Microsoft

Deploy two-tier hierarchy of PKI

Windows Server 2012

Hands On Lab

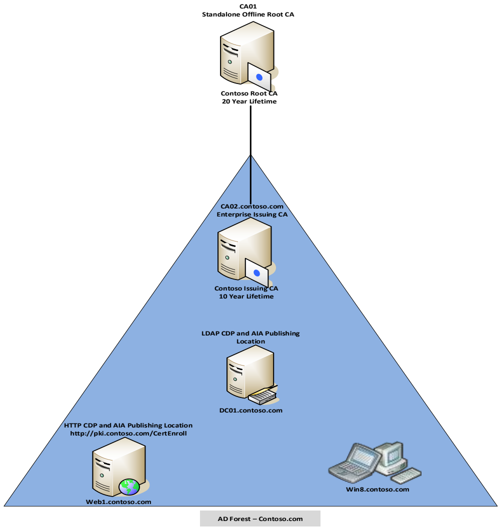
Type the Abstract

PCITHOL303 - How to Deploy Two-Tier PKI Hierarchy

This document contains instructions to deploy two-tier PKI hierarchy which an Offline Root Certification Authority and an Online Enterprise Subordinate Certification Authority. Using instruction in document you will deploy a two-tier PKI hierarchy; configure LDAP/HTTP CDP (CRL Distribution Points), LDAP/HTTP AIA (Authority Information Access) and Certificate Auto enrollment to domain joined system(s).

Lab Overview

There are five computers involved in this two-tier PKI hierarchy. There is one Domain Controller (DNS and LDAP CDP/AIA), One Standalone Offline Root CA, One Enterprise Issuing CA, and One Web Server (HTTP CDP/AIA) and one Windows 8 Client computer.



Virtual Machine	Role	IP Address/Subnet Mask/DNS Server
DC01.Contoso.com	DC – DNS – LDAP CDP/AIA Windows Server 2012	192.168.0.10/255.255.255.0/192.168.0.10
CA01	Standalone Offline Root CA Windows Server 2012	192.168.0.11/255.255.255.0/192.168.0.10
CA02.Contoso.com	Enterprise Issuing CA Windows Server 2012	192.168.0.12/255.255.255.0/192.168.0.10
Web1.Contoso.com	Web Server - HTTP CDP/AIA Windows Server 2012	192.168.0.13/255.255.255.0/192.168.0.10
Win8.Contoso.com	Windows Client Computer Windows 8	192.168.0.14/255.255.255.0/192.168.0.10

✋ For all machines in this lab use account **Administrator** with password **Password1**

Key Technical Points

There are six exercises in this step-by-step guide as listed below (each includes several sub tasks).

- **Exercise 1:** Prepare HTTP Web Server for CDP and AIA Publication
  - Create CertEnroll Folder and grant Share & NTFS Permissions to Cert Publishers group
  - Create CertEnroll Virtual Directory in IIS
  - Enable Double Escaping on IIS Server
  - Create CNAME (pki.Contoso.com) in DNS
- **Exercise 2:** Install Standalone Offline Root CA
  - Create CAPolicy.inf for Standalone Offline Root CA
  - Installing Standalone Offline Root CA
- **Exercise 3:** Perform Post Installation Configuration On Standalone Offline Root CA
- **Exercise 4:** Install Subordinate Issuing CA
  - Create CAPolicy.inf for Subordinate Enterprise Issuing CA
  - Publish Root CA Certificate & CRL to Active Directory, HTTP and add to local store on CA02.Contoso.com
  - Install Subordinate Issuing CA
  - Submit and Issue Contoso Issuing CA Certificate Request on Contoso Root CA (CA01)
  - Install Contoso Issuing CA certificate on CA02.Contoso.com
- **Exercise 5:** Perform Post Installation Configuration On Subordinate Issuing CA
- **Exercise 6:** Verify PKI Hierarchy Health
  - Validate PKI Health using PKIView.msc (Enterprise PKI)
- **Exercise 7:** Configure and Perform Auto enrollment on Windows 8 Client
  - Configure GPO to Enable Auto Enrollment
  - Prepare Certificate Template for Auto Enrollment
  - Publish Certificate Template on CA
  - Perform Auto Enrollment on Win8 Client

PCITHOL303 - How to Deploy Two-Tier PKI Hierarchy

Introduction

Estimated time to complete this lab

60 minutes – Complete lab time estimate as accurately as possible.

Objectives

After completing this lab, you will be able to:

- How to install and configure two-tier PKI Hierarchy
- How to configure key configuration settings (CDP and AIA) to deploy two-tier PKI Hierarchy
- How to configure certificate auto enrollment

Overview of Lab

Through this ILL you will learn about how to install and configure tow PKI Hierarchy. Also you will learn how to configure auto enrollment.

Virtual Machine Technology

This lab is completed using virtual machines that run on Windows Server® 2008 R2 Hyper-V™ technology. To log on to the virtual machines, press CTRL+ALT+END and enter your logon credentials.

Note regarding pre-release software

Portions of this lab include software that is not yet released, and as such may still contain active or known issues. While every effort has been made to ensure this lab functions as written, unknown or unanticipated results may be encountered as a result of using pre-release software.

Note regarding user account control

Some steps in this lab may be subject to user account control. User account control is a technology which provides additional security to computers by requesting that users confirm actions that require administrative rights. Tasks that generate a user account control confirmation are denoted using a shield icon. If you encounter a shield icon, confirm your action by selecting the appropriate button in the dialog box that is presented.

Exercise 1: Prepare HTTP Web Server for CDP and AIA Publication

This task contains several sub-tasks as listed below ….

- Create CertEnroll Folder and grant Share & NTFS Permissions to Cert Publishers group
- Create CertEnroll Virtual Directory in IIS
- Enable Double Escaping on IIS Server
- Create CNAME (pki.Contoso.com) in DNS

Note – To save time Web Server (IIS) role has been installed on Web1.contoso.com.

Create CertEnroll Folder and grant Share & NTFS Permissions to Cert Publishers group

1 Log onto **WEB1.Contoso.com** as **Contoso\Administrator** using the password **Password1**

2 Open **Windows Explorer** and then go to **C:\** drive.

3 Create folder called **CertEnroll** at the root of **C:\** drive.

4 Right click on **CertEnroll** folder and then right click & select **Properties.**

5 On "**CertEnroll Properties**" page select **Sharing** tab to configure share permissions.

6 Click on **Advanced Sharing** option and then select **Share this folder**.

7 Click on **Permissions** and then click A**dd**.

8 On "**Select Users or Groups**" page, type in **Cert Publishers** under the **Enter the object names to select** field and then click **OK.**

9 On "**Permissions for CertEnroll**" page highlight **Cert Publishers** group and then select **Change** permission and then click **OK** twice to go back to "**CertEnroll Properties**" page.

10 Select **Security** tab and click **Edit** to configure NTFS permissions.

11 On "**Permissions for CertEnroll**" page click **Add**.

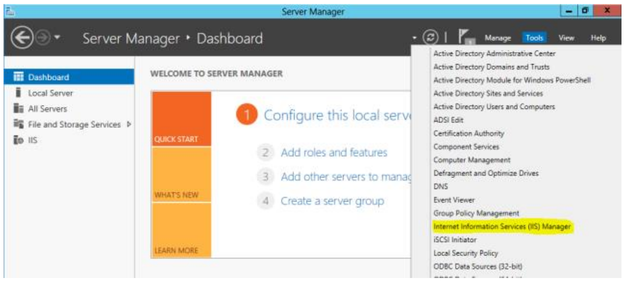
12 On "**Select Users or Groups**" page, type in **Cert Publishers** under the **Enter the object names to select** field and then click **OK.**

13 On "**Permissions for CertEnroll**" page highlight **Cert Publishers** group and then select **Modify** permission and then click **OK.**

14 On "**CertEnroll Properties**" page, click **Close**.

Create CertEnroll Virtual Directory in IIS

1. Log onto **WEB1.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Open **Server Manager** and click **Tools** and select **Internet Information Services (IIS) Manager**.


Server Manager
Server Manager ‣ Dashboard
Manage
Tools
View
Help
Dashboard
Local Server
All Servers
File and Storage Services
IIS
WELCOME TO SERVER MANAGER
QUICK START
WHAT'S NEW
LEARN MORE
1 Configure this local serv
2 Add roles and features
3 Add other servers to manag
4 Create a server group
Active Directory Administrative Center
Active Directory Domains and Trusts
Active Directory Module for Windows PowerShell
Active Directory Sites and Services
Active Directory Users and Computers
ADSI Edit
Certification Authority
Component Services
Computer Management
Defragment and Optimize Drives
DNS
Event Viewer
Group Policy Management
Internet Information Services (IIS) Manager
iSCSI Initiator
Local Security Policy
ODBC Data Sources (32-bit)

3. On left side, expand **WEB1** node and then expand **Sites.**

   Note – On pop-up window click **No.**

4. Right click on **Default Web Site** and select **Add Virtual Directory.**
5. On **"Add Virtual Directory"** page, type **CertEnroll** as "**Alias:**" and **C:\CertEnroll** as "**Physical Path:**". Click **OK**.
6. Select **CertEnroll** virtual directory under **Default Web Site** on left side.
7. Double click on **Directory Browsing** in middle pane and then select **Enable** under **Actions** pane on right side.

Enable Double Escaping on IIS Server

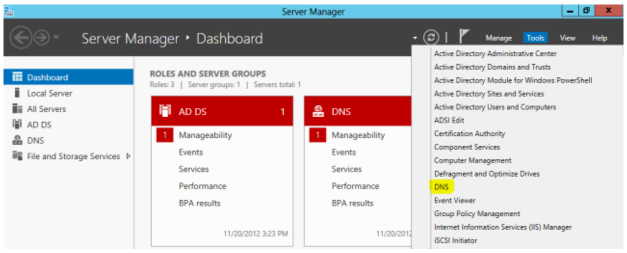
1. Log onto **WEB1.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Open Command Prompt and type **CD** and hit **Enter** to go to C:\.
3. Then type **cd %windir%\system32\inetsrv\** and hit **Enter.**
4. Type following command (all on one line) and hit **Enter.**

```
Appcmd set config "Default Web Site" /section:system.webServer/Security/requestFiltering
-allowDoubleEscaping:True
```

5. To restart IIS service type **iisreset** and hit **Enter.**

Create CNAME (pki.Contoso.com) in DNS

1. Log onto **DC01.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Open **Server Manager** and click **Tools** and select **DNS**.


Server Manager
Server Manager ‣ Dashboard
Manage
Tools
View
Help
Dashboard
Local Server
All Servers
AD DS
DNS
File and Storage Services
ROLES AND SERVER GROUPS
Roles: 3 | Server groups: 1 | Servers total: 1
AD DS 1
1 Manageability
Events
Services
Performance
BPA results
11/20/2012 3:23 PM
DNS
1 Manageability
Events
Services
Performance
BPA results
11/20/2012
Active Directory Administrative Center
Active Directory Domains and Trusts
Active Directory Module for Windows PowerShell
Active Directory Sites and Services
Active Directory Users and Computers
ADSI Edit
Certification Authority
Component Services
Computer Management
Defragment and Optimize Drives
DNS
Event Viewer
Group Policy Management
Internet Information Services (IIS) Manager
iSCSI Initiator

3. Expand **Forward Lookup Zones**, right click **Contoso.com** zone and then select **New Alias (CNAME).**
4. Enter **PKI** in the **"Alias Name"** field, then **WEB1.Contoso.com.** in the "**Fully qualified domain name (FQDN) for target host"** field, then click **OK.**

   Note - Include the terminating "." in the FQDN in the previous step. In a production environment this alias can resolve to a load balancer which distributes requests to any number of web servers that contain the CA certificates and CRLs.

Exercise 2: Install Standalone Offline Root CA

This task contains several sub-tasks as listed below ….

- Create CAPolicy.inf for Standalone Offline Root CA
- Installing Standalone Offline Root CA

Create CAPolicy.inf for Standalone Offline Root CA

1. Log onto **CA01** as **CA01\Administrator** using the password **Password1**
2. Open **C:\Windows\CAPolicy.inf** and reviews its content. The file content should look like as listed below. (**Note** – To save time this file has been already created for you).

```
[Version]
Signature="$Windows NT$"
[PolicyStatementExtension]
Policies=InternalPolicy

[InternalPolicy]
OID= 1.2.3.4.1455.67.89.5
Notice="Legal Policy Statement"
URL=http://pki.contoso.com/CertEnroll/cps.txt

[Certsrv_Server]
RenewalKeyLength=2048
RenewalValidityPeriod=Years
RenewalValidityPeriodUnits=20
AlternateSignatureAlgorithm=1
```

Note - The OID shown in the example is the Microsoft OID. Individual organizations should obtain their own OIDs. For more information about OIDs, see Obtaining a Root OID from an ISO Name Registration Authority (http://msdn.microsoft.com/library/windows/desktop/ms677621.aspx).

In the CAPolicy.inf, you can see there is a line specifying the URL http://pki.contoso.com/CertEnroll/cps.txt. The Internal Policy section of the CAPolicy.inf is just shown as an example of how you would specify the location of a certificate practice statement (CPS). To learn more about policy statements including CPS, see Creating Certificate Policies and Certificate Practice Statements (http://technet.microsoft.com/library/cc780454.aspx) and RFC 2527 (http://www.ietf.org/rfc/rfc2527.txt).

Note – If any entry in CAPolicy.inf file contains spelling mistakes, it will be ignored completely.

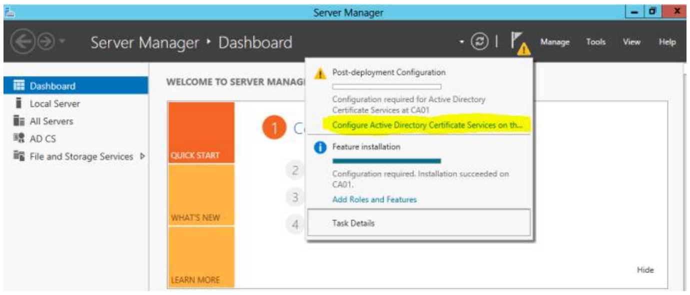
Note - Windows XP and Windows Server 2003 certificate clients do not support the Alternate Signature Algorithm. If you want these clients to be able to enroll for certificates, do not add the line AlternateSignatureAlgorithm=1 to the CAPolicy.inf. For more information, see Guidelines for Using Alternate Signature Formats.

3. Close the CAPolicy.inf file after review.

Installing Standalone Offline Root CA

1. Log onto **CA01** as **CA01\Administrator** using the password **Password1**
2. In **Server Manager**, click **Manage**, and then click **Add Roles and Features**.
3. On the "**Before you begin"** page, click Next.
4. On the "**Select Installation Type**" page, make sure that **Role-based or feature-based installation** is selected and then click **Next**.
5. On the "**Select Destination Server**" page, make sure that **CA01** is selected under **Server Pool** and then click **Next**.
6. On the "**Select Server Roles"** page, select the **Active Directory Certificate Services** role.
7. When prompted to install **Remote Server Administration Tools** click **Add Features**. Click **Next**.
8. On the "**Select Features**" page, click **Next**.
9. On the "**Active Directory Certificate Services**" page, click **Next**.
10. On the "**Select Role Services**" page, the **Certification Authority** role is selected by default. Click **Next**.
11. On the "**Confirm Installation Selections**" page, verify the information and then click **Install**.
12. Wait for the installation to complete. The installation progress screen is displayed while the binary files for the CA are installed. When the binary file installation is complete, click the **Configure Active Directory Certificate Services on the destination server** link.

    If you were to click **Close** without completing configuration, you can complete the configuration of the role service by through a link to complete the configuration in the ***notifications icon*** of **Server Manager** as shown below.



Post-deployment Configuration

Configuration required for Active Directory Certificate Services at CA01

Configure Active Directory Certificate Services on th...

Feature installation

Configuration required. Installation succeeded on CA01.

Add Roles and Features

Task Details

13. On the **Credentials** page, you should see that the **CA01\Administrator** is displayed in the Credentials box. Click **Next**.
14. On the **Role Services** page, select **Certification Authority**. This is the only available selection when only the binary files for the certification authority role are installed on the server. Click **Next**.
15. The only selection available on the **Setup Type** page is **Standalone CA**. This is because the server is not a member of an Active Directory Domain Services (AD DS) domain. Click **Next**.
16. On the **CA Type** page, **Root CA** is selected by default. Click **Next**.
17. On the **Private Key** page, leave the default selection to **Create a new private key** selected. Click **Next**.
18. On the **Cryptography for CA** page, ensure that the cryptographic provider is **RSA#Microsoft Software Key Storage Provider**, the key length is set to **2048** and the hash algorithm is set to **SHA1** then click **Next**.

19. On the **CA Name** page, in the **Common name for this CA** text box, type **Contoso Root CA** and then click **Next**.
20. On the **Validity Period** page, enter **20** for the number of years for the certificate to be valid.
21. On the **CA Database** page, leave the default locations for the database and database log files. Click **Next**.
22. On the **Confirmation** page, click **Configure**.
23. On the **Installation Progress** page, click **Close**.

    Note - The following Windows PowerShell commands would perform the same action as shown above.

    ```
    Add-WindowsFeature Adcs-Cert-Authority –IncludeManagementTools

    Install-AdcsCertificationAuthority –CAType StandaloneRootCA –CACommonName “Contoso Root CA” –KeyLength 2048 –HashAlgorithm SHA1 –CryptoProviderName “RSA#Microsoft Software Key Storage Provider” -ValidityPeriod Years -ValidityPeriodUnits 20 -Force
    ```

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Exercise 3: Perform Post Installation Configuration On Standalone Offline Root CA

1. Log onto **CA01** as **CA01\Administrator** using the password **Password1**
2. Open **Command Prompt**.
3. To define **Active Directory Configuration Partition DN**, type following command and then press **Enter**. Make sure there is no spelling mistake or typos.

   ```
   Certutil -setreg CA\DSConfigDN CN=Configuration,DC=Contoso,DC=com
   ```

4. To define **CRL Period Units** and **CRL Period**, type following command and then press **Enter**.

   ```
   Certutil -setreg CA\CRLPeriodUnits 52
   Certutil -setreg CA\CRLPeriod “Weeks”
   ```

5. To define **CRL Overlap Period Units** and **CRL Overlap Period**, type following command and then press **Enter**.

   ```
   Certutil -setreg CA\CRLOverlapPeriodUnits 12
   Certutil -setreg CA\CRLOverlapPeriod “Hours”
   ```

6. To define **Validity Period Units** for all issued certificates by this CA, type following command and then press **Enter**. Keep in mind that in our two tier PKI hierarchy we want Enterprise Issuing CA to have 10 year lifetime for its CA certificate. This is the reason we need to configure this value at standalone offline root CA.

   ```
   Certutil -setreg CA\ValidityPeriodUnits 10
   Certutil -setreg CA\ValidityPeriod “Years”
   ```

7. CA auditing depends on system **Object Access** auditing to be enabled. Therefore, to set up CA auditing for a system, you will need to configure following two settings.

   a. Enable auditing for the CA by selecting which group of events to audit in the Certificate Authority MMC snap-in or by configuring **AuditFilter** registry key setting.

      To configure **Auditing** for all CA related events, type following command and then press **Enter**.

      ```
      Certutil -setreg CA\AuditFilter 127
      ```

   b. Enable Object Access Auditing on the Certificate Authority. As Standalone Offline Root CA is not joined to domain we need to configure this setting using Local Security Policy.

      Enable **Object Access Auditing** through **Local Security Policy**.

      i. Open **Server Manager** and click on **Tools** then select **Local Security Policy.**
      ii. Expand **Local Policies** and then select **Audit Policy**.

iii. Double click **Audit Object Access** and then select **Success** and **Failure** then click **OK**.

iv. Close Local Security Policy editor.

8. To open Registry Editor right-click the **Start** icon and the select **Run**. Type **Regedit** and press **Enter**.
9. Open **HKLM\System\CurrentControlSet\Services\CertSvc\Configuration\Contoso Root CA** registry location and then open **CACertPublicationURLs.**

   Make sure that **CACertPublicationURLs** are configured exactly as listed below. Make appropriate changes as required.

   1:C:\Windows\system32\CertSrv\CertEnroll\%1_%3%4.crt

   2:http://**pki.contoso.com/CertEnroll**/%1_%3%4.crt

   2:ldap:///CN=%7,CN=AIA,CN=Public Key Services,CN=Services,%6%11

10. Open **HKLM\System\CurrentControlSet\Services\CertSvc\Configuration\Contoso Root CA** registry location and then open **CRLPublicationURLs.**

    Make sure that **CRLPublicationURLs** are configured exactly as listed below. Make appropriate changes as required.

    1:C:\Windows\system32\CertSrv\CertEnroll\%3%8%9.crl

    2:http://**pki.contoso.com/CertEnroll**/%3%8%9.crl

    10:ldap:///CN=%7%8,CN=%2,CN=CDP,CN=Public Key Services,CN=Services,%6%10

11. Close the registry editor and then type following command to restart Active Directory Certificate services using command prompt.

    net stop certsvc & net start certsvc

12. To publish CRL, type following command at command prompt. (If you get an RPC error, wait a few moments.)

    Certutil -CRL

Exercise 4: Install Subordinate Issuing CA

This task contains several sub-tasks as listed below ….

- Create CAPolicy.inf for Subordinate Enterprise Issuing CA
- Publish Root CA Certificate & CRL to Active Directory, HTTP and add to local store on CA02.Contoso.com
- Install Subordinate Issuing CA
- Submit and Issue Contoso Issuing CA Certificate Request on Contoso Root CA (CA01)
- Install Contoso Issuing CA certificate on CA02.Contoso.com

Create CAPolicy.inf for Subordinate Enterprise Issuing CA

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Open **C:\Windows\CAPolicy.inf** and reviews its content. The file content should look like as listed below. (**Note** – To save time this file has been already created for you).

```
[Version]
Signature="$Windows NT$"

[Certsrv_Server]
RenewalKeyLength=2048
RenewalValidityPeriod=Years
RenewalValidityPeriodUnits=10
LoadDefaultTemplates=0
AlternateSignatureAlgorithm=1
```

Note - Windows XP and Windows Server 2003 certificate clients do not support the Alternate Signature Algorithm. If you want these clients to be able to enroll for certificates, do not add the line AlternateSignatureAlgorithm=1 to the CAPolicy.inf. For more information, see Guidelines for Using Alternate Signature Formats.

3. Close the CAPolicy.inf file after review.

Publish Root CA Certificate & CRL to Active Directory, HTTP and add to local store on CA02.Contoso.com

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Copy **Root CA Certificate** (**.crt** file) and **Root CA CRL** (**.crl** file) files from **\\192.168.0.11\C$\Windows\System32\CertSrv\CertEnroll** directory to local **C:\** drive.

3. On CA2, open a command prompt.

4. Type **cd** and press ENTER to change to the root of C:

~~3.~~5. To publish **Contoso Root CA Certificate** and **CRL** in **Active Directory**, type following command and then press **Enter**.

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```
certutil -f -dspublish “CA01_Contoso Root CA.crt” RootCA
certutil -f -dspublish “Contoso Root CA.crl”
```

~~4.~~6. To publish **Contoso Root CA Certificate** and **CRL** to http://pki.Contoso.com/CertEnroll, copy Contoso Root CA Certificate and CRL to \\Web1.Contoso.com\C$\CertEnroll directory.
Type following commands and press **Enter**. Make sure to run following commands from root of **C:\** drive.

```
copy "CA01_Contoso Root CA.crt" \\WEB1.Contoso.com\C$\CertEnroll\
copy "Contoso Root CA.crl" \\WEB1.Contoso.com\C$\CertEnroll\
```

~~5.~~7. To add **Contoso Root CA** Certificate and CRL in **CA02.Contoso.com** local store, type following command and then press **Enter**. Make sure to run following commands from root of **C:\** drive.

```
certutil -addstore -f root “CA01_Contoso Root CA.crt”
certutil -addstore -f root “Contoso Root CA.crl”
```

Install Subordinate Issuing CA

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. In **Server Manager**, click **Manage**, and then click **Add Roles and Features**.
3. On the “**Before you begin**”, click **Next**.
4. On the “**Select installation type**” page, ensure the default selection of **Role or Feature Based Installation** is selected. Click **Next**.
5. On the “**Select destination server**” page, ensure that **CA02.contoso.com** is selected and then click **Next**.
6. On the “**Select server roles**” page, select the **Active Directory Certificate Services** role.
7. When prompted to install **Remote Server Administration Tools** click **Add Features**. Click **Next**.
8. On the “**Select features**” page, click **Next**.
9. On the “**Active Directory Certificate Services**” page, click **Next**.
10. On the “**Select role services**” page, ensure **Certification Authority** is selected and then click **Next**.
11. On the “**Confirm installation selections**” page, verify the information and then click **Install**.
12. Wait for the installation to complete. The installation progress screen is displayed while the binary files for the CA are installed. When the binary file installation is complete, click the **Configure Active Directory Certificate Services on the destination server** link.

    If you were to click **Close** without completing configuration, you could complete the configuration of the role service by through a link to complete the configuration in the ***notifications icon*** of **Server Manager**.

13. On the “**Credentials**” page, the credentials for **Contoso\Administrator** appear. Click **Next**.
14. On the “**Role Services**” page, select **Certification Authority**.
15. On the “**Setup Type**” page, ensure that **Enterprise CA** is selected and then click **Next**.
16. On the “**CA Type**” page, select **Subordinate CA** to install an Enterprise Subordinate CA. Click **Next**.
17. On the “**Private Key**” page, ensure the **Create a new private key** option is selected and then click **Next**.
18. The “**Cryptography for CA**” page, ensure that the cryptographic provider is **RSA#Microsoft Software Key Storage Provider**, key length is **2048**, and the hash algorithm is set to **SHA1**. Click **Next**.
19. On the “**CA Name**” page, in “**Common name for this CA**”, type **Contoso Issuing CA**. You will see that the distinguished name changes to **CN=Contoso Issuing CA,DC=contoso,DC=com**. Click **Next**.

20. On the “**Certificate Request**” page, notice that **Save a certificate request to file on the target machine** is selected. This is the correct option because we are using an Offline Root CA (Contoso Root CA) in this configuration. Leave the default and click **Next**.
21. On the “**CA Database**” page, leave the default database and log locations and then click **Next**.
22. On the “**Confirmation**” page, click **Configure**.
23. On the “**Results**” page, you see that you must take the certificate request to the parent CA in order to complete the configuration. Click **Close**.

    Note - The Windows PowerShell commands to perform the installation of the Enterprise Subordinate CA as shown in this section are:

    Add-WindowsFeature Adcs-Cert-Authority –IncludeManagementTools

    Install-AdcsCertificationAuthority -CAType EnterpriseSubordinateCA -CACommonName "Contoso Issuing CA" -KeyLength 2048 -HashAlgorithm SHA1 -CryptoProviderName "RSA#Microsoft Software Key Storage Provider"

Submit and Issue Contoso Issuing CA Certificate Request on Contoso Root CA (CA01)

1. Log onto **CA01** as **CA01\Administrator** using the password **Password1**
2. Copy Contoso Issuing CA certificate request file located at “**\\192.168.0.12\C$\CA02.Contoso.com_Contoso Issuing CA.req”** to local **C:\** drive on **CA01**.
3. In **Server Manager**, click **Tools**, and then -click **Certification Authority** to open Certificate Authority Manager MMC.
4. Right click on **Contoso Root CA**, select **All Tasks** and then select **Submit New Request**.
5. Browse to the request file (“**CA02.Contoso.com_Contoso Issuing CA.req**”) at the root of **C:\** and then click **Open**.
6. Expand **Contoso Root CA** node, then highlight **Pending Requests**. You should see the pending request. If you do not, right-click **Pending Requests**, and click **Refresh**.
7. Right click the pending request on the right pane, select **All Tasks** and then select **Issue**.
8. Highlight **Issued Certificates**, then right click the issued certificate on the right pane and select **Open**.
9. Navigate to the **Details** tab and click **Copy to File** at the bottom.
10. On the “**Welcome to the Certificate Export Wizard**” page, click **Next**.
11. Change the format to “**Cryptographic Message Syntax Standard - PKCS #7 Certificates (.P7B)**” and then click **Next**.
12. Type **C:\Contoso Issuing CA** in the “**file name**” field, then click **Next**, then **Finish**, then **OK**, then **OK**.

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Install Contoso Issuing CA certificate on CA02.Contoso.com

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Copy Contoso Issuing CA certificate located at **\\192.168.0.11\C$\Contoso Issuing CA.P7B** to local **C:\** drive on **CA02.Contoso.com**.
3. In **Server Manager**, click **Tools** then select **Certificate Authority** to open Certificate Authority Manager MMC.
4. Right click **Contoso Issuing CA**, select **All Tasks**, and then select **Install CA Certificate**.
5. Browse to the **C:\Contoso Issuing CA.P7B** file, and then click **Open**.

6. To start Certificate Authority service, select **Consoto Issuing CA** in Certificate Authority MMC and click **Start Service** icon in Certificate Authority Manager. (**Note** – You may have to wait for few seconds before it allows you to start service).

   Note - Start service icon is ~~a black square with a green triangle inside~~a green triangle on the menu bar. You can also start the service by enter the command **net start certsvc** at a command prompt.

7. Expand **Contoso Issuing CA** node, highlight **Certificate Templates**, and verify the default templates are not present in the right pane. We removed these certificate templates using CAPolicy.inf configuration called **LoadDefaultTemplates=0.**

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Exercise 5: Perform Post Installation Configuration On Subordinate Issuing CA

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Open **Command Prompt**.
3. To define **CRL Period Units** and **CRL Period**, type following command and then press **Enter**.

```
Certutil -setreg CA\CRLPeriodUnits 1
Certutil -setreg CA\CRLPeriod “Weeks”
Certutil –setreg CA\CRLDeltaPeriodUnits 1
Certutil –setreg CA\CRLDeltaPeriod “Days”
```

4. To define **CRL Overlap Period Units** and **CRL Overlap Period**, type following command and then press **Enter**.

```
Certutil -setreg CA\CRLOverlapPeriodUnits 12
Certutil -setreg CA\CRLOverlapPeriod “Hours”
```

5. Default setting for Validity Period is 2 years in registry. Adjust this setting accordingly to meet your needs of entity certificate’s lifetime issued from Contoso Issuing CA. It is recommended to not configure this setting to more than half of total lifetime of Contoso Issuing CA certificate. Keep in mind that in our two tier PKI hierarchy scenario we want end-entity certificates to not have more than 5 year lifetime.

```
Certutil -setreg CA\ValidityPeriodUnits 5
Certutil -setreg CA\ValidityPeriod “Years”
```

6. CA auditing depends on system **Object Access** auditing to be enabled. Therefore, to set up CA auditing for a system, you will need to configure following two settings.

   a. Enable auditing for the CA by selecting which group of events to audit in the Certificate Authority MMC snap-in or by configuring **AuditFilter** registry key setting.

      To configure **Auditing** for all CA related events, type following command and then press **Enter**.

      ```
      Certutil -setreg CA\AuditFilter 127
      ```

   b. Enable Object Access Auditing on the Certificate Authority. We are configuring this setting using Local Security Policy however CA02.Contoso.com is domain joined so domain based GPO can be used to configure this setting as well.

      Enable **Object Access Auditing** through **Local Security Policy**.

      i. ~~Click **Start** → **Administrative**~~In Server Manager, click **Tools** and then select **Local Security Policy.**
      ii. Expand **Local Policies** and then select **Audit Policy**.

iii. Double click **Audit Object Access** and then select **Success** and **Failure** then click **OK**.

iv. Close Local Security Policy editor.

7. To open Registry Editor type **Regedit** in Command Prompt and click **OK**.
8. Open **HKLM\System\CurrentControlSet\Services\CertSvc\Configuration\Contoso Issuing CA** registry location and then open **CACertPublicationURLs.**

   Make sure that CA Certificate Publication URLs are configured exactly as listed below. Make appropriate changes as required.

   ```
   1:C:\Windows\system32\CertSrv\CertEnroll\%1_%3%4.crt
   2:http://pki.Contoso.com/CertEnroll/%1_%3%4.crt
   2:ldap:///CN=%7,CN=AIA,CN=Public Key Services,CN=Services,%6%11
   ```

9. Open **HKLM\System\CurrentControlSet\Services\CertSvc\Configuration\Contoso Issuing CA** registry location and then open **CRLPublicationURLs.**

   Make sure that CRL Publications URLs are configured exactly as listed below. Make appropriate changes as required.

   ```
   65:C:\Windows\system32\CertSrv\CertEnroll\%3%8%9.crl
   6:http://pki.Contoso.com/CertEnroll/%3%8%9.crl
   79:ldap:///CN=%7%8,CN=%2,CN=CDP,CN=Public Key Services,CN=Services,%6%10
   65:file://\\Web1.Contoso.com\CertEnroll\%3%8%9.crl
   ```

10. Close the registry editor and then type following command to restart Active Directory Certificate services using command prompt.

    ```
    net stop certsvc & net start certsvc
    ```

11. To publish CRL, type following command at command prompt.

    ```
    Certutil -CRL
    ```

12. To publish Contoso Issuing CA Certificate to http://pki.contoso.com/CertEnroll, run following command.

    ```
    copy “C:\Windows\System32\CertSrv\CertEnroll\CA02.contoso.com_Contoso Issuing CA.crt"
    \\WEB1.Contoso.com\C$\CertEnroll\
    ```

Exercise 6: Verify PKI Hierarchy Health

Validate PKI Health using PKIView.msc (Enterprise PKI)

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. Open **Command Prompt** and type **PKIView.msc** and press **Enter**.
3. Expand **Enterprise PKI** node and then select **Contoso Root CA** and **Contoso Issuing CA**, and verify the status for the **CA Certificates**, **AIA** URLs, and **CDP** URLs are showing status of **OK**.
4. Right click **Enterprise PKI** and then select **Manage AD Containers**.
5. On **NTAuthCertificates** tab, verify the **Contoso Issuing CA** certificate object appears with a status of **OK**.
6. On **AIA Container** tab, verify both **Contoso Root CA** and **Contoso Issuing CA** certificates are present with a status of **OK**.
7. On **CDP Container** tab, verify **Contoso Root CA** base CRL, **Contoso Issuing CA** base & delta CRLs are present with a status of **OK**.
8. On **Certificate Authorities Container**, verify **Contoso Root CA** certificate is present with a status of **OK**.
9. On **Enrollment Services Container**, verify **Contoso Issuing CA** certificate is present with a status of **OK**.

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Exercise 7: Configure and Perform Auto enrollment on Windows 8 Client

This task contains several sub-tasks as listed below ….

- Configure GPO to Enable Auto Enrollment
- Prepare Certificate Template for Auto Enrollment
- Publish Certificate Template on CA
- Perform Auto Enrollment on Win8 Client

Configure GPO to Enable Auto Enrollment

1. Log on to **CA02.contoso.com** as **Contoso\Administrator** using the password **Password1**
2. In **Server Manager**, click **Tools** and Select **Group Policy Management**.
3. Expand **Forest: Contoso.com,** then **Domains and Contoso.com**. Right click on **Default Domain Policy** and click **Edit**.
4. Under **Computer Configuration** go to **Policies\Windows Settings\Security Settings\Public Key Policies.**

   Note – To enable auto enrollment for User based certificate templates, you will also need to configure GPO for User Configuration. In this exercise we are only enabling auto enrollment for Computer based certificate templates.

5. While **Public Key Polices** selected**,** on right side on pane double click on **Certificate Services Client – Auto Enrollment.**
6. Using drop down menu select **Enabled.** Once it is enabled select following two options as well.

   - **Renew expired certificates, update pending certificates and remove revoked certificates**
   - **Update certificates that use certificate templates**

7. Click **OK**.

Prepare Certificate Template for Auto Enrollment

1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**
2. In **Server Manager**, click **Tools** and then select **Certificate Authority** to open **Certification Authority MMC**.
3. Expand **Contoso Issuing CA**, right click on **Certificate Templates**, and select **Manage**.
4. Double click on **Workstation Authentication** certificate template in the **Certificate Templates** Console page.
5. Go to **Security** tab and click **Add**.
6. Click on **Object Types** and select **Computers**. Click **OK**.
7. Type in **Win8** under **Enter the object names to select**, and click **Check Names**. Click **OK**.
8. **Grant** Win8 computer object **Read, Enroll** and **Autoenroll** permissions. Click **OK**. Close **Certificate Templates** console.

Publish Certificate Template on CA

1. Close the Certificates Templates console.

~~1. Log onto **CA02.Contoso.com** as **Contoso\Administrator** using the password **Password1**~~

~~4.~~3. Highlight **Workstation Authentication** in the "**Enable Certificate Templates**" page and then click **OK**. If you do not see the Workstation Authentication template, close the Certificate Authority console, reopen it and try the steps again.

Perform Auto Enrollment on Win8 Client

1. Log into **Win8.Contoso.com** as **Contoso\Administrator** using the password **Password1**

2. On the Start screen, type **cmd** and press ENTER.

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~~2.~~3. ~~Open~~ At the **Command Prompt**, ~~and then~~ type **gpupdate /force**.

Note – You can achieve same result as above if you reboot the Win8.contoso.com.

~~3.~~4. Open **Command Prompt** and type **MMC** and press **Enter**. Click on **File** → **Select Add or Remove Snap-in**.

~~4.~~5. Select **Certificates**, then click **Add**, click **Computer Account**, then **Next**, **Finish** again, then **OK**.

6. Expand **Certificates**, then **Personal** and **Certificates**. You will find your auto enrolled Workstations Authentication certificate.

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~~5.~~7. Alternatively, at the command prompt, type **certutil –viewstore MY**, and press ENTER.

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