApp cannot compress the icons. You might want to have all of the original icons of the application visible to the system shell.

Examples

You can instruct the `tlink.exe` utility to retain all of the original icons of the application.

```
[app.exe]
Source=%ProgramFilesDir%\myapp\app.exe
RetainAllIcons=1
```

The default behavior removes unused icons from the portion of the executable file that is visible to the physical environment.

```
[app.exe]
Source=%ProgramFilesDir%\myapp\app.exe
RetainAllIcons=0
```

Configuring Logging

You can use ThinApp parameters to prevent logging activity or customize the location of the log files.

DisableTracing

The `DisableTracing` parameter prevents `.trace` file generation when you run Log Monitor. Log Monitor produces `.trace` files for troubleshooting purposes.

You might want to disable `.trace` file generation for the following reasons:

- You might need to hide the execution history for security purposes.
- In a testing environment, you might need to turn off tracing for specific applications that you know work properly. Producing extra `.trace` files wastes disk space and CPU time.

Examples

You can stop an application from creating a `.trace` file even if you run Log Monitor.

```
[BuildOptions]
DisableTracing=1
```

The default behavior supports `.trace` file generation in Log Monitor.

```
[BuildOptions]
DisableTracing=0
```

LogPath

The `LogPath` parameter sets the location to store `.trace` files during logging activity. The default location is the same directory that stores the application executable file. You might change the default location to find a directory with more space or to redirect the logs from a USB device to the client machine.

Examples

You can direct ThinApp to store log files in `c:\ThinappLogs`.

```
[BuildOptions]
LogPath=C:\ThinappLogs
```

Unlike most paths in ThinApp, the log path cannot contain macros such as `%AppData%` or `%Temp%`.

Configuring Versions

ThinApp parameters provide information about the versions of application executable files and ThinApp.

CapturedUsingVersion

The `CapturedUsingVersion` parameter indicates the version of the Setup Capture wizard used during the application capture process.

Examples

You do not need to adjust this parameter.

```
[BuildOptions]
CapturedUsingVersion=4.0.0–2200
```

StripVersionInfo

The `StripVersionInfo` parameter removes all version information from the source executable file when ThinApp builds the application.

Version information for executable files is in Windows properties. Properties information includes the copyright, trademark, and version number. By default, ThinApp copies all version information from the source executable file. The `StripVersionInfo` parameter strips version information from the captured application.

Examples

You can generate a target application without version information.

```
[app.exe]
Source=%ProgramFilesDir%\myapp\app.exe
StripVersionInfo=1
```

Version.XXXX

The `Version.XXXX` parameter overrides executable file version strings or adds new version strings.

ThinApp copies version resources from the original executable file. You can override the version resource strings and add new ones with a `Version.<string_name>=<string_value>` setting.

Examples

You can set `My New Product Name` as the version product name value.

```
[<app>.exe]
Version.ProductName=My New Product Name
Version.Description=This Product is great!
```

Configuring Locale Information

ThinApp parameters that display locale information do not require changes.

AnsiCodePage

The `AnsiCodePage` parameter uses a numerical value to specify the country locale where you captured the application. ThinApp uses the value to translate multibyte strings.

Examples

The capture process generates the `AnsiCodePage` value.

```
[BuildOptions]
AnsiCodePage=1252
```

LocaleIdentifier

The `LocaleIdentifier` parameter displays a numeric ID for the locale. The value locates the correct language resources from the application.

Examples

1033 is the locale ID for an English language application.

```
[BuildOptions]
LocaleIdentifier=1033
```

LocaleName

The `LocaleName` parameter displays the name of the locale when you capture an application on Microsoft Vista.

Examples

ThinApp can generate a Japanese locale name.

```
[BuildOptions]
LocaleName=ja-JP
```

Configuring Individual Applications

Parameters specific to entry points fall under the `[<application>.exe]` sections of the `Package.ini` file. For example, the entries under `[Adobe Reader 8.exe]` for an Adobe Reader application affect areas such as command-line arguments and application shortcuts.

CommandLine

The `CommandLine` parameter specifies the command-line arguments that start a shortcut executable file. While the `Source` parameter specifies the path to the shortcut executable file, the `CommandLine` parameter specifies the file with the required options or parameters.

The options and parameters follow the base application name. Depending on the application, use / or – before the option or parameter. Use folder macros for the path name conventions.

If the **Start** menu shortcut for the application has command-line options, ThinApp determines the value of the `CommandLine` parameter based on those options. In rare troubleshooting cases, you might need to alter this parameter.

Examples

Use the /<option> <parameter> format for command-line arguments.

```
[<app>.exe]
Source=%ProgramFilesDir%\<base_app>\<app>.exe
Shortcut=<primary_data_container>.exe
CommandLine="%ProgramFilesDir%\<base_app>\<app>.exe" /<option> <parameter>
```

ThinApp can create a CommandLine entry based on the "C:\Program Files\Mozilla Firefox\firefox.exe" –safe–mode **Start** menu shortcut.

```
CommandLine="C:\Program Files\Mozilla Firefox\firefox.exe" –safe–mode
```

Disabled

The Disabled parameter indicates that an application build target is just a placeholder and prevents ThinApp from generating the executable file in the /bin directory. This parameter is useful when you do not select a particular entry point during the Setup Capture wizard but decide at a later time that you want to generate an executable file for that entry point.

If you do not select the cmd.exe, regedit.exe, or iexplore.exe entry points during the application capture process, and you develop a need to debug or troubleshoot the environment, you can set the Disabled parameter to 0 and rebuild the project to generate these entry points. For information about the troubleshooting entry points, see "Specify Application Shortcuts and Tracking Names" on page 16.

Examples

You can prevent the generation of the application executable file during the build process. ThinApp uses this setting for the entry points that you do not select during the Setup Capture wizard.

```
[app.exe]
Source=%ProgramFilesDir%\<my_app>\<app>.exe
Disabled=1
```

You can use a value of 0 for the Disabled parameter or remove the line to generate the application executable file.

```
[app.exe]
Source=%ProgramFilesDir%\<my_app>\<app>.exe
Disabled=0
```

ReadOnlyData

The ReadOnlyData parameter specifies the name of the read-only virtual registry file created during the application build.

Do not alter the value of this parameter. The Package.ini file displays this parameter in case you need to locate the primary data container. The ReadOnlyData parameter in an application-specific section of the Package.ini file designates the primary data container.

When the primary data container is less than 200MB, the container is stored within an entry point executable file. When the primary data container is more than 200MB, ThinApp stores the container as a .dat file that cannot serve as an entry point for the application.

Examples

The default and required value specifies Package.ro.tvr as the name of the virtual registry file.

```
ReadOnlyData=bin\Package.ro.tvr
```

ReserveExtraAddressSpace

The `ReserveExtraAddressSpace` parameter indicates the amount of extra address space to reserve for the captured executable file.

The `tlink.exe` utility sets the Windows `SizeOfImage` field in the generated executable file based on the `SizeOfImage` field of the source executable file. The Windows loader uses the `SizeOfImage` field to determine how much virtual address space to reserve for the executable file. When you build a package based on a source executable file that is not included in the package, you can reserve virtual address space by specifying the `ReserveExtraAddressSpace` parameter. The value is the number of bytes to reserve. You can add `K` after the number to indicate kilobytes or `M` to indicate megabytes. The default value of `0` specifies address space to reserve.

Examples

You can instruct the Windows loader to reserve 512KB of address space.

```
[app.exe]
Source=%ProgramFilesDir%\myapp\app.exe
ReserveExtraAddressSpace=512K
```

The default behavior does not reserve extra address space.

```
[app.exe]
Source=%ProgramFilesDir%\myapp\app.exe
ReserveExtraAddressSpace=0
```

Shortcut

The `Shortcut` parameter points a shortcut executable file to the primary data container that contains the virtual file system and virtual registry. You can distinguish a primary data container from other entry points in the `Package.ini` file because the primary data container contains the `ReadOnlyData` entry and the other entry points contain the `Shortcut` entry.

To ensure that the application can start, the shortcut executable file must reside in the directory that stores the primary data container file. For information about the primary data container, see "ReadOnlyData" on page 81.

Do not change the value of the `Shortcut` parameter. ThinApp detects the primary data container during the capture process.

Examples

ThinApp can point `AcroRd32.exe`, the shortcut executable file, to `Adobe Reader 8.exe`, the primary data container file.

```
[AcroRd32.exe]
Shortcut=Adobe Reader 8.exe
Source=%ProgramFilesDir%\Adobe\Reader 8.0\Reader\AcroRd32.exe
```

ThinApp can point `Microsoft Office Word 2007.exe`, the shortcut executable file, to `Microsoft Office Enterprise 2007.dat`, the primary data container file.

```
[Microsoft Office Word 2007.exe]
Source=%ProgramFilesDir%\Microsoft Office\Office12\WINWORD.EXE
Shortcut=Microsoft Office Enterprise 2007.dat
```

Shortcuts

The `Shortcuts` parameter lists the locations where the `thinreg.exe` utility creates a shortcut to a virtual application. You can separate the entries with semicolons. Each entry can contain folder macros.

The capture process determines `Shortcuts` entries based on the shortcuts the application installer implements. If you add shortcut locations, use semicolons to separate the entries.

MSI files use the `Shortcuts` parameter to determine the shortcuts to create.

Examples

You can create a shortcut in the Microsoft Office folder of the **Start** menu to the Microsoft Word 2003 application.

```
[Microsoft Office Word 2003.exe]
ReadOnlyData=bin\Package.ro.tvr
Source=%ProgramFilesDir%\Microsoft Office\OFFICE11\WINWORD.EXE
Shortcuts=%Programs%\Microsoft Office
```

Source

The `Source` parameter points to the executable file that ThinApp loads when you use a shortcut executable file. The parameter provides the path to the executable file in the virtual or physical file system. If ThinApp cannot locate the source executable file in the virtual file system, ThinApp searches the physical file system. For example, if you use native Internet Explorer from the virtual environment, ThinApp loads the source executable file from the physical file system.

ThinApp specifies the source for each executable file. If an application suite has three user entry points, such as `Winword.exe`, `Powerpnt.exe`, and `Excel.exe`, the `Package.ini` file lists three application entries. Each entry has a unique source entry.

The Source parameter and the `/bin` directory in the project are not related to each other. The `/bin` directory stores the generated executable file and the `Source` path leads to the installed executable file stored in the read-only virtual file system.

Do not alter the `Source` path. The capture process determines the path based on where the application installer places the executable file in the physical file system of the capture machine. ThinApp creates a virtual file system path based on the physical file system path.

Examples

ThinApp can create an entry point for an application in `C:\Program Files\<base_app>\<app>.exe`.

```
[<app>.exe]
Source=%ProgramFilesDir%\<base_app>\<app>.exe
```

WorkingDirectory

The `WorkingDirectory` parameter sets the current working directory before the application starts. The working directory is the first place in which an application looks for files and places files.

ThinApp does not include this parameter by default in the `Package.ini` file because Thinapp assumes the working directory is the directory where the executable file resides. The typical location in a ThinApp environment is on the desktop of the deployment machine.

You can set the working directory for individual applications. The working directory can exist in the virtual file system, the sandbox, or the physical system depending on the isolation mode setting. You can use folder macros for the path name conventions.

The `WorkingDirectory` parameter sets the initial value of the working directory but the directory is dynamic as you navigate to other locations.

Examples

You might change the working directory for an application on a USB drive from the default USB location to the `My Documents` directory on the desktop.

```
[<app>.exe]
WorkingDirectory=%Personal%
```

The location of the `My Documents` directory depends on the isolation mode setting. If you want to map the working directory to the `My Documents` directory on the physical system, use the `Merged` isolation mode setting. If you want to map the working directory to the sandbox on the local machine, use `WriteCopy` or `Full` isolation mode. See "DirectoryIsolationMode" on page 64.

Configuring Dependent Applications with Application Link

The Application Link utility keeps shared components or dependent applications in separate packages. In the `Package.ini` file, you can use the `OptionalAppLinks` and `RequiredAppLinks` entries to dynamically combine ThinApp packages at runtime on end-user computers. This process enables you to package, deploy, and update component pieces separately and retain the benefits of application virtualization.

ThinApp supports linking up to 250 packages at a time. Each package can be any size.

Sandbox changes from linked packages are not visible to the base package. For example, you can install Acrobat Reader as a standalone virtual package and as a linked package to the base Firefox application. When you start Acrobat Reader as a standalone application by running the virtual package and you make changes to the preferences, ThinApp stores the changes in the sandbox for Acrobat Reader. When you start Firefox, Firefox cannot detect those changes because Firefox has its own sandbox. Opening a `.pdf` file with Firefox does not reflect the preference changes that exist in the standalone Acrobat Reader application.

For more information about the Application Link utility, see "Application Link Updates" on page 41, "OptionalAppLinks" on page 85, and "RequiredAppLinks" on page 84.

Application Link Path Name Formats

The Application Link utility supports the following path name formats:

- Path names can be relative to the base executable file. For example, `RequiredAppLinks=..\SomeDirectory` results in `c:\MyDir\SomeDirectory` when you deploy the base executable file to `c:\MyDir\SubDir\ Dependency.exe`.
- Path names can be absolute path names. An example is `RequiredAppLinks=c:\SomeDirectory`.
- Path names can use a network share or a UNC path. An example is `RequiredAppLinks=\\share\somedir\Dependency.exe`.
- Path names can contain environment variables and dynamically expand to any of the preceding path names. An example is `RequiredAppLinks=%MYAPP_ADDONS%\Dependency.exe`.
- Path names can specify multiple links or dependencies with a semicolon that separates individual filenames. An example is `RequiredAppLinks=Dependency1.exe; Dependency2.exe;`.

RequiredAppLinks

The `RequiredAppLinks` parameter specifies a list of required packages to import to the base package at runtime. You can configure this parameter in the `Package.ini` file of the base package.

If the import operation for any dependent package fails, an error message appears and the base executable file exits. You can use the `OptionalAppLinks` parameter instead to continue even when load errors occur. If you use a wildcard pattern to specify a package and files do not match the wildcard pattern, ThinApp does not generate an error message.

Importing packages involves the following operations:

- Running VBScripts from imported packages
- Starting autostart services from imported packages
- Registering fonts from imported packages
- Relocating SxS DLL files from Windows XP to Windows Vista

You must create a link to the primary data container of a package. You cannot link to other shortcut packages.

Path names are on the deployment machine because the linking takes effect at runtime on the client machine. You can specify absolute paths, such as `c:\abs\path\dotnet.exe`, relative paths, such as `relpath\dotnet.exe`, and UNC paths, such as `\\server\share\dotnet.exe`. Path names can contain environment variables. Use semicolons to separate the linked packages.

For more information about the Application Link utility, see "Application Link Updates" on page 41.

Examples

If you package the .NET framework in the `dotnet.exe` package and you have a .NET application, you can specify that the application needs to link to the `dotnet.exe` file before it can start.

```
RequiredAppLinks=c:\abs\path\dotnet.exe
```

You can import a single package located in the same directory as the base executable file.

```
RequiredAppLinks=Plugin.exe
```

You can import a single package located in a subdirectory of the base executable file.

```
RequiredAppLinks=plugins\Plugin.exe
```

You can import all executable files located in the directory for plug-in files. If ThinApp cannot import any executable file because the file is not a proper Thinapp package or because a security problem exists, the base executable file fails to load.

```
RequiredAppLinks=plugins\*.exe
```

You can import all executable files located at the `n:\plugins` absolute path.

```
RequiredAppLinks=n:\plugins\*.exe
```

You can expand the `PLUGINS` environment variable and import all executable files at this location.

```
RequiredAppLinks=%PLUGINS%\*.exe
```

You can load two specified plug-in files and a list of executable files located under the plug-in location.

```
RequiredAppLinks=plugin1.exe;plugin2.exe;plugins\*.exe
```

OptionalAppLinks

The `OptionalAppLinks` parameter is similar to the `RequireAppLinks` parameter but ignores errors and starts the main application even when an import operation fails.

You must create a link to the primary data container of a package. You cannot link to other shortcut packages.

Path names are on the deployment machine because the linking takes effect at runtime on the client machine. You can specify absolute paths, such as `c:\abs\path\dotnet.exe`, relative paths, such as `relpath\dotnet.exe`, and UNC paths, such as `\\server\share\dotnet.exe`.

`RequiredAppLinks` and `OptionalAppLinks` parameters use the same syntax. For information about the `RequireAppLinks` parameter and examples, see "RequiredAppLinks" on page 84.

Configuring Application Updates with Application Sync

The Application Sync utility keeps deployed virtual applications up to date. When an application starts, Application Sync can query a Web server to determine if an updated version of the package is available. If an update is available, ThinApp downloads the differences between the existing package and the new package and constructs an updated version of the package.

The Application Sync utility downloads updates in the background. You can continue to use an old version of the application. If the user quits the application before the download is complete, the download resumes when the virtual application starts again. When the download is finished, ThinApp activates the new version the next time the application starts.

You must comment the AppSyncURL parameter to activate all Application Sync parameters. The following entries are the default settings for Application Sync parameters:

```
AppSyncURL=https://example.com/some/path/PackageName.exe
AppSyncUpdateFrequency=1d
AppSyncExpirePeriod=30d
AppSyncWarningPeriod=5d
AppSyncWarningFrequency=1d
AppSyncWarningMessage=This application will become unavailable for use in AppSyncWarningPeriod
days if it cannot contact its update server. Check your network connection to ensure
uninterrupted service
AppSyncExpireMessage=This application has been unable to contact its update server for
AppSyncExpirePeriod days, so it is unavailable for use. Check your network connection and try
again
AppSyncUpdatedMessage=
AppSyncClearSandboxOnUpdate=0
```

For more information about the Application Sync utility, see "Application Sync Updates" on page 39.

AppSyncClearSandboxOnUpdate

The AppSyncClearSandboxOnUpdate parameter empties the sandbox after an update.

Examples

The default value of the AppSyncClearSandboxOnUpdate parameter does not clear the sandbox.

```
AppSyncClearSandboxOnUpdate=0
```

You can clear the sandbox after application updates.

```
AppSyncClearSandboxOnUpdate=1
```

AppSyncExpireMessage

The AppSyncExpireMessage parameter sets the message that appears when the connection to the Web server fails after the expiration period ends and a virtual application starts. The application quits when the message appears.

Examples

ThinApp provides a default message for the AppSyncExpireMessage parameter.

```
AppSyncExpireMessage=This application has been unable to contact its update server for
<AppSyncExpirePeriod_value> days, so it is unavailable for use. Check your network connection and
try again.
```

If the value of the AppSyncExpirePeriod parameter is in hours or minutes, change the message to indicate hours or minutes rather than days.

AppSyncExpirePeriod

The AppSyncExpirePeriod parameter sets the expiration of the package in minutes (m), hours (h), or days (d). If ThinApp cannot reach the Web server to check for updates, the package continues to work until the expiration period ends and the user closes it. Even after the expiration period ends, ThinApp tries to reach the Web server at each subsequent startup attempt.

Examples

You can prevent the package from expiring with the default never value.

```
AppSyncExpirePeriod=never
```

AppSyncURL

The AppSyncURL parameter sets the Web server URL or fileshare location that stores the updated version of an application. ThinApp checks this location and downloads the updated package.

Application Sync works over the HTTP (unsecure), HTTPS (secure), and File protocols. Part of the HTTPS protocol involves checking the identity of the Web server. You can include a user name and a password in the AppSyncURL parameter for basic authentication. ThinApp adheres to the standard Internet Explorer proxy setting.

You must comment the AppSyncURL parameter to activate all Application Sync parameters.

Examples

You can assign an HTTP or HTTPS value to the AppSyncURL parameter according to the following format.

```
AppSyncURL=https://<site.com>/<path>/<package_name>.exe
```

You can specify local and network drive paths.

```
file:///C:/<path>/<package_name>.exe
```

You can use a UNC path and access locations of network resources.

```
file://<server>/<share>/<path>/<package_name>.exe
```

AppSyncUpdateFrequency

The AppSyncUpdateFrequency parameter specifies how often ThinApp checks the Web server for application updates. You can set the update frequency in minutes (m), hours (h), or days (d).

ThinApp does not check for an update when another running application shares the same sandbox.

Examples

The default value connects a package to the Web server once a day to check for updates.

```
AppSyncUpdateFrequency=1d
```

A value of 0 sets the captured application to check for updates every time you start it.

```
AppSyncUpdateFrequency=0
```

AppSyncUpdatedMessage

The AppSyncUpdatedMessage parameter sets the message that appears when an updated package first starts.

Examples

The AppSyncUpdatedMessage value confirms that the application is updated.

```
AppSyncUpdatedMessage=Your application has been updated.
```

AppSyncWarningFrequency

The AppSyncWarningFrequency specifies how often a warning appears before the package expires. You can specify minutes (m), hours (h), or days (d).

Examples

The default value sets the warning message to appear only once a day.

```
AppSyncWarningFrequency=1d
```

A 0 value configures the warning to appear each time the application starts.

```
AppSyncWarningFrequency=0
```

AppSyncWarningMessage

The AppSyncWarningMessage parameter sets the message that appears when the warning period starts. The first time you start the application in the warning period, a warning message appears and ThinApp tries to access the update from the server. If ThinApp cannot update the package, ThinApp tries again every time the application starts. The warning message appears only after each AppSyncWarningFrequency period expires.

Examples

ThinApp includes a default message for the Application Sync utility warning.

```
AppSyncWarningMessage=This application will become unavailable for use in %%remaining_days%%
day(s) if it cannot contact its update server. Check your network connection to ensure
uninterrupted service.
```

The %%remaining_days%% variable is the number of days remaining until the expiration of the package.

If the value of the AppSyncWarningPeriod parameter is in hours or minutes, change the message to indicate hours or minutes rather than days.

AppSyncWarningPeriod

The AppSyncWarningPeriod parameter sets the start of the warning period before a package expires. You can specify minutes (m), hours (h), or days (d). When the warning period starts, ThinApp checks the Web server every time an application starts and sets the value of the AppSyncUpdateFrequency parameter to 0.

Examples

The default period of the AppSyncWarningPeriod parameter is five days.

```
AppSyncWarningPeriod=5d
```

Configuring MSI Files

MSI parameters configure MSI files that you might deploy instead of executable files. For information about MSI files, see "Building an MSI Database" on page 29.

MSIArpProductIcon

The MSIArpProductIcon parameter specifies the icons to place in the Windows control panel for the Add or Remove Programs list.

Examples

You can specify icons for Microsoft Office 2007 in the Add or Remove Programs list.

```
MSIArpProductIcon=%Program Files Common%\Microsoft Shared\OFFICE12\
              Office Setup Controller\OSETUP.DLL,1
```

The general format is MSIArpProductIcon=<filename>[,<icon_index>]. The <icon_index> entry is optional.

MSIDefaultInstallAllUsers

The MSIDefaultInstallAllUsers parameter sets the installation mode of the MSI database. You can install a .msi file for all users on a computer and for individual users. The parameter works only when the MSIFilename parameter requests the generation of a Windows installer database.

For information about forcing an MSI installation for each user or each machine, see "Force MSI Deployments for Each User or Each Machine" on page 30.

Examples

If a user installs the `.msi` file with a value of `1` for the `MSIDefaultInstallAllUsers` parameter, that user and all other users who log in to the computer can use shortcuts, file type associations, and more. You must have administrator rights for a machine installation.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIDefaultInstallAllUsers=1
```

If a user installs the `.msi` file with a value of `0` for the `MSIDefaultInstallAllUsers` parameter, only that user can use shortcuts, file type associations, and more. You do not need administrator rights for an individual user installation.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIDefaultInstallAllUsers=0
```

Administrators can create a database installation for all users on a machine and users without administrator rights can create installations for individual users.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIDefaultInstallAllUsers=2
```

MSIFilename

The `MSIFilename` parameter enables the generation of an MSI database and specifies its filename.

The `MSIFilename` parameter produces a Windows installer with the specified filename in the output directory.

Examples

You can generate an MSI file during the build process and replace the `mymsi.msi` file with your own filename.

```
[BuildOptions]
MSIFilename=mymsi.msi
```

MSIInstallDirectory

The `MSIInstallDirectory` parameter specifies the path of the MSI installation directory. The parameter works only when the `MSIFilename` parameter requests the generation of a Windows installer database.

By default, ThinApp places packages in the `%ProgramFilesDir%\<InventoryName>` directory during the installation on each machine. You can change the installation path with the `MSIInstallDirectory` parameter. When you use a relative path, the path is relative to `%ProgramFilesDir%` for installations on each machine and relative to `%AppData%` for installations for each user. If you set the `MSIInstallDirectory` parameter to `ExampleDir`, the default installation directory for installations on each machine is `%ProgramFilesDir%\ExampleDir`.

Examples

You can install a `.msi` file in the `C:\Program Files\My Application` directory.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIInstallDirectory=My Application
```

MSIManufacturer

The `MSIManufacturer` parameter specifies the manufacturer to put in the MSI database. The default setting is the name of the company to which your copy of Windows is registered. The parameter works only when the `MSIFilename` parameter requests the generation of a Windows installer database.

Examples

You can set the `MSIManufacturer` parameter to the name of your organization. The name does not have any effect other than appearing in the properties of the MSI database.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIManufacturer=My Company Name
```

MSIProductCode

The `MSIProductCode` parameter specifies a product code for the MSI database. The parameter works only when the `MSIFilename` parameter requests the generation of a Windows Installer database.

Each MSI database needs a product code. The capture process generates a default product code and places it in the `Package.ini` file. If you change the product code, the new value must be a valid Globally Unique Identifier (GUID).

Examples

You can create an `MSI` file with 590810CE-65E6-3E0B-08EF-9CCF8AE20D0E as the product code.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIProductCode={590810CE-65E6-3E0B-08EF-9CCF8AE20D0E}
```

MSIProductVersion

The `MSIProductVersion` parameter specifies a product version number for the MSI database. The parameter works only when the `MSIFilename` parameter requests the generation of a Windows installer database.

The product version appears when you show the properties of the database. When you deploy a package to a machine that already has the package installed, Windows Installer checks the version numbers and blocks the installation of an older version over an updated version. In this situation, you must manually uninstall the new version.

Examples

The default product version is 1.0.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIProductVersion=1.0
```

MSIRequireElevatedPrivileges

The `MSIRequireElevatedPrivileges` parameter applies to Windows Vista and specifies elevated privilege requirements for the MSI database. The parameter works only when the `MSIFilename` parameter requests the generation of a Windows installer database.

A value of `1` marks the MSI database as requiring elevated privileges. If your system is set up for UAC prompts, a UAC prompt appears when you install an application.

A value of `0` blocks the UAC prompt and the installation across all machines.

Examples

The default setting of `1` creates an MSI file that always prompts for elevated privileges on Windows Vista.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIRequireElevatedPrivileges=1
```

MSIUpgradeCode

The `MSIUpgradeCode` parameter specifies an upgrade code for the MSI database. The parameter works only when the `MSIFilename` parameter requests the generation of a Windows installer database.

VMware recommends that each MSI database have an upgrade code. The capture process generates a suitable upgrade code in the `Package.ini` file. Avoid changing the `UpgradeCode` value unless you verify that the new value is a valid GUID.

Examples

You can create an MSI file with D89F1994-A24B-3E11-0C94-7FD1E13AB93F as the upgrade code.

```
[BuildOptions]
MSIFilename=mymsi.msi
MSIUpgradeCode={D89F1994-A24B-3E11-0C94-7FD1E13AB93F}
```

MSIUseCabs

The `MSIUseCabs` parameter determines the use of `.cab` files.

If you set the value to `1`, ThinApp stores the package files in a `.cab` file. The `.cab` file is in the MSI file.

If you set the value to `0`, ThinApp does not use `.cab` files. You might avoid a `.cab` file when it slows down the installation process for applications. You can distribute the MSI file and individual executable files in `/bin` to install the application.

Examples

You can store package files in a `.cab` file.

```
[BuildOptions]
MSIUseCabs=1
```

Configuring Sandbox Storage and Inventory Names

The sandbox parameters configure the directory where all changes that the captured application makes are stored. The ThinApp inventory name might affect the need to change the sandbox name.

For more information about the sandbox, see Appendix B, "ThinApp Sandbox," on page 95.

InventoryName

The `InventoryName` parameter is a string that inventory tracking utilities use for package identification. This parameter determines the default names of the project folder and sandbox during the application capture process.

The application capture process sets a default value for the `InventoryName` parameter based on new strings created under one of the following locations:

- `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall`
- `HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall`

The `thinreg.exe` utility and ThinApp MSI files reference the inventory name to determine the product name for display in the Add or Remove Programs control panel. For example, if the inventory name is `SuperApp` and you install an MSI file or register a package with the `thinreg.exe` utility, the Add or Remove programs list displays an installed application with the `SuperApp (VMware ThinApp)` string. ThinApp appends `VMware ThinApp` to the inventory name to distinguish applications that are virtualized during inventory scans.

You can use the same inventory name across different versions of the same application to ensure that only the most recent version appears in Add or Remove Programs list. The applications overwrite each other in the Add or Remove Programs list and prevent you from uninstalling all of the registered packages. If you want to uninstall more than one version, use a different inventory name for each version. For example, use Microsoft Office 2003 and Microsoft Office 2007 as inventory names rather than just Microsoft Office. When you maintain different versions of a virtual application in the same environment, you might want to change the `SandboxName` parameter to ensure that a new version has isolated user settings in a different sandbox.

If you have a package that includes other applications, you might update the inventory name manually to reflect the true contents of the package. For example, if you capture the `SuperApp` application and the package includes Java Runtime, the `InventoryName` value might appear as `Java Runtime Environment 1.5` instead of `SuperApp`. The Add or Remove Programs list displays the first application installed within the package.

Examples

You can set the inventory name to Microsoft Office 2003.

```
[BuildOptions]
InventoryName=Microsoft Office 2003
```

RemoveSandboxOnExit

The `RemoveSandboxOnExit` parameter deletes the sandbox and resets the application when the last child process exits.

ThinApp stores all application changes to the registry and file system locations with WriteCopy or Full isolation in the sandbox. By default, the sandbox directory keeps consistent settings across multiple runs of the application. You might want to delete the sandbox each time the application exits.

If the application creates child processes, ThinApp does not delete the sandbox until all child processes exit. Applications might be designed to leave child processes in place that can block the cleanup operation. For example, Microsoft Office 2003 leaves the `ctfmon.exe` process. You might need to use a script to end the `ctfmon.exe` process and child processes to force the cleanup operation to occur.

You can decide at runtime whether to use the `RemoveSandboxOnExit` script API function to delete the sandbox on exit.

Examples

You can delete the sandbox when the application exits.

```
[BuildOptions]
RemoveSandboxOnExit=1
```

You can leave the sandbox in place when the application exits. This is the default behavior.

```
[BuildOptions]
RemoveSandboxOnExit=0
```

SandboxName

The `SandboxName` parameter sets the name of the directory that stores the sandbox.

When you upgrade an application, the sandbox name helps determine whether users retain previous personal settings or require new settings. Changing the sandbox name with new deployments affects the need to create a new sandbox with different settings or retains the same sandbox.

Examples

You can make `My Application 1.0` the sandbox directory name.

```
[BuildOptions]
SandboxName=My Application 1.0
```

SandboxNetworkDrives

The `SandboxNetworkDrives` parameter determines whether ThinApp uses sandboxes for network-mapped drives.

Examples

You can store changes in the sandbox and prevent the user from writing directly to network-mapped drives.

```
[BuildOptions]
SandboxNetworkDrives=1
```

You can write directly to network-mapped drives without storing changes in a sandbox. This is the default behavior.

```
(default)
[BuildOptions]
SandboxNetworkDrives=0
```

SandboxPath

The `SandboxPath` parameter sets the path to create a new sandbox.

If an application runs only from portable media, such as USB flash devices, you can use the `SandboxPath` parameter to force the application to use a local sandbox. For information about how ThinApp locates a sandbox, see "Search Order for the Sandbox" on page 95.

Examples

You can create the sandbox in the same directory as the executable file.

```
[BuildOptions]
SandboxPath=.
```

You can create the sandbox in a subdirectory subordinate to the executable file location.

```
[BuildOptions]
SandboxPath=LocalSandbox\Subdir1
```

You can create the sandbox in the `AppData` folder of the user under the `Thinstall` subdirectory:

```
[BuildOptions]
SandboxPath=%AppData%\Thinstall
```

You can create the sandbox on a network mapped drive.

```
[BuildOptions]
SandboxPath=Z:\Sandboxes
```

SandboxRemovableDisk

The `SandboxRemovableDisk` parameter determines whether ThinApp can write removable disk changes to the disks or to the sandbox. Removable disks include USB flash devices and removable hard drives.

Examples

The default value instructs ThinApp to write removable disk file changes directly to the disk.

```
[BuildOptions]
SandboxRemovableDisk=0
```

ThinApp can apply isolation modes to removable disks. Depending on the isolation mode, changes to files stored on removable disks can reside in the sandbox or on the removable disk.

```
[BuildOptions]
SandboxRemovableDisk=1
```

ThinApp Sandbox

B

The sandbox is the directory where all changes that the captured application makes are stored. The next time you start the application, those changes are incorporated from the sandbox. When you delete the sandbox directory, the application reverts to its captured state.

This information includes the following topics:

Search Order for the Sandbox

During startup of the captured application, ThinApp searches for an existing sandbox in specific locations and in a specific order. ThinApp uses the first sandbox it detects. If ThinApp cannot locate an existing sandbox, ThinApp creates a sandbox according to certain environment variable and parameter settings. Review the search order and sandbox creation logic before changing the placement of the sandbox.

The search order uses Mozilla Firefox 3.0 as an example with the following variables:

- `<sandbox_name>` is Mozilla Firefox 3.0

  The `SandboxName` parameter in the `Package.ini` file determines the name. See "SandboxName" on page 92.

- `<sandbox_path>` is `Z:\sandboxes`

  The `SandboxPath` parameter in the `Package.ini` file determines the path. See "SandboxPath" on page 93.

- `<exe_directory>` is `C:\Program Files\Firefox`

  The application runs from this location.

- `<computer_name>` is JOHNDOE-COMPUTER

- `%AppData%` is `C:\Documents and Settings\JohnDoe\Application Data`

  ThinApp requests the `Application Data` folder location from the operating system. The location depends on the operating system or configuration.

ThinApp starts the sandbox search by trying to locate the following environment variables in this order:

- %<sandbox_name>_SANDBOX_DIR%

  This environment variable changes the sandbox location for specific applications on the computer. For example, if the Mozilla Firefox 3.0_SANDBOX_DIR environment variable exists, its value determines the parent directory sandbox location. If the value is z:\FirefoxSandbox before you run the application, ThinApp stores the sandbox in z:\FirefoxSandbox.JOHNDOE-COMPUTER if the directory already exists. If the directory does not exist, ThinApp creates a sandbox in z:\FirefoxSandbox.

- %THINSTALL_SANDBOX_DIR%

  This environment variable changes the location of all sandboxes on a computer. For example, if the THINSTALL_SANDBOX_DIR environment variable exists, its value determines the parent directory sandbox location. If the value is z:\MySandboxes before you run the application, ThinApp creates a sandbox in z:\MySandboxes.

If ThinApp does not detect the %<sandbox_name>_SANDBOX_DIR% or %THINSTALL_SANDBOX_DIR% environment variable, ThinApp checks for the following file system directories and creates a sandbox in the first directory it detects:

- <exe_directory>\<sandbox_name>.<computer_name>

  For example, C:\Program Files\Firefox\Mozilla Firefox 3.0.JOHNDOE-COMPUTER

- <exe_directory>\<sandbox_name>

  For example, C:\Program Files\Firefox\Mozilla Firefox 3.0

- <exe_directory>\Thinstall\<sandbox_name>.<computer_name>

  For example, C:\Program Files\Firefox\Thinstall\Mozilla Firefox 3.0.JOHNDOE-COMPUTER

- <exe_directory>\Thinstall\<sandbox_name>

  For example, C:\Program Files\Firefox\Thinstall\Mozilla Firefox 3.0

- <sandbox_path>\<sandbox_name>.<computer_name>

  For example, Z:\sandboxes\Mozilla Firefox 3.0.JOHNDOE-COMPUTER

- <sandbox_path>\<sandbox_name>

  For example, Z:\sandboxes\Mozilla Firefox 3.0

- %AppData%\Thinstall\<sandbox_name>.<computer_name>

  For example, C:\Documents and Settings\JohnDoe\Application Data\Thinstall\Mozilla Firefox 3.0.JOHNDOE-COMPUTER

- %AppData%\Thinstall\<sandbox_name>

  For example, C:\Documents and Settings\JohnDoe\Application Data\Thinstall\Mozilla Firefox 3.0

If ThinApp does not detect the %<sandbox_name>_SANDBOX_DIR% or %THINSTALL_SANDBOX_DIR% environment variable, and does not detect the specified file system directories, ThinApp creates a sandbox using the following guidelines in this order:

- If the SANDBOXPATH Package.ini parameter is set, the value determines the sandbox location.
- If ThinApp completes the sandbox search without any results, ThinApp creates a sandbox in the default %AppData%\Thinstall directory of the user.

NOTE Only one computer at a time can use a shared sandbox. If a computer is already using a sandbox, ThinApp creates a new sandbox to allow you to continue working until the previous copy of the sandbox closes.

Controlling the Sandbox Location

The setup capture process adds the SandboxName parameter to the Package.ini file. If you capture Firefox and Mozilla Firefox 3.0 is the value of this parameter, the default location of the sandbox for the application is %AppData%\Thinstall\Mozilla Firefox 3.0. The typical %AppData% location is C:\Documents and Settings\<user_name>\Application Data. %AppData% is often mapped to a shared network drive.

Store the Sandbox on the Network

You can use the SandboxPath parameter to store the sandbox on a mapped drive. A network location is useful for backing up the sandbox and for users who need to log in to any machine and retain their application settings. For more information about the SandboxPath parameter, see "SandboxPath" on page 93.

To store the sandbox on a mapped drive

1 Open the Package.ini file.

2 Under the SandboxName parameter, set the SandboxPath parameter to the network location.

```
SandboxName=Mozilla Firefox 3.0
SandboxPath=Z:\Sandbox
```

For example, if Mozilla Firefox 3.0 is the value of the SandboxName parameter, the captured Firefox application creates the sandbox in Z:\Sandbox\Mozilla Firefox 3.0.

Store the Sandbox on a Portable Device

You can use the SandboxPath parameter to set a portable device location for the sandbox. You can use any portable device, such as a USB drive, that appears as a disk drive in the My Computer system folder. A portable device location is useful to keep the sandbox data on the device where the application resides.

For more information about the SandboxPath parameter, see "SandboxPath" on page 93.

To store the sandbox in the same directory on a USB drive where the executable file resides

1 Open the Package.ini file.

2 Under the SandboxName parameter, set the SandboxPath parameter to this value.

```
SandboxName=Mozilla Firefox 3.0
SandboxPath=.
```

For example, if Mozilla Firefox 3.0 is the value of the SandboxName parameter, the captured Firefox application creates the Mozilla Firefox 3.0 sandbox in the same directory that Firefox runs from.

To store the sandbox in a Thinstall directory on a USB drive at the same level as the executable file

1 If the %THINSTALL_SANDBOX_DIR% or %<sandbox_name>_SANDBOX_DIR% environment variables are set, unset the variables.

2 On the portable device, create a Thinstall directory in the same directory as your captured application.

The next time the packaged application starts from the portable device, the application creates a sandbox in the Thinstall directory.

3 If the application and sandbox originally ran from another location, such as a computer, and you need the same sandbox on a portable device, copy the Thinstall directory from %AppData% to the directory where the executable file resides on the device.

ThinApp no longer uses the sandbox in the original location.

Sandbox Structure

ThinApp stores the sandbox using a file structure almost identical to the build project structure. ThinApp uses macro names for shell folder locations, such as `%AppData%`, instead of hard coded paths. This structure enables the sandbox to migrate to different computers dynamically when the application runs from new locations.

The sandbox contains the following registry files:

- `Registry.rw.tvr` – Contains all registry modifications that the application makes.
- `Registry.rw.lck` – Prevents other computers from simultaneously using a registry located on a network share.
- `Registry.tvr.backup` – Contains a backup of the `.tvr` file that ThinApp uses when the original `.tvr` file is corrupted.

Besides these registry files, the sandbox contains directories that include `%AppData%`, `%ProgramFilesDir%`, and `%SystemRoot%`. Each of these folders contains modifications to respective folders in the captured application.

Making Changes to the Sandbox

ThinApp stores file system information in the virtual registry. The virtual registry enables ThinApp to optimize file system access in the virtual environment. For example, when an application tries to open a file, ThinApp does not need to consult the real file system for the real system location and again for the sandbox location. Instead, ThinApp can check for the existence of the file by consulting only the virtual registry. This ability increases the ThinApp runtime performance.

VMware does not support modifying or adding files directly to the sandbox. If you copy files to the sandbox directory, the files are not visible to the application. If the file already exists in the sandbox, you can overwrite and update the file. VMware recommends that you perform all modifications from the application itself.

Listing Virtual Registry Contents with vregtool

Because the sandbox contains the modifications to the registry, you might need the `vregtool` utility to view modified virtual registry changes. You must have access to the `vregtool` utility in `C:\Program Files\VMware\VMware ThinApp`.

A sample command to list the contents of a virtual registry file is `vregtool registry.rw.tvr printkeys`.

Snapshot Commands and Customization

C

The `snapshot.exe` utility creates a snapshot of a computer file system and registry and creates a ThinApp project from two previously captured snapshots. You do not need to start the `snapshot.exe` utility directly because the Setup Capture wizard starts it. Only advanced users and system integrators who are building ThinApp functionality into other platforms might make direct use of this utility.

Creating a snapshot of a computer file system and registry involves scanning and saving a copy of the following data:

- File information for all local drives

  This information includes directories, filenames, file attributes, file sizes, and file modification dates.

- `HKEY_LOCAL_MACHINE` and `HKEY_USERS` registry trees

  ThinApp does not scan `HKEY_CLASSES_ROOT` and `HKEY_CURRENT_USER` registry entries because those entries are subsets of `HKEY_LOCAL_MACHINE` and `HKEY_USERS` entries.

The `snapshot.ini` configuration file specifies what directories and subkeys to exclude from a ThinApp project when you capture an application. You might customize this file for certain applications.

This information includes the following topics:

Methods of Using the snapshot.exe Utility

You can use the `snapshot.exe` utility to create snapshot files of machine states, create the template file for the `Package.ini` file, create a ThinApp project, and display the contents of a snapshot file.

For information about the full procedure to create a ThinApp project from the command line, see "Create a Project Without the Setup Capture Wizard" on page 101.

Creating Snapshots of Machine States

The `snapshot.exe` utility creates a snapshot file of a machine state. ThinApp captures the machine state and saves it to a single file to create a project. The `snapshot.exe` utility saves a copy of registry data and file system metadata that includes paths, filenames, sizes, attributes, and timestamps.

Usage

```
snapshot.exe SnapshotFileName.snapshot [–Config ConfigFile.ini][BaseDir1][BaseDir2][BaseReg1]
```

Examples

```
Snapshot My.snapshot
Snapshot My.snapshot -Config MyExclusions.ini
Snapshot My.snapshot c:\MyAppDirectory HKEY_LOCAL_MACHINE\Software\MyApp
```

Options

The options specify the directories or subkeys in the snapshot.

Option	Description
`-Config ConfigFile.ini`	Specifies directories or registry subkeys to exclude during snapshot creation. If you do not specify a configuration file, ThinApp uses the `snapshot.ini` file from the ThinApp installation directory.
`BaseDir1`	Specifies one or more base directories to include in the scan. If you do not specify base directories, the `snapshot.exe` utility scans `c:\` and all subdirectories. If you scan a machine where Windows or program files are installed on different disks, include these drives in the scan. If you know that your application installation creates or modifies files in fixed locations, specify these directories to reduce the total time required to scan a machine.
`BaseReg1`	Species one or more base registry subkeys to include in the scan. If you do not specify registry subkeys, the `snapshot.exe` utility scans the `HKEY_LOCAL_MACHINE` and `HKEY_USERS` keys.

Creating the Template Package.ini file from Two Snapshot Files

The `snapshot.exe` utility generates a template `Package.ini` file. The utility scans the two snapshot files for all applications that are created and referenced from shortcut links or the **Start** menu. The template `Package.ini` file becomes the basis of the `Package.ini` file in a ThinApp project.

Usage

```
snapshot.exe Snap1.snapshot –SuggestProject Snap2.snapshot OutputTemplate.ini
```

Examples

```
Snapshot Start.snapshot -SuggestProject End.snapshot Template.ini
```

ThinApp requires all of the parameters.

Creating the ThinApp Project from the Template Package.ini File

The `snapshot.exe` utility creates the ThinApp project file from the template `Package.ini` file.

Usage

```
snapshot.exe Template.ini –GenerateProject OutDir [–Config ConfigFile.ini]
```

Examples

```
Snapshot Template.ini -GenerateProject c:\MyProject
               Snapshot Template.ini -GenerateProject c:\MyProject -Config MyExclusions.ini
```

`–Config ConfigFile.ini` is optional. The configuration file specifies directories or registry subkeys for exclusion from the project. If you do not specify a configuration file, ThinApp uses the `snapshot.ini` file.

Displaying the Contents of a Snapshot File

The `snapshot.exe` utility lists the contents of the snapshot file.

Usage

```
snapshot.exe SnapshotFileName.snapshot –Print
```

Examples

```
Snapshot Start.snapshot -Print
```

ThinApp requires all of the parameters.

Sample snapshot.exe Commands

Table C-1 describes sample commands for the `snapshot.exe` utility. The parameters are not case-sensitive. The commands are wrapped in the Command column because of space restraints.

Table C-1. snapshot.exe Sample Commands

Command	Description
`snapshot c:\Capture.snapshot`	Captures a complete snapshot of local drives and registry to the file `c:\Capture.snapshot`.
`snapshot c:\Capture.snapshot c:\ e:\`	Captures a complete snapshot of the `c:\` and `e:\` drives. ThinApp does not capture registry information.
`snapshot c:\Capture.snapshot c:\ HKEY_LOCAL_MACHINE\Software\Classes`	Captures a complete snapshot of the `c:\` drive and all of the `HKEY_CLASSES_ROOT` registry subtree.
`snapshot c:\Original.snapshot –Diff c:\NewEnvironment.snapshot c:\MyProject`	Generates a ThinApp project directory by comparing two snapshots.
`snapshot Original.snapshot –DiffPrint NewEnvironment.snapshot`	Displays differences between two captured snapshots.
`snapshot C:\data.snapshot snapshot C:\data.snapshot C:\ HKEY_LOCAL_MACHINE`	Saves the state of the computer file system and registry.
`snapshot C:\start.snapshot –diffprint C:\end.snapshot`	Compares two recorded states.
`snapshot C:\start.snapshot –print`	Prints the contents of a saved state.
`snapshot C:\start.snapshot –SuggestProject C:\end.snapshot C:\project.ini snapshot C:\project.ini –GenerateProject`	Generates a ThinApp project by comparing two saved states.

Create a Project Without the Setup Capture Wizard

You can use the `snapshot.exe` utility from the command line instead of using the Setup Capture wizard that runs the `snapshot.exe` utility in the background. The command-line utility is useful to package a large number of applications or automate ThinApp project creation. The typical location of the `snapshot.exe` utility is `C:\Program Files\VMware\VMware ThinApp\snapshot.exe`.

The snapshot process makes a copy of the all registry entries on the system and file system metadata. File system metadata includes path, filename, attribute, size, and timestamp information but excludes actual file data.

To create a project with the snapshot.exe command-line utility

1 Save an initial snapshot of the current machine configuration to disk.

```
snapshot.exe c:\Start.snapshot
```

2 Install the application and make any necessary manual system changes.

3 Save to disk a snapshot of the new machine configuration.

```
snapshot.exe c:\End.snapshot
```

4 Generate a template `Package.ini` file.

```
snapshot.exe c:\Start.snapshot -SuggestProject c:\End.snapshot c:\Template.ini
```

ThinApp uses the template file to generate the final `Package.ini` file. The template file contains a list of all detected executable file entry points and `Package.ini` parameters. If you write your own script to replace the Setup Capture wizard, use the template `Package.ini` file to select the entry points to keep or customize `Package.ini` parameters such as `InventoryName`.

5 Generate a ThinApp project.

```
snapshot.exe c:\Template.ini -GenerateProject c:\MyProjectDirectory
```

6 (Optional) Delete the temporary `c:\Start.snapshot`, `c:\End.snapshot`, and `c:\Template.ini` files.

7 (Optional) To generate multiple projects with different configurations, reuse the original `Start.snapshot` file and repeat the procedure from Step 2.

Customizing the snapshot.ini File

The `snapshot.ini` configuration file specifies what registry keys to exclude from a ThinApp project when you capture an application.

For example, if you use Internet Explorer 7, you might need ThinApp to capture the following registry keys:

- `HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Desktop\Components`
- `HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Internet Settings`
- `HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Internet Settings\Connections`
- `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Hardware Profiles\0001\Software\Microsoft\windows\CurrentVersion\Internet Settings`

If the `snapshot.ini` file excludes the `HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Internet Settings\Connections` key by default, you can remove this key from the `snapshot.ini` file to ensure that ThinApp captures the key in the capture process.

If you do not customize the `snapshot.ini` file, the snapshot process loads the file from one of these locations:

- `Application Data\Thinapp\snapshot.ini`

  This location is the `AppData` directory of the user.

- `C:\Program Files\VMware\VMWare Thinapp\snapshot.ini`

  This is the location from which ThinApp runs the `snapshot.exe` utility.

ThinApp Virtual File System

D

ThinApp stores the differences between snapshots during the setup capture process in a virtual file system and virtual registry.

This information about the virtual file system includes the following topics:

Virtual File System Formats

ThinApp generates the following virtual file system formats:

- Build

  The setup capture process generates this format from files found directly on the physical file system. ThinApp uses folder macros to represent Windows shell folder locations.

- Embedded

  The `build.bat` file triggers a build process that embeds a read-only file system in executable files. The executable files provide block-based streaming to client computers. ThinApp compresses the file system.

- Sandbox

  Running the captured application generates the read-write directory structure that holds file data that the application modifies. File modifications that prompt ThinApp to extract embedded virtual files to the sandbox include the following operations:

  - Changing the timestamp or attributes of a file
  - Opening a file with write access
  - Truncating a file
  - Renaming or moving a file

The embedded and sandbox file systems use folder macros to enable file paths to dynamically expand at runtime.

Merged and Virtual Views of the File System

Isolation modes specify whether ThinApp presents the application with a merged view of the virtual and physical file system or a view of virtual files. For information about isolation modes, see "Modifying Isolation Modes" on page 23.

Using Folder Macros

ThinApp uses macros to represent file system path locations that might change when virtualized applications run on different Windows operating systems or computers. The use of macros allows shared application profile information to instantly migrate to different operating systems.

For example, you might capture an application on a system that has `C:\WINNT` as the Windows directory and deploy the application on a system that has `C:\Windows` as the Windows directory. ThinApp transparently converts `C:\WINNT` to `%SystemRoot%` during the capture process for that system and expands `%SystemRoot%` to `C:\Windows` during runtime for that system.

If an application registers DLLs to `C:\winnt\system32` while running on Windows 2000, the user can quit the application and log in to a Windows XP machine. On the Windows XP machine, the files appear to exist at `C:\windows\system32` and all related registry keys point to `C:\windows\system32`.

On Windows Vista, ThinApp moves Windows SxS DLLs and policy information to match Windows Vista instead of using Windows XP file path styles. This feature allows most applications to migrate to updated or older operating systems.

ThinApp provides SxS support for applications running on Windows 2000 even though the underlying operating system does not. This support enables most applications captured on Windows XP to run on Windows 2000 without changes.

List of Folder Macros

ThinApp uses the `shfolder.dll` file to obtain the location of shell folders. Older versions of the `shfolder.dll` file do not support some macro names.

Macros requiring `shfolder.dll` version 5.0 or later include `%ProgramFilesDir%`, `%Common AppData%`, `%Local AppData%`, `%My Pictures%`, and `%Profile%`.

Macros requiring `shfolder.dll` version 6.0 or later include `%My Videos%`, `%Personal%`, and `%Profiles%`.

Table D-1 lists the available folder macros.

Table D-1. Folder Macros

Macro Name	Typical Location
%AdminTools%	C:\Documents and Settings\<user_name>\Start Menu\Programs\Administrative Tools
%AppData%	C:\Documents and Settings\<user_name>\Application Data
%CDBurn Area%	C:\Documents and Settings\<user_name>\Local Settings\Application Data\Microsoft\CD Burning
%Common AdminTools%	C:\Documents and Settings\All Users\Start Menu\Programs\Administrative Tools
%Common AppData%	C:\Documents and Settings\All Users\Application Data
%Common Desktop%	C:\Documents and Settings\All Users\Desktop
%Common Documents%	C:\Documents and Settings\All Users\Documents
%Common Favorites%	C:\Documents and Settings\All Users\Favorites
%Common Programs%	C:\Documents and Settings\All Users\Start Menu\Programs
%Common StartMenu%	C:\Documents and Settings\All Users\Start Menu
%Common Startup%	C:\Documents and Settings\All Users\Start Menu\Programs\Startup
%Common Templates%	C:\Documents and Settings\All Users\Templates
%Cookies%	C:\Documents and Settings\<user_name>\Cookies
%Desktop%	C:\Documents and Settings\<user_name>\Desktop
%Drive_c%	C:\
%Drive_m%	M:\

Table D-1. Folder Macros (Continued)

Macro Name	Typical Location
%Favorites%	C:\Documents and Settings\<user_name>\Favorites
%Fonts%	C:\Windows\Fonts
%History%	C:\Documents and Settings\<user_name>\Local Settings\History
%Internet Cache%	C:\Documents and Settings\<user_name>\Local Settings\Temporary Internet Files
%Local AppData%	C:\Documents and Settings\<user_name>\Local Settings\Application Data
%My Pictures%	C:\Documents and Settings\<user_name>\My Documents\My Pictures
%My Videos%	C:\Documents and Settings\<user_name>\My Documents\My Videos
%NetHood%	C:\Documents and Settings\<user_name>\NetHood
%Personal%	C:\Documents and Settings\<user_name>\My Documents
%PrintHood%	C:\Documents and Settings\<user_name>\PrintHood
%Profile%	C:\Documents and Settings\<user_name>
%Profiles%	C:\Documents and Settings
%Program Files Common%	C:\Program Files\Common Files
%ProgramFilesDir%	C:\Program Files
%Programs%	C:\Documents and Settings\<user_name>\Start Menu\Programs
%Recent%	C:\Documents and Settings\<user_name>\My Recent Documents
%Resources%	C:\Windows\Resources
%Resources Localized%	C:\Windows\Resources\<language_ID>
%SendTo%	C:\Documents and Settings\<user_name>\SendTo
%Startup%	C:\Documents and Settings\<user_name>\Start Menu\Programs\Startup
%SystemRoot%	C:\Windows
%SystemSystem%	C:\Windows\System32
%TEMP%	C:\Documents and Settings\<user_name>\Local Settings\Temp
%Templates%	C:\Documents and Settings\<user_name>\Templates

Processing %SystemRoot%

A Terminal Services environment has a shared Windows directory, such as `C:\Windows`, and a private Windows directory, such as `C:\Documents and Settings\User\Windows`. In this environment, ThinApp uses the user-specific directory for `%SystemRoot%`.

ThinApp Scripts

E

Scripts modify the behavior of virtual applications dynamically. You can create custom code before starting an application packaged with ThinApp or after an application exits. You can use scripts to authenticate users and load configuration files from a physical to virtual environment.

Callback functions run code during specific events. If applications create child processes, use callback functions to run code only in the main parent process.

API functions run ThinApp functions and interact with the ThinApp runtime. API functions can authenticate users and prevent the start of applications for unauthorized users.

Adding scripts to your application involves creating an ANSI text file with the `.vbs` file extension in the root application project directory. The root project directory is the same directory that contains the `Package.ini` file. During the build process, ThinApp adds the script files to the executable file and runs each of the script files at runtime.

ThinApp uses VBScript to run script files. For information about VBScript, see the Microsoft VBScript documentation. You can use VBScript to access COM controls registered on the host system or within the virtual package.

This information includes the following topics:

Callback Functions

Callback functions with specific names run only under certain conditions. For example, callback functions run script code only when an application starts or quits.

Callback function names include the following names:

- `OnFirstSandboxOwner`—Called only when an application first locks the sandbox. This callback is not called if a second copy of the same application uses the same sandbox while the first copy runs. If the first application spawns a subprocess and quits, the second subprocess locks the sandbox and prevents this callback from running until all subprocesses quit and the application runs again.
- `OnFirstParentStart`—Called before running a ThinApp executable file regardless of whether the sandbox is simutaneously owned by another captured executable file.
- `OnFirstParentExit`—Called when the first parent process exits. If a parent process runs a child process and quits, this callback is called even if the child process continues to run.
- `OnLastProcessExit`—Called when the last process owning the sandbox exits. If a parent process runs a child process and quits, this callback is called when the last child process exits.

The following callback example shows the `OnFirstSandboxOwner` and `OnFirstParentExit` functions.

```
------------------------example.vbs ---------------------------------
Function OnFirstSandboxOwner
msgbox "The sandbox owner is: " + GetCurrentProcessName
End Function

Function OnFirstParentExit
msgbox "Quiting application: " + GetCurrentProcessName
End Function

msgbox "This code will execute for all parent and child processes"
----------------------------------------------------------------------
```

Use Scripts in a ThinApp Environment

You might use a script in the following circumstances:

- Timing out an application on a specific date.
- Running a `.bat` file from a network share inside the virtual environment.
- Modifying the virtual registry.
- Importing the `.reg` file at runtime.
- Stopping a virtual service when the main application quits.
- Copying an external system configuration file into the virtual environment on startup.

To use a script

1 Save the script contents in a plain text file with the `.vbs` extension in the same directory as your `Package.ini` file.

  You can use any filename. ThinApp adds all `.vbs` files to the package at build time.

2 Rebuild the application.

.bat Example

The following script runs an external `.bat` file from a network share inside of the virtual environment. The `.bat` file makes modifications to the virtual environment by copying files, deleting files, or applying registry changes using `regedit /s regfile.reg`. Run this script only for the first parent process. If you run this script for other processes, each copy of the `cmd.exe` utility runs the script and an infinite recursion develops.

```
Function OnFirstParentStart
 Set Shell = CreateObject("Wscript.Shell")
 Shell.Run "\\jcdesk2\test\test.bat"
End Function
```

Timeout Example

The following script prevents the use of an application after a specified date. The VBS date uses the `#mm/dd/yyyy#` format, regardless of locale.

This check occurs upon startup of the parent process and any child processes.

```
if Date >= #03/20/2007# then
 msgbox "This application has expired, please contact Administrator"
 ExitProcess 0
end if
```

Modify the Virtual Registry

The following script procedure modifies the virtual registry at runtime to load an external ODBC driver from the same directory where the package executable file is located.

To modify the registry

1 Obtain the path to the package executable files.

```
Origin = GetEnvironmentVariable("TS_ORIGIN")
```

2 Find the last slash in the path and obtain the characters that precede the slash.

```
LastSlash = InStrRev(Origin, "\")
SourcePath = Left(Origin, LastSlash)
```

3 Form a new path to the ODBC DLL file located outside of the package.

```
DriverPath=SourcePath + "tsodbc32.dll"
```

4 Modify the virtual registry to point it to this location.

```
Set WSHShell = CreateObject("Wscript.Shell")
WSHShell.RegWrite "HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBCINST.INI\Transoft ODBC
Driver\Driver," DriverPath
```

This modification causes the application to load the DLL from an external location.

.reg Example

The following script imports the registry values from an external `.reg` file into the virtual registry at runtime.

```
Function OnFirstParentStart
ExecuteVirtualProcess "regedit /s c:\tmp\somereg.reg"
End Function
```

Stopping a Service Example

The following script stops a virtual or native service when the main application quits.

```
Function OnFirstParentExit
Set WshShell = CreateObject("WScript.Shell")
WshShell.Run "net stop ""iPod Service"""
End Function
```

Copying a File Example

The following script sections shows how to copy a configuration file located in the same directory as the captured executable file into the virtual file system each time the application starts. This script is useful for an external configuration file that is easy to edit after deployment. Because the copy operation occurs each time you run the application, any changes to the external version are reflected in the virtual version.

For example, if your captured executable file is running from `\\server\share\myapp.exe`, this script searches for a configuration file located at `\\server\share\config.ini` and copies it to the virtual file system location at `c:\Program Files\my application\config.ini`.

By putting this code in the `OnFirstParentStart` function, it is only called once each time the script runs. Otherwise it runs for every child process.

```
Function OnFirstParentStart
```

ThinApp sets up TS_ORIGIN to indicate the full path to a captured executable file package. A virtual application sets the TS_ORIGIN variable to the physical path of the primary data container.If you have a virtual application consisting of the main.exe and shortcut.exe files, both files reside in C:\VirtApp. When you run the main.exe file, TS_ORIGIN var is set to C:\VirtApp\main.exe. When you run the shortcut.exe file, the TS_ORIGIN environment variable is set to C:\VirtApp\main.exe. The environment variable is always set to the primary data container, even when you create a shortcut. When you run VBScripts that are included in the package, the variable is already set and available to the scripts.

```
Origin = GetEnvironmentVariable("TS_ORIGIN")
```

You can separate the filename from TS_ORIGIN by finding the last backslash and removing all of the characters following it.

```
LastSlash = InStrRev(Origin, "\")
SourcePath = Left(Origin, LastSlash)
```

The source file to copy into the virtual environment is the package path plus config.ini.

```
SourceFile = SourcePath + "Config.ini"
```

The location to copy to might be a different location on different computers if the Program Files directory is mapped to a location other than c:\. The following call lets ThinApp expand a macro to obtain the correct location for the local computer.

```
DestFile = ExpandPath("%ProgramFilesDir%\MyApplication\Config.ini")
```

Use the file systemObject parameter to check the source file exists.

```
Set objFSO = CreateObject("Scripting.filesystemObject")
If objFSO.FileExists(SourceFile) Then
```

If the source file exists, copy it into the virtual file system. The %ProgramFilesDir%\MyApplication virtual directory is in the package.

```
objFSO.CopyFile SourceFile, DestFile, TRUE
End if
End Function
```

Add a Value to the System Registry

This script procedure adds a value to the physical system registry.

To add a value to the system registry

1 Create a .reg file and run the regedit /s command as an external process that accesses the system registry instead of the virtual registry.

```
Function OnFirstParentStart
```

2 Create the .reg file in a location that has the IsolationMode parameter set to Merged so that the virtual environment can access it with this script and the physical environment can it with the regedit /s command.

```
RegFileName = ExpandPath("%Personal%\thin.reg")
Set fso = CreateObject("Scripting.filesystemObject")
Set RegFile = fso.CreateTextFile(RegFileName, true)
```

The %Personal% directory is a directory that has Merged isolation mode by default.

3 Construct the .reg file.

```
RegFile.WriteLine("Windows Registry Editor Version 5.00")
RegFile.WriteBlankLines(1)
RegFile.WriteLine("[HKEY_CURRENT_USER\Software\Thinapp\demo]") RegFile.WriteLine(chr(34) and
"InventoryName" and chr(34) and "=" and chr(34) and GetBuildOption("InventoryName") and
chr(34))
RegFile.Close
```

4 Enter the information in the system registry.

```
RegEditPid = ExecuteExternalProcess("regedit /s " and chr(34) and RegFileName and chr(34))
WaitForProcess RegEditPid, 0
```

Wait until the process is complete.

5 Clean the environment.

```
fso.DeleteFile(RegFileName)
End Function
```

API Functions

You can use API functions that instruct ThinApp to complete operations such as load DLLs as virtual DLLS, convert paths from macro format to system format, and run commands inside of the virtual environment.

AddForcedVirtualLoadPath

The `AddForcedVirtualLoadPath(Path)` function instructs ThinApp to load all DLLs from the specified path as virtual DLLs even if they are not located in the package.

Use this function if the application needs to load external DLLs that depend on DLLs located inside the package.

Parameters

`Path`

[in] The filename or path for DLLs to load as virtual.

Examples

You can load any DLL located in the same directory as the executable file as a virtual DLL.

```
Origin = GetEnvironmentVariable("TS_ORIGIN")
```

TS_ORIGIN is the path from which the executable file is running.

You can delete the filename from TS_ORIGIN by finding the last backslash and removing all of the characters that follow it.

```
LastSlash = InStrRev(Origin, "\")
SourcePath = Left(Origin, LastSlash)
```

You can instruct ThinApp to load all DLLs in the same or lower directory from where the source executable file resides.

```
AddForcedVirtualLoadPath(SourcePath)
```

This process allows you to drop additional files in the SourcePath tree and have them resolve import operations against virtual DLLs.

ExitProcess

The `ExitProcessExitCode` function quits the current process and sets the specified error code.

Parameters

`ExitCode`

[in] The error code to set. This information might be available to a parent process. A value of 0 indicates no error.

Examples

You can exit the process and indicate success.

```
ExitProcess 0
```

When the process exits, the scripting system receives its `OnLastProcessExist` function callback. Any loaded DLLs run termination code to clean up the environment.

ExpandPath

The `ExpandPath(InputPath)` function converts a path from macro format to system format.

Parameters

`InputPath`

[in] A path in macro format.

Returns

The expanded macro path in system format.

Examples

Path = `ExpandPath("%ProgramFilesDir%\Myapp.exe")`

Path = `c:\Program Files\myapp.exe`

All macro paths must escape the % and # characters by replacing these characters with #25 and #23.

Path = `ExpandPath("%ProgramFilesDir%\FilenameWithPercent#25.exe")`

This expands to `C:\Program Files\FileNameWithPercent%.exe`.

ExecuteExternalProcess

The `ExecuteExternalProcess(CommandLine)` function runs a command outside of the virtual environment. You can use this function to make physical system changes.

Parameters

`CommandLine`

[in] Representation of the application and command-line parameters to run outside of the virtual environment.

Returns

Integer process ID. You can use the process ID with the `WaitForProcess` function. See "WaitForProcess" on page 117.

Examples

```
ExecuteExternalProcess("cmd.exe /c copy c:\systemfile.txt c:\newsystemfile.txt")
```

You can run a command that requires quotation marks in the command line.

```
ExecuteExternalProcess("regsvr32 /s " and chr(34) and "c:\Program Files\my.ocx" and chr(34))
```

ExecuteVirtualProcess

The `ExecuteVirtualProcess(CommandLine)` function runs a command inside of the virtual environment. You can use this function to make changes to the virtual environment.

Parameters

`CommandLine`

[in] Representation of the application and command-line parameters to run outside of the virtual environment.

Returns

Integer process ID. You can use the process ID with the `WaitForProcess` function. See "WaitForProcess" on page 117.

Examples

```
ExecuteVirtualProcess("cmd.exe /c copy c:\systemfile.txt c:\virtualfile.txt")
```

You can run a command that requires quotation marks in the command line.

```
ExecuteVirtualProcess("regsvr32 /s " and chr(34) and "c:\Program Files\my.ocx" and chr(34))
```

GetBuildOption

The `GetBuildOption(OptionName)` function returns the value of a setting specified in the `[BuildOptions]` section of the `Package.ini` file used for capturing applications.

Parameters

`OptionName`

[in] Name of the setting.

Returns

This function returns a string value. If the requested option name does not exist, the function returns an empty string ("").

Examples

```
Package.ini contains:
[BuildOptions]
CapturedUsingVersion=4.0.1–2866
```

The following line appears in a VBS file:

```
Value = GetBuildOption("CapturedUsingVersion")
```

GetFileVersionValue

The `GetFileVersionValue(Filename, Value)` function returns version information value from files such as a specific DLL, OCX, or executable file. You can use this function to determine the internal version number of a DLL or retrieve DLL information about the copyright owner or a product name.

Parameters

`Filename`

[in] The name of the filename whose version information is being retrieved.

Value

[in] The name of the value to retrieve from the version information section of the specified file.

You can retrieve the following values from most DLLs:

- Comments
- InternalName
- ProductName
- CompanyName
- LegalCopyright
- ProductVersion
- FileDescription
- LegalTrademarks
- PrivateBuild
- FileVersion
- OriginalFilename
- SpecialBuild

Returns

This function returns a string value. If the requested filename does not exist, or the function cannot locate the specified value in the file, the function returns an empty string ("").

Examples

```
FileVersion = GetFileVersionValue("c:\windows\system32\kernel32.dll," "FileVersion")

if FileVersion = "1.0.0.0" then
                MsgBox "This is Version 1.0!"

End if
```

GetCommandLine

The `GetCommandLine` function accesses the command-line parameters passed to the running program.

Returns

This function returns a string that represents the command-line arguments passed to the current running program, including the original executable file.

Examples

```
MsgBox "The command line for this EXE was " + GetCommandLine
```

GetCurrentProcessName

The `GetCurrentProcessName` function accesses the full virtual path name of the current process.

Returns

This function returns a string that represents the full executable path name inside of the virtual environment. In most circumstances, this path is `c:\Program Files\...`, even if the package source runs from a network share.

Examples

```
MsgBox "Running EXE path is " + GetCurrentProcessName
```

GetOSVersion

The `GetOSVersion()` function returns information about the current version of Windows.

Parameters

This function has no parameters.

Returns

This function returns a string in the `MAJOR.MINOR.BUILD_NUMBER.PLATFORM_ID OS_STRING` format.

`MAJOR` is one the following values:

Windows Vista	6
Windows Server 2008	6
Windows Server 2003	5
Windows XP	5
Windows 2000	5
Windows NT 4.0	4

`MINOR` is one of the following values:

Windows Vista	0
Windows Server 2008	0
Windows Server 2003	2
Windows XP	1
Windows 2000	0
Windows NT 4.0	0
Windows NT 3.51	51

`BUILD_NUMBER` is the build number of the operating system.

PLATFORM_ID assigns one of the following values:

- `Value = 1` for Windows Me, Windows 98, or Windows 95 (Windows 95 based OS)
- `Value = 2` for Windows Server 2003, Windows XP, Windows 2000, or Windows NT. (Windows NT based OS)

`OS_STRING` represents information about the operating system such as `Service Pack 2`.

Examples

```
if GetOSVersion() = "5.1.0.2 Service Pack 2"
               then MsgBox "You are running on Windows XP Service Pack 2!"
endif
```

GetEnvironmentVariable

The `GetEnvironmentVariable(Name)` function returns the environment variable associated with the `Name` variable.

Parameters

`Name`

[in] The name of the environment variable for which the value is retrieved.

Returns

This function returns the string value associated with the `Name` environment variable.

Examples

```
MsgBbox "The package source EXE is " + GetEnvironmentVariable("TS_ORIGIN")
```

RemoveSandboxOnExit

The `RemoveSandboxOnExit(YesNo)` function set toggles that determine whether to delete the sandbox when the last child process exits.

If you set the `RemoveSandboxOnExit` parameter to `1` in the `Package.ini` file, the default cleanup behavior for the package with is `Yes`. You can change the cleanup behavior to `No` by calling `RemoveSandboxOnExit` with the value of 0. If you do not modify the `RemoveSandboxOnExit=1` entry in the `Package.ini` file, the default cleanup behavior for the package is `No`. You can change the cleanup behavior to `Yes` by calling `RemoveSandboxOnExit` with the value of 1.

Parameters

`Yes No`

[in] Do you want to clean up when the last process shuts down? 1=Yes, 0=No

Examples

The following example turns on cleanup.

```
RemoveSandboxOnExit 1
```

The following example turns off cleanup.

```
RemoveSandboxOnExit 0
```

SetEnvironmentVariable

The `SetEnvironmentVariable(Name, Value)` function set the value of an environment variable.

Parameters

`Name`

[in] The name of the environment variable to store the value.

`Value`

[in] The value to store.

Examples

```
SetEnvironmentVariable "PATH", "C:\Windows\system32"
```

SetfileSystemIsolation

The `Setfile systemIsolation(Directory, IsolationMode)` function sets the isolation mode of a directory.

Parameters

`Directory`

[in] Full path of the directory whose isolation mode is to be set.

`IsolationMode`

[in] Isolation mode to set.

1 = WriteCopy
2 = Merged
3 = Full

Examples

You can set the Merged isolation mode for the temp directory.

```
Setfile systemIsolation GetEnvironmentVariable("TEMP"), 2
```

SetRegistryIsolation

The `SetRegistryIsolation(RegistryKey, IsolationMode)` function sets the isolation mode of a registry key.

Parameters

`RegistryKey`

[in] The registry key on which to set the isolation mode. Start with `HKLM` for `HKEY_LOCAL_MACHINE`, `HKCU` for `HKEY_CURRENT_USER`, and `HKCR` for `HKEY_CLASSES_ROOT`.

`IsolationMode`

[in] Isolation mode to set.

1 = WriteCopy
2 = Merged
3 = Full

Examples

You can set the Full isolation mode for `HKEY_CURRENT_USER\Software\Thinapp\Test`.

```
SetRegistryIsolation "HKCU\Software\Thinapp\Test," 3
```

WaitForProcess

The `WaitForProcess(ProcessID, TimeOutInMilliSeconds)` function waits until the process ID is finished running.

Parameters

`ProcessID`

[in] The process ID to end. The process ID can come from `ExecuteExternalProcess` or `ExecuteVirtualProcess`.

`TimeOutInMilliSeconds`

[in] The maximum amount of time to wait for the process to finish running before continuing. A value of 0 specifies INFINITE.

Returns

This function returns an integer.

0 = Timeout fails
1 = Process exits
2 = Process does not exist or security is denied

Examples

```
id = ExecuteExternalProcess("cmd.exe")
WaitForProcess(id, 0)
```

Glossary

A

Application Link
A utility that links dependent applications to a base application at runtime and starts all the applications together when you start the base application. You can use the utility to deploy and update component packages separately rather than capture all components in the same package.

Application Sync
A utility that updates an application by detecting a new packaged version on a server or network share. You can configure update settings, such as the checking of an update server at certain intervals. ThinApp detects the most recent application executable file and downloads the differences.

attributes.ini
The file that applies configuration settings at the directory level of the package rather than the entire package. The `##Attributes.ini` settings override the overall `Package.ini` settings.

B

build
To convert a ThinApp project into a package. You can build a package with the Setup Capture wizard or with the `build.bat` utility.

C

capture
To package an application into a virtual environment and set initial application parameters. ThinApp provides the Setup Capture wizard or the `snapshot.exe` utility to create a portable application package that is independent of the operating system it runs on.

clean machine
The computer or virtual machine, installed with only the basic Windows operating system, on which you capture the application. The Windows operating system version must be the earliest version of Windows that you expect the application to run on.

E

entry point
An executable file that starts the captured application. An application might have multiple entry points. For example, the `Firefox.exe` file and `cmd.exe` file might serve as the entry points for a Mozilla Firefox application. The primary data container file must exist as one of the entry points.

I

inventory name
A name that ThinApp uses for internal tracking of the application. The inventory name sets the default project directory name and appears in the **Add or Remove Programs** dialog box for Windows.

isolation mode
A package setting that determines the read and write access to the physical environment. ThinApp has WriteCopy, Merged, and Full isolation modes.

L

logging.dll
A utility that generates `.trace` files.

Log Monitor
A utility that captures chronological activity for executable files that the captured application starts.The `log_monitor.exe` file is compatible only with applications captured using the same version of ThinApp.

M

MSI
A Windows Installer container that is useful for application deployment tools. You can deliver the captured application as an MSI file instead of an executable file.

N

native
Refers to the physical environment rather than the virtual environment. *See also* physical.

network streaming
The process of running a package from a central server. ThinApp downloads blocks of the application as needed to ensure quick processing and display.

P

package
The virtual application files that the ThinApp build process generates. The package includes the primary data container file and entry point files to access the application.

package.ini
The file that applies configuration settings to the package and that resides in the captured application folder. The Setup Capture wizard sets the initial values of the configuration settings.

physical
Refers to the computer memory and file system in which all standard Windows processes run. Depending on ThinApp isolation mode settings, processes in the virtual environment can access the physical environment. *See also* native, virtual.

prescan
To establish a baseline image or snapshot of a machine before you install the application you want to capture. The capture process stores in a virtual file system and virtual registry the differences between the prescan and postscan images. *See also* postscan, snapshot.

primary data container
The main file to access the virtual application. The file is a `.exe` file or a `.dat` file that includes the ThinApp runtime and the read-only virtual file system and virtual registry. The primary data container must reside in the same `/bin` directory with any subordinate application executable files.

project
The data that the capture process creates before you build a package. The capture process uses the inventory name as the default project directory name. You can customize parameters in the project files before you build an application package. You cannot deploy a captured application until you build a package from the project.

postscan
To establish an image or snapshot of a machine after you install the application you want to capture. The capture process stores in a virtual file system and virtual registry the differences between the prescan and postscan images. *See also* prescan, snapshot.

S

sandbox
The physical system folder that stores runtime user changes to the virtual application. When you start the application, ThinApp incorporates changes from the sandbox. When you delete the sandbox, ThinApp reverts the application to its captured state. The default location of the sandbox is `%APPDATA%\Thinstall\<user_name>`.

sbmerge.exe
A utility that makes incremental updates to applications, such as the incorporation of a plug-in or a change in a browser home page. The `sbmerge.exe` utility merges runtime changes recorded in the sandbox back into a ThinApp project.

snapshot
A recording of the state of the Windows file system and registry during the application capture process. The Setup Capture process uses the `snapshot.exe` utility to take a snapshot before and after the application is installed and stores the differences in a virtual file system and virtual registry. *See also* postscan, prescan.

snapshot.exe
A utility that creates the snapshots of a computer file system and registry and facilitates the prescan and postscan operations during the capture process. Only advanced users who build ThinApp functionality into other platforms might make direct use of this utility. *See also* postscan, prescan, snapshot.

snapshot.ini
A configuration file that specifies the directories and subkeys to exclude from a ThinApp project when you capture an application. You can customize this file for applications.

T

template.msi
A template for MSI files that you can customize to adhere to company deployment procedures and standards. For example, you can add registry settings for ThinApp to add to client computers as part of the installation.

thinreg.exe
A utility that establishes file type associations, sets up **Start** menu and desktop shortcuts, and facilitates the opening of files. You must run the `thinreg.exe` utility to register executable files. MSI files automate the `thinreg.exe` registration process.

tlink.exe
A utility that links key modules during the build process.

V

vftool.exe
A utility that compiles the virtual file system during the build process.

virtual
Refers to the logical file and memory within which a captured application runs. Processes in a physical environment cannot access the virtual environment. *See also* physical.

virtual application
An application that you capture to make it portable and independent of the operating system it runs on.

virtual file system
The file system as the captured application sees it.

virtual registry
The registry as the captured application sees it.

vregtool.exe
A utility that compiles the virtual registry during the build process.

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