4/5/2021

Hands On Exercise

Chapter 8

Implementing Active Directory Certificate Services

(Part1)

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IT 416 - SPRING 2021 - OLD DOMINION UNIVERSITY

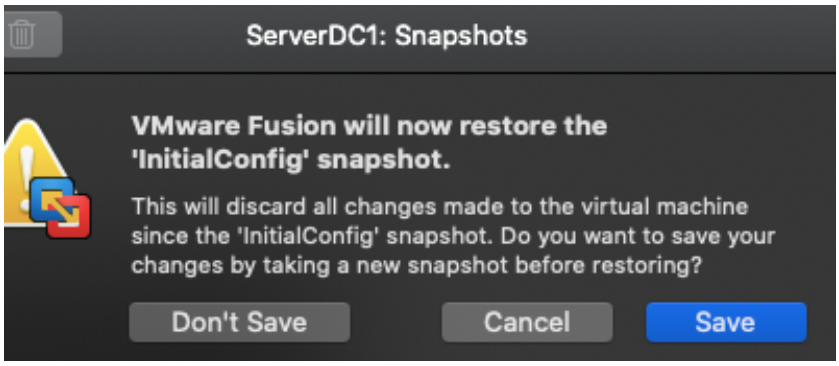
Table 8-1 Activity requirements

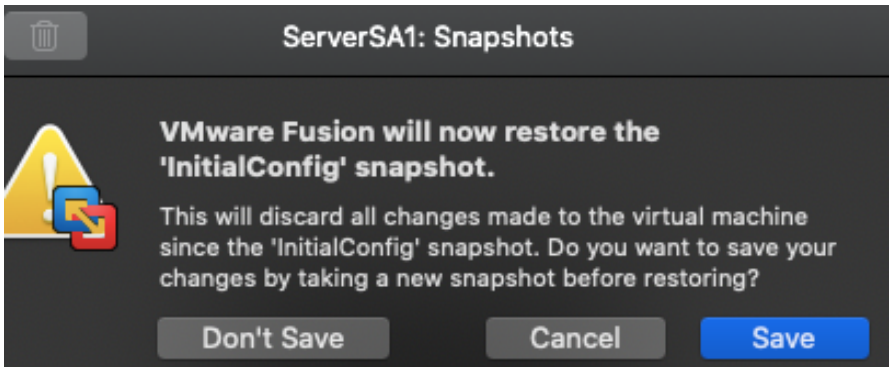
Activity	Requirements	Notes
Activity 8-1: Resetting Your Virtual Environment	ServerDC1, ServerDM1, ServerDM2, ServerSA1	
Activity 8-2: Installing the AD CS Role	ServerDC1, ServerDM1	
Activity 8-3: Creating an EFS Certificate Template	ServerDC1, ServerDM1	
Activity 8-4: Configuring EFS Certificate Autoenrollment	ServerDC1, ServerDM1	
Activity 8-5: Testing EFS Certificate Autoenrollment	ServerDC1, ServerDM1	
Activity 8-6: Installing the Web Enrollment Role Service	ServerDC1, ServerDM1	
Activity 8-7: Configuring an OCSP Response Signing Certificate Template	ServerDC1, ServerDM1	
Activity 8-8: Requesting the OCSP Response Signing Certificate	ServerDC1, ServerDM1	
Activity 8-9: Creating a Revocation Configuration for the OR	ServerDC1, ServerDM1	
Activity 8-10: Backing Up the CA Server and Archiving a Key	ServerDC1, ServerDM1	
Activity 8-11: Recovering a Lost Key	ServerDC1, ServerDM1	

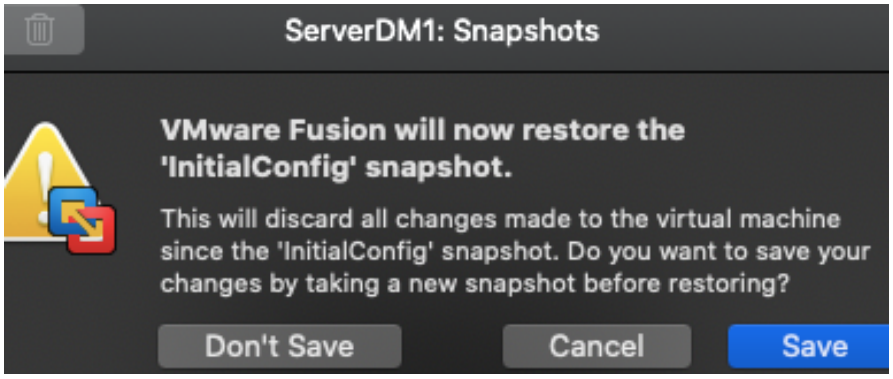
Activity 8-1: Resetting Your Virtual Environment

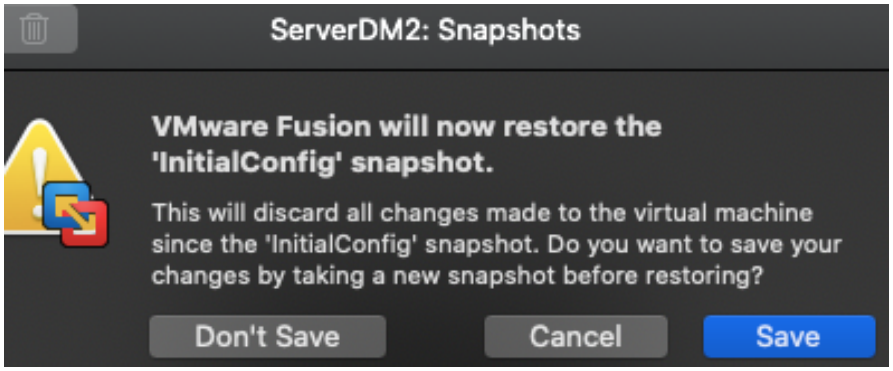
Time Required: 5 minutes
Objective: Reset your virtual environment by applying the InitialConfig checkpoint or snapshot.
Required Tools and Equipment: ServerDC1, ServerDM1, ServerDM2, ServerSA1
Description: Apply the InitialConfig checkpoint or snapshot to ServerDC1, ServerDM1, ServerDM2, and ServerSA1.

1. Be sure all servers are shut down. In your virtualization program, apply the InitialConfig checkpoint or snapshot to ServerDC1, ServerDM1, ServerDM2, and ServerSA1.
2. When the snapshot or checkpoint has finished being applied, continue to the next activity.









Activity 8-2: Installing the AD CS Role

Time Required: 20 minutes
Objective: Install the AD CS role.
Required Tools and Equipment: ServerDC1, ServerDM1
Description: You want to set up a PKI on your network to augment security, so in this activity, you install AD CS on ServerDM1, a member server, and configure it as an enterprise CA.

1. Start ServerDC1, if necessary. Start ServerDM1, and sign in to the domain as **Administrator**.
2. In Server Manager, click **Manage, Add Roles and Features** to start the Add Roles and Features Wizard. Click **Next** until you get to the Server Roles window.
3. In the Server Roles window, click the **Active Directory Certificate Services** check box. Click **Add Features**, and then click **Next**. In the Features window, click **Next** again.
4. In the AD CS window, read the description and the paragraph under "Things to note." In particular, notice that you can't change the computer name, join a different domain, or promote the server to a domain controller after the role is installed. Click **Next**.
5. In the Role Services window, the Certification Authority option is selected by default. Click **Certification Authority Web Enrollment**, and then click **Add Features**. Click **Online Responder**, click **Add Features**, and then click **Next**. In the Web Server Role (IIS) window, click **Next**. In the Role Services window, click **Next**. In the Confirmation window, click **Install**. Click **Close** when the installation is finished.
6. In Server Manager, click the notifications flag, and then click the **Configure Active Directory Certificate Services on the destination server** link to start the AD CS Configuration Wizard. In the Credentials window, accept the default credentials **MCSA2016\Administrator** and click **Next**.
7. In the Role Services window, click **Certification Authority**. (You configure the other role services later.) Click **Next**.
8. In the Setup Type window, accept the default **Enterprise CA**, and then click **Next**.

9. In the CA Type window, accept the default **Root CA**, and then click **Next**.
10. In the Private Key window, accept the default option **Create a new private** key (see Figure 8-3). If this CA were replacing a failed CA or you had an existing certificate you wanted to use, you would click "Use existing private key." Click **Next**.
11. In the Cryptography window, accept the default selections (described after this activity), and then click **Next**.
12. The CA Name window requests a name for the CA (see Figure 8-4). By default, the name is generated automatically to include the domain name and server name followed by CA. You can also enter the distinguished name suffix, but for most situations, the default is okay. Click **Next**.
13. In the Validity Period window, you can set the validity period of the certificate issued to this CA. The validity period should be specified in the certificate practice statement. The period you choose depends on how this CA is used and the types of certificates it will issue. If the certificate expires, the CA and any certificates it has issued are no longer valid. The validity period of the CA's certificate should be longer than that of the certificates it will issue. Certificates can be renewed as needed. Accept the default **5 Years**, and then click **Next**.
14. In the Certificate Database window, you can choose where certificates and the certificate log should be stored. If the CA will be used heavily, these two databases should be stored on separate drives and shouldn't be placed on the same drive as the Windows folder. For testing purposes, you can use the default location C:\Windows\system32\CertLog for both databases. Click **Next**.
15. Click **Configure** in the Confirmation window. When the configuration is finished, click **Close**. If prompted to configure additional role services, click **No**.
16. Open a command prompt window. Type **certutil-viewstore** and press **Enter**. The View Certificate Store dialog box opens, listing all certificates currently published in Active Directory. Click **More choices** to see all the certificates. Scroll down until you see MCSA2016-SERVERDM1-CA (see Figure 8-5). Click the **MCSA2016-ServerDM1-CA** certificate, and then click the **Click here to view certificate properties** link.

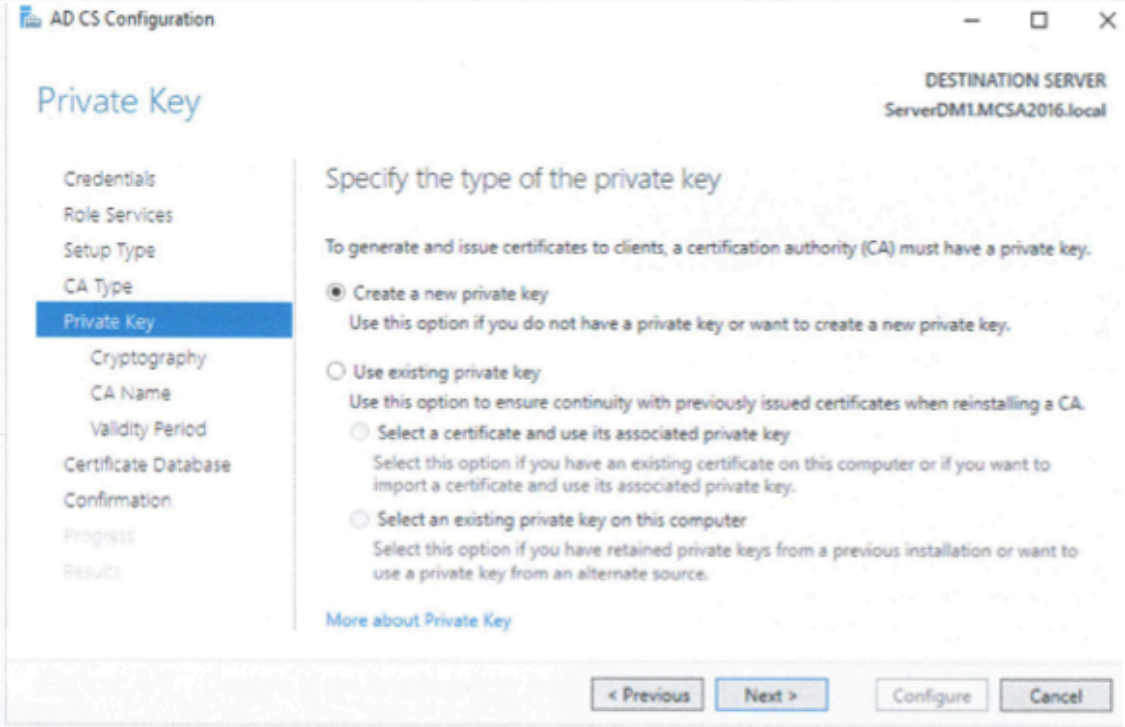


Figure 8-3 Specifying the private key

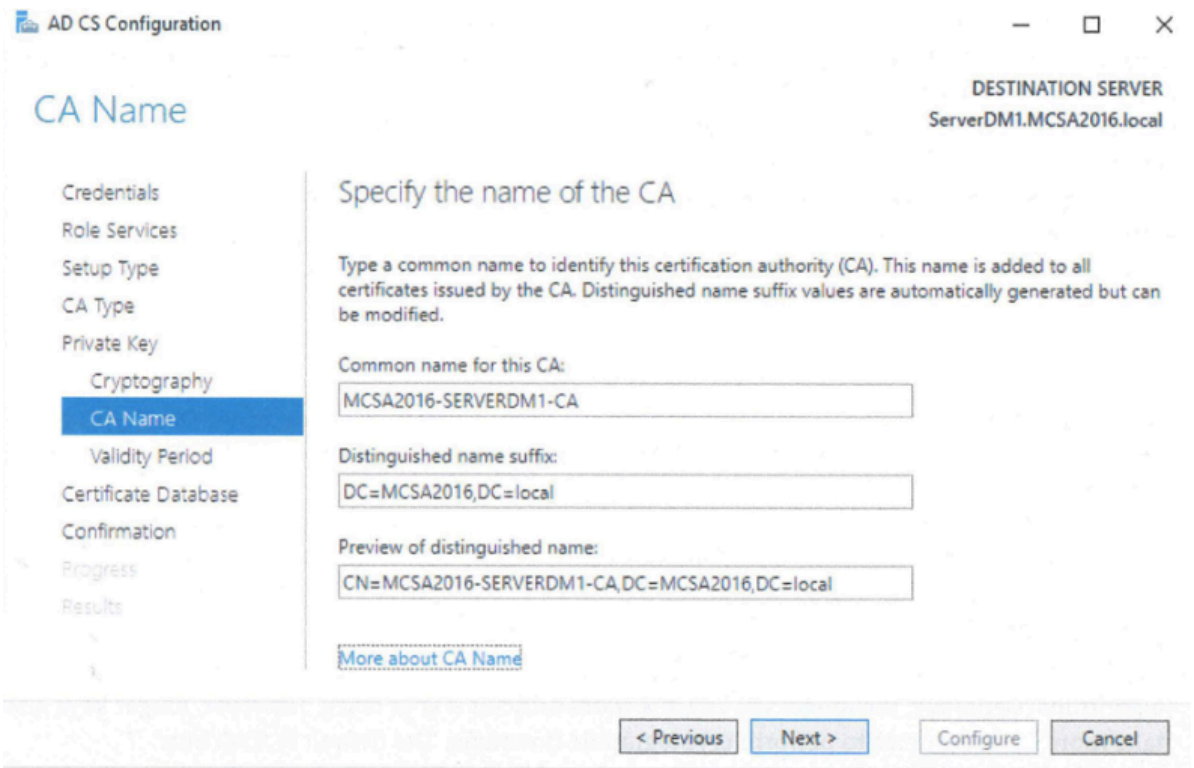


Figure 8-4 Specifying the CA name

Figure 8-5 Viewing the certificate store

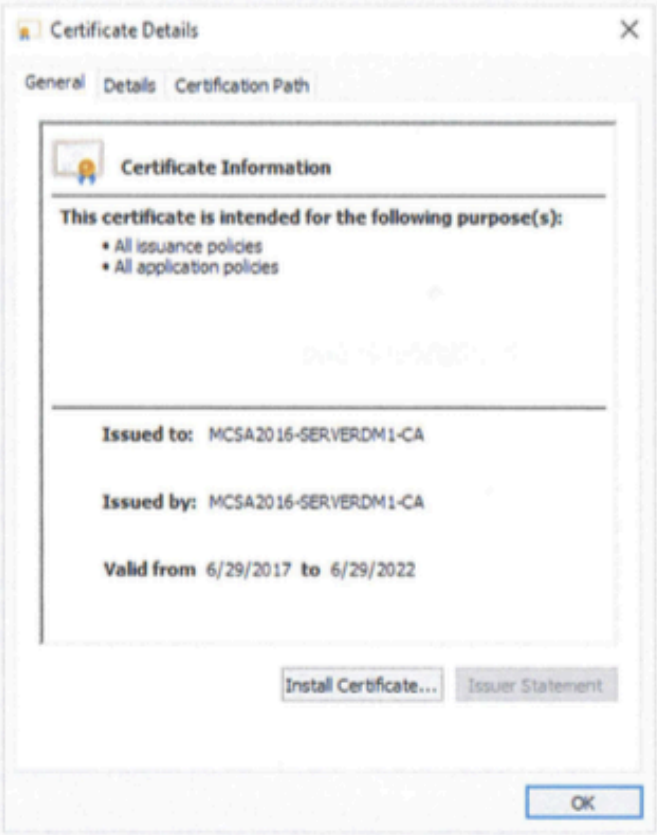


Figure 8-6 The General tab for the CA certificate

17. Figure 8-6 shows the certificate for the new CA. Notice that the Issuer Statement button is grayed out. If you publish a CPS, this button becomes active and links to your CPS. Click the **Details** tab to view more information about the certificate. Click the **Certification Path** tab, which shows the path through the CA hierarchy to the root CA where the certificate originates. In this case, only the current server is listed because you don't have a multilevel CA hierarchy. Click **OK**.
18. Click **OK** in the View Certificate Store dialog box to close it. Close the command prompt window.
19. Continue to the next activity.

To install the following roles, role services, or features on selected server, click Install.

☐ Restart the destination server automatically if required

Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.

- Active Directory Certificate Services
  - Certification Authority
  - Online Responder
  - Certification Authority Web Enrollment
- Remote Server Administration Tools
  - Role Administration Tools
    - Active Directory Certificate Services Tools
      - Certification Authority Management Tools
      - Online Responder Tools
- Web Server (IIS)

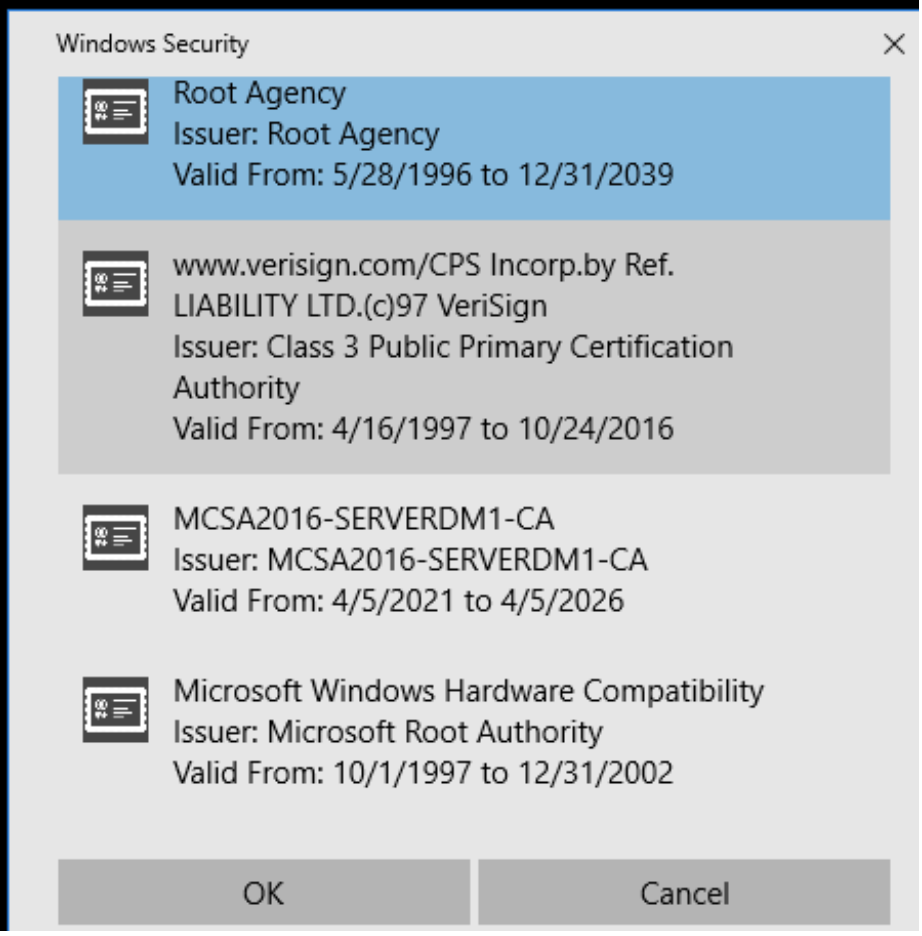
To configure the following roles, role services, or features, click Configure.

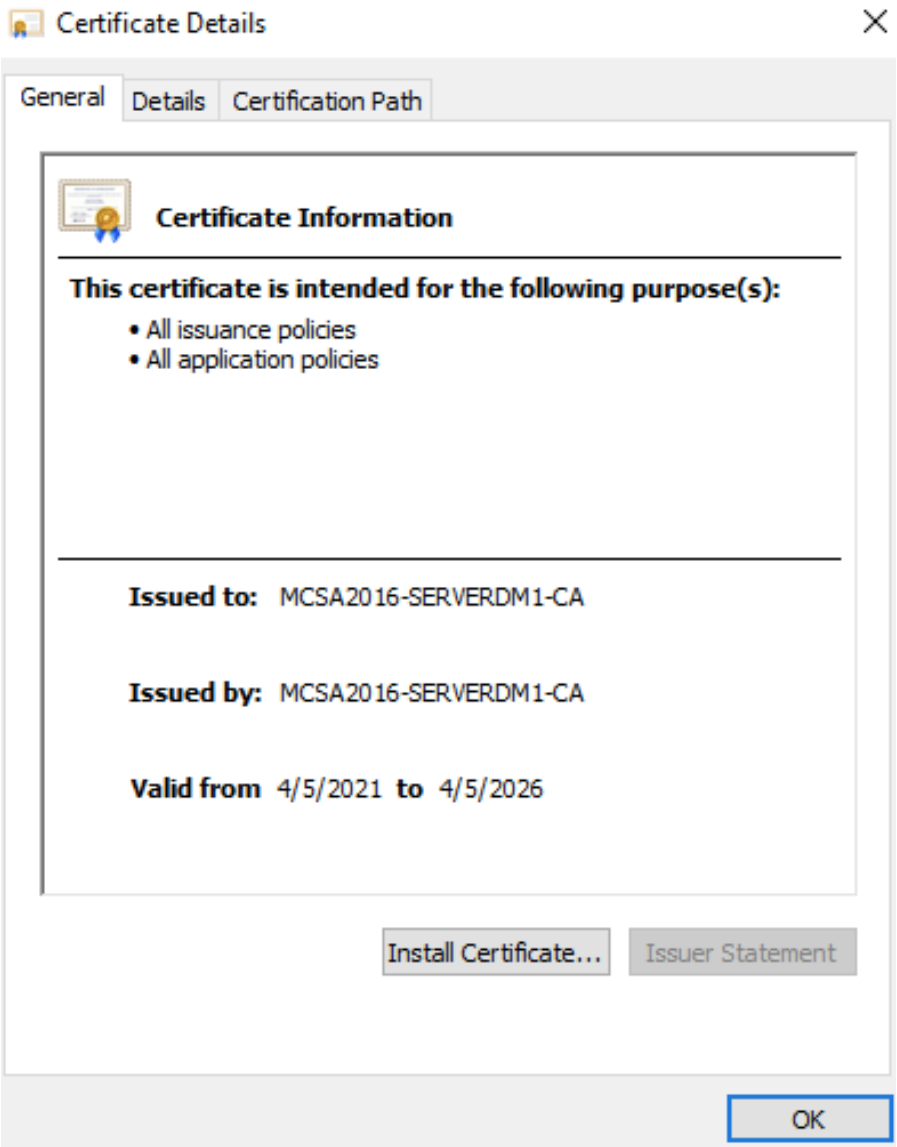
Active Directory Certificate Services

Certification Authority

CA Type:	Enterprise Root
Cryptographic provider:	RSA#Microsoft Software Key Storage Provider
Hash Algorithm:	SHA256
Key Length:	2048
Allow Administrator Interaction:	Disabled
Certificate Validity Period:	4/5/2026 5:27:00 PM
Distinguished Name:	CN=MCSA2016-SERVERDM1-CA,DC=MCSA2016,DC=local
Certificate Database Location:	C:\Windows\system32\CertLog
Certificate Database Log Location:	C:\Windows\system32\CertLog

```
C:\Users\administrator.MCSA2016>certutil -viewstore
CA "Intermediate Certification Authorities"
```





Activity 8-3: Creating an EFS Certificate Template

Time Required: 10 minutes
Objective: Create an EFS certificate template.
Required Tools and Equipment: ServerDC1, ServerDM1
Description: You want to issue certificates to employees so that they can use EFS throughout the domain. In this activity, you duplicate the version 1 Basic EFS template and create a version 3 EFS template for use on Windows 10 and Windows Server 2016 clients.

1. On ServerDM1 from Server Manager, click **Tools, Certification Authority**. Click to expand the server node. Right-click **Certificate Templates** and click **Manage** to open the Certificate Templates console.
2. Right-click **Basic EFS** in the right pane and click **Properties**. Notice that all options are grayed out because you must duplicate the version 1 template to make changes. Click **Cancel**.
3. Right-click **Basic EFS** and click **Duplicate Template**. In the Properties of New Template dialog box, you can select the minimum version of Windows Server with which you want the certificate to be compatible. In the Certification Authority list box, click **Windows Server 2016**. Click **OK** in the Resulting changes dialog box. In the Certificate recipient list box, click **Windows 10/Windows Server 2016**. Click **OK** in the Resulting changes dialog box.
4. Click the **General** tab, and type **EFS-2016** in the Template display name text box (see Figure 8-17). Notice that the certificate is set to publish in Active Directory automatically.

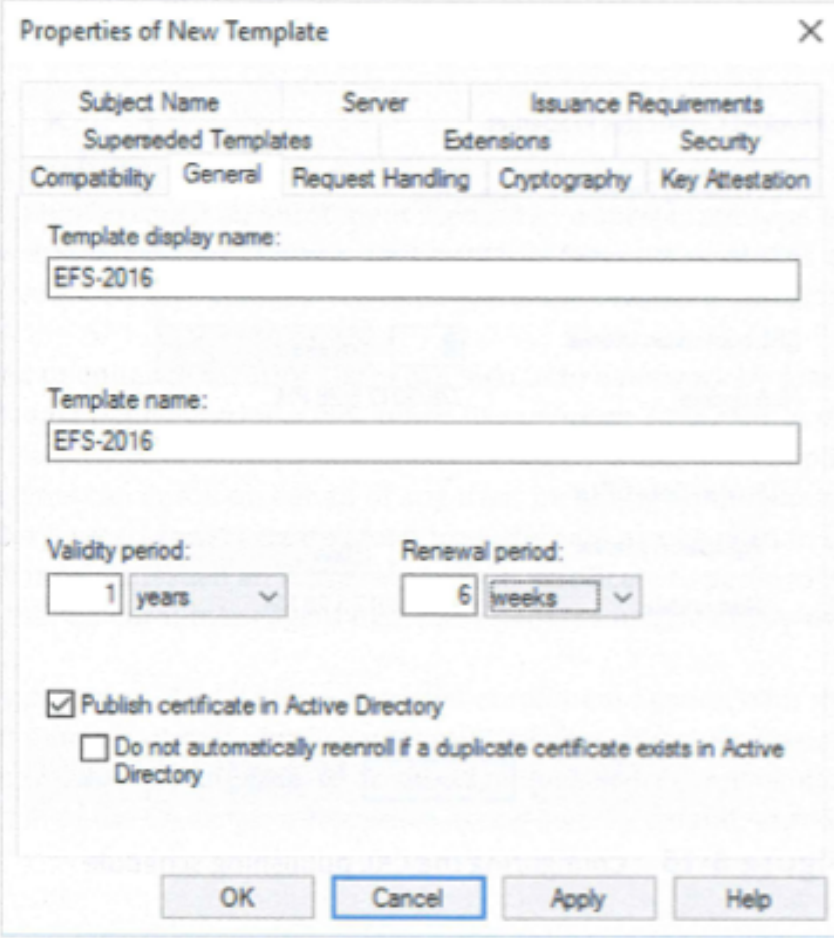
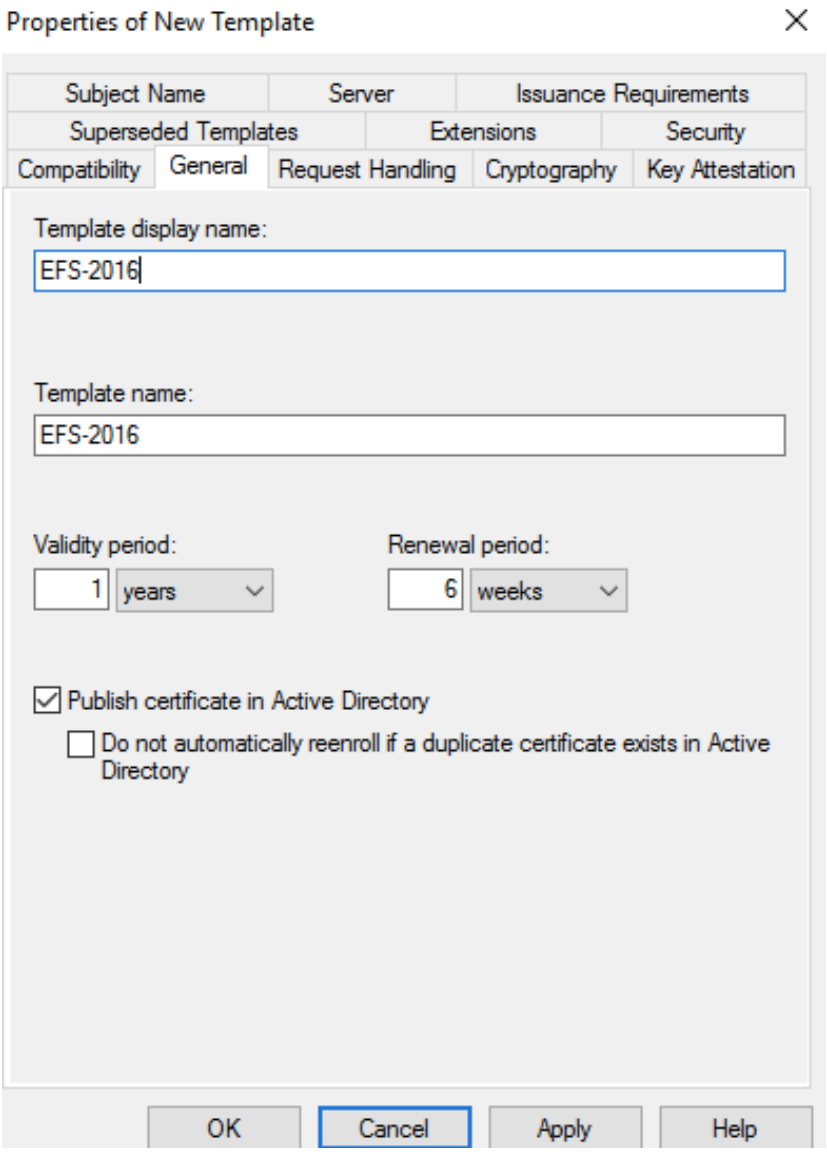
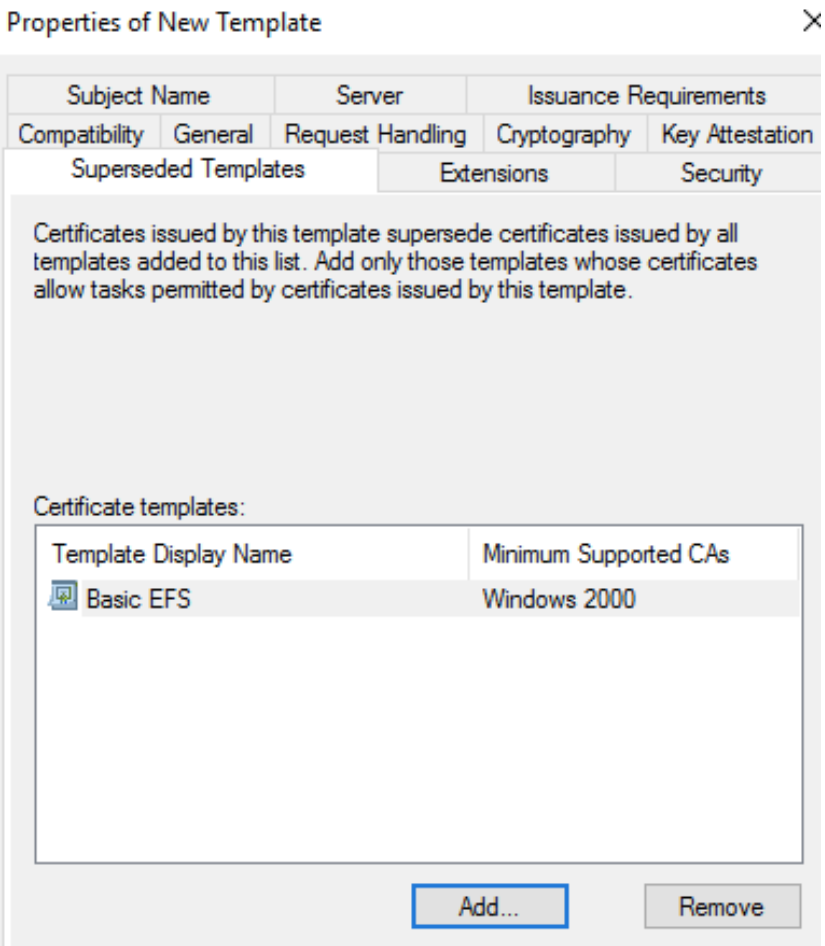


Figure 8-17 Changing the display name on a new template

5. Click the **Request Handling** tab. Click the **Purpose** list arrow to view the options for certificates created with this template. Leave **Encryption** as the selected purpose. Review the other options in this tab.
6. Click the **Superseded Templates** tab. Click **Add**, click **Basic EFS** in the Certificate templates list box, and then click **OK.** Now when a request for an EFS certificate is made, only the new EFS-2016 certificate is used.
7. Browse through the options in other tabs to see the configuration settings available for this template, and click **OK** when you're finished. Close the Certificate Templates console and Certification Authority console.
8. Continue to the next activity.





Activity 8-4: Configuring EFS Certificate Autoenrollment

Time Required: 20 minutes
Objective: Configure autoenrollment for users to use EFS.
Required Tools and Equipment: ServerDC1, ServerDM1
Description: In this activity, you configure autoenrollment by configuring group policies and certificate template properties.

1. On ServerDC1, open the Group Policy Management console. Click to select the **Group Policy Objects** folder.
2. Right-click the **Group Policy Objects** folder and click **New**. Type **CertAutoEnroll** in the Name text box, and then click **OK**.
3. Right-click **CertAutoEnroll** and click **Edit**. In the Group Policy Management Editor, click to expand **User Configuration, Policies, Windows Settings, Security Settings**, and **Public Key Policies**. Click to select **Public Key Policies**. In the right pane, double-click **Certificate Services Client - Auto-Enrollment**. (*Note*: Make sure that you configure the policy in the User Configuration section of the GPO, not the Computer Configuration section.)
4. In the Enrollment Policy Configuration tab, click the **Configuration Model** list arrow and click **Enabled**. Click the **Renew expired certificates, update pending certificates, and remove revoked certificates** check box and the **Update certificates that use certificate templates** check box. Click **OK**. Close the Group Policy Management Editor.
5. In the Group Policy Management console, right-click the domain node and click **Link an Existing GPO.** In the Select GPO list box, click **CertAutoEnroll**, and then click **OK**. Close the Group Policy Management console.
6. On ServerDM1, in Server Manager click **Tools, Certification Authority**. Click to expand the server node. Right-click **Certificate Templates** and click **Manage** to open the Certificate Templates console.
7. Double-click **EFS-2016** to open its Properties dialog box, and then click the **Security** tab. Click **Domain Users**, click the **Autoenroll** permission in the Allow column, and then click **OK**. Close the Certificate Templates console.
8. In the left pane of the Certification Authority console, right-click the CA server node **(MCSA2016-ServerDM1-CA)** and click **Properties**.
9. Click the **Policy Module** tab, and then click **Properties**. Verify that the **Follow the settings in the certificate template, if applicable. Otherwise, automatically issue the certificate** option button is selected, and then click **Cancel** twice.
10. In the Certification Authority console, click the **Certificate Templates** folder. The listed templates represent the certificates that this CA can issue. Right-click the **Certificate Templates** folder, point to **New**, and click **Certificate Template to Issue**.
11. In the Enable Certificate Templates dialog box, click **EFS-2016**, and then click **OK**. Your CA is now ready to issue EFS certificates through autoenrollment. (*Note*: If you do not see the EFS-2016 template right away, close the Certification Authority console, wait a few minutes, and try Steps 8–11 again.)
12. Sign out of ServerDM1 and continue to the next activity.

Certificate Services Client - Auto-Enrollment Properties

Enrollment Policy Configuration

Enroll user and computer certificates automatically

Configuration Model: Enabled

☑ Renew expired certificates, update pending certificates, and remove revoked certificates

☑ Update certificates that use certificate templates

Log expiry events and show expiry notifications when the percentage of remaining certificate lifetime is

10 %

Additional stores. Use "," to separate multiple stores. For example: "Store1, Store2, Store3"

☐ Display user notifications for expiring certificates in user and machine MY store

- Group Policy Management
  - Forest: MCSA2016.local
    - Domains
      - MCSA2016.local
        - CertAutoEnroll
        - Default Domain Policy
        - Domain Controllers
        - Group Policy Objects
          - CertAutoEnroll
          - Default Domain Cor
          - Default Domain Pol

CertAutoEnroll

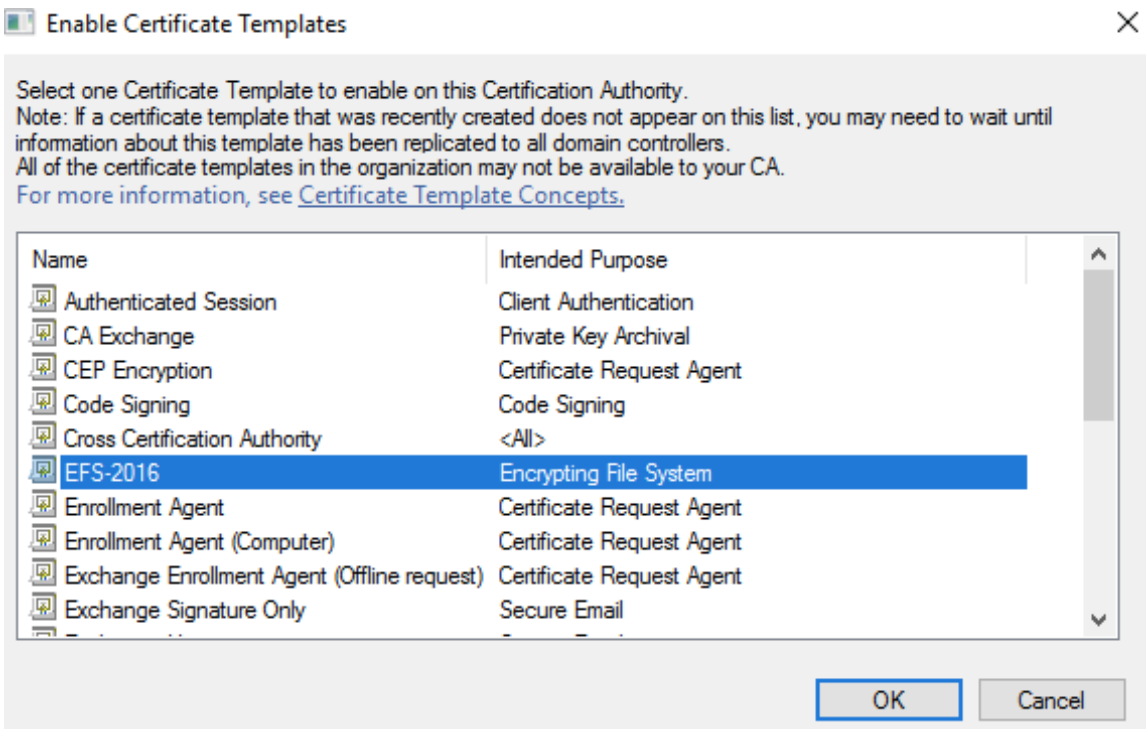
Scope | Details | Settings | Delegation | Status

Links

Display links in this location: MCSA2016.local

The following sites, domains, and OUs are linked to this GPO:

Location	Enforced	Link Enabled	Path
MCSA2016.local	No	Yes	MCSA2016.loc



Activity 8-5: Testing EFS certificate Autoenrollment

Time Required: 20 minutes
Objective: Test EFS certificate autoenrollment.
Required Tools and Equipment: ServerDC1, ServerDM1
Description: You have configured a certificate template to autoenroll members of the Domain Users group with an EFS certificate. You test the configuration by signing in to the domain from ServerDM1 using a test user account and verifying that a new certificate has been issued.

1. On ServerDM1 sign in to the domain as **domuser1** with password **Password01**.
2. When you sign in, autoenrollment of user certificates takes place. To verify that the EFS-2016 certificate has been issued, you can view your certificates. Right-click **Start**, click **Run**, type **MMC** in the Open text box, and press **Enter**.
3. Click **File, Add/Remove Snap-in** from the MMC menu. In the Available snap-ins list box, click **Certificates**, and then click **Add**. Click **OK**.
4. In the left pane, click to expand **Certificates - Current User** and **Personal**, and then click **Certificates**. The issued EFS-2016 certificate is displayed in the right pane (see Figure 8-18). Note that the Intended Purposes column shows Encrypting File System. (*Note*: If you don't see the certificate, you might need to run `gpupdate` from a command prompt on ServerDM1, sign out, sign in again as domuser1, and then repeat this step.)

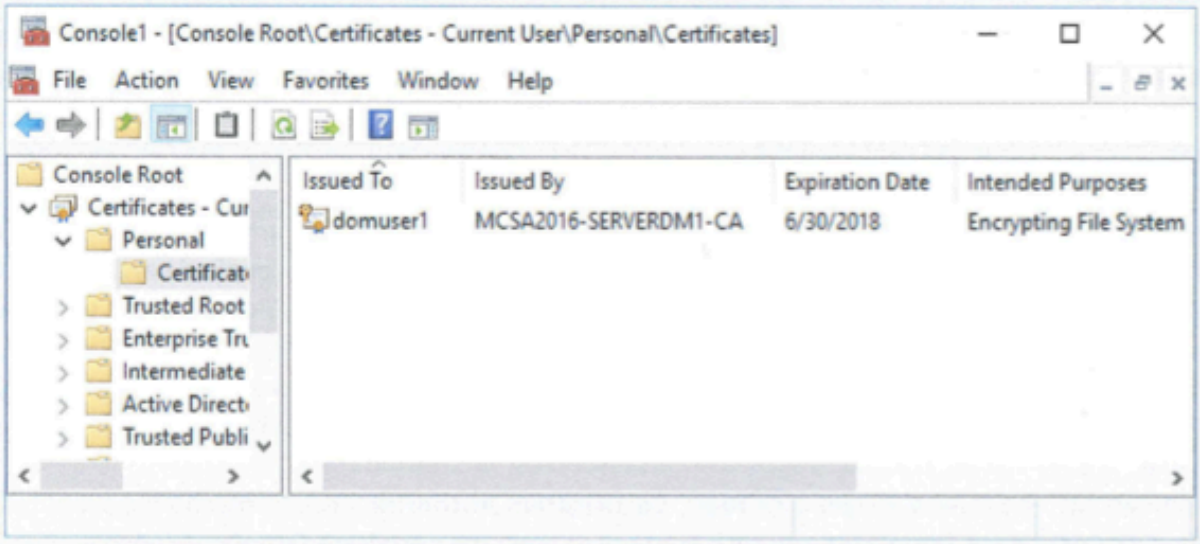


Figure 8-18 Viewing issued certificates

5. In the left pane, click to expand **Trusted Root Certification Authorities**, and click the **Certificates** folder to view certificates of CAs your computer trusts. MCSA2016-ServerDM1-CA should be listed near the top. Close the MMC. When prompted to save the console, click **No**. Sign out of ServerDM1 and sign in again as the domain administrator (remember to sign in using mcsa2016\administrator as the user name).
6. On ServerDM1, open the Certification Authority console and click the **Issued Certificates** folder. The EFS-2016 certificate for domuser1 and administrator are listed (the administrator account was issued a certificate when you signed in as administrator in the previous step). You will also see one or more certificates issued to ServerDC1.
7. Close the Certification Authority console. Continue to the next activity.

Console1 - [Console Root\Certificates - Current User\Personal\Certificates]

File Action View Favorites Window Help

Console Root
- Certificates - Current User
  - Personal
    - Certificates
  - Trusted Root Certification Auth
  - Enterprise Trust
  - Intermediate Certification Auth

Issued To	Issued By	Expiration Date	Intended Purposes
domuser1	MCSA2016-SERVERDM1-CA	4/6/2022	Encrypting File Syst...

Console1 - [Console Root\Certificates - Current User\Trusted Root Certification Authorities\Certificates]

File Action View Favorites Window Help

Console Root
- Certificates - Current User
  - Personal
    - Certificates
  - Trusted Root Certificatior
    - Certificates
  - Enterprise Trust
  - Intermediate Certificatior
  - Active Directory User Obj
  - Trusted Publishers
  - Untrusted Certificates
  - Third-Party Root Certifica
  - Trusted People

Issued To	Issued By	Expiration Date	Intended Purposes	Friendly Na
Baltimore CyberTrust R...	Baltimore CyberTrust Root	5/12/2025	Client Authenticati...	DigiCert Ba
Class 3 Public Primary ...	Class 3 Public Primary Certificatio...	8/1/2028	Client Authenticati...	VeriSign Cla
Copyright (c) 1997 Mic...	Copyright (c) 1997 Microsoft Corp.	12/30/1999	Time Stamping	Microsoft T
DigiCert Assured ID Ro...	DigiCert Assured ID Root CA	11/9/2031	Client Authenticati...	DigiCert
DigiCert Global Root CA	DigiCert Global Root CA	11/9/2031	Client Authenticati...	DigiCert
DigiCert Global Root G2	DigiCert Global Root G2	1/15/2038	Client Authenticati...	DigiCert Gl
MCSA2016-SERVERDM...	MCSA2016-SERVERDM1-CA	4/5/2026	<All>	<None>
MCSA2016-SERVERDM...	MCSA2016-SERVERDM1-CA	4/5/2026	<All>	<None>
Microsoft Authenticod...	Microsoft Authenticode(tm) Root...	12/31/1999	Secure Email, Code ...	Microsoft A
Microsoft Root Authority	Microsoft Root Authority	12/31/2020	<All>	Microsoft R
Microsoft Root Certific	Microsoft Root Certificate Authori	5/9/2021	<All>	Microsoft R

certsrv - [Certification Authority (Local)\MCSA2016-SERVERDM1-CA\Issued Certificates]

File Action View Help

Certification Authority (Local)
- MCSA2016-SERVERDM1-CA
  - Revoked Certificates
  - Issued Certificates
  - Pending Requests
  - Failed Requests
  - Certificate Templates

Request ID	Requester Name	Binary Certificate	Certificate Template	Serial Number	Certificate Effective
2	MCSA2016\SERVERDC1$	-----BEGIN CERTI...	Domain Controller (...	100000000207d...	4/6/2021 10:50 AM
3	MCSA2016\domuser1	-----BEGIN CERTI...	EFS-2016 (1.3.6.1.4.1....	10000000030a2...	4/6/2021 11:44 AM
4	MCSA2016\administrator	-----BEGIN CERTI...	EFS-2016 (1.3.6.1.4.1....	10000000043f8...	4/6/2021 11:52 AM
5	MCSA2016\Administrator	-----BEGIN CERTI...	EFS-2016 (1.3.6.1.4.1....	100000000548b...	4/6/2021 11:54 AM

Activity 8-6: Installing the Web Enrollment Role Service

Time Required: 20 minutes
Objective: Install the Web Enrollment role service.
Required Tools and Equipment: ServerDC1, ServerDM1
Description: In this activity, you install the Certification Authority Web Enrollment role service with PowerShell and test it by requesting a certificate from ServerDM1. (If you want to test the configuration from your CA server or domain controller, you must enable IE to run ActiveX controls.)

1. On ServerDM1, in Server Manager, click the notifications flag, and then click the **Configure Active Directory Certificate Services on the destination server** link. The AD CS Configuration Wizard starts. In the Credentials window, click **Next**.
2. In the Role Services window, click **Certification Authority Web Enrollment**, and then click **Next**. In the Confirmation window, click **Configure**. Click **Close**. If you're prompted to configure additional role services, click **No**.
3. IIS must have a Web Server Certificate. To request one, click **Tools, Internet Information Services (IIS) Manager** from the Server Manager menu.
4. In the left pane of IIS Manager, click the **ServerDM1** node. In the middle pane, double-click **Server Certificates**.
5. In the Actions pane, click **Create Domain Certificate** to start the Create Certificate Wizard. In the Distinguished Name Properties window shown in Figure 8-19, fill in the following information:
   - Common name: **ServerDM1.MCSA2016.local**
   - Organization: **Server 2016 Class**
   - Organizational unit: ***Your name***
   - City/locality: ***Your city***
   - State/province: ***Your state or province***
   - Country/region: ***Your country***

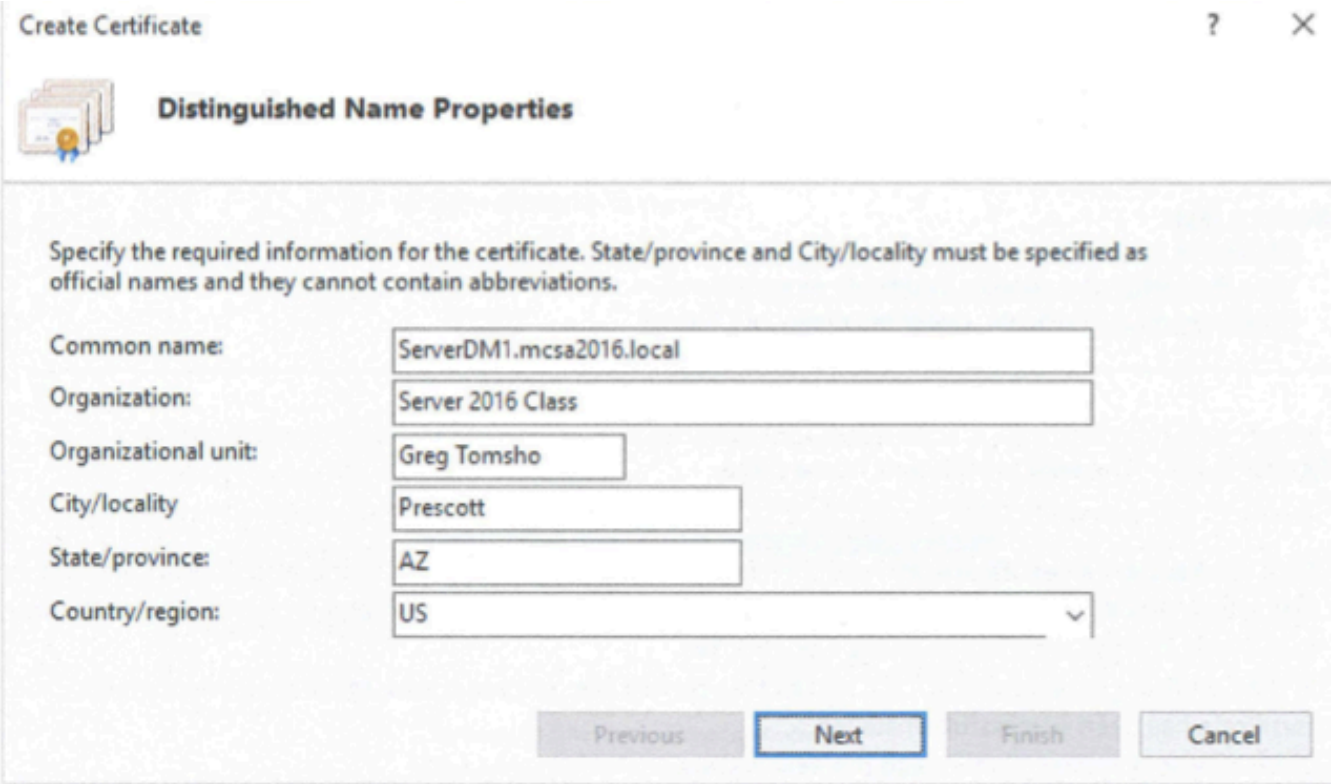


Figure 8-19 Entering distinguished name information

6. Click **Next**. In the Online Certification Authority window, click **Select**, click **MCSA2016-ServerDM1-CA**, and then click **OK**. In the Friendly name text box, type **ServerDM1.MCSA2016.local**, and then click **Finish**.
7. In the left pane of IIS Manager, click the **Sites** node. Right-click **Default Web Site** and click **Bindings**.
8. In the Site Bindings dialog box, click **Add**. In the Add Site Binding dialog box, click the **Type** list arrow and click **https**. Click the **SSL certificate** list arrow, click **ServerDM1.MCSA2016.local**, and then click **OK**. Click **Close**.
9. In the left pane of IIS Manager, click to expand **Default Web Site**, and then click **CertSrv**. In the middle pane, double-click **SSL Settings**. In the SSL Settings dialog box, click **Require SSL**. Notice the options under Client certificates. You can have the Web server ignore, accept, or require client certificates. If you want client computers to connect to the Web server to verify their identity, you would select Require. For now, leave the default **Ignore** selected. Click **Apply** in the Actions pane, and then close IIS Manager.
10. To test your configuration, first you need to turn off IE enhanced security. On ServerDC1, from Server Manager, click **Local Server**. Click the link next to **IE Enhanced Security Configuration**. Click the **Off** option button for both Administrators and Users and click **OK**.
11. Open **Internet Explorer**, type **https://ServerDM1.MCSA2016.local/certsrv** in the Address box, and press **Enter**. (If you see a Security Alert dialog box, click the check box and then click **OK**). When prompted for a user name and password, sign in as **domuser1** with **Password01** and click **OK**. The web enrollment home page opens (see Figure 8-20).

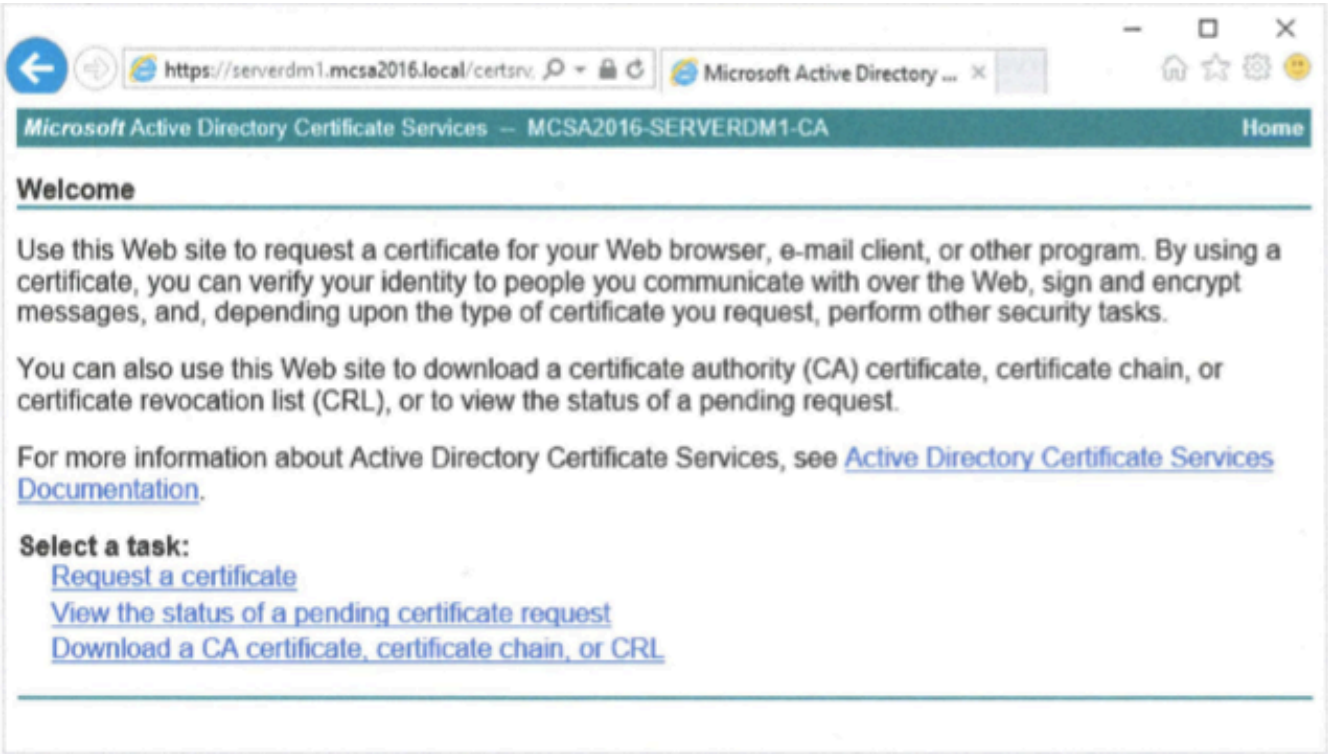


Figure 8-20 The web enrollment home page

12. Click the **Request a certificate** link, and then click the **User Certificate** link. In the Web Access Confirmation dialog box, click **Yes**. In the message stating that no further identifying information is required, click **Submit**. In the Web Access Confirmation dialog box, click **Yes**.
13. In the Certificate Issued window, click **Install this certificate.** You see a message stating that the new certificate has been successfully installed.
14. Close Internet Explorer. Continue to the next activity.

Internet Information Services (IIS) Manager

SERVERDM1 ▸

File View Help

Connections

Start Page

SERVERDM1 (MCSA2016\ad

Application Pools

Sites

Server Certificates

Create Certificate

Distinguished Name Properties

Specify the required information for the certificate. State/province
official names and they cannot contain abbreviations.

Common name:	ServerDM1.MCSA2016.local
Organization:	Server 2016 Class
Organizational unit:	Taoufik El Adel
City/locality	Virginia Beach
State/province:	VA
Country/region:	US

Internet Information Services (IIS) Manager

SERVERDM1 ▸ Sites ▸ Default Web Site ▸ CertSrv ▸

File View Help

Connections

Start Page

SERVERDM1 (MCSA2016\adm

Application Pools

Sites

Default Web Site

CertEnroll

CertSrv

SSL Settings

This page lets you modify the SSL settings for the content of a website or application.

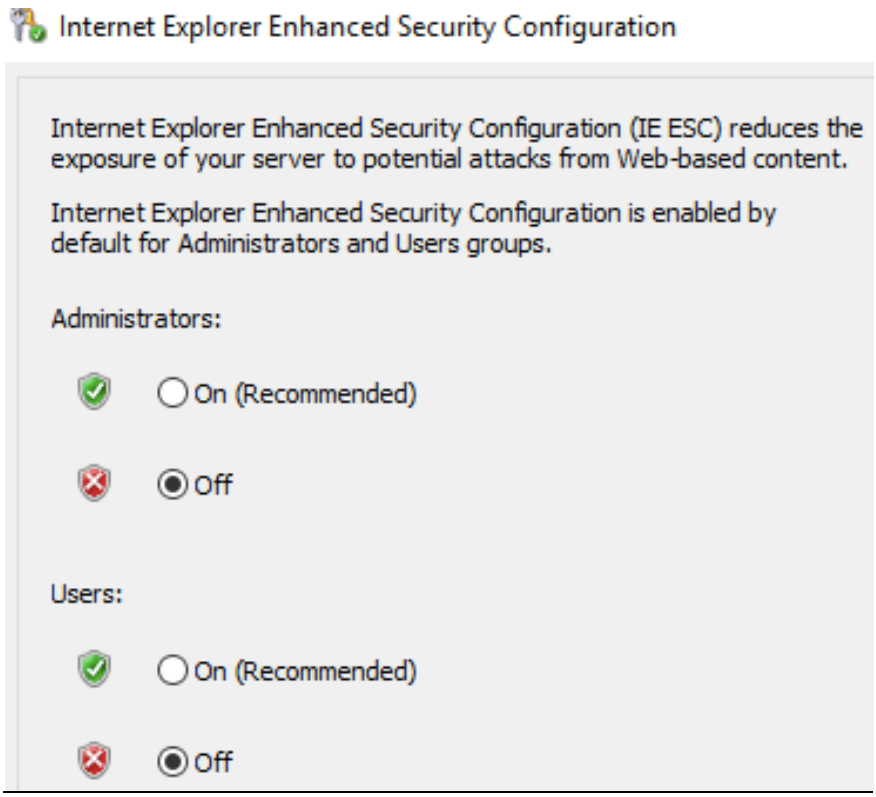
☑ Require SSL

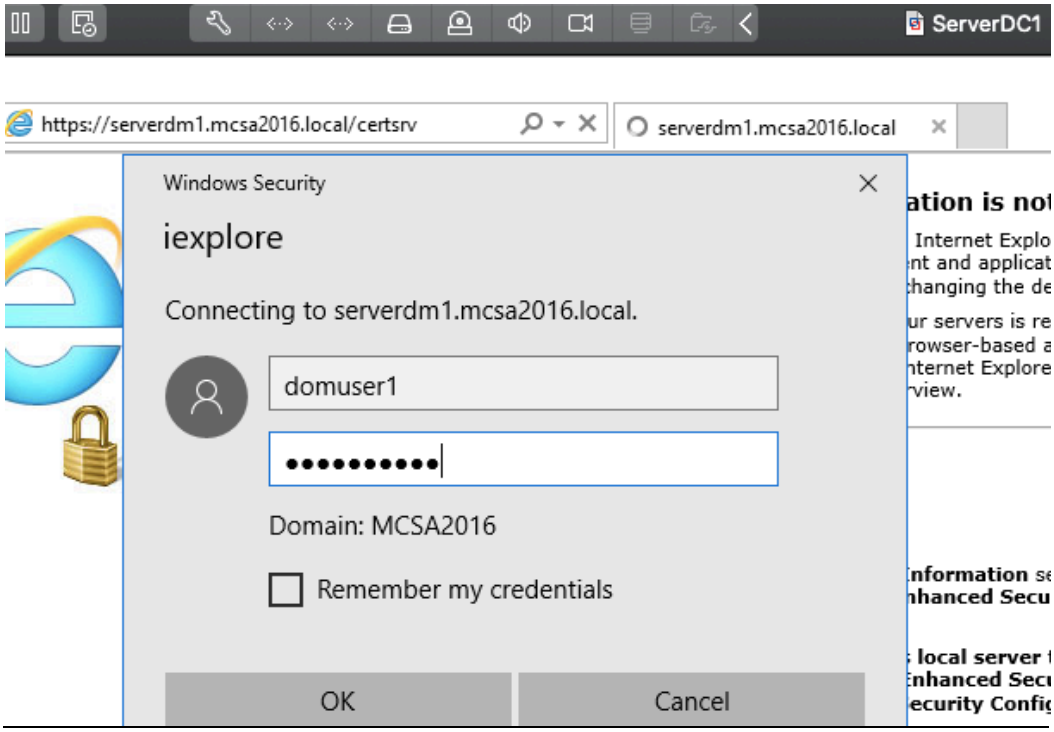
Client certificates:

◉ Ignore

○ Accept

○ Require


Internet Explorer Enhanced Security Configuration
Internet Explorer Enhanced Security Configuration (IE ESC) reduces the exposure of your server to potential attacks from Web-based content.
Internet Explorer Enhanced Security Configuration is enabled by default for Administrators and Users groups.
Administrators:
On (Recommended)
Off
Users:
On (Recommended)
Off


ServerDC1
https://serverdm1.mcsa2016.local/certsrv
serverdm1.mcsa2016.local
Windows Security
iexplore
Connecting to serverdm1.mcsa2016.local.
domuser1
Domain: MCSA2016
Remember my credentials
OK
Cancel

https://serverdm1.mcsa2016.local/certsrv/ Microsoft Active Directory ...

Microsoft Active Directory Certificate Services -- MCSA2016-SERVERDM1-CA Hom

Welcome

Use this Web site to request a certificate for your Web browser, e-mail client, or other program. By using a certificate, you can verify your identity to people you communicate with over the Web, sign and encrypt messages, and, depending upon the type of certificate you request, perform other security tasks.

You can also use this Web site to download a certificate authority (CA) certificate, certificate chain, or certificate revocation list (CRL), or to view the status of a pending request.

For more information about Active Directory Certificate Services, see Active Directory Certificate Services Documentation.

Select a task:

- Request a certificate
- View the status of a pending certificate request
- Download a CA certificate, certificate chain, or CRL

ServerDC1

https://serverdm1.mcsa2016.local/certsrv/certrm Microsoft Active Directory ...

Microsoft Active Directory Certificate Services -- MCSA2016-SERVERDM1-CA

Certificate Installed

Your new certificate has been successfully installed.