z/OS

IBM Multi-Factor Authentication for z/OS User's Guide

Version 1 Release 1

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z/OS

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Note
Before using this information and the product it supports, read the information in "Notices" on page 31.

This edition applies to Version *1* Release *1* of IBM Multi-Factor Authentication for z/OS (product number 5655-162) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this information

This book provides instructions for using IBM® Multi-Factor Authentication for z/OS®. It is intended primarily for system users, and assumes you are familiar with the z/OS operating system. This book contains general user information, including explanations of AZF messages.

For installation information, refer to *IBM Multi-Factor Authentication for z/OS Installation and Customization*.

To find the complete z/OS library, go to IBM Knowledge Center (http://www.ibm.com/support/knowledgecenter/SSLTBW/welcome).

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Chapter 1. Introduction

IBM Multi-Factor Authentication for z/OS, which is referred to in this document as IBM MFA, provides an alternate authentication mechanism for z/OS networks that are used in conjunction with RSA SecurID-based authentication systems. IBM MFA allows RACF to use RSA SecurID authentication mechanisms in place of the standard z/OS password.

The most common method for authenticating users to z/OS systems is by the use of passwords or password phrases. Unfortunately, passwords can present a relatively simple point of attack for exploitation. In order for systems that rely on passwords to be secure, they must enforce password controls and provide user education. Users tend to pick common passwords, write down passwords, and unintentionally install malware that can log passwords. Additionally, building an extremely powerful dedicated password cracking computer system has become trivial and low-cost. Clients are looking for ways to raise the assurance level of their systems by requiring additional authentication factors for users.

You can use IBM MFA with a large variety of applications. Some examples provided in this document include:

- TSO/E. Time Sharing Options (TSO/E) allows users to create an interactive session with the z/OS system. TSO provides a single-user logon capability and a basic command prompt interface to z/OS.
- CICS CESL. Customer Information Control System (CICS) is a family of application servers and connectors that provides industrial-strength, online transaction management and connectivity for mission-critical applications.
- z/OSMF. IBM z/OS Management Facility (z/OSMF) provides a web-based interface that allows you to manage various aspects of your z/OS systems through a browser.
- IBM OpenSSH. OpenSSH provides secure encryption for both remote login and file transfer.

Multi-Factor Authentication Concepts

In IBM MFA, the typical Resource Access Control Facility (RACF) password authentication decision is delegated to the RSA Authentication Manager.

In the simplest terms, the RSA Authentication Manager determines whether the user's credentials are valid and, if so, returns success to RACF. RACF then resumes control and completes the authentication and authorization process as usual.

A multi-factor authentication system requires that multiple authentication factors be presented during logon in order to verify a user's identity. Each authentication factor must be from a separate category of credential types.

IBM MFA depends on "something you have," and two or more "things you know." The "something you have" is a hardware or software RSA SecurID token. The "things you know" include an RSA SecurID Personal Identification Number (PIN), and your z/OS user name.

By requiring multiple authentication factors, a user's account cannot be compromised even if one of their factors is discovered.

RSA Authentication Manager Concepts

The RSA Authentication Manager includes token codes, PINs, and passcodes as described in this section.

SecurID token code

The SecurID token code is a continuously regenerated number used to prove your identity.

The token code is a pseudo-random 6- or 8-digit number (PRN), based on the current time, that is displayed on the RSA SecurID token device. It is presumed that only an authorized user possesses the token device.

The token code is a one-time password (OTP). It is valid only while it is displayed, and it can be used only once. The token device generates a new token code at regular intervals, typically every 60 seconds. The display frequency for the token device determines the amount of time that a token code appears before the display is refreshed.

SecurID PIN

The SecurID PIN is conceptually similar to a PIN that you might use for financial transactions. It is a number that only you know that helps to identify you.

The Personal Identification Number (PIN) is a unique 4- to 8-digit identifier that only you know. Your PIN can be of your own choosing, or system generated by RSA Authentication Manager depending on your RSA token policy. If you create your own PIN, follow the locally established rules for creating a valid PIN, including the number of characters, the reuse policy, and so forth.

Your security administrator can clear and reset the PIN as needed, so it is possible that your current PIN is invalid and you need to change it.

SecurID passcode

A SecurID passcode is the combination of a PIN and token code.

Similar to the token code, a passcode is a one-time password (OTP). It is valid only while it is displayed, and it can be used only once.

There are two types of passcodes:

- For hardware fob-style tokens without a PINpad, the SecurID passcode consists of your PIN followed by the token code and you must enter both. For example, if your PIN is 1234 and the token code is 567891, you enter the passcode as 1234567891.
- For SecurID PINpad hardware tokens and SoftToken applications, you enter your PIN on the pin pad and the token generates a hash-encrypted passcode from the PIN and the generated token. The token generates a new passcode at regular intervals, typically every 60 seconds. You then use the generated passcode when you log in.

Types of token devices

Several types of RSA SecurID token devices are supported for use with IBM Multi-Factor Authentication for z/OS.

RSA SecurID card-style tokens and key fobs

These devices generates a token code. Card-style tokens (such as the RSA SecurID 200) and key fobs (such as the RSA SecurID 800) function identically, with both displaying the token code in the LCD.

RSA SecurID PINpads

With an RSA SecurID PINpad token, you enter your PIN directly into the token, and the token generates a hash-encrypted six- or eight-digit passcode. For example, with the RSA SecurID 520 card-style PINpad, you enter the PIN via a 10-digit numeric pad that is contained on the card. The passcode displayed is a hash-encrypted combination of the PIN and the current token code.

You can use the PINpad token in two ways:

- If you have a valid PIN, enter the PIN and the token generates a hash-encrypted passcode. The passcode displayed is a hash-encrypted combination of the PIN and the current token code. The passcode can be six or eight digits, depending on the profile.
- If you do not have a valid PIN, which can occur if the security administrator forces you to change it, use the token to generate a token code. You then use the generated token code to log in and change your PIN.

RSA SecurID SoftToken tokens

RSA SecurID SoftToken applications reside on a computer or other smart device.

You can use the SoftToken application in two ways:

- If you have a valid PIN, enter the PIN and the token generates a hash-encrypted passcode. The passcode displayed is a hash-encrypted combination of the PIN and the current token code. The passcode can be six or eight digits, depending on the profile.
- If you do not have a valid PIN, which can occur if the security administrator forces you to change it, use the token to generate a token code. You then use the generated token code to log in and change your PIN.

Chapter 2. TSO/E

How you log in to TSO/E with IBM MFA enabled depends on the token type you are using, whether you have a valid PIN, and whether pass phrases are enabled.

If the security administrator has enabled your account for IBM MFA, you no longer use your RACF password to log in. Instead, how you log in with TSO/E depends on the following SecurID token and TSO/E configuration choices made by your security administrator:

- What type of token do you have? See "Types of token devices" on page 2 for the supported token types.
- Whether you have a valid PIN, whether you must create a new one, or whether the system generates one for you. Your security administrator decides when you must change your PIN.
- Whether pass phrases are enabled. TSO/E passwords are typically a maximum of eight characters. However, it is possible for SecurID credentials to exceed eight characters. Therefore, your security administrator may have selected an alternate TSO/E logon panel that allows you to enter longer passwords called pass phrases in the Password field.

General guidelines

Observe the following guidelines:

- It is a best practice to wait until the token code changes before attempting to log in.
- You can use the token code only once.
- If you receive an authentication failure, wait until the token code changes before attempting to log in again.

Fob-style hardware token

Several TSO/E login options are available for use with IBM MFA if you are using a hardware token without a PINpad.

Consult Table 1 to determine which login option matches your specific configuration and then follow the link to the related section.

Table 1. TSO/E Logon Options for a fob-style hardware token

Token type	Valid PIN?	Pass phrases enabled?	Use this login choice...
Fob-style hardware token	Yes	No	"Logging in with valid PIN, no pass phrase" on page 6
	Yes	Yes	"Logging in with valid PIN, with pass phrase" on page 6
	No	No	"Logging in without valid PIN or pass phrase" on page 6
	No	Yes	"Logging in without valid PIN, with pass phrase" on page 7

Logging in with valid PIN, no pass phrase

You can log in to TSO/E with a valid PIN without using pass phrases. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field.
4. Enter your PIN in the New Password field and press Enter. The LOGON panel appears again.
5. Re-enter your PIN to confirm it and press Enter.

Logging in with valid PIN, with pass phrase

You can log in to TSO/E with a valid PIN when using pass phrases. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the Password field. For example, if your PIN is 4321 and your token code is 456789, enter 4321456789 in the Password field.
4. Press Enter.

Logging in without valid PIN or pass phrase

You can log in to TSO/E without a currently valid PIN and without using pass phrases. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field. Leave the New Password field empty. Press Enter. If the token code is accepted, a status message indicates that you must enter a new 4- to 8-digit PIN.
4. Press Enter. The LOGON panel is displayed and you are prompted to enter a new password.
5. Enter a new PIN in the New Password field and press Enter. (If you are prompted with a system-generated PIN, use that PIN. You might also be prompted to use either the system-generated PIN or your own.)
6. Confirm the PIN. If accepted, the "new PIN accepted" message is displayed.
7. Press Enter to return to the LOGON panel.

8. Because you changed the PIN, you must log in again. Wait for the token code displayed by the SecurID token to change and get the new token token code.
9. Enter the token code displayed by the SecurID token in the Password field.
10. Enter the PIN in the New Password field and press Enter.

Logging in without valid PIN, with pass phrase

You can log in to TSO/E without a currently valid PIN using pass phrases. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field. Press Enter. If the token code is accepted, a status message indicates that you must enter a new 4- to 8-digit PIN.
4. Press Enter. The LOGON panel is displayed and you are prompted to enter a new password.
5. Enter a new PIN in the Password field and press Enter. (If you are prompted with a system-generated PIN, use that PIN. You might also be prompted to use either the system-generated PIN or your own.)
6. Confirm the PIN. If accepted, the "new PIN accepted" message is displayed.
7. Press Enter to return to the LOGON panel.
8. Because you changed the PIN, you must log in again. Wait for the token code displayed by the SecurID token to change. Get the new token code.
9. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the Password field. Press Enter.

Hardware token with a PINpad

Several TSO/E login options are available for use with IBM MFA if you are using a hardware token with a PINpad.

Consult Table 2 to determine which login option matches your specific configuration and then follow the link to the related section.

Table 2. TSO/E Logon Options for a hardware token with a PINpad

Token type	Valid PIN?	Pass phrases enabled?	Use this login choice...
Hardware token (with PINpad)	Yes	No	“Logging in with valid PIN, no pass phrase” on page 8
	Yes	Yes	“Logging in with valid PIN, with pass phrase” on page 8
	No	No	“Logging in without valid PIN or pass phrase” on page 8
	No	Yes	“Logging in without valid PIN, with pass phrase” on page 9

Logging in with valid PIN, no pass phrase

You can log in to TSO/E with a valid PIN without using pass phrases. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Enter your PIN in the SecurID token and generate a passcode.
3. Enter the 6- to 8-digit passcode displayed by the SecurID token in the Password field.
4. Leave the New Password field empty.
5. Press Enter.

Logging in with valid PIN, with pass phrase

You can log in to TSO/E with a valid PIN when using pass phrases. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Enter your PIN in the SecurID token and generate a passcode.
3. Enter the 6- to 8-digit passcode displayed by the SecurID token in the Password field.
4. Press Enter.

Logging in without valid PIN or pass phrase

You can log in to TSO/E without a currently valid PIN and without using pass phrases. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Generate a token code on the SecurID token without entering a PIN.
3. Get the 6- to 8-digit token code displayed by the SecurID token.
4. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field. Leave the New Password field empty. Press Enter. If the token code is accepted, a status message indicates that you must enter a new 4- to 8-digit PIN.
5. Press Enter. The LOGON panel is displayed and you are prompted to enter a new password.
6. Enter a new PIN in the New Password field and press Enter. (If you are prompted with a system-generated PIN, use that PIN. You might also be prompted to use either the system-generated PIN or your own.)
7. Confirm the new PIN. The "new PIN accepted" message is displayed.
8. Press Enter to return to the LOGON panel.

9. Because you changed the PIN, you must log in again. Wait for the token displayed by the SecurID token to change. Enter your PIN and generate a new passcode.
10. Enter the passcode displayed by the SecurID token in the Password field.
11. Leave the New Password field empty.
12. Press Enter.

Logging in without valid PIN, with pass phrase

You can log in to TSO/E without a currently valid PIN using pass phrases. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Generate a token code on the SecurID token without entering a PIN.
3. Get the 6- to 8-digit token code displayed by the SecurID token.
4. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field and press Enter. If the token code is accepted, a status message indicates that you must enter a new 4- to 8-digit PIN.
5. Press Enter. The LOGON panel is displayed and you are prompted to enter a new password.
6. Enter a new PIN in the Password field and press Enter. (If you are prompted with a system-generated PIN, use that PIN. You might also be prompted to use either the system-generated PIN or your own.)
7. Confirm the new PIN. The "new PIN accepted" message is displayed.
8. Press Enter to return to the LOGON panel.
9. Because you changed the PIN, you must log in again. Wait for the token code displayed by the SecurID token to change. Enter your PIN and generate a passcode.
10. Enter the passcode displayed by the SecurID token in the Password field.
11. Press Enter.

SoftToken token

Several TSO/E login options are available for use with IBM MFA.

Consult Table 3 to determine which login option matches your specific configuration and then follow the link to the related section.

Table 3. TSO/E Logon Options for a SoftToken

Token type	Valid PIN?	Pass phrases enabled?	Use this login choice...
SoftToken	Yes	No	“Logging in with valid PIN, no pass phrase” on page 10
	Yes	Yes	“Logging in with valid PIN, with pass phrase” on page 10
	No	No	“Logging in without valid PIN or pass phrase” on page 10
	No	Yes	“Logging in without valid PIN, with pass phrase” on page 11

Logging in with valid PIN, no pass phrase

You can log in to TSO/E with a valid PIN without using pass phrases. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Enter your PIN in the SoftToken application and generate a 6- to 8-digit passcode.
3. Use the copy feature to copy the passcode.
4. Paste the passcode displayed by the SecurID token in the Password field.
5. Leave the New Password field empty.
6. Press Enter.

Logging in with valid PIN, with pass phrase

You can log in to TSO/E with a valid PIN when using pass phrases. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Enter your PIN in the SoftToken application and generate a 6- to 8-digit passcode.
3. Use the copy feature to copy the passcode.
4. Paste the passcode displayed by the SecurID token in the Password field.
5. Press Enter.

Logging in without valid PIN or pass phrase

You can log in to TSO/E without a valid PIN and without using pass phrases. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Generate a token code on the SecurID token without entering a PIN. Use the copy feature to copy the token code.
3. Paste the 6- to 8-digit token code displayed by the SecurID token in the Password field. Leave the New Password field empty. Press Enter. If the token code is accepted, a status message indicates that you must enter a new 4- to 8-digit PIN.
4. Press Enter. The LOGON panel is displayed and you are prompted to enter a new password.
5. Enter a new PIN in the New Password field and press Enter. (If you are prompted with a system-generated PIN, use that PIN. You might also be prompted to use either the system-generated PIN or your own.)

6. Confirm the new PIN. The "new PIN accepted" message is displayed.
7. Press Enter to return to the LOGON panel.
8. Because you changed the PIN, you must log in again. Wait for the token displayed by the SecurID token to change. Enter your PIN and generate a new passcode. Use the copy feature to copy the passcode.
9. Paste the passcode displayed by the SecurID token in the Password field.
10. Leave the New Password field empty.
11. Press Enter.

Logging in without valid PIN, with pass phrase

You can log in to TSO/E without a currently valid PIN using pass phrases. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to TSO/E with your user name.
2. Generate a token code on the SecurID token without entering a PIN. Use the copy feature to copy the token code.
3. Paste the 6- to 8-digit token code displayed by the SecurID token in the Password field. Press Enter. If the token code is accepted, a status message indicates that you must enter a new 4- to 8-digit PIN.
4. Press Enter. The LOGON panel is displayed and you are prompted to enter a new password.
5. Enter a new PIN in the Password field and press Enter. (If you are prompted with a system-generated PIN, use that PIN. You might also be prompted to use either the system-generated PIN or your own.)
6. Confirm the new PIN. The "new PIN accepted" message is displayed.
7. Press Enter to return to the LOGON panel.
8. Because you changed the PIN, you must log in again. Wait for the token displayed by the SecurID token to change. Enter your PIN and generate a new passcode. Use the copy feature to copy the passcode.
9. Paste the passcode displayed by the SecurID token in the Password field.
10. Press Enter.

Chapter 3. CICS CESL Transaction

How you log in to a CICS CESL transaction with IBM MFA enabled depends on the token type you are using and whether you have a valid PIN.

If the security administrator has enabled your account for IBM MFA, you no longer use your z/OS password to log in. Instead, how you log in with CICS depends on the following SecurID token and CICS configuration choices made by your security administrator.

- What type of token do you have? See "Types of token devices" on page 2 for the supported token types.
- Whether you have a currently valid PIN or whether you must create a new one. Your security administrator decides when you must change your PIN.

General guidelines

Observe the following guidelines:

- It is a best practice to wait until the token code changes before attempting to log in.
- You can use the token code only once.
- If you receive an authentication failure, wait until the token code changes before attempting to log in again.

Fob-style hardware token

Several CICS CESL login options are available for use with IBM MFA if you are using a fob-style hardware token.

Consult Table 4 to determine which login option matches your specific configuration and then follow the link to the related section.

Table 4. CICS Logon Options for a fob-style hardware token

Token type	Valid PIN?	Use this login choice...
Fob-style hardware token	Yes	"Logging in with valid PIN"
	No	"Logging in without valid PIN" on page 14

Logging in with valid PIN

You can log in to a CICS CESL transaction with a valid PIN. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to the CICS CESL transaction with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the Password field. For example, if your PIN is 4321 and your token code is 456789, enter 4321456789 in the Password field.

4. Leave the New Password field empty.
5. Press Enter.

Logging in without valid PIN

You can log in to a CICS CESL transaction without a currently valid PIN. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to the CICS CESL transaction with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field. Leave the New Password field empty. Press Enter. The message "DFHCE3525 Your password has expired. Please type your new password." is displayed.
4. Enter a new PIN in the New Password field and press Enter. Confirm the new PIN. The message "DFHCE3532 Your userid or password is invalid. Please retype both." is displayed.
5. Because you changed the PIN, you must log in again. Wait for the token code displayed by the SecurID token to change and get the new token token code.
6. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the Password field.
7. Leave the New Password field empty.
8. Press Enter.

Hardware token with a PINpad

Several CICS CESL login options are available for use with IBM MFA if you are using a hardware token with a PINpad.

Consult Table 5 to determine which login option matches your specific configuration and then follow the link to the related section.

Table 5. CICS Logon Options for a hardware token with a PINpad

Token type	Valid PIN?	Use this login choice...
Hardware token (with PINpad)	Yes	"Logging in with valid PIN"
	No	"Logging in without valid PIN" on page 15

Logging in with valid PIN

You can log in to a CICS CESL transaction with a valid PIN. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to a CICS CESL transaction with your user name.
2. Enter your PIN in the SecurID token and generate a passcode.

3. Enter the 6- to 8-digit passcode displayed by the SecurID token in the Password field.
4. Leave the New Password field empty.
5. Press Enter.

Logging in without valid PIN

You can log in to a CICS CESL transaction without a currently valid PIN. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to a CICS CESL transaction with your user name.
2. Generate a token code on the SecurID token without entering a PIN.
3. Get the 6- to 8-digit token code displayed by the SecurID token.
4. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field. Leave the New Password field empty. Press Enter. The message "DFHCE3525 Your password has expired. Please type your new password." is displayed.
5. Enter a new PIN in the New Password field and press Enter. Confirm the new PIN. The message "DFHCE3532 Your userid or password is invalid. Please retype both." is displayed.
6. Because you changed the PIN, you must log in again. Wait for the token displayed by the SecurID token to change. Enter your PIN and generate a passcode.
7. Enter the passcode displayed by the SecurID token in the Password field.
8. Leave the New Password field empty.
9. Press Enter.

SoftToken token

Several CICS CESL login options are available for use with IBM MFA.

Consult Table 6 to determine which login option matches your specific configuration and then follow the link to the related section.

Table 6. CICS Logon Options for a SoftToken

Token type	Valid PIN?	Use this login choice...
SoftToken	Yes	“Logging in with valid PIN”
	No	“Logging in without valid PIN” on page 16

Logging in with valid PIN

You can log in to a CICS CESL transaction with a valid PIN. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to a CICS CESL transaction with your user name.

2. Enter your PIN in the SoftToken application and generate a 6- to 8-digit passcode.
3. Use the copy feature to copy the passcode.
4. Paste the passcode displayed by the SecurID token in the Password field.
5. Leave the New Password field empty.
6. Press Enter.

Logging in without valid PIN

You can log in to a CICS CESL transaction without a currently valid PIN. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to a CICS CESL transaction with your user name.
2. Generate a token code on the SecurID token without entering a PIN. Use the copy feature to copy the token code.
3. Enter the 6- to 8-digit token code displayed by the SecurID token in the Password field. Leave the New Password field empty. Press Enter. The message "DFHCE3525 Your password has expired. Please type your new password." is displayed.
4. Enter a new PIN in the New Password field and press Enter. Confirm the new PIN. The message "DFHCE3532 Your userid or password is invalid. Please retype both." is displayed.
5. Because you changed the PIN, you must log in again. Wait for the token displayed by the SecurID token to change. Enter your PIN and generate a new passcode. Use the copy feature to copy the passcode.
6. Paste the passcode displayed by the SecurID token in the Password field.
7. Leave the New Password field empty.
8. Press Enter.

Chapter 4. z/OS Management Facility

How you log in to IBM z/OS Management Facility (z/OSMF) with IBM MFA enabled depends on the token type you are using. You must already have a valid PIN.

If the security administrator has enabled your account for IBM MFA, you no longer use your z/OS password to log in. Instead, how you log in with z/OSMF depends on the type of token you have. See "Types of token devices" on page 2 for the supported token types.

General guidelines

Observe the following guidelines:

- It is a best practice to wait until the token code changes before attempting to log in.
- You can use the token code only once.
- If you receive an authentication failure, wait until the token code changes before attempting to log in again.

Logging in with a fob-style hardware token

You can log in to z/OSMF with a valid PIN. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Begin to log in to z/OSMF with your user name.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the Password field. For example, if your PIN is 4321 and your token code is 456789, enter 4321456789 in the Password field.
4. Press Enter.

Logging in with a hardware token with a PINpad

You can log in to z/OSMF with a valid PIN. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Begin to log in to z/OSMF with your user name.
2. Enter your PIN in the SecurID token and generate a passcode.
3. Enter the 6- to 8-digit passcode displayed by the SecurID token in the Password field.
4. Press Enter.

Logging in with a SoftToken

You can log in to z/OSMF with a valid PIN. This use case requires a SoftToken token.

Procedure

Perform the following steps:

1. Begin to log in to z/OSMF with your user name.
2. Enter your PIN in the SoftToken application and generate a 6- to 8-digit passcode.
3. Use the copy feature to copy the passcode.
4. Paste the passcode displayed by the SecurID token in the Password field.
5. Press Enter.

Chapter 5. IBM FTP

How you log in to IBM FTP with IBM MFA enabled depends on the token type you are using. You must already have a valid PIN.

If the security administrator has enabled your account for IBM MFA, you no longer use your z/OS password to log in. Instead, how you log in with IBM FTP depends on the type of token you have. See “Types of token devices” on page 2 for the supported token types.

General guidelines

Observe the following guidelines:

- It is a best practice to wait until the token code changes before attempting to log in.
- You can use the token code only once.
- If you receive an authentication failure, wait until the token code changes before attempting to log in again.

Logging in with a fob-style hardware token

You can log in to IBM FTP with a valid PIN. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Open an IBM FTP connection and enter your user name.
2. Press Enter.
3. Get the 6- to 8-digit token code displayed by the SecurID token.
4. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the password field. For example, if your PIN is 4321 and your token code is 456789, enter 4321456789 in the password field.
5. Press Enter. If successful, IBM FTP displays PASS.

Logging in with a hardware token with a PINpad

You can log in to IBM FTP with a valid PIN. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Open an IBM FTP connection and enter your user name.
2. Press Enter.
3. Enter your PIN in the SecurID token and generate a passcode.
4. Enter the 6- to 8-digit passcode displayed by the SecurID token in the password field.
5. Press Enter. If successful, IBM FTP displays PASS.

Logging in with a SoftToken

You can log in to IBM FTP with a valid PIN. This use case requires a SoftToken application.

Procedure

Perform the following steps:

1. Open an IBM FTP connection and enter your user name.
2. Press Enter.
3. Enter your PIN in the SoftToken token and generate a passcode. Use the copy feature to copy the passcode.
4. Paste the 6- to 8-digit passcode displayed by the SoftToken token in the password field.
5. Press Enter. If successful, IBM FTP displays PASS.

Chapter 6. IBM OpenSSH

How you log in to IBM OpenSSH with IBM MFA enabled depends on the token type you are using. You must already have a valid pin.

If the security administrator has enabled your account for IBM MFA, you no longer use your z/OS password to log in. Instead, how you log in with IBM OpenSSH utilities depends on the type of token you have. See "Types of token devices" on page 2 for the supported token types.

General guidelines

Observe the following guidelines:

- It is a best practice to wait until the token code changes before attempting to log in.
- You can use the token code only once.
- If you receive an authentication failure, wait until the token code changes before attempting to log in again.

Logging in with a fob-style hardware token

You can log in to IBM OpenSSH with a valid PIN. This use case requires a fob-style hardware token.

Procedure

Perform the following steps:

1. Open an OpenSSH utility connection to the z/OS system. Consider the following examples:

   ```
   ssh user-name@your-host
   scp files.txt user-name@your-host:/home/user-name
   ```

   You are prompted for the password.
2. Get the 6- to 8-digit token code displayed by the SecurID token.
3. Enter your PIN **followed by** the 6- to 8-digit token code displayed by the SecurID token in the password field. For example, if your PIN is 4321 and your token code is 456789, enter 4321456789 in the password field.
4. Press Enter. If successful, the OpenSSH command succeeds.

Logging in with a hardware token with a PINpad

You can log in to IBM OpenSSH with a valid PIN. This use case requires a hardware token with a PINpad.

Procedure

Perform the following steps:

1. Open an OpenSSH utility connection to the z/OS system. Consider the following examples:

   ```
   ssh user-name@your-host
   ```

```
scp files.txt user-name@your-host:/home/user-name
```

You are prompted for the password.

2. Enter your PIN in the SecurID token and generate a passcode.
3. Enter the 6- to 8-digit passcode displayed by the SecurID token in the password field.
4. Press Enter. If successful, the OpenSSH command succeeds.

Logging in with a SoftToken

You can log in to IBM OpenSSH with a valid PIN. This use case requires a SoftToken application.

Procedure

Perform the following steps:

1. Open an OpenSSH utility connection to the z/OS system. Consider the following examples:

```
ssh user-name@your-host
scp files.txt user-name@your-host:/home/user-name
```

You are prompted for the password.

2. Enter your PIN in the SoftToken token and generate a passcode. Use the copy feature to copy the passcode.
3. Paste the 6- to 8-digit passcode displayed by the SoftToken token in the password field.
4. Press Enter. If successful, the OpenSSH command succeeds.

Chapter 7. Troubleshooting

If you are unable to successfully log in using IBM MFA, your next steps depend on which program you are using to log in.

Before you begin

Not all programs display the messages described in Chapter 8, “Multi-Factor Authentication messages,” on page 25. Therefore, the cause of a login failure might not be totally obvious.

For example, because the number of unsuccessful login attempts that trigger RSA SecurID "next token" mode can vary due to local security policy, it is possible that you are in the "next token" mode without being aware of it. (RSA SecurID "next token" mode is described in “Logging in with RSA SecurID "next token" mode” on page 24.)

As another example, if the RSA Authentication Manager is configured for system-generated PINs, the new PIN may not be displayed. Similarly, in the unlikely event that your PIN is invalid and you are not aware of it, the cause of the login failure might not be obvious to you if your application does not display the messages.

Note: If the application you are using stores and reuses password information, this method is incompatible with IBM MFA because a token can be used only once. For example, HTTP Basic authentication works this way. To resolve these types of issues, contact your system programming support.

Procedure

Perform the following steps:

1. If your program displays the messages, see Chapter 8, “Multi-Factor Authentication messages,” on page 25 for more information about how to resolve the issue.
2. If you have previously been able to log in with IBM MFA, but now receive an error, the most likely cause is you made a typing error.
3. Wait until the token code (or passcode) changes before attempting to log in, then take your time. Reusing a token code or passcode is a common mistake.
4. Make sure that your PIN is correct.
5. Make sure you are using token codes and passcodes correctly. There is a difference between a token code and a passcode, as described in “Multi-Factor Authentication Concepts” on page 1. If you use one instead of the other, your login will fail.
6. Do not keep trying. If you are unable to log in after several attempts, ask your security administrator for guidance.

Logging in with RSA SecurID "next token" mode

Next token code mode requires you to enter two successive codes to log in. After *n* number of failed login attempts followed by a successful login, where *n* is determined by your local security policy, you may be prompted to also enter the next displayed token code for extra security. If you do not enter the next displayed token code or passcode, the login fails.

Before you begin

Note: Not all login applications indicate when the RSA SecurID "next token" mode is in effect. Because the number of unsuccessful login attempts that trigger "next token" mode can vary due to local security policy, it may not be obvious that the next token is also required. Ask your security administrator for guidance if you are unable to log in after several attempts.

Procedure

Perform the following steps:

1. If prompted to enter the next token code, wait for the token code you just used to change. If you are using a hardware token with a PINpad or a SoftToken, wait for the passcode you just used to change.
2. Get the 6- to 8-digit token code (or passcode) displayed by the SecurID token.
3. Enter the token code (or passcode) where prompted.
4. Press Enter.

Logging in with Password Fallback

IBM MFA password fallback allows you to log in using your z/OS password if the RSA Authentication Manager or IBM MFA server are down.

About this task

If your security administrator has configured your account with the password fallback parameter, password fallback provides a mechanism to log in with your z/OS password instead of your SecurID credentials. The password fallback mechanism is provided as a fail safe authentication method, and is not something you typically use.

If after several attempts you are unable to log in using your SecurID credentials, and you are certain that you are using your approved login process, PIN, and token, ask your security administrator if there is a system problem and whether you should use your z/OS password.

Procedure

Perform the following steps:

1. Log in with your user name.
2. Enter your z/OS password, not your SecurID PIN or token credentials.
3. If your z/OS password has expired, you are prompted to enter a new password.

Chapter 8. Multi-Factor Authentication messages

This topic explains the messages that IBM MFA issues to the user.

Messages with AZF message numbers

This section describes messages issued with IBM MFA AZF message numbers.

A letter following the message number indicates the severity of the message:

I Information.

W Warning.

E Error.

AZF1001I ENTER NEXT TOKENCODE

Explanation: After *n* number of failed login attempts followed by a successful login, where *n* is determined by your local security policy, you may be prompted to also enter the next displayed token code for extra security. By successfully entering the next token code, the system is able to verify that you have possession of the token assigned to you.

Next token code mode requires you to enter the **next** token code (or passcode) that is displayed. That is, you must enter two successive codes to log in. If you do not enter the next displayed token code or passcode, the login fails.

User response:

1. Wait for the token code you just used to change. If you are using a hardware token with a PINpad or a SoftToken, wait for the passcode you just used to change.
2. Get the 6- to 8-digit token code (or passcode) displayed by the SecurID token.
3. Enter the token code (or passcode) where prompted.
4. Press Enter.

AZF1002I CONFIRM SYSGEN PIN: *PIN*

Explanation: The RSA Authentication Manager generated a system-generated PIN.

User response: Confirm the system-generated PIN.

AZF1003I USER OR SYSGEN PIN: *PIN*

Explanation: The RSA Authentication Manager is configured to allow you to use either a system-generated PIN or a PIN of your choice. The message is displayed with a system-generated PIN appended, but you can choose something else.

User response: Accept the system-generated PIN or choose your own.

AZF1004I NEW PIN ACCEPTED

Explanation: The new PIN you entered was accepted.

User response: Because you changed the PIN, you must log in again. Wait for the token code (or passcode) displayed by the SecurID token to change.

AZF1005E NEW PIN REJECTED

Explanation: The new PIN you entered was rejected.

User response: Follow the locally established rules for creating a valid PIN, including the number of characters, the reuse policy, and so forth. The PIN typically must be between four and eight characters.

AZF1006E ACCESS DENIED

Explanation: Your PIN, token code, or both were rejected.

User response:

- If you are unable to log in after several attempts, ask your security administrator for guidance. If you continue to try to log in you will probably lock your account.
- It is a best practice to wait until the token code or passcode changes before attempting to log in. That way, you do not have to rush to enter it before it expires.
- You can use the token code or passcode only once.
- If you receive an authentication failure, wait until the token code or passcode changes before attempting to log in again.
- Remember that there is a difference between a token code and a passcode, as described in “Multi-Factor

Authentication Concepts" on page 1. If you use one instead of the other, your login will fail.

AZF1007I ENTER NEW PIN - MIN 4 MAX 8

Explanation: You must enter a new PIN before you can log in.

User response: Follow the locally established rules for creating a valid PIN, including the number of characters, the reuse policy, and so forth. The PIN typically must be between four and eight characters.

After you enter and confirm the new PIN, you must log in again.

AZF1008E NEW PIN CANCELLED

Explanation: You must enter a new PIN before you can log in.

User response: Follow the locally established rules for creating a valid PIN, including the number of characters, the reuse policy, and so forth. The PIN typically must be between four and eight characters.

After you enter and confirm the new PIN, you must log in again.

Appendix. Accessibility

Accessible publications for this product are offered through IBM Knowledge Center (http://www.ibm.com/support/knowledgecenter/SSLTBW/welcome).

If you experience difficulty with the accessibility of any z/OS information, send a detailed message to the "Contact us" web page for z/OS (http://www.ibm.com/systems/z/os/zos/webqs.html) or use the following mailing address.

IBM Corporation
Attention: MHVRCFS Reader Comments
Department H6MA, Building 707
2455 South Road
Poughkeepsie, NY 12601-5400
United States

Accessibility features

Accessibility features help users who have physical disabilities such as restricted mobility or limited vision use software products successfully. The accessibility features in z/OS can help users do the following tasks:

- Run assistive technology such as screen readers and screen magnifier software.
- Operate specific or equivalent features by using the keyboard.
- Customize display attributes such as color, contrast, and font size.

Consult assistive technologies

Assistive technology products such as screen readers function with the user interfaces found in z/OS. Consult the product information for the specific assistive technology product that is used to access z/OS interfaces.

Keyboard navigation of the user interface

You can access z/OS user interfaces with TSO/E or ISPF. The following information describes how to use TSO/E and ISPF, including the use of keyboard shortcuts and function keys (PF keys). Each guide includes the default settings for the PF keys.

- *z/OS TSO/E Primer*
- *z/OS TSO/E User's Guide*
- *z/OS V2R2 ISPF User's Guide Vol I*

Dotted decimal syntax diagrams

Syntax diagrams are provided in dotted decimal format for users who access IBM Knowledge Center with a screen reader. In dotted decimal format, each syntax element is written on a separate line. If two or more syntax elements are always present together (or always absent together), they can appear on the same line because they are considered a single compound syntax element.

Each line starts with a dotted decimal number; for example, 3 or 3.1 or 3.1.1. To hear these numbers correctly, make sure that the screen reader is set to read out

punctuation. All the syntax elements that have the same dotted decimal number (for example, all the syntax elements that have the number 3.1) are mutually exclusive alternatives. If you hear the lines 3.1 USERID and 3.1 SYSTEMID, your syntax can include either USERID or SYSTEMID, but not both.

The dotted decimal numbering level denotes the level of nesting. For example, if a syntax element with dotted decimal number 3 is followed by a series of syntax elements with dotted decimal number 3.1, all the syntax elements numbered 3.1 are subordinate to the syntax element numbered 3.

Certain words and symbols are used next to the dotted decimal numbers to add information about the syntax elements. Occasionally, these words and symbols might occur at the beginning of the element itself. For ease of identification, if the word or symbol is a part of the syntax element, it is preceded by the backslash (\) character. The * symbol is placed next to a dotted decimal number to indicate that the syntax element repeats. For example, syntax element *FILE with dotted decimal number 3 is given the format 3 * FILE. Format 3* FILE indicates that syntax element FILE repeats. Format 3* * FILE indicates that syntax element * FILE repeats.

Characters such as commas, which are used to separate a string of syntax elements, are shown in the syntax just before the items they separate. These characters can appear on the same line as each item, or on a separate line with the same dotted decimal number as the relevant items. The line can also show another symbol to provide information about the syntax elements. For example, the lines 5.1*, 5.1 LASTRUN, and 5.1 DELETE mean that if you use more than one of the LASTRUN and DELETE syntax elements, the elements must be separated by a comma. If no separator is given, assume that you use a blank to separate each syntax element.

If a syntax element is preceded by the % symbol, it indicates a reference that is defined elsewhere. The string that follows the % symbol is the name of a syntax fragment rather than a literal. For example, the line 2.1 %OP1 means that you must refer to separate syntax fragment OP1.

The following symbols are used next to the dotted decimal numbers.

? indicates an optional syntax element
The question mark (?) symbol indicates an optional syntax element. A dotted decimal number followed by the question mark symbol (?) indicates that all the syntax elements with a corresponding dotted decimal number, and any subordinate syntax elements, are optional. If there is only one syntax element with a dotted decimal number, the ? symbol is displayed on the same line as the syntax element, (for example 5? NOTIFY). If there is more than one syntax element with a dotted decimal number, the ? symbol is displayed on a line by itself, followed by the syntax elements that are optional. For example, if you hear the lines 5 ?, 5 NOTIFY, and 5 UPDATE, you know that the syntax elements NOTIFY and UPDATE are optional. That is, you can choose one or none of them. The ? symbol is equivalent to a bypass line in a railroad diagram.

! indicates a default syntax element
The exclamation mark (!) symbol indicates a default syntax element. A dotted decimal number followed by the ! symbol and a syntax element indicate that the syntax element is the default option for all syntax elements that share the same dotted decimal number. Only one of the syntax elements that share the dotted decimal number can specify the ! symbol. For example, if you hear the lines 2? FILE, 2.1! (KEEP), and 2.1 (DELETE), you know that (KEEP) is the

default option for the FILE keyword. In the example, if you include the FILE keyword, but do not specify an option, the default option KEEP is applied. A default option also applies to the next higher dotted decimal number. In this example, if the FILE keyword is omitted, the default FILE(KEEP) is used. However, if you hear the lines 2? FILE, 2.1, 2.1.1! (KEEP), and 2.1.1 (DELETE), the default option KEEP applies only to the next higher dotted decimal number, 2.1 (which does not have an associated keyword), and does not apply to 2? FILE. Nothing is used if the keyword FILE is omitted.

*** indicates an optional syntax element that is repeatable**

The asterisk or glyph (*) symbol indicates a syntax element that can be repeated zero or more times. A dotted decimal number followed by the * symbol indicates that this syntax element can be used zero or more times; that is, it is optional and can be repeated. For example, if you hear the line 5.1* data area, you know that you can include one data area, more than one data area, or no data area. If you hear the lines 3* , 3 HOST, 3 STATE, you know that you can include HOST, STATE, both together, or nothing.

Notes:

1. If a dotted decimal number has an asterisk (*) next to it and there is only one item with that dotted decimal number, you can repeat that same item more than once.
2. If a dotted decimal number has an asterisk next to it and several items have that dotted decimal number, you can use more than one item from the list, but you cannot use the items more than once each. In the previous example, you can write HOST STATE, but you cannot write HOST HOST.
3. The * symbol is equivalent to a loopback line in a railroad syntax diagram.

+ indicates a syntax element that must be included

The plus (+) symbol indicates a syntax element that must be included at least once. A dotted decimal number followed by the + symbol indicates that the syntax element must be included one or more times. That is, it must be included at least once and can be repeated. For example, if you hear the line 6.1+ data area, you must include at least one data area. If you hear the lines 2+, 2 HOST, and 2 STATE, you know that you must include HOST, STATE, or both. Similar to the * symbol, the + symbol can repeat a particular item if it is the only item with that dotted decimal number. The + symbol, like the * symbol, is equivalent to a loopback line in a railroad syntax diagram.

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