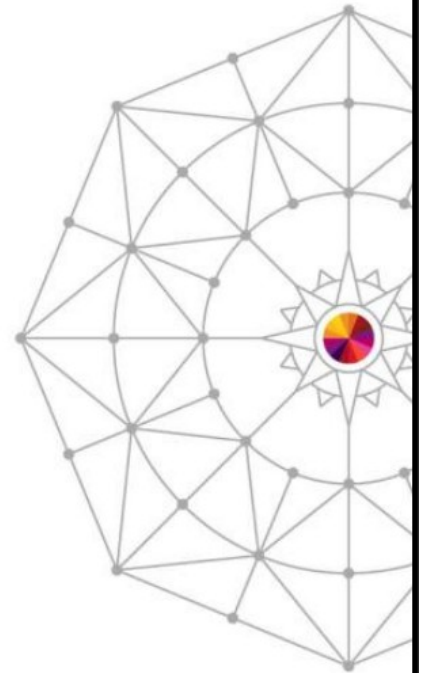




z/OS PKI Services Hands-on Lab

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Objectives of this Lab

At the end of this lab, you will understand the steps to perform some of the following tasks

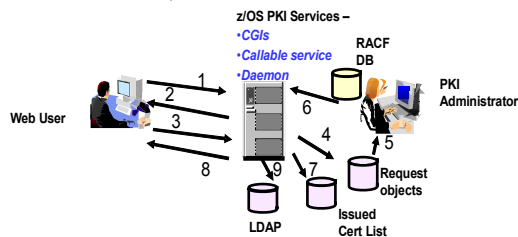
- **Submit and approve a certificate request for (pick one)**
 - A certificate with key pair generated by the browser – EX 1
 - A certificate with key pair generated by PKI Services – EX 2
 - A certificate with key pair generated on a z/OS server – EX 3
- **View the installed certificate from the IE browser – EX 4**
- **Revoke/Suspend a certificate – EX 5**
- **Check the certificate status – EX 6**
 - Certificate Revocation List (CRL)
 - Online Certificate Status Protocol (OCSP)
- **Customize PKI Services – EX 7 (if you have time)**
 - Configuration file – pkiserv.conf
 - Template file – pkiserv.tmpl

Background information

- PKI Services is an application to generate and manage certificates.

z/OS PKI Services Process Flow – a simplified sample view

1. User contacts PKI Services to request for certificate
2. CGI constructs a web page for user to input information
3. CGI packages all the info and send to the callable service
4. Callable service calls the daemon to generate the request object and put it in the Request objects DB
5. Administrator approves the request through the administrator web page
6. CGI calls callable service which in turn calls the daemon to create the certificate, sign with the CA key in the RACF DB
7. Certificate is placed in the Issued Cert List DB
8. User retrieves the certificate
9. Certificate is posted to LDAP



- Configuration is done through 3 files – pkiserv.envars, pkiserv.conf, pkiserv.tmpl.
- In z/OS V1R8, we support multiple instances of PKI Services running on the same LPAR. It is this feature that makes this lab possible since each of you can experiment with your own set up.
- Each user will have his own Certificate Authority (CA) Domain with its CA certificate issued by a Master CA with subject name 'OU=Demo Customer Design Centre Certificate Authority,O=TEST,C=US'
- The users' CA certificates are named 'CN=Sharb01CA,OU=Test,O=The Sharb01 Firm', 'CN=Sharb02CA...', 'CN=Sharb03CA...' etc.

- This is the partial content of a sample **pkiserv.envvars** file
- It sets up the environment variables for the CA Domain name and the location of the PKI Services configuration file, pkiserv.conf

```
...
# When running as a CA Domain, set the CA Domain name by assigning
# desired value to the _PKISERV_CA_DOMAIN variable.
# Note: The first eight characters must be unique.
#
# example: _PKISERV_CA_DOMAIN=WebAppCA
_PKISERV_CA_DOMAIN=SHARB01
#
# Configuration File location and Message configuration Options
#
_PKISERV_CONFIG_PATH=/sharelab/sharb01/pkilab
_PKISERV_MSG_LOGGING=stdout_logging
_PKISERV_MSG_LEVEL=*.w
...
```

- This is the partial content of a sample **pkiserv.conf** file
- It specifies the names of the VSAM datasets used as the PKI Services databases
- It contains the time intervals for certain tasks to perform
- It has the global information needed to be in the certificates in all kinds of templates, eg. The CRL Distribution Point location
- **Re-starting PKI Services is needed for any changes to this file**

```
...
# Data set name of the VSAM request (object store) base CLUSTER
ObjectDSN='pkisrvd.vsam.ost'
# Data set name of the VSAM issued certificate list (ICL) base CLUSTER
ICLDSN='pkisrvd.vsam.icl'
# How often to turn approved requests into certificates
CreateInterval=1m
# How often to create the CRL
TimeBetweenCRLs=10m
# CRL distribution point name
CRLDistName=CRL
# CRL distribution point extension containing the location
CRLDistURI=http://mvsl.centers.ihost.com:8041/Sharb01/crls/
# Is OCSP responder enabled?
OCSPType=basic
...
```

- This is the partial content of a sample **pkiserv.tmpl** file
- It contains HTML like tags
- There are different types of templates for certificates with certain usage
- The certificate information needed are customizable per template basis, verses those global information specified in pkiserv.conf
- Under the <CONTENT> section is a list of fields that you expect user to input when a request is made
- Under the <CONSTANT> section is a list of hard coded fields
- **The change to this file will be picked up dynamically**

```

<TEMPLATE NAME=1-Year PKI SSL Browser Certificate>
<CONTENT>
%%Requestor (optional)%%
%%NotifyEmail (optional)%%
%%PassPhrase%%
%%Mail (optional)%%
%%CommonName%%
...
</CONTENT>

<CONSTANT>
%%OrgUnit=Class 1 Internet Certificate CA%%
%%Org=The Sharbxx Firm%%
%%KeyUsage=handshake%%
%%ExtKeyUsage=clientauth%%
%%AuthInfoAcc=OCSP,URL=http://mvs1.centers.ihost:8041/Sharb01/public-
cgi/caocsp%%
%%NotBefore=0%%
%%NotAfter=365%%
...
</CONSTANT>
...
</TEMPLATE>

```

Exercise Instructions:

Note 1: All the references of *xx* refer to the number part of your assigned id, eg. 01 if your assigned ID is sharb01)

Note 2: You will play both roles as an end user and as an administrator in the lab. The tasks performed by an end

user and an administrator are indicated by a male  and female  icon respectively.

Note 3: If you are not familiar with the MVS/OMVS system, you may refer to Appendix 1 to get some hints.

Exercise 1 - Request a certificate with key pair generated from the browser

A. Submit a request

- Open an Internet Explorer browser to go to the url (change xx to the number part of your assigned id):
<http://mvs1.centers.ihost.com:8041/Sharbxx/public-cgi/camain.rexx>
- Click on the “**Install the CA certificate to enable SSL sessions for PKI Services**’ link so that SSL can be performed for the subsequent actions:

PKI Services Certificate Generation Application

[Install the CA certificate to enable SSL sessions for PKI Services](#) **This is the start page**

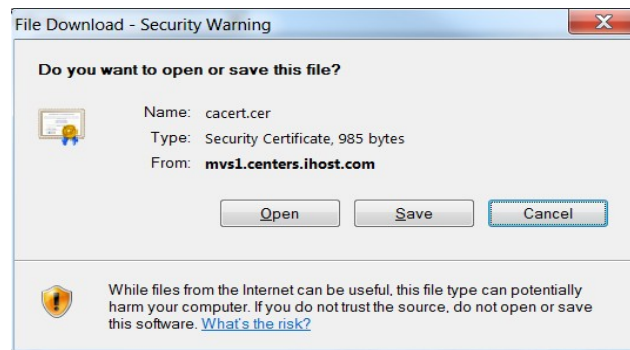
Choose one of the following:

- **Request a new certificate using a model**
Select the certificate template to use as a model:
- **Pick up a previously requested certificate**
Enter the assigned transaction ID:
Select the certificate return type:
- **Renew or revoke a previously issued browser certificate**
- **Administrators click here**

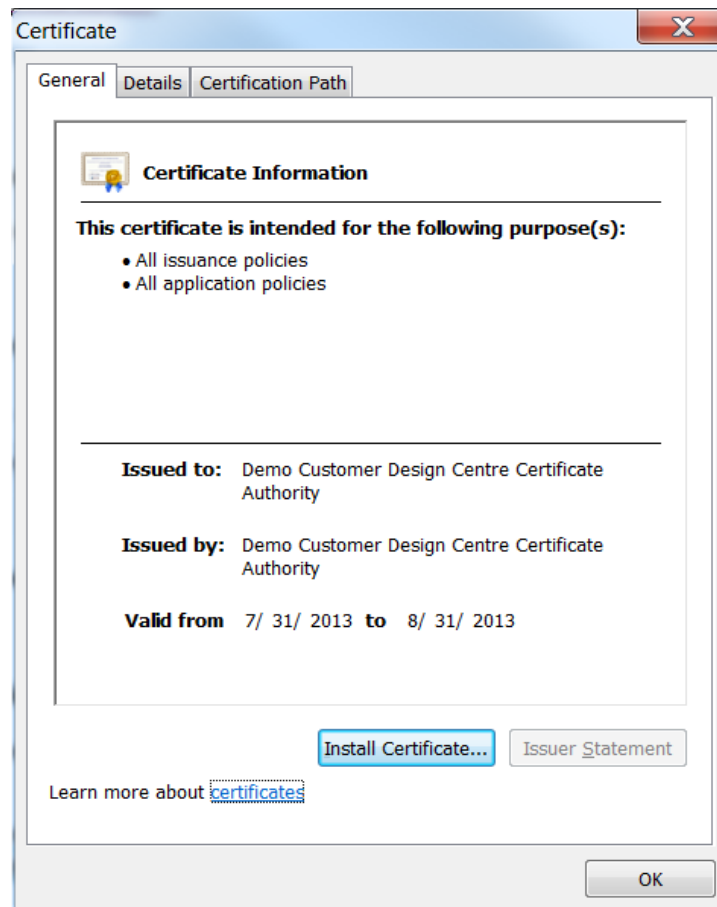
[email: webmaster@your-company.com](mailto:webmaster@your-company.com)

Click 'Install Certificate' and select 'Trusted Root Certification Authorities' as the Certificate Store

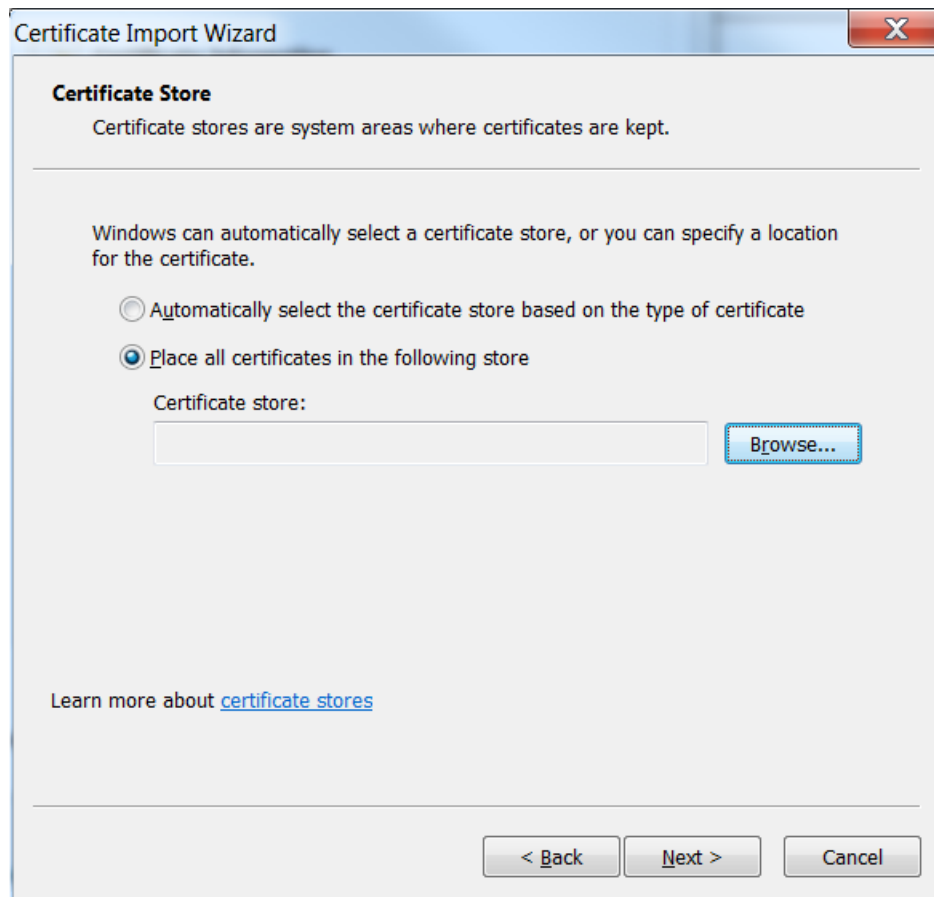
- Click Open for the question - Do you want to open or save this file?



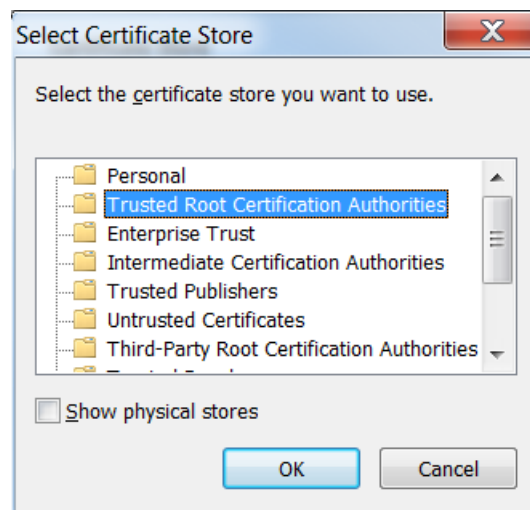
- Click Install Certificate, then click Next



- Select “Place all certificates in the following store” and click browse:




- Highlight 'Trusted Root Certification Authorities Store', click OK, click Next and then click Finish:



- Choose the '1 Year PKI SSL Browser Certificate' template
- Click 'Request Certificate'

PKI Services Certificate Generation Application



Pick a template

[Install the CA certificate to enable SSL sessions for PKI Services](#)

Choose one of the following:

- Request a new certificate using a model

Select the certificate template to use as a model

1-Year PKI SSL Browser Certificate

1-Year PKI SSL Browser Certificate
 1-Year PKI S/MIME Browser Certificate
 2-Year PKI Windows Logon Certificate
 2-Year PKI Browser Certificate For Authenticating To z/OS
 5-Year PKI SSL Server Certificate
 5-Year PKI IPSEC Server (Firewall) Certificate
 5-Year PKI Intermediate CA Certificate
 2-Year PKI Authenticode - Code Signing Certificate
 5-Year SCEP Certificate - Preregistration
 1-Year PKI Generated Key Certificate
 n-Year PKI Certificate for Extensions Demonstration

Request Certificate
- Pick up a previously requested certificate

Enter the assigned transaction ID

 Select the certificate return type

PKI Browser

Pick up Certificate
- Renew or revoke a previously issued browser certificate

Renew or Revoke Certificate
- Recover a previously issued certificate whose key was generated by PKI Services

Enter the email address when the original certificate was requested

 Enter the same pass phrase as on the request form


Recover Certificate
- Administrators click here

Go to Administration Page

- Fill in the values for the certificate request information
- Select Microsoft Base Cryptographic Provider to generate key pair
- Click on 'Submit certificate request'

1-Year PKI SSL Browser Certificate

Choose one of the following:



Fill in the info

- **Request a New Certificate**

Enter values for the following field(s)

Your name for tracking this request (optional)

Email address for notification purposes (optional)

Pass phrase for securing this request. You will need to supply this value when retrieving your certificate

Reenter your pass phrase to confirm

Email address for distinguished name MAIL= attribute (optional)

Common Name

Select the following key information

Cryptographic Service Provider

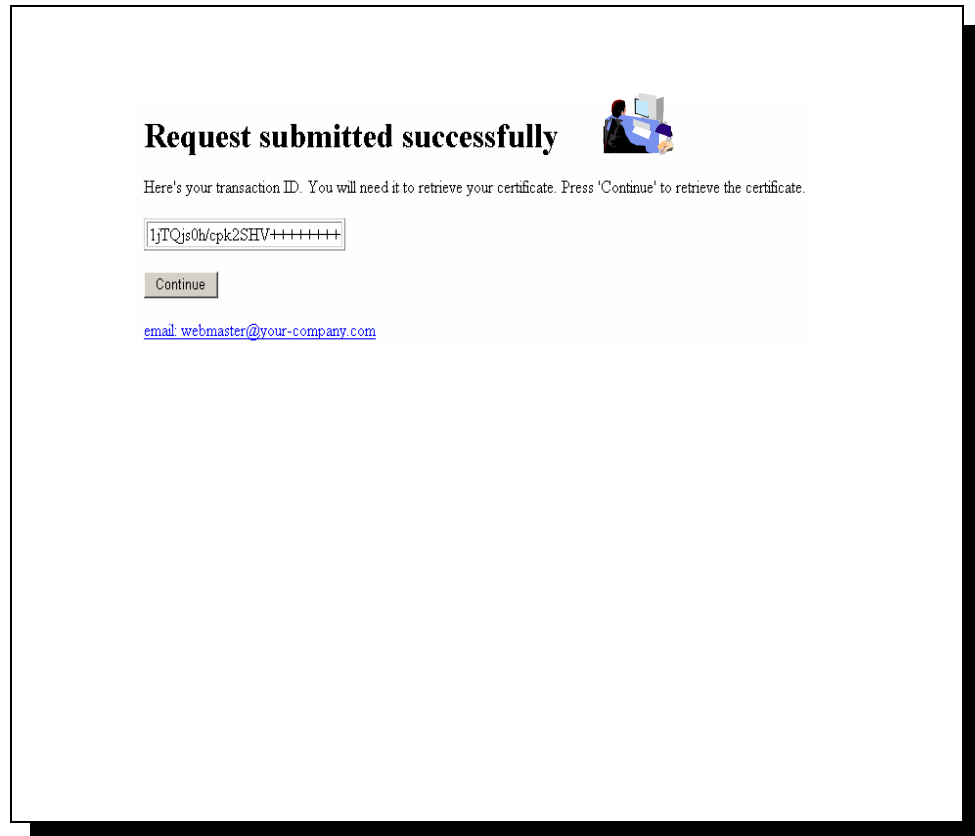
Enable strong private key protection? ☐ No
- **Pick Up a Previously Issued Certificate**

[email: webmaster@your-company.com](mailto:webmaster@your-company.com)

These input fields are controlled by the <CONTENT> entries on p7


The browser will use the selected crypto provider to generate public/private key pair. Pick Microsoft Base Cryptographic Provider.

- Save this transaction ID into some file (eg. Open notepad and paste it)
- Click 'Continue'



- Enter the passphrase that you entered when you made the request
- Click on 'Retrieve and Install Certificate' (It will fail, see next page)

Retrieve Your PKI Browser Certificate



Please bookmark this page

Since your certificate may not have been issued yet, we recommend that you create a bookmark to this location so that when you return to this bookmark, the browser will display your transaction ID. This is the easiest way to check your status.

Enter the assigned transaction ID


If you specified a pass phrase when submitting the certificate request, type it here, exactly as you typed it on the request form

[Retrieve and Install Certificate](#)

[Home page](#)

- You will find the request was not successful because it is waiting for the administrator to approve it

Request was not successful



Please correct the problem or report the error to your Web admin person

IKYI002I SAF Service IRRSPX00 Returned SAF RC = 8 RACF RC = 8 RACF RSN = 56
Request is still pending approval or yet to be issued

[email: webmaster@your-company.com](mailto:webmaster@your-company.com)

Certificate not ready

B. Approve the certificate request

- Open another Internet Explorer browser to go to the same url (change xx to the number part of your assigned id):
<http://mvs1.centers.ihost.com:8041/Sharbxx/public-cgi/camain.rexx>
- This time you act as an administrator, click on the 'Go to Administration Page'
- When prompted for userid and password, use your assigned sharbxx userid and password

PKI Services Certificate Generation Application

[Install the CA certificate to enable SSL sessions for PKI Services](#)


Choose one of the following:

- Request a new certificate using a model
Select the certificate template to use as a model: 1-Year PKI SSL Browser Certificate
- Pick up a previously requested certificate
Enter the assigned transaction ID:
Select the certificate return type: PKI Browser Certificate
- Renew or revoke a previously issued browser certificate
- Administrators click here
 Administrator starts working

[email: webmaster@your-company.com](mailto:webmaster@your-company.com)

- Choose 'Show requests pending approval' and click on 'Find Certificates or Certificate Requests'

PKI Services Administration



Choose one of the following:

- Work with a single certificate request

Enter the Transaction ID:
- Work with a single issued certificate

Enter the Serial Number:
- Specify search criteria for certificates and certificate requests

Certificate Requests	Issued Certificates
<input type="radio"/> Show all requests	<input type="radio"/> Show all issued certificates
<input checked="" type="radio"/> Show requests pending approval	<input type="radio"/> Show revoked certificates
<input type="radio"/> Show approved requests	<input type="radio"/> Show suspended certificates
<input type="radio"/> Show completed requests	<input type="radio"/> Show expired certificates
<input type="radio"/> Show rejected requests	<input type="radio"/> Show active certificates (not expired, not revoked, not suspended)
<input type="radio"/> Show rejections in which the client has been notified	<input type="radio"/> Show disabled certificates (suspended or revoked, not expired)
<input type="radio"/> Show preregistered requests	<input type="radio"/> Show active, automatic renewal enabled certificates
	<input type="radio"/> Show active, automatic renewal disabled certificates
	<input type="radio"/> Show active, not renewable certificates


Additional search criteria (Optional)

Requestor's name

Show recent activity only:

Show certificates that will expire: (Only applicable to active certificates when recent activity is not selected)

- This shows the request summary
- Click on the Trans ID link to view the request details



Certificate Requests

Request summary info

The following certificate requests matched the search criteria specified:

All <input checked="" type="checkbox"/>	Requestor	Certificate Request Information	Status	Dates
<input checked="" type="checkbox"/>	jan27a	Trans ID: 1kA8sDZcZkZ2Tc----- Template: 1-Year PKI SSL Browser Certificate Subject: CN=jan27a, OU=Class 1 Internet Certificate CA, O=The Sharb01 Firm, C=US	Pending Approval	Created: 2011/01/27 Modified: 2011/01/27

Choose one of the following:

- Click on a transaction ID to see more information or to modify, approve, reject, or delete requests individually
- Select and take action against multiple requests at once


Action Comment (Optional)

- Approve without modification all requests selected above that are "Pending Approval"

- Reject all requests selected above that are "Pending Approval"

- Delete all requests selected above

- Notice that Subject name value has values coming from both the user input (the CN value) and the hard coded value in pkiserv.tmpl under the <CONSTANT> section (the OU and O values)
- Click on 'Approve Request with Modifications'



Single Request

Requestor: jan27a	Created: 2011/01/27
Status: Pending Approval	Modified: 2011/01/27
Transaction Id: 1kA8sDZcZjkZ2Tc++++++	Passphrase: a
Template: 1-Year PKI SSL Browser Certificate	

The Subject's name value comes from the user input and hardcoded value in pkiserv.tmpl

Subject:	CN=jan27a,OU=Class 1 Internet Certificate CA,O=The Sharb01 Firm,C=US
Issuer:	CN=Sharb01 CA,OU=Test,O=The Sharb01 Firm,C=US
Validity:	2011/01/27 00:00:00 - 2012/01/26 23:59:59
Usage:	handshake(digitalSignature, keyEncipherment)
Extended Usage:	clientauth
Fingerprints:	
SHA1:	99:56:1F:05:34:3A:3D:51:A2:F2:3A:DC:A0:E1:0F:F6:CC:72:19:79
MD5:	24:9F:4E:F6:D2:A1:FB:B8:E6:BB:37:F8:96:58:0D:97
SHA256:	A8:4F:8A:7B:74:74:28:84:27:9F:ED:95:79:95:16:D8:68:10:59:09:F5:54:5A:96:BA:41:5E:24:8F:3C:3F:F5
SHA512:	29:04:6C:5B:50:1C:D5:AC:A9:3C:A4:ED:04:4B:9A:B8:52:B5:16:6A:00:F6:7D:05:4E:8A:DC:B0:19:3F:48:4C:11:55:CD:7B:3B:9B:71:7C:4B:E0:0A:60:BB:0F:36:DC:B8:6B:D6:B1:49:F1:07:5C:61:08:B3:11:E5:C6:00:27

Request detail info

Action to take:

Action Comment (Optional)

Approve Request As It is

Reject Request

Delete Request

Approve Request with Modifications

- As an administrator, you can modify the info that the user input before you approve the request
- After the modification, if any, click on 'Approve with specified modifications'

Modify and Approve Request

Requestor	Request Information	Dates
jan27a	Trans ID:1kA8sDZcZjkZ2Tc++++++ Template:1-Year PKI SSL Browser Certificate Subject:CN=jan27a,OU=Class 1 Internet Certificate CA,O=The Sharb01 Firm,C=US	Created:2011/01/27 Modified:2011/01/27



You may modify the following fields by providing new values. To remove a field simply blank it out or de-select it.

• Subject Distinguished Name:

Common Name (optional)

Organizational Unit (optional)

Organizational Unit (optional)

Organization (optional)

Country

• Extensions:

Indicate the key usage for the certificate (optional)

Protocol handshaking, e.g. SSL (digitalSignature, keyEncipherment) ☐
 Certificate and CRL signing (keyCertSign, cRLSign) ☐
 Document signing (nonRepudiation) ☐
 Data encryption (dataEncipherment) ☐

Indicate the extended key usage the certificate

Server side authentication (serverAuth) ☐
 Client side authentication (clientAuth) ☐
 Code signing (codeSigning) ☐
 Email protection (emailProtection) ☐

HostIdMappings Extension value(s) in subject-id@host-name form (optional)

HostIdMappings Extension value(s) in subject-id@host-name form (optional)

HostIdMappings Extension value(s) in subject-id@host-name form (optional)

HostIdMappings Extension value(s) in subject-id@host-name form (optional)

• Validity Period:

Date certificate becomes valid Date certificate expires (at end of day)

2011 2012

Automatic Renewal:

Action Comment (Optional)

Approve with specified modifications

Reset Modified Fields

Page primed with
requested info.
Administrator can
change them if
necessary.

- You will get a confirmation that the request is approved
- Click on 'Administration Home Page' to take a look at the request status



- Choose 'Show all requests' and click on 'Find Certificates or Certificate Requests'

To display all the requests

Choose one of the following:

- Work with a single certificate request

Enter the Transaction ID:
- Work with a single issued certificate

Enter the Serial Number:
- Specify search criteria for certificates and certificate requests

Certificate Requests	Issued Certificates
<input checked="" type="radio"/> Show all requests	<input type="radio"/> Show all issued certificates
<input type="radio"/> Show requests pending approval	<input type="radio"/> Show revoked certificates
<input type="radio"/> Show approved requests	<input type="radio"/> Show suspended certificates
<input type="radio"/> Show completed requests	<input type="radio"/> Show expired certificates
<input type="radio"/> Show rejected requests	<input type="radio"/> Show active certificates (not expired, not revoked, not suspended)
<input type="radio"/> Show rejections in which the client has been notified	<input type="radio"/> Show disabled certificates (suspended or revoked, not expired)
<input type="radio"/> Show preregistered requests	<input type="radio"/> Show active, automatic renewal enabled certificates
	<input type="radio"/> Show active, automatic renewal disabled certificates
	<input type="radio"/> Show active, not renewable certificates

Additional search criteria (Optional)

Requestor's name:

Show recent activity only: ▼

Show certificates that will expire: ▼ (Only applicable to active certificates when recent activity is not selected)

- Notice that the status of the request became 'Approved'. If the certificate has been created, a serial number will also be displayed.
- Click on 'Re-specify Your Search Criteria' to check on the certificate

Certificate Requests



The following certificate requests matched the search criteria specified:

All <input checked="" type="checkbox"/>	Requestor	Certificate Request Information	Status	Dates
<input checked="" type="checkbox"/>	jan27a	Trans ID: 1kA8sDZcZjkZ2Tc++++++ Template: 1-Year PKI SSL Browser Certificate Subject: CN=jan27a,OU=Class 1 Internet Certificate CA,O=The Sharb01 Firm,C=US	Approved Serial #: 2	Created: 2011/01/27 Modified: 2011/01/27

Choose one of the following:

- Click on a transaction ID to see more information or to modify, approve, reject, or delete requests individually
- Select and take action against multiple requests at once

Action Comment (Optional)

Delete

- Delete all requests selected above

Respecify Your Search Criteria

Home Page

Request is approved. The presence of a serial number indicates the certificate is created.

- This time choose 'Show all issued certificates' and click on 'Find Certificates or Certificate Requests'

Choose one of the following:

- Work with a single certificate request

Enter the Transaction ID:

Process Request



- Work with a single issued certificate

Enter the Serial Number:

Process Certificate

To display all the certificates

- Specify search criteria for certificates and certificate requests

Certificate Requests

- ☐ Show all requests
- ☐ Show requests pending approval
- ☐ Show approved requests
- ☐ Show completed requests
- ☐ Show rejected requests
- ☐ Show rejections in which the client has been notified
- ☐ Show preregistered requests

Issued Certificates

- ☒ Show all issued certificates
- ☐ Show revoked certificates
- ☐ Show suspended certificates
- ☐ Show expired certificates
- ☐ Show active certificates (not expired, not revoked, not suspended)
- ☐ Show disabled certificates (suspended or revoked, not expired)
- ☐ Show active, automatic renewal enabled certificates
- ☐ Show active, automatic renewal disabled certificates
- ☐ Show active, not renewable certificates

Additional search criteria (Optional)

Requestor's name

Show recent activity only (Not Selected)

Show certificates that will expire (Not Selected) (Only applicable to active certificates when recent activity is not selected)

Find Certificates or Certificate Requests

- Similar info as in the request. The status of the certificate is 'Active' when it is created
- Click on the Serial # link to display certificate details



Issued Certificates

The following issued certificates matched the search criteria specified:

All <input checked="" type="checkbox"/>	Requestor	Certificate Information	Status	Key archived	Dates
<input checked="" type="checkbox"/>	jan27a	Serial #: 2 Template: 1-Year PKI SSL Browser Certificate Subject: CN=jan27a, OU=Class 1 Internet Certificate CA, O=The Sharb01 Firm, C=US	Active	No	Created: 2011/01/27 Modified: 2011/01/27

Choose one of the following:

Certificate summary info

- Click on a serial number to see more information or to perform action on a single certificate
- Select and take action against multiple certificates at once

Action Comment (Optional)

- Revoke all selected active certificates

- Suspend all selected active certificates

- Delete all selected certificates

This page can also be reached from the Serial # link appeared on the Certificate Requests page (p. 22)
Where do the values of Validity, Usage, Extended Usage come from? User input, pkiserv.tmpl or pkiserv.conf?



Single Issued Certificate

Certificate detail info

Requestor:	jan27a	Created:	2011/01/27
Status:	Active	Modified:	2011/01/27
Template:	1-Year PKI SSL Browser Certificate	PassPhrase:	a
Serial#:	3		
Previous Action Comment: Issued certificate			

Subject:	CN=jan27a,OU=Class 1 Internet Certificate CA,O=The Sharb01 Firm,C=US
Issuer:	CN=Sharb01 CA,OU=Test,O=The Sharb01 Firm,C=US
Validity:	2011/01/27 00:00:00 - 2012/01/26 23:59:59
Usage:	handshake(digitalSignature, keyEncipherment)
Extended Usage:	clientauth

Action to take:

Action Comment (Optional)

Revoke Certificate	No Reason <input type="button" value="v"/>
--------------------	--


C. Pick up the certificate

- Switch back to the user browser window and go to this page again (p.9)
- Enter the transaction ID, select 'PKI Browser Certificate' as the certificate return type and click on 'Pick up Certificate'

PKI Services Certificate Generation Application

[Install the CA certificate to enable SSL sessions for PKI Services](#)

Choose one of the following:



- **Request a new certificate using a model**

Select the certificate template to use as a model: 1-Year PKI SSL Browser Certificate

Request Certificate
- **Pick up a previously requested certificate**

Enter the assigned transaction ID: 1j9I3qJRQoNp2Tc++++++

Select the certificate return type: PKI Browser Certificate

Pick up Certificate
- **Renew or revoke a previously issued browser certificate**


Renew or Revoke Certificate
- **Administrators click here**

Go to Administration Page

[email: webmaster@your-company.com](mailto:webmaster@your-company.com)

- Enter the password that you entered when you made the request and click 'Retrieve and Install Certificate'

Retrieve Your PKI Browser Certificate



Please bookmark this page

Since your certificate may not have been issued yet, we recommend that you create a bookmark to this location so that when you return to this bookmark, the browser will display your transaction ID. This is the easiest way to check your status.

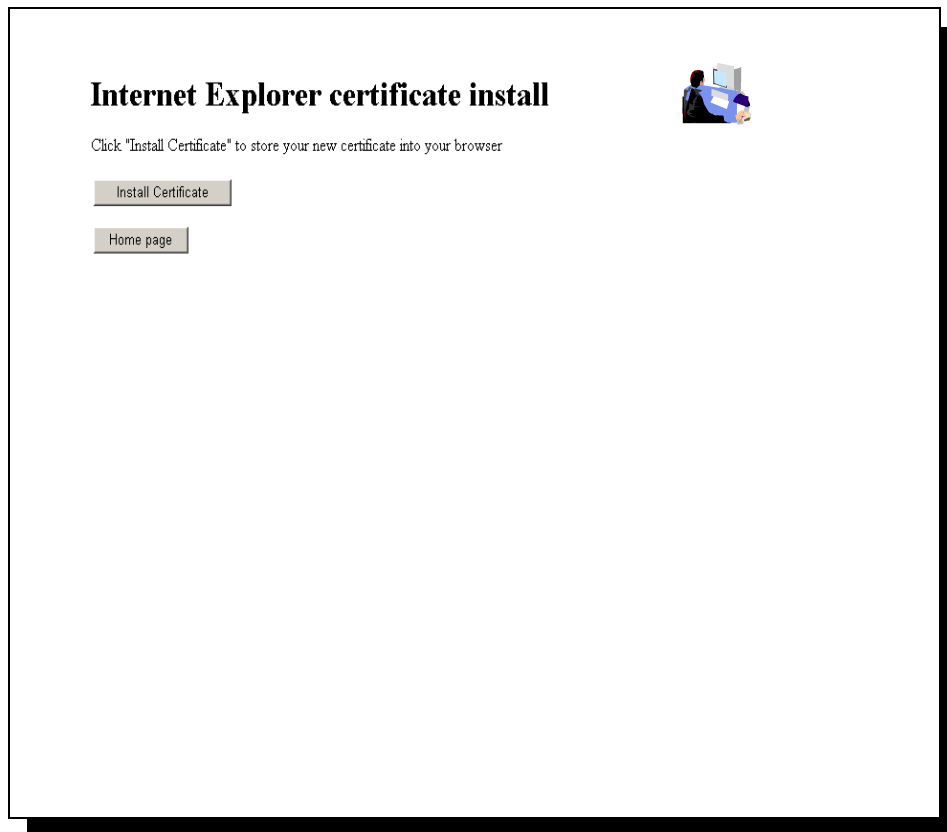
Enter the assigned transaction ID

If you specified a pass phrase when submitting the certificate request, type it here, exactly as you typed it on the request form

[Retrieve and Install Certificate](#)

[Home page](#)

- Click 'Install Certificate'
- Answer 'Yes' when you are asked whether you want to install the certificate(s)

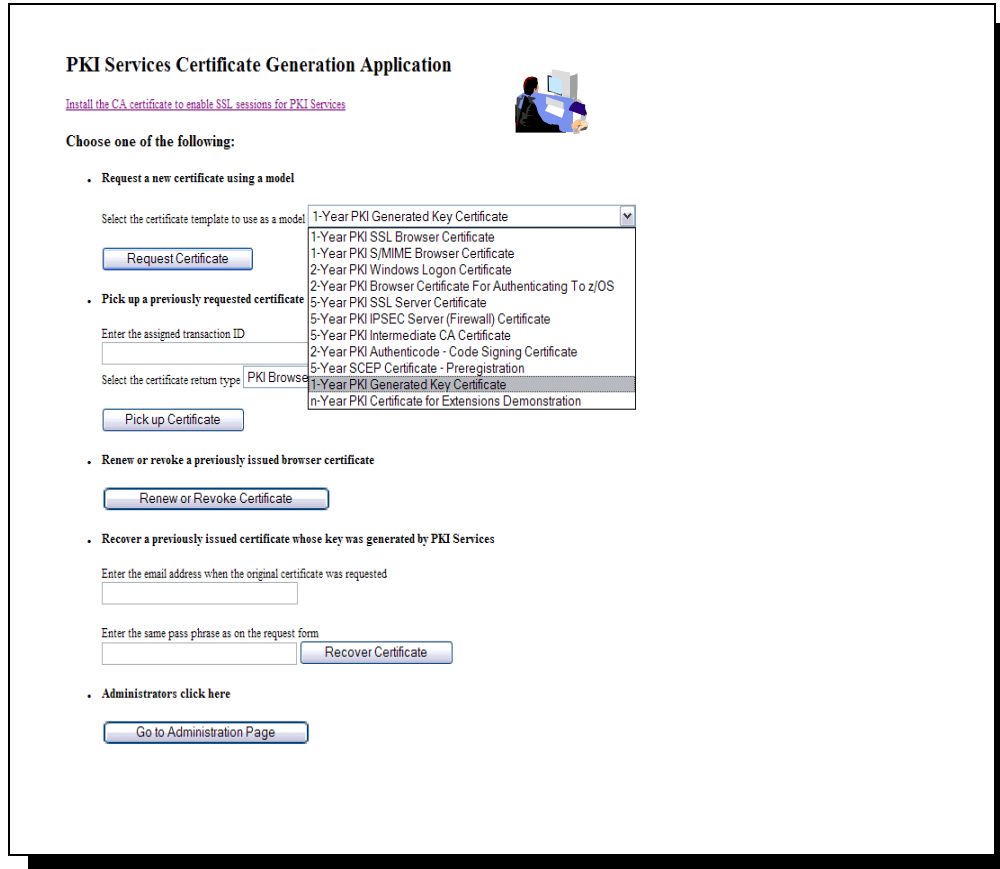


- You will look at the certificate you installed from the browser in Exercise 4.

Exercise 2 - Request a certificate with key pair generated by PKI Services

A. Submit a request

- Go to the main page again as in Exercise 1 (change xx to the number part of your assigned id):
<http://mvs1.centers.ihost.com:8041/Sharbxx/public-cgi/camain.rexx>
- Choose the '1 Year PKI Generated Key Certificate' template
- Click 'Request Certificate'



The screenshot shows the 'PKI Services Certificate Generation Application' web interface. At the top, there is a title and a link to 'Install the CA certificate to enable SSL sessions for PKI Services'. Below this, a section titled 'Choose one of the following:' lists four options:

- Request a new certificate using a model**: This option includes a dropdown menu for 'Select the certificate template to use as a model' and a 'Request Certificate' button. The dropdown menu is open, showing a list of templates: 1-Year PKI Generated Key Certificate, 1-Year PKI SSL Browser Certificate, 1-Year PKI S/MIME Browser Certificate, 2-Year PKI Windows Logon Certificate, 2-Year PKI Browser Certificate For Authenticating To z/OS, 5-Year PKI SSL Server Certificate, 5-Year PKI IPSEC Server (Firewall) Certificate, 5-Year PKI Intermediate CA Certificate, 2-Year PKI Authenticode - Code Signing Certificate, 5-Year SCEP Certificate - Preregistration, 1-Year PKI Generated Key Certificate (highlighted), and n-Year PKI Certificate for Extensions Demonstration.
- Pick up a previously requested certificate**: This option includes a text field for 'Enter the assigned transaction ID', a dropdown for 'Select the certificate return type' (set to 'PKI Browser'), a 'Pick up Certificate' button, and a 'Renew or Revoke Certificate' button.
- Recover a previously issued certificate whose key was generated by PKI Services**: This option includes a text field for 'Enter the email address when the original certificate was requested', a text field for 'Enter the same pass phrase as on the request form', and a 'Recover Certificate' button.
- Administrators click here**: This option includes a 'Go to Administration Page' button.

- Fill in the values for the certificate request information

- Select the key type and key size for PKI to generate key pair
- Click on 'Submit certificate request'

1-Year PKI Key Generated Certificate

Choose one of the following:

- Request a New Certificate

Enter values for the following field(s)

Enter the requestor's email address

Pass phrase for securing this request. You will need to supply this value when retrieving your certificate

Reenter your pass phrase to confirm

Common Name

Email address for distinguished name MAIL= attribute (optional)

Select the key type and key size

RSA - 512

RSA - 1024

RSA - 2048

RSA - 4096

NISTECC - 192

NISTECC - 224

NISTECC - 256

NISTECC - 384

NISTECC - 521

BPECC - 160

BPECC - 192

BPECC - 224

BPECC - 256

Submit certificate request

Clear

Issued Certificate

certificate

email=

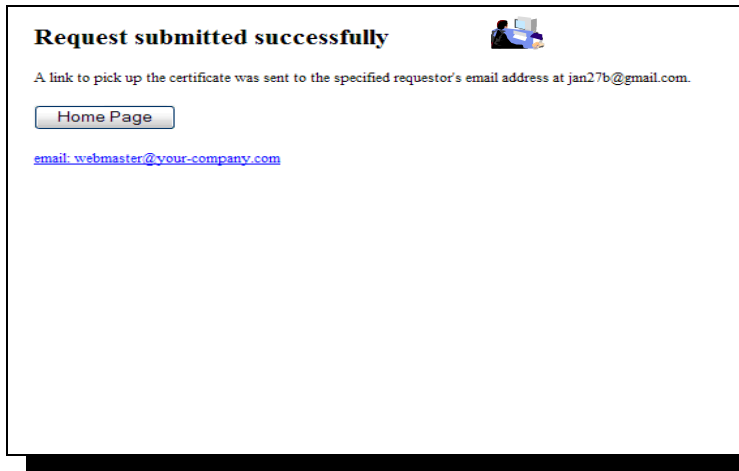
my.com

Fill in the info

These input fields are controlled by the <CONTENT> entries on p7

Select the key type and key size for PKI to generate public/private key pair.

- Unlike the browser generated key certificate, you do not get back a transaction ID on this page




- Note: The lab system won't allow the sending out of email. We will use the administrator role to get the transaction ID to retrieve the certificate.

B. Approve the request

- Go to the administrator's page to approve the request the same way you just did as in Exercise 1

- Save the Transaction Id from the request detail page. (You will need it to retrieve the certificate in Step C later.)



Single Request

Requestor: jae27b@gmail.com	Created: 2011/01/27
Status: Approved	Modified: 2011/01/27
Transaction Id: 1E68Yf6AwZ2Tc*****	Passphrase: a
Template: 1-Year PKI Generated Key Certificate	NotifyEmail: jae27b@gmail.com
Serial #: 4	

Request detail info

Subject: CN=jae27b,OU=Class 1 Internet Certificate CA,O=The Sharb01 Firm,C=US
 Issuer: CN=Sharb01 CA,OU=Test,O=The Sharb01 Firm,C=US
 Validity: 2011/01/27 00:00:00 - 2012/01/26 23:59:59
 Usage: handwritten(digitalSignature, keyEncipherment)
 Extended Usage: not specified

Action to take:

Action Comment (Optional)

[Delete Request](#)

[Administration Home Page](#)

[Home Page](#)

- Notice that the Key archived column for this certificate is Yes since the key pair was generated by PKI Services and PKI keeps a copy of it.

Issued Certificates



The following issued certificates matched the search criteria specified:

All <input checked="" type="checkbox"/>	Requestor	Certificate Information	Status	Key archived	Dates
<input checked="" type="checkbox"/>	jan27a	Serial #: 3 Template: 1-Year PKI SSL Browser Certificate Subject: CN=jan27a, OU=Class 1 Internet Certificate CA, O=The Sharb01 Firm, C=US	Active	No	Created: 2011/01/27 Modified: 2011/01/27
<input checked="" type="checkbox"/>	jan27b@gmail.com	Serial #: 4 Template: 1-Year PKI Generated Key Certificate Subject: CN=jan27b, OU=Class 1 Internet Certificate CA, O=The Sharb01 Firm, C=US	Active	Yes	Created: 2011/01/27 Modified: 2011/01/27

Choose one of the following:

- Click on a serial number to see more information or to perform action on a single certificate
- Select and take action against multiple certificates at once

Certificate summary info

Action Comment (Optional)

- Revoke all selected active certificates

- Suspend all selected active certificates

- Delete all selected certificates


C. Pick up the certificate

- Go back to the user home page to retrieve the PKI key generated certificate. Paste the Transaction ID and select 'PKI Key Certificate' as the certificate return type. Click on Pick up Certificate.

PKI Services Certificate Generation Application

[Install the CA certificate to enable SSL sessions for PKI Services](#)

Choose one of the following:



- Request a new certificate using a model

Select the certificate template to use as a model:

Request Certificate
- Pick up a previously requested certificate

Enter the assigned transaction ID

Select the certificate return type:

Pick up Certificate
- Renew or revoke a previously issued browser certificate

Renew or Revoke Certificate
- Recover a previously issued certificate whose key was generated by PKI Services

Enter the email address when the original certificate was requested

Enter the same pass phrase as on the request form

Recover Certificate
- Administrators click here

Go to Administration Page

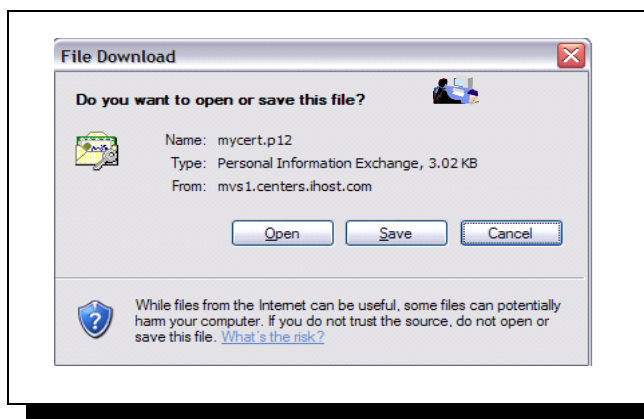
- Note: In real system, the end user will reach this page by clicking on the link sent to his email address
- Enter the pass phrase you entered when you made the request

Retrieve Your PKI Key Certificate

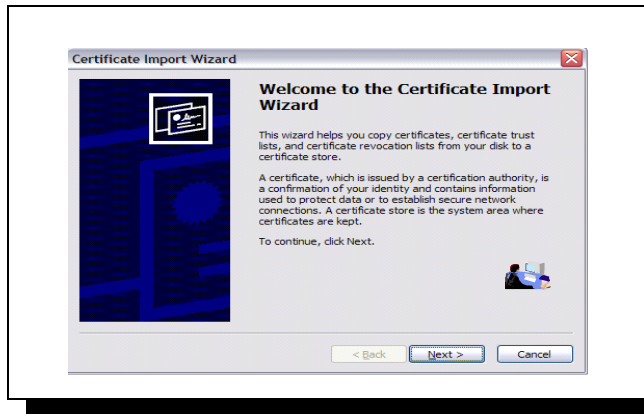
Enter the assigned transaction ID
1kA8YYeAwtcZ2Tc*****

If you specified a pass phrase when submitting the certificate request, type it here, exactly as you typed it on the request form

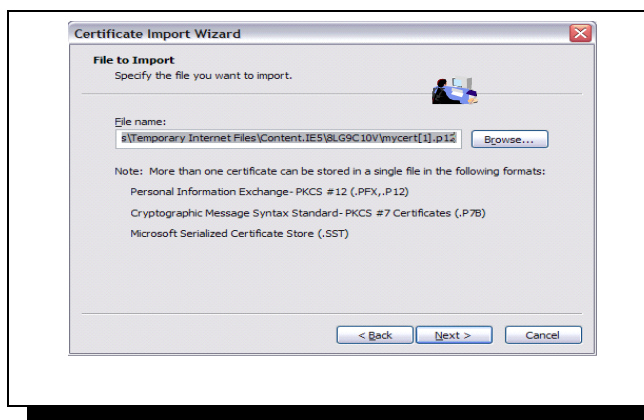
- Click Open.



- Click Next.



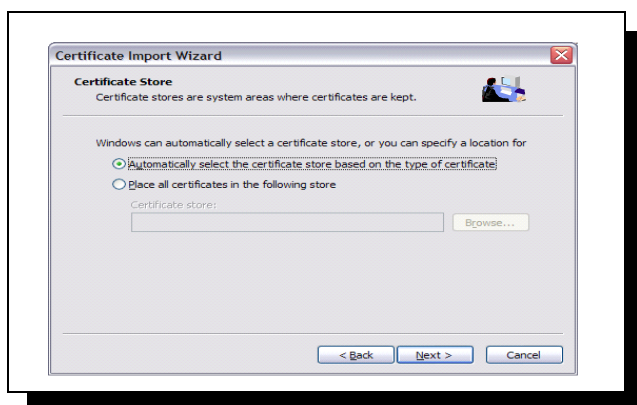
- Click Next.



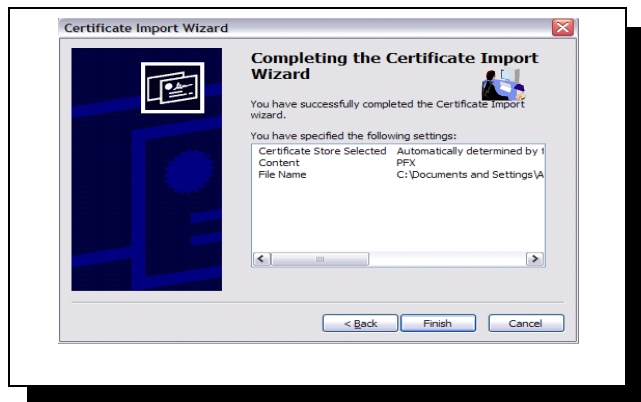
- Enter the password and check the key as exportable.



- Click Next.



- Click Finish.



- You will look at the certificate you installed from the browser in Exercise 4.

Exercise 3 - Request a certificate with key pair generated on z/OS

A. Create a request



- Log on the MVS system (See Appendix 1)
- Go to ISPF panel, enter option 6

```
File Edit View Communication Actions Window Help
----- SHARE ISPF 5.9 SCROLLABLE PRIMARY OPTION MENU ----- S1
OPTION ==> 6_

D Alternate Dialog ==> CMD(%????)
D2 Alternate Dialog ==> PANEL(????)

More:
The time is 12:30 p.m. on Tuesday, July 22, 2008 (2008.204)
Your uid is SHARB01 dsn prefix is SHARB01 proc is SHARE sys is S1

0 SETTINGS - Specify ISPF parameters
1 VIEW - View source data or output listing
1P VIEW-OE - View/Browse files in the Open Edition file system
2 EDIT - Create or change source data
2P EDIT-OE - Edit files in the Open Edition file system
3 UTILITIES - Perform utility functions
3P ISHELL-OE - Open Edition ISPF shell
4 FOREGROUND - Invoke language processors in foreground
5 BATCH - Submit job for language processing
6 COMMAND - Enter TSO command, CLIST, or REXX exec
7 DIALOG TEST - Perform dialog testing
8 LM UTILITIES - Perform library administrator utility functions
9 IBM PRODUCTS - Additional IBM program development products
10 SCLM - Software Configuration and Library Manager
```

- From ISPF 6, enter the RACDCERT command to create a certificate request by 2 commands: (Note: Values are case sensitive within quotes)
 - RACDCERT id(Sharbxx) GENCERT SUBJECT(CN('MySSLCertxx')) WITHLABEL('MySSLCertxx')
 - RACDCERT id(Sharbxx) GENREQ(LABEL('MySSLCertxx')) DSN(myssl)

```
Menu List Mode Functions Utilities Help

ISPf Command Shell
Enter TSO or Workstation commands below:

==> RACDCERT id(Sharbxx) GENCERT SUBJECT(CN('MySSLCertxx'))
WITHLABEL('MySSLCertxx')
```

```

Menu List Mode Functions Utilities Help
-----
ISPF Command Shell
Enter TSO or Workstation commands below:

==> RACDCERT id(Sharbxx) GENREQ(LABEL('MySSLCertxx')) DSN(myssl)

```

- PF3 to exit out option 6 and go to ISPF 3.4, hit enter

```

File Edit View Communication Actions Window Help
-----
SHARE ISPF 5.9 SCROLLABLE PRIMARY OPTION MENU ----- S1
OPTION ==> 3.4_

D Alternate Dialog ==> CMD(%????)
D2 Alternate Dialog ==> PANEL(????)

The time is 12:45 p.m. on Tuesday, July 22, 2008 (2008.204)
Your uid is SHARB01 dsn prefix is SHARB01 proc is SHARE sys is S1

0 SETTINGS - Specify ISPF parameters
1 VIEW - View source data or output listing
1P VIEW-OE - View/Browse files in the Open Edition file system
2 EDIT - Create or change source data
2P EDIT-OE - Edit files in the Open Edition file system
3 UTILITIES - Perform utility functions

```

- enter 'Sharbxx.myssl' on the 'Dsnname Level' input line and hit enter

```

Menu RefList RefMode Utilities Help
-----
Data Set List Utility

Option ==> _____ More: +

blank Display data set list P Print data set list
V Display VTOC information PV Print VTOC information

Enter one or both of the parameters below:
Dsnname Level . . . SHARBxx.myssl
Volume serial . . . _____

```

- Put letter 'e' next to 'Sharbxx.myssl'
- Select its entire content by using the mouse. Click on Edit->Copy. This will be used to paste on the PKCS#10 Certificate Request box in the following steps.

```

***** ***** Top of Data *****
==MSG> -Warning- The UNDO command is not available until you change
==MSG>          your edit profile using the command RECOVERY ON.
000001 -----BEGIN NEW CERTIFICATE REQUEST-----
000002 MIIBhTCB7wIBADAWMRQwEgYDVQQDEwtNWVNTTENFULQwMTCBnzANBgkqhkiG9w0B
000003 AQEFAA0BjQAwgYkCgYEA0C8ulvTwd0ywl/T9dyRgkbuR7765h3R406tZWgpp2YaM
000004 cXw0DjQkckHQgWqwr/FXHCbh/IJkFTa3B5cGKEIL1PQBJH1hCfDH6Kb311vFaYCb
000005 svELyRofKVSI tUL54Q/ZREuczpcKcv8dMJsr33CZQW/uViqou0Q4DFHdZD2LoJMC
000006 AwEAAaAwMC4GCSqGS Ib3DQEJDjEhMB8wHQYDVR00BBYEF00H9DduigJsku3i1IVF
000007 z2aHQmopMA0GCSqGS Ib3DQEBBQUAA4GBAGcCY/fJUqr1gj36sRiBdGfj33y18XJn
000008 fBWIZ4g8N0En76+iVtTdxP0a4ZIH4A+ncaEq29H6ckIloXAsCHSuNENdYP+vGicH
000009 0tVe4tYcovvmVSwKoj1jmiZc55DMh2gebYmkqqvNbvizPdjs/aj8iWA5AyxHOPw
000010 th59aL4s0fyg
000011 -----END NEW CERTIFICATE REQUEST-----
***** ***** Bottom of Data *****

```


- Don't exit out of this file, leave it there.

B. Submit the request

- Go to the PKI Services Start page (p.9). This time choose the '5 Year PKI SSL Server Certificate' template and click on 'Request Certificate'.

PKI Services Certificate Generation Application

[Install the CA certificate to enable SSL sessions for PKI Services](#)



Choose one of the following:

- Request a new certificate using a model

Select the certificate template to use as a model

5-Year PKI SSL Server Certificate

1-Year PKI SSL Browser Certificate

1-Year PKI S/MIME Browser Certificate

2-Year PKI Windows Logon Certificate

2-Year PKI Browser Certificate For Authenticating To z/OS

5-Year PKI SSL Server Certificate

5-Year PKI IPSEC Server (Firewall) Certificate

5-Year PKI Intermediate CA Certificate

2-Year PKI Authenticode - Code Signing Certificate

5-Year SCEP Certificate - Preregistration

1-Year PKI Generated Key Certificate

n-Year PKI Certificate for Extensions Demonstration

Request Certificate
- Pick up a previously requested certificate

Enter the assigned transaction ID

Select the certificate return type

PKI Browser

Pick up Certificate
- Renew or revoke a previously issued browser certificate

Renew or Revoke Certificate
- Recover a previously issued certificate whose key was generated by PKI Services

Enter the email address when the original certificate was requested

Enter the same pass phrase as on the request form

Recover Certificate
- Administrators click here

Go to Administration Page

This time, let's try to
get a SSL Server cert

- Fill in the information

5-Year PKI SSL Server Certificate

Choose one of the following:

- Request a New Certificate

Enter values for the following field(s)

Your name for tracking this request (Optional)

Email address for notification purposes (Optional)

Pass phrase for securing this request. You will need to supply this value when retrieving your certificate

Reenter your pass phrase to confirm

Email address for distinguished name MAIL= attribute (Optional)

Common Name (Optional)

Organizational Unit (Optional)

Street address (Optional)

Locality (Optional)


State or Province (Optional)

Zipcode or postal code (Optional)

Country (Optional)


Email address for alternate name (Optional)

Domain name for alternate name (Optional)



Fill in info just like the browser cert case except...

- Paste the request from the 'Sharbxx.myssl' dataset
- Click on 'Submit certificate request' and save the transaction ID (see p.13)
- Go to the Administrator pages to approve this request in the same way you did in the browser certificate case



Uniform Resource Identifier for alternate name (Optional)

IP address for alternate name in dotted decimal form (Optional)

Base64 encoded PKCS#10 certificate request

Paste the request here

```

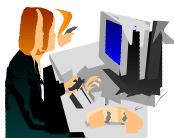
MIIBfTCB5wIBADACM2wCgYDVQQDEwN3YXVwZ28wDQYJKoZIhvcNAQEBBQADgY0A
MIGJAoGBARMTbi4MmQ0cN37iGqk++0OQ3S+J/0yqnP9wgeazossRX9dJHMF2o2Q
PqbRXwEx+vgFjLHZ82dHbBbXQJ7zmXLwTEw6H8bf1BFYigPe:Rmjn+0HaLQw0Fon
9wvVNVlQh3wojC9OENT5J6cavhHkvY8XTnmj6zMAVY2+QA/XuNYlqMBAAgMDAu
BqkqkhiG9w0BCQ4xITAFMB0GALUdDgQWBBRhu1ZQyMtwTgDhRI2g+9xPDI21kjAN
BqkqkhiG9w0BAQUFAA0BgQBeTu4hH9punDv+eQ+Iaxtm4VSM2kkCvo/aM3h2uw1O
z4AricBWF9SCA2pchr9gg0ThauX503gHiELnEx6bP/MDboQVumzEFkfQBL+9KTKU
1hy1rdK4LaM4mjEMVvvi1f2JxQ/Q2aAeVrhMxfHKT3dJq2v7KwceUUKID2FVf0x
GQ==
-----END NEW CERTIFICATE REQUEST-----

```

• Pick Up a Previously Issued Certificate

[email: webmaster@your-company.com](mailto:webmaster@your-company.com)

C. Approve the request




- Same steps as in the previous exercises

D. Pick up the certificate

- Retrieve the certificate in the same way shown on p. 26 and p. 27, except that this time you choose 'PKI Server Certificate' as the return type.
- Highlight the content to copy. (You may need to copy the entire content in parts.)

Here's your Certificate. Cut and paste it to a file

```
-----BEGIN CERTIFICATE-----
MIIGhwY3KoZlIhvcNAQCoIIGeDCCBnQCAQEXADALBgkqhkiG9w0BBwGgggZcMIID
9TCCA16gAwIBAgIBBDAwBgkqhkiG9w0BAQUFADAYMzQwQGVVQGVVUzEEMMAoG
A1UEChM5UjNHRUwEwYVUQQLFwYU1BZDZKJ0IEF1dGgwHhcNMjQxMDA2MDAwMDAw
WbcnNDcxNDAAUjE1OTU5YjBGMzQwQGVVUzEEMMAoGAIUECRHITw3IF1V
cmwFTATBwNAQCoIIGeDCCBnQCAQEXADALBgkqhkiG9w0BAQUFADAYMzQwQGVV
ZKXIw2BwQGVU3KoZlIhvcNAQCoIIGeDCCBnQCAQEXADALBgkqhkiG9w0BAQUF
eF4zLw4ADBgYU1IP/Tc+Tj3T6c5mYU7EwGpA1EwPc8W6KWLROM31HwYU1B
oG9O/FrcrHcKvP5Q6CvbxvqZnA1M4K6G1B9v6ev21fLAH9OJNLAmJcC2/h
EhB0edQ4RL6VCFzr8o2B8gMBAAGjggHTMIIB8zApBgNVHRETIjAghhhodHRwOi8v
d3d3LnJ1Z2N1cnZlc15b22HBAl7LUMwYVUVR0PQAQ/HBAQDAGUwMENGAIUjQCM
MAoGCCsGAQUFBwMBMIIBYwYVUVR0dEIBWjCCAVTWSABH0EwKQzBBMzQwQGVUQGV
DAJVVUzEEMMAoGAIUECgwdSUJNHRUwEwYVUQQLDAXIUIBDZKJ0IEF1dGgwDALTALBgNV
BAMNBENSTDEwXaBboFmGVZxkYXA6Ly85LjU2LjU0LjEzMDozODkxQGVUQGVUQGV
VT1U1UyMEN1cnZlc15b22HBAl7LUMwYVUVR0dEIBWjCCAVTWSABH0EwKQzBBMzQwQGV
aW9uTG1zdDBoG6gbY2RbGRhcDovL215b3RoZXJse2ZGwc2VydG9maW50YVUVR0dEIBWj
eS5jb206Zm9uZS50N0F1UNSTDEwYU1U1UyMEN1cnZlc15b22HBAl7LUMwYVUVR0dEIBWj
P21cnR2m1jYXR1UmV2b2NhdG1vbkcpc3QwN6A1oDOOHNh0dHA6Ly93d3cuXlJ1
b21wYVU5LmVhbnN5S9S001T2XJ2L2NhY2VydHMvQ1UjMMS5jcmwHQTVUVR0OB8YEFFp6
TEC8zJ0Gnu/1vJWmJqx/S2+NH88GA1U0IwQYBAAFLdu6pMU19gTBPAXMeK3zu12
H+arMA0GCCsGIB3DQEBBQUAA6BAdp36b10eBL+2GQnd9EQGKYP5srPYoALJ08
LP3ug05s11R5SmtN8Um356J2fwt/46UP6zmDmn3hXAc6cwh1VTHRpKzIQHEx+02
15L/XZ/Su8QCFH8K7a1S2+4eppco016/YxHEH1+SqChv5/oeabH2EzocSNw18b
n/zKHevMIICXCCc1gAwIBAgIBBDAwBgkqhkiG9w0BAQUFADAYMzQwQGVVQGV
FwYU1U1UyMEN1cnZlc15b22HBAl7LUMwYVUVR0dEIBWjCCAVTWSABH0EwKQzBBMzQwQGV
NDAAQDQwMDAwHhcNMjQxMDA2MDAwMDAwWbcnNDcxNDAAUjE1OTU5YjBGMzQwQGV
CHM5UjNHRUwEwYVUQQLFwYU1BZDZKJ0IEF1dGgwZ8wDQY3KoZlIhvcNAQCoIIGeDCCBn
gTOAIGJaoGBALAb2JUN/FwYU1U1UyMEN1cnZlc15b22HBAl7LUMwYVUVR0dEIBWjCCAVT
Q1Phw61cQURSTW+uxnXJg560QA0c4we1Fr+GRm61Sa311/Yt4oIeIDAgMBAAGj
gTYQwYUwYU1U1UyMEN1cnZlc15b22HBAl7LUMwYVUVR0dEIBWjCCAVTWSABH0EwKQzBBMzQwQGV
U2VydG9maW50YVUVR0dEIBWjCCAVTWSABH0EwKQzBBMzQwQGVU2VydG9maW50YVUVR0dEIBWj
BAUwAwEB/zAdBgNVHQ4EFgQUc27qkxQj2AgEA9cx4cf07Vks5qswDQYU3KoZlIhvcN
AQEFBQADgYEAqUtnDcf7GUaww7hBk5XWbObstSN/A/P2mVFs7mspJ3T311dbE+I
Ipf4kRFrucN6hIFdW0Yfncp71BbVH8dF/OnMwBGMsFEhLcF6Fjw12ovCbWVqC1AE
-----END CERTIFICATE-----
```



The cert is returned in B64 format for you to cut and paste it to a file from the server side. You may not be able to paste the entire content into the server dataset. Do it in parts OR use a function provided by PCOMM: Edit->Paste, Paste Next.

email_webmaster@your-company.com

E. Install the certificate in the server

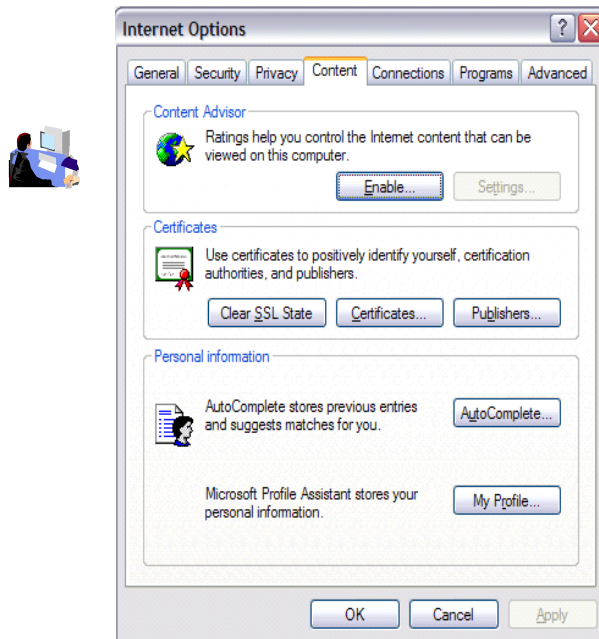
Page 47 of 66

- Go back to the MVS system, the content of the 'Sharbxx.myssl' should be still displaying. Replace the content of the 'Sharbxx.myssl' dataset with this copied content by deleting its original content and *paste the new content. (*This is a convenient way so that we don't have to allocate another dataset for this.*)
 - ***A neat trick to paste multiple pages: Click on Edit->Paste, Edit->Paste Next***
- Save the file by hitting PF3
- Go to ISPF 6, enter the following command to replace the original self-signed certificate with this one issued by PKI Services
 - RACDCERT ID(Sharbxx) ADD('Sharbxx.myssl')

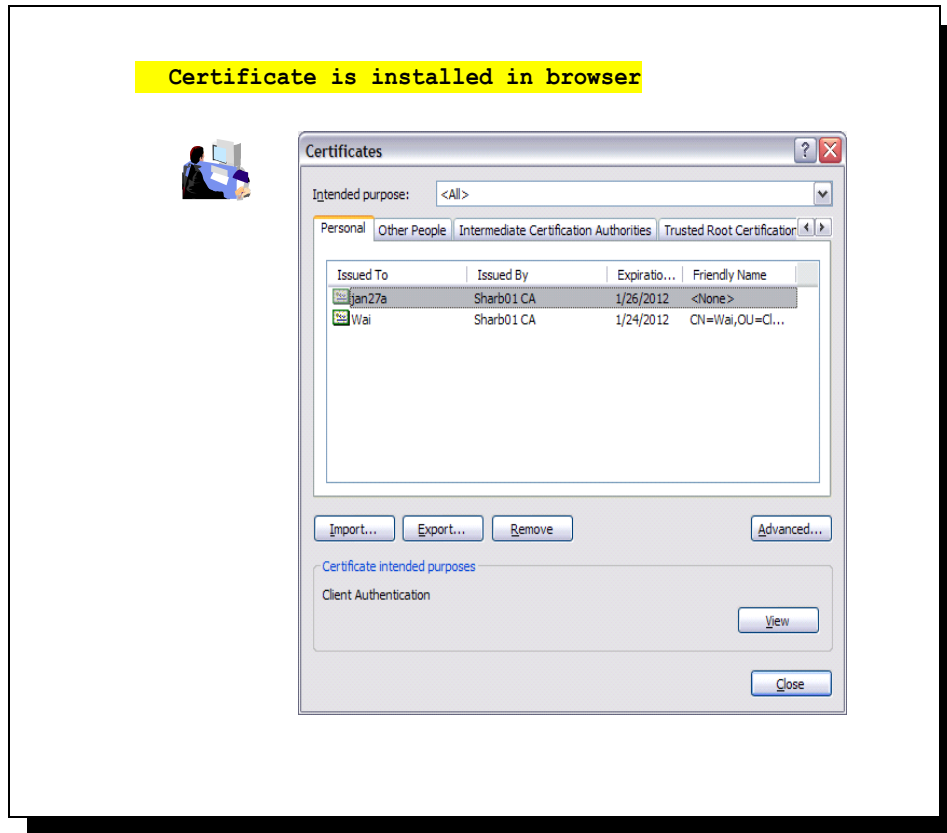
(You will get a warning message IRRD113I about incorrect range. That's fine since the CA cert in this lab was set up to have a very short validity period.)

Exercise 4 - View the installed certificate from the IE browser

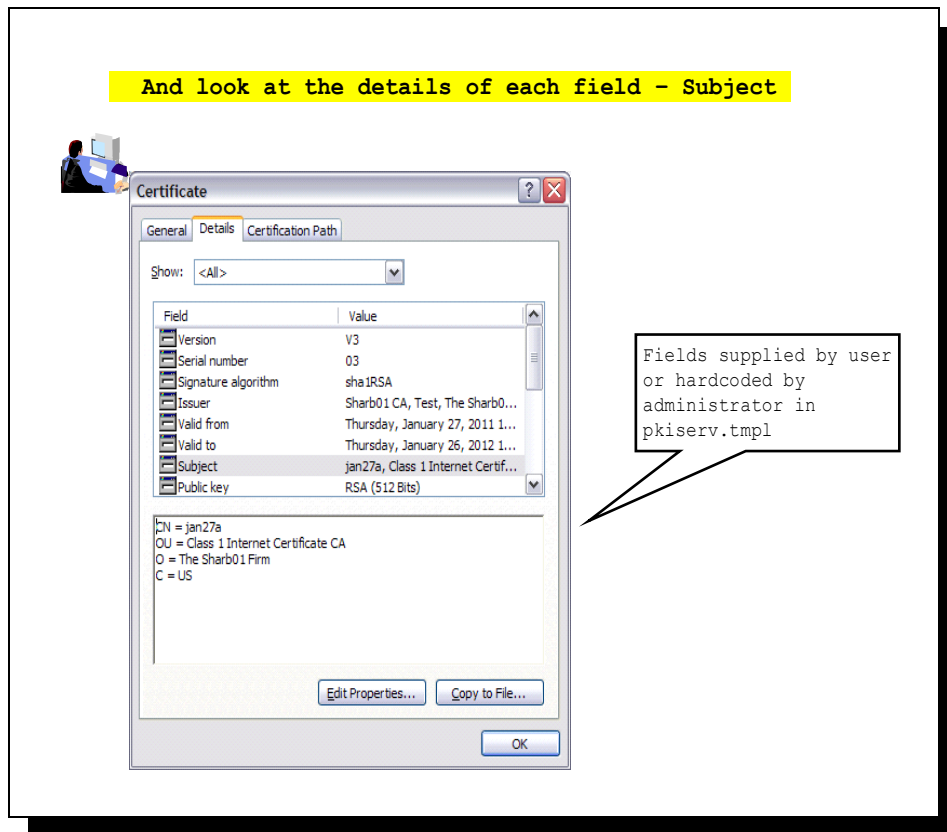
- From IE, click on Tools -> Internet Options...
- Go to the Content tab
- Click on 'Certificates'



- Go to the 'Personal' tab and find the certificate you have just installed. Find it by the name you entered when you made the request
- Click on 'View' and go to the 'Details' tab' to look at some certificate details

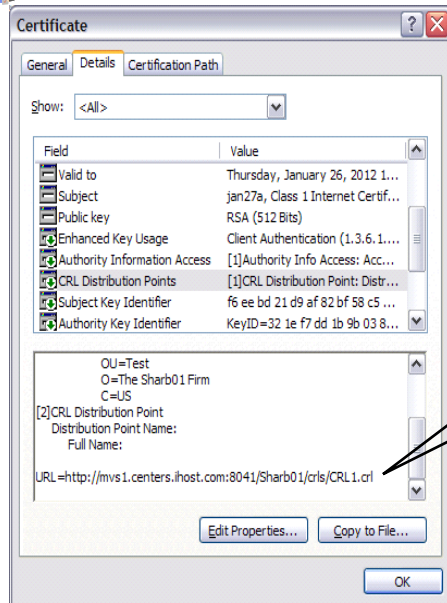


- Highlight the entry you want to see, eg. When Subject is highlighted, you can see all the components of the certificate subject name



- CRL Distribution Points shows the URL of the Certificate Revocation List (You will make use of it in Exercise 6)

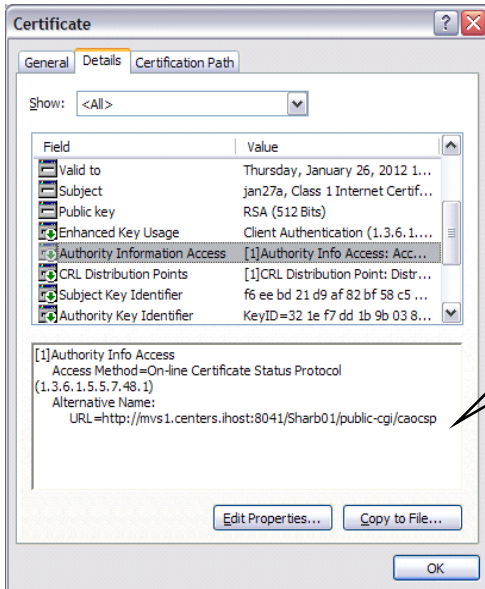
And look at the details of each field - CRL DP location



This is set up in
pkiserv.conf

- Authority Information Access shows the URL of the Online Certificate Status Protocol responder (You will need this in Exercise 6)

And look at the details of each field - OCSP location



This is hardcoded by administrator in pkiserv.tpl

Exercise 5 - Suspend a certificate by the administrator

(Both the end user and the administrator can revoke/suspend a certificate. The user can act on his own certificate while the administrator can act on any.)

Both revoke and suspend will cause the certificate to be posted to a CRL. But the suspended one will not appear on the next CRL if the administrator resumes it.)

- This shows the administrator path. Go to the page to display the certificate details and click on 'Suspend Certificate' (p. 23 – 25)
(If the user wants to suspend his own certificate, he can go to 'Home page' (p.9) and click on 'Renew or Revoke Certificate' and go through the subsequent pages)
- You may check the result. Click on 'Administration Home Page' which will bring you to p.16. Choose 'Show all issued certificates'. You will see that the status is now displayed as 'Suspended' instead of 'Active'

The screenshot displays the 'Single Issued Certificate' page. At the top right, there is a small icon of a person at a computer. The main content area is divided into two sections. The top section shows certificate details for 'jan27a', with the status 'Active' circled in red. The bottom section, titled 'Action to take:', contains several buttons: 'Revoke Certificate' (with a 'No Reason' dropdown), 'Suspend Certificate' (circled in red), 'Disable Automatic Renewal', 'Enable Automatic Renewal', and 'Delete Certificate'. A yellow callout box with the text 'Status changes from Active to Suspended' has an arrow pointing from the 'Active' status in the top section to the 'Suspended' status in the bottom section. The bottom section also shows the same certificate details, but the status is now 'Suspended'.

Single Issued Certificate

Requestor: jan27a Created: 2011/01/27
Status: Active Modified: 2011/01/27
Template: 1-Year PKI SSL Browser Certificate PassPhrase: a
Serial #: 3
Previous Action Comment: Issued certificate

Subject: CN=jan27a,OU=Class 1 Internet Certificate CA,O=The Sharp01 Firm,C=US
Issuer: CN=Sharp01 CA,OU=Test,O=The Sharp01 Firm,C=US
Validity: 2011/01/27 00:00:00 - 2012/01/26 23:59:59
Usage: handshake/digitalSignature, keyEncipherment
Extended Usage: clientauth

Action to take:

Action Comment (Optional)

Revoke Certificate No Reason

Suspend Certificate

Disable Automatic Renewal

Enable Automatic Renewal

Delete Certificate

Requestor: jan27a Created: 2011/01/27
Status: Suspended Modified: 2011/01/27
Template: 1-Year PKI SSL Browser Certificate PassPhrase: a
Serial #: 3
Previous Action Comment:

Exercise 6 - Check the status of a certificate outside PKI Services



- *through Certificate Revocation List (CRL)*
 - *this is a snap shot of all the revoked/suspended certificates at the time of the query. Depending on the time the CRL is refreshed, a revoked certificate may not appear on the list*
- *through Online Certificate Status Protocol (OCSP)*
 - *this provides the live status of a certificate at the time of the query*

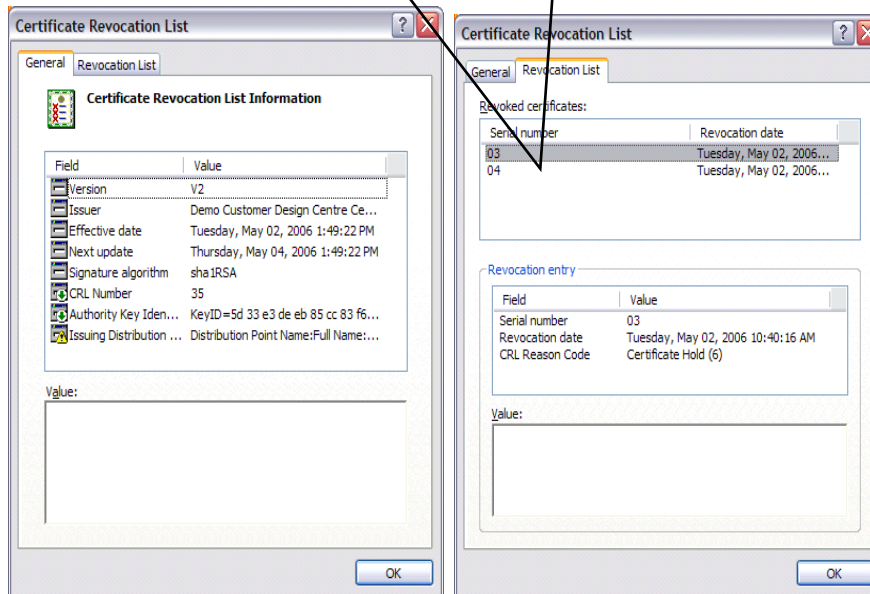
Note: *In this lab, in addition to the roles of the certificate owner and the PKI Services administrator, you also play the role of any third party who wants to verify your certificate's status. In this lab setup, you can export the certificate you've just created, and its issuers' chain in the way described below. But in the real world, the third party needs to get all the related certificates in different ways, eg. get them from some public directory like LDAP.*

Method 1: Check the certificate status through CRL

- Open an IE browser and enter the url displayed in the CRL Distribution Point field in the certificate you have installed (p.29, 30, 32) in Exercise 1 and click Open when prompted
- Click on the 'Revocation List' tab to look at the list of serial numbers of revoked/suspended certificates
(If you don't find the certificate you just revoked, wait for a few minutes and try again. You need to wait until the next CRL is posted. Where is the posting interval of CRL set? pkiserv.tmpl or pkiserv.conf?)

Go to <http://mvs1.centers.ihost.com:8041/Sharbxx/crls/CRL1.crl>

Cert with serial no. 3 and 4 are revoked or suspended



Method 2: Check the certificate status through OCSP

- Export the **user certificate** from Exercise 1 (do not export the private key) from the browser. Click on 'Export' on p. 48 under the 'Personal' tab. Save it to **c:\temp\mycert.cer** in Base-64 format (click the 2nd radio button when you are asked on the export format).
- Export its **signer certificate** from the browser. Click on 'Export' on p. 48 under the 'Intermediate Certification Authorities' tab. Its name should be Sharbxx CA (xx is the number part of your assigned id). Save it to **c:\temp\mycacert.cer** in Base-64 format also.
- Export the **root certificate**. Click on 'Export' on p. 48 under the 'Trusted Root Certification Authorities' tab. Its name should be 'Demo Customer Design Centre Certificate Authority'. Save it to **c:\temp\cacert.cer** in Base-64 format too.

(We will use the openssl command to send a status request to the PKI Services responder.

To save the typing, a batch file named 'statusof' that contains the command which expects 2 parameters (file contains the user cert and part of URL identifying your system) is placed under \openssl\bin. (The openssl command syntax is in the Appendix 2).)

- Open a Windows Command processor window,
 - enter 'cd \openssl\bin'
 - enter 'statusof c:\temp\mycert.cer xx' (xx is the number part of your assigned id)

- Look at the Serial Number, Cert Status and Revocation Reason
- The first box shows the status after the certificate is suspended – revoked status with reason 6 means suspension
- The second box shows the status of the same certificate after it is resumed (Go to the Single Issued Certificate page

Get the status from OSCP using openssl...

```

OCSP Response Data:
  OSCP Response Status: successful (0x0)
  Response Type: Basic OCSP Response
  Version: 1 (0x0)
  Responder Id: 0 = The Share03 Firm, OU = Test, CN = Share03 CA
  Produced At: Dec  7 03:13:46 2006 GMT
  Responses:
    Certificate ID:
      Hash Algorithm: sha1
      Issuer Name Hash: 1BA48167FFFD2EC4D90BB2E1F66B109E055C34BE
      Issuer Key Hash: ACDD82434055FF87FFB8790B3F09AED8A3EB0816
      Serial Number: 01
    Cert Status: revoked    Cert 01 is suspended (from reason 0x6)
    Revocation Time: Dec  6 22:36:04 2006 GMT
    Revocation Reason: certificateHold (0x6)
    This Update: Dec  7 03:13:46 2006 GMT
  
```

```

OCSP Response Data:
  OSCP Response Status: successful (0x0)
  Response Type: Basic OCSP Response
  Version: 1 (0x0)
  Responder Id: 0 = The Share03 Firm, OU = Test, CN = Share03 CA
  Produced At: Dec  7 03:27:54 2006 GMT
  Responses:
    Certificate ID:
      Hash Algorithm: sha1
      Issuer Name Hash: 1BA48167FFFD2EC4D90BB2E1F66B109E055C34BE
      Issuer Key Hash: ACDD82434055FF87FFB8790B3F09AED8A3EB0816
      Serial Number: 01
    Cert Status: good      Cert 01 is not revoked or suspended
    This Update: Dec  7 03:27:54 2006 GMT
  
```

to click on the 'Resume Certificate' button)

Exercise 7 – Customization



A. Customize a template in pkiserv.tmpl

- Choose the 'n-Year PKI Certificate for Extensions Demonstration' template from the Home page (p. 9) and take a look at all the input fields for that template. There are a lot of them. Don't fill in anything yet.
- Go to the MVS system's OMVS session

```
File Edit View Communication Actions Window Help
Menu List Mode Functions Utilities Help

ISPF Command Shell
Enter TSO or Workstation commands below:

==> OMVS_
```

- Edit the pkiserv.tmpl file under /sharelab/sharbx/pkilab in a similar way shown below.

(Note: Save a copy before you make any changes – `cp pkiserv.tmpl pkiserv.tmpl.backup`)

```
MVS1:SHARA01:/sharelab/shara01: >

==> cd pkilab
RUNNING

MVS1:SHARA01:/sharelab/shara01: > cd pkilab
MVS1:SHARA01:/sharelab/shara01/pkilab: >

==> cp pkiserv.tmpl pkiserv.tmpl.backup
INPUT

MVS1:SHARA01:/sharelab/shara01: > cd pkilab
MVS1:SHARA01:/sharelab/shara01/pkilab: >

==> oedit pkiserv.tmpl
INPUT
```

You want to

- 1) change input field(s) to hard coded field(s),

Here are the steps:

- Find the <TEMPLATE NAME= n-Year PKI Certificate for Extensions Demonstration> section, under <CONTENT>.
- Delete : **ValidStateProv(frm) &&**
- Delete: **ValidCountry(frm) &&**
- Delete: **%%StateProv (optional)%%**
- Delete: **%%Country (optional)%%**

Under **<CONSTANT>**,

Add: **%%StateProv=New York%%**

Add: **%%Country=US%%**

2) change optional field(s) to required field(s)

Here is the step:

under **<CONTENT>**

Change: **%%PostalCode (optional)%%** to **%%PostalCode%%**

- Save the changes
- Open **another** IE window to go to the '**n-Year PKI Certificate for Extensions Demonstration**' template again.
Compare this page with the previous one. You will see:
 - the input fields for 'State of Province' and 'Country' are no longer there.
 - the 'Postal Code' field becomes a required field.
- You can fill in the info to make a request and check for the information in the certificate created using the steps you have learnt.

B. Customize pkiserv.conf

- Go to the MVS system's OMVS session to edit the pkiserv.conf file under /sharelab/sharbx/pkilab as follows.
(Note: Save a copy before you make any changes – cp pkiserv.conf pkiserv.conf.backup)

You want to change the time interval to turn an approved request into a certificate.

- Change: CreateInterval=1m to CreateInterval=5m
- PF3 to save the change
- Restart PKI Services (Any changes to pkiserv.conf need re-starting the daemon to pick up the changes)
 - Go to MVS system, ISPF S.LOG

```
File Edit View Communication Actions Window Help
----- SHARE ISPF 5.9 SCROLLABLE PRIMARY OPTION MENU ----- S1
OPTION ==> s.log_
D Alternate Dialog ==> CMD(%???)
D2 Alternate Dialog ==> PANEL(???)
More: +
```

- On COMMAND INPUT ==>, enter '/p pkisebxx' to stop the daemon first

```
SDSF SYSLOG 13317.101 S1 S1 01/28/2011 2W 14,836 COLUMNS 02- 81
COMMAND INPUT ==> /p pkisebxx SCROLL ==> CSR
```

- Then restart PKI Services, enter '/', hit enter

```
File Edit View Communication Actions Window Help
Display Filter View Print Options Help
-----
SDSF SYSLOG 14434.103 S1 S1 07/22/2008 0W 13633 COLUMNS 1 80
COMMAND INPUT ==> / SCROLL ==> CSR
LR 835 00000090 LOCAL TP'S INBOUN
```

- Enter 's pkiservd.jobname=pkiseaxx,dir=/sharelab/sharbx/pkilab'

```
Display Filter View Print Options Search Help
System Command Extension
Type or complete typing a system command, then press Enter.
==> s pkiservd.jobname=pkisebxx,dir='/sharelab/sharbx/pkilab'
==>
```

- Go to the PKI Service web page to request a certificate and check if you have to wait longer to get back a certificate after it has been approved (See how long you will see a serial number displayed under the request status when you display the requests, p.22. You need to refresh the page to see the change if any.)

Appendix 1

Some commands for the TSO session (3270 interface)

Start emulator

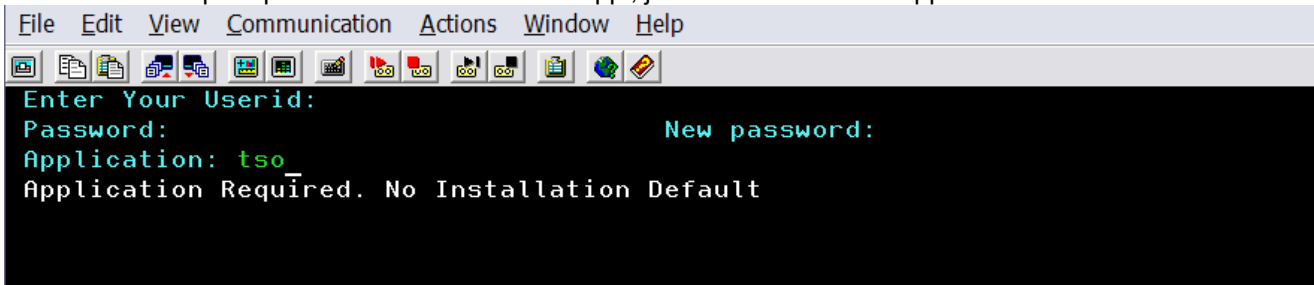
- a. Double Click on the provided icon provided

This starts a Pcomm 3270 session using **mvs1.centers.ihost.com**.

Note: The **Enter** key is the right **Ctrl** key

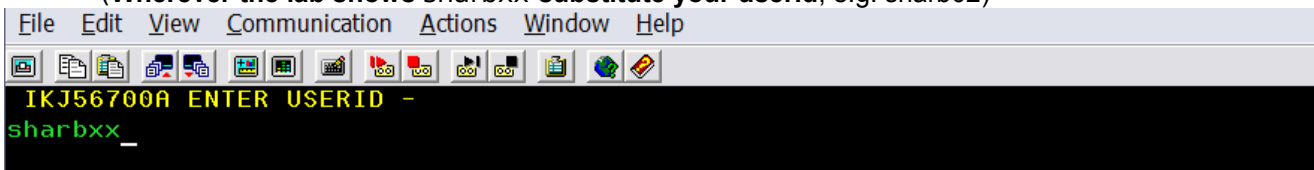
Logon to MVS system

- a. When prompted for Userid/ Password/Apl, just enter TSO in the Application field and hit enter

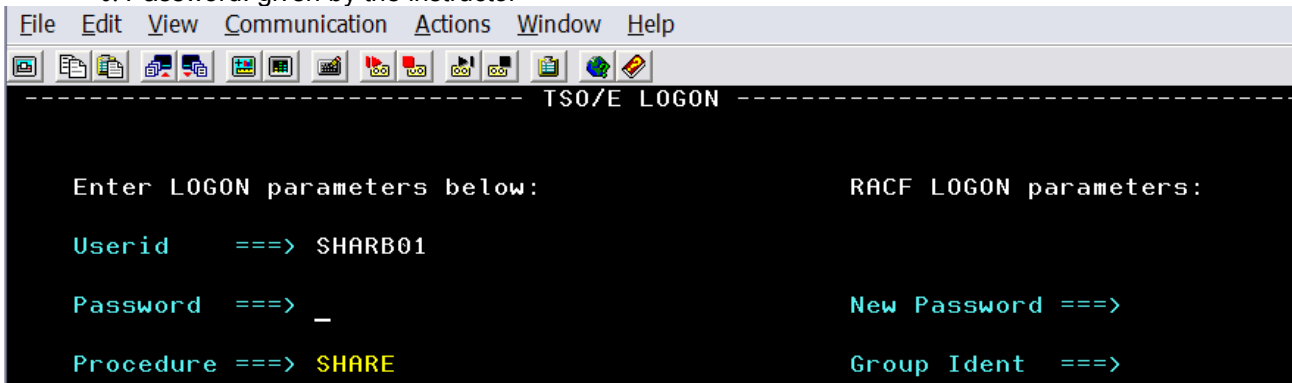


- b. Enter Userid: sharbxx

(Wherever the lab shows sharbxx substitute your userid, e.g. sharb02)



- c. Password: given by the instructor



- d. Hit enter when you see ***, you will be in the ISPF main panel

Logoff from MVS system

- a. Keep hitting PF3 until you are presented with this panel

Log Data Set (SHARBxx.SPFLOG1.LIST) Disposition:

- Process Option
1. Print data set and delete
 2. Delete data set without printing
 3. Keep data set - Same
(allocate same data set in next session)
 4. Keep data set - New
(allocate new data set in next session)

- b. Enter option 2

- c. Enter logoff

Open a OMVS session

- a. From ISPF main panel, enter option 6
- b. Enter: **omvs**

Exit a OMVS session

- a. From OMVS shell, type 'exit'

Using the oedit editor / ISPF editor

- a. From OMVS shell, type 'oedit <filename>
- b. From the line numbers columns (on the left side):
 - i – insert a line (i 20 – insert 20 lines)
 - c – copy a line
 - m – move a line
 - a – paste a line that you've copied using 'c' or moved using 'm' after the current line
 - d – delete a line (d 20 – delete 20 lines)
- c. From Command ==>
 - f xx – find the occurrences of xx
 - c xx yy – change the occurrence of xx to yy (PF6 to repeat the change to the other occurrences)
- d. PF3 to save the file and exit (If you want to exit without saving, type 'cancel' on Command==> line)

Appendix 2

A sample openssl command to send a request to an OCSP responder

issuer: file contains the issuer cert of the target cert in Base-64 format

cert: file contains the target cert in Base-64 format, the one you want to check the status

url: location of the responder, in our case, it is PKI Services itself. (The CA and the responder can be different)

resp_text: indicates the print out of the response text

respout: file contains the DER encoded response

CAfile: file contains the root certificate in Base-64 format

Get the status from OCSP using openssl...

Send a request to the responder:

```
> openssl ocsf
-issuer \temp\mycacert.cer
-cert \temp\mycert.cer
-url http://mvs1.centers.ihost.com:8041/Sharbxx/public-
  cgi/caocsp
-resp_text -respout \temp\resp.der
-CAfile \temp\cacert.cer
```

(Note: In the provided batch file, two input parameters are used:

```
-cert %1
-url http://mvs1.centers.ihost.com:8041/Sharb%2/public-
  cgi/caocsp)
```

Here is the link to install openssl in windows:

<http://www.slproweb.com/products/Win32OpenSSL.html>

The document:

<http://www.openssl.org/docs/apps/openssl.html>

References

- PKI Services web site:
<http://www.ibm.com/servers/eserver/zseries/zos/pki>
- PKI Services Red Book:
<http://www.redbooks.ibm.com/abstracts/sg246968.html>
- RACF web site:
<http://www.ibm.com/servers/eserver/zseries/zos/racf>
- IBM Education Assistant:
<http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp>
- Cryptographic Services
 - | PKI Services Guide and Reference (SA22-7693)
 - | OCSF Service Provider Developer's Guide and Reference (SC24-5900)
 - | ICSF Administrator's Guide (SA22-7521)
 - | System SSL Programming (SC24-5901)
- Security Server Manuals:
 - | RACF Command Language Reference (SC28-1919)
 - | RACF Security Administrator's Guide (SC28-1915)
 - | RACF Callable Services Guide (SC28-1921)
 - | LDAP Administration and Use (SC24-5923)
- IBM HTTP Server Manuals:
 - | Planning, Installing, and Using (SC31-8690)
- Other Sources:
 - | PKIX - <http://www.ietf.org/html.charters/pkix-charter.html>

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