z/OS PKI Services Hands-on Lab

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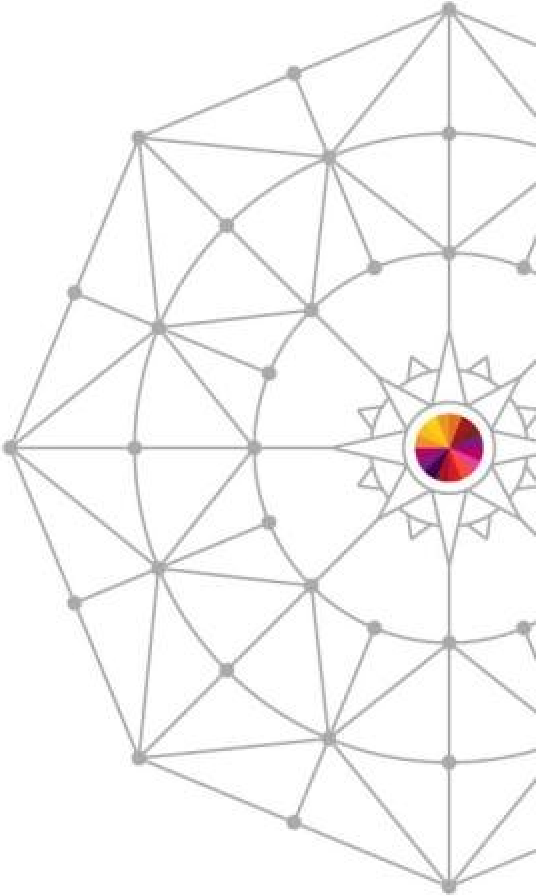
March 13th, 2014
Session: 14964



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Agenda

- **PKI Services Overview**
- PKI Services **Lab**

Digital Certificate support on z/OS

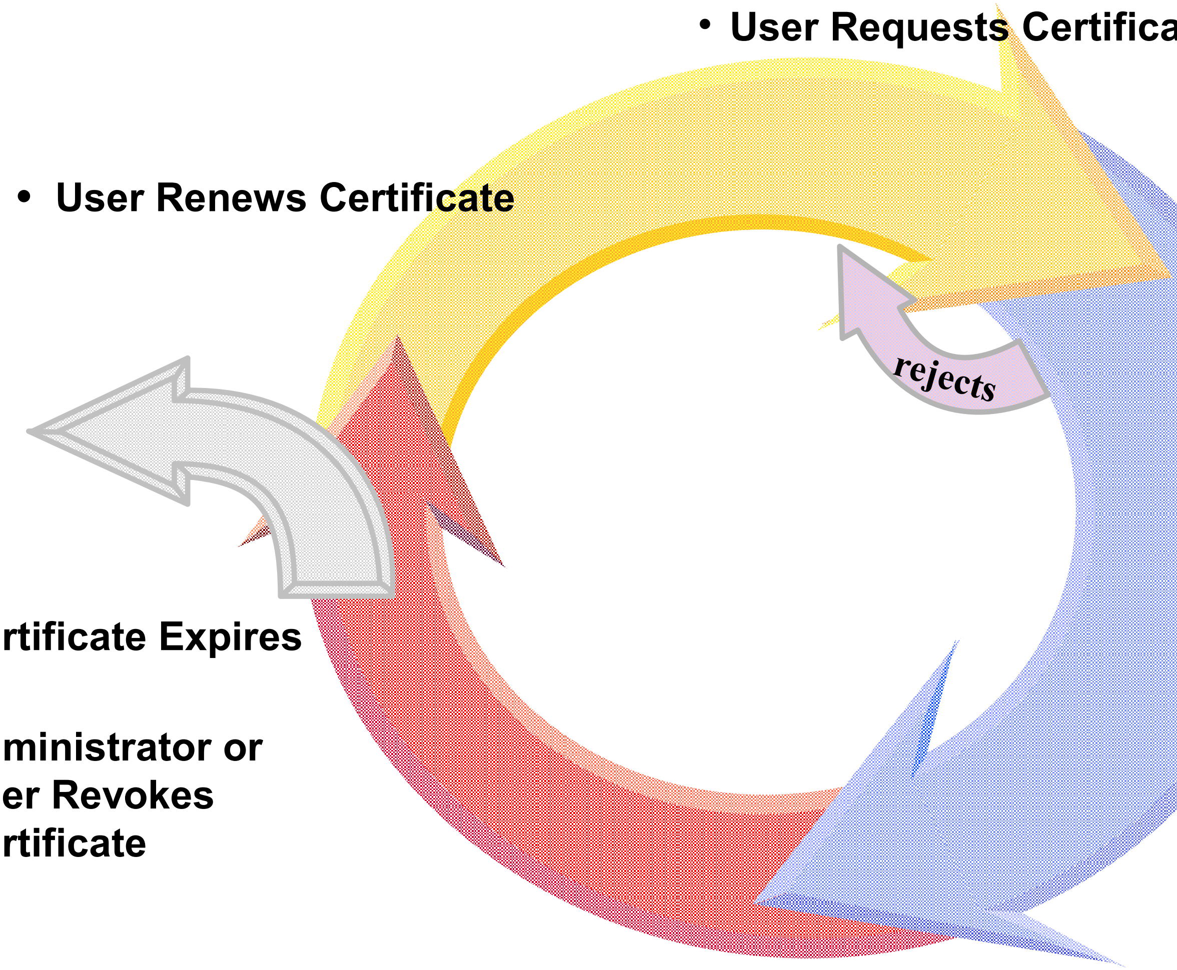
- Two main components delivering Digital Certificate support:
  - **RACF:**
    - **RACDCERT Commands** – Provides basic Digital Certificate generation and Key Ring management
    - **R_DataLib SAF Callable Service** – Provides API for accessing certificates in SAF Key rings
  - **z/OS PKI Services:**
    - Provides a fully functional Certificate Authority
    - Much more robust than a simple certificate utility like RACDCERT

PKI Services
Certificate Authority on z/OS

- PKI Services provides a full functioning **Certificate Authority**
  - Allows a organization to issue certificates signed by their own trusted CA certificate

- Provides for the full certificate life cycle:
  - End users can create a certificate **request**
  - PKI Administrators can **approve** / **modify** / **reject** requests
  - Certificates can be **revoked**
  - Certificates can be **renewed**

Certificate Life Cycle



- User Requests Certificate
- Administrator Approves the request
- CA Generates and distributes certificate
- Owner uses the certificate
- Certificate Expires

Or

- Administrator or User Revokes Certificate
- User Renews Certificate

PKI Services – Features

- Compared with RACDCERT, PKI Services can create certificates with many more fields in the Distinguished Names, and more extensions, including customizable ones
- Supports multiple certificate revocation mechanisms:
  - **Certificate Revocation Lists** (CRL) – List of certificates which can no longer be trusted
  - **Online Certificate Status Protocol** (OCSP) – dynamic checking on certificate status
- **SCEP Support:**
  - Simple Certificate Enrollment Protocol – automatic fulfillment on certificate request from network devices
- **CMP Support:**
  - Certificate Management Protocol – enable PKI functions through standard transport protocol

PKI Services – Features

- Certificates and CRLs can be posted to **LDAP** and/or stored in an HFS file for HTTP server

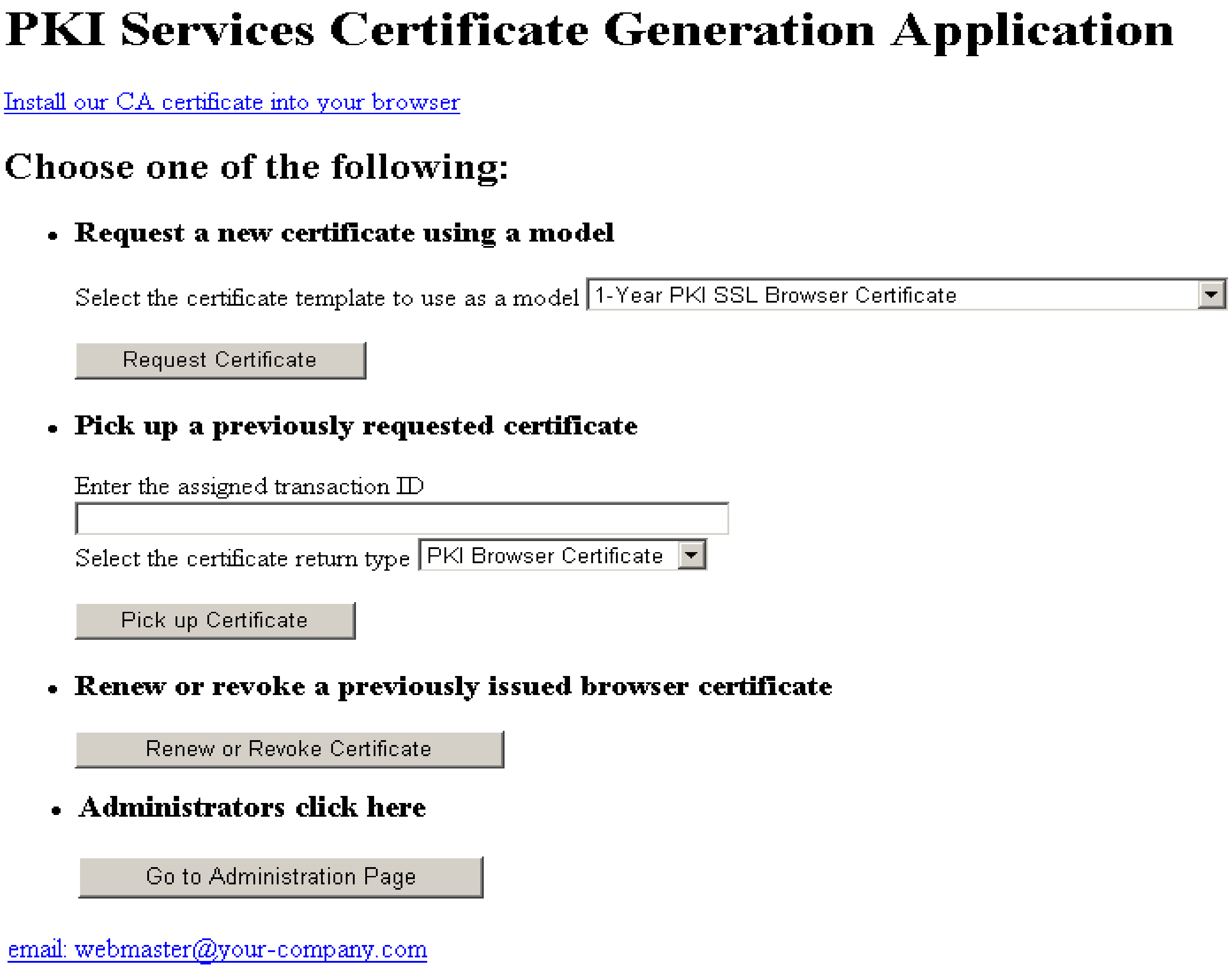
- Provide options for requestor to **generate his own key pair** or request the **PKI CA to generate it**

- Provides email notification:
  - Notify administrator for **pending requests**
  - Notify end user for **completed** certificate request and
  - Notify users for certificate **expiration** warnings
  - Send the **automatic renewed** certificate

PKI Services – Features

- Can issue many different types of certificates though customizable certificate templates
  - S/MIME, IPSEC, SSL, CA, Windows Logon
- Smart-card support
- Support **automatic** or **administrator approval** process
- Certificates can be picked up from the requestor’s machine
- Generation and administration of certificates via **customizable web pages**

PKI Services Webpages: Sample



PKI Services Certificate Generation Application

Install our CA certificate into your browser

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

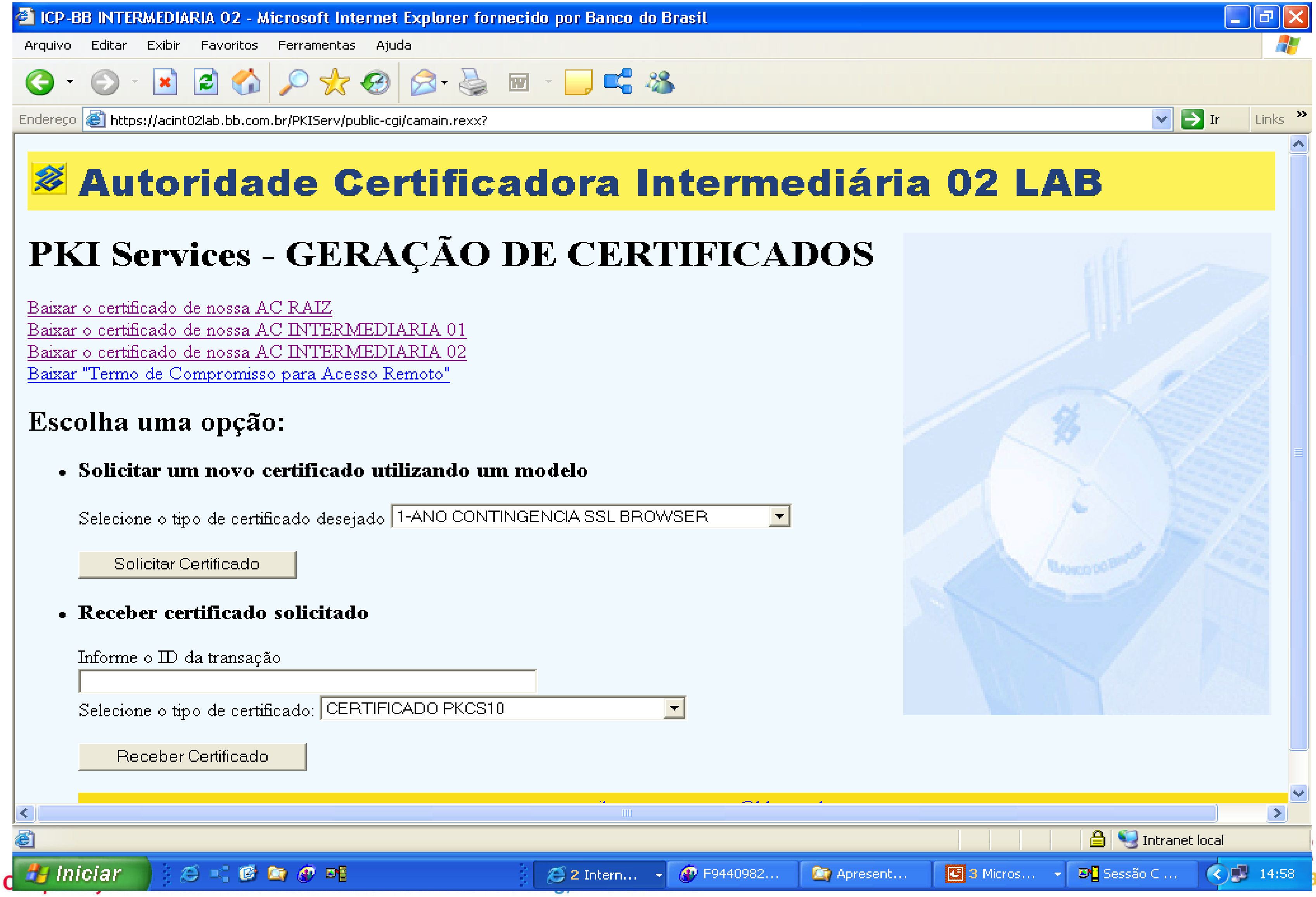
  Select the certificate return type: PKI Browser Certificate

- **Renew or revoke a previously issued browser certificate**

- **Administrators click here**

email: webmaster@your-company.com

PKI Services Webpages: Customized



https://acint02lab.bb.com.br/PKIServ/public-cgi/camain.rexx?

Autoridade Certificadora Intermediária 02 LAB

PKI Services - GERAÇÃO DE CERTIFICADOS

Baixar o certificado de nossa AC RAIZ
Baixar o certificado de nossa AC INTERMEDIARIA 01
Baixar o certificado de nossa AC INTERMEDIARIA 02
Baixar "Termo de Compromisso para Acesso Remoto"

Escolha uma opção:

- **Solicitar um novo certificado utilizando um modelo**

  Selecione o tipo de certificado desejado: 1-ANO CONTINGENCIA SSL BROWSER

  Solicitar Certificado

- **Receber certificado solicitado**

  Informe o ID da transação

  Selecione o tipo de certificado: CERTIFICADO PKCS10

  Receber Certificado

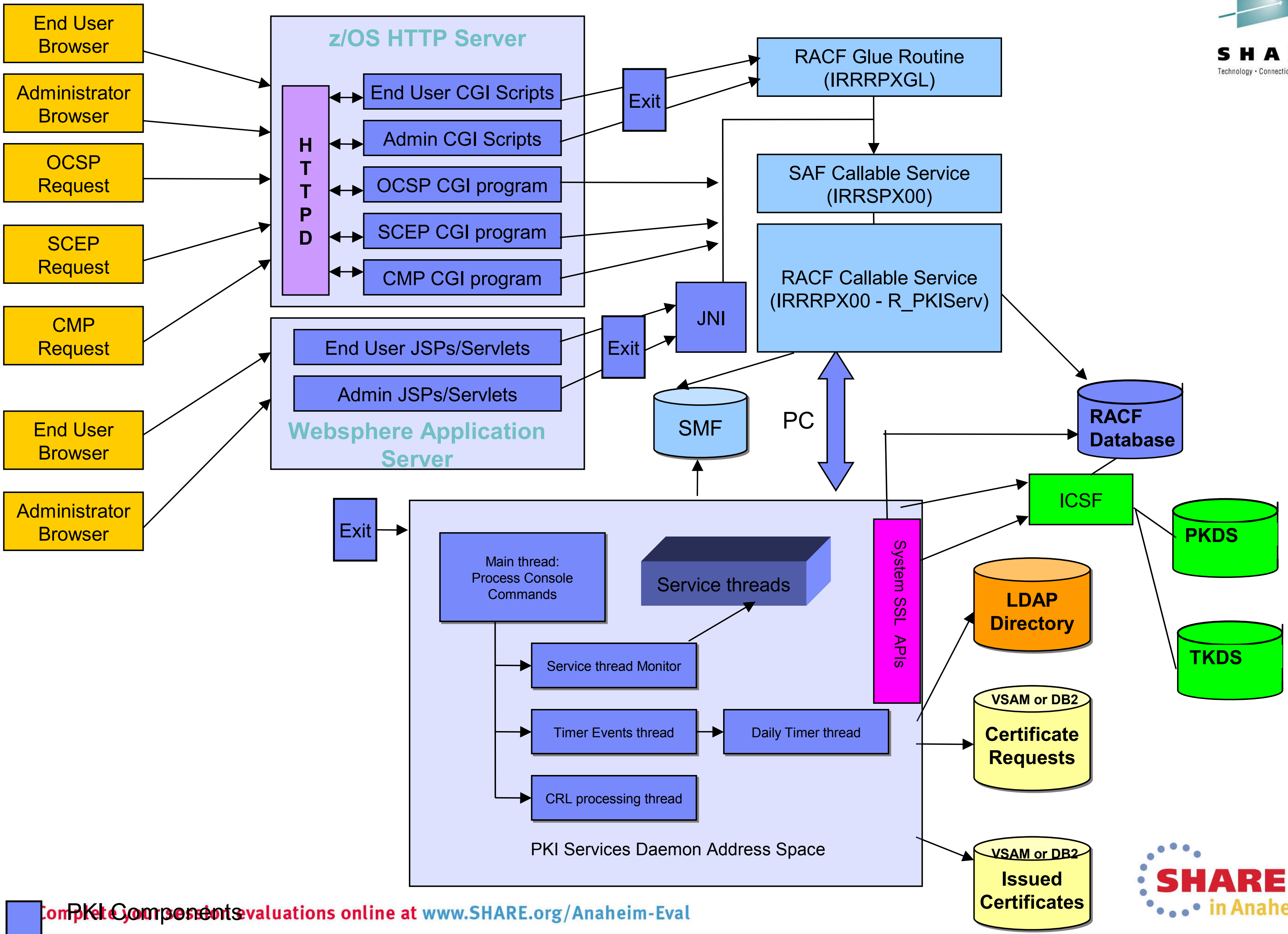
PKI Services Customization

- **Configuration File** - pkiserv.conf (used by the PKI Services daemon)
  - Contains mainly setup information for PKI Services
  - May contain certificate information applies to all types of certificates that PKI Services creates

- **Template File** - pkiserv.tmpl (used by the PKI Services CGIs), pkitmpl.xml (used by PKI Services JSPs)
  - Provides different types of certificate template
    - Browser certificate – key generated by browser
    - Server certificate – key generated by server
    - Key certificate – key generated by PKI CA
  - Each template contains certificate information that is specific to a certain type of certificate
    - S/MIME, IPSEC, SSL, CA, Windows Logon…

Why PKI Services on z/OS?

- Feature rich:
  - Responsive to customer requirements
- Cost effective:
  - Not a priced product - Licensed and *integrated* within z/OS
  - Alternative to purchasing third party certificates
- Scalable:
  - Scalable and available with z/OS Sysplex exploitation
  - Customers issue thousands and millions of certificates
- Secure:
  - CA's private key can be protected using System z Crypto hardware
  - Authority checking and Auditing though a SAF callable service - R_Pkiserv



End User Browser

Administrator Browser

OCSP Request

SCEP Request

CMP Request

End User Browser

Administrator Browser

z/OS HTTP Server

HTTPD

End User CGI Scripts

Admin CGI Scripts

OCSP CGI program

SCEP CGI program

CMP CGI program

End User JSPs/Servlets

Admin JSPs/Servlets

Websphere Application Server

Exit

Exit

JNI

RACF Glue Routine (IRRRPXGL)

SAF Callable Service (IRRSPX00)

RACF Callable Service (IRRRPX00 - R_PKIServ)

SMF

PC

RACF Database

ICSF

PKDS

TKDS

Exit

Main thread: Process Console Commands

Service threads

Service thread Monitor

Timer Events thread

Daily Timer thread

CRL processing thread

System SSL APIs

PKI Services Daemon Address Space

LDAP Directory

VSAM or DB2

Certificate Requests

VSAM or DB2

Issued Certificates

🟦 PKI Components

Major Prerequisite Products

- **RACF (or equivalent)**
  - For storing PKI CA certificate
  - For authorization
- **IBM z/OS HTTP Server / Websphere Application Server**
  - For web page interface
- **LDAP Directory (z/OS or other platforms)**
  - For publishing issued certificates and CRLs
  - For email notification
- **ICSF (optional)**
  - For more secure CA private key
  - For PKI CA to generate key pair
- **z/OS Communications Server (optional)**
  - For email notification
- **DB2 (optional)**
  - An alternative implementation for backend stores

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