WebSphere Application Server for z/OS and OS/390

WebSphere Application Server V5 Security

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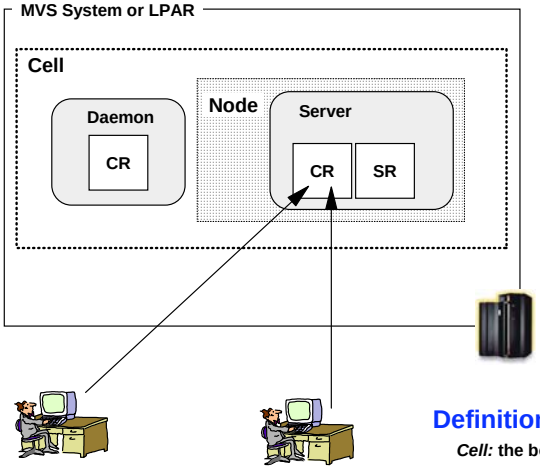
Agenda

- Overview WebSphere Application Server security.
- Review the RACF definitions needed.
- Describe Global Security and how to activate it.

V5 "Base Application Server Node"

This is the starting point after installing WebSphere for z/OS Version 5



The "Base Application Server Node" is comprised of:

- A "Daemon" server
- A "Node"
- A "Cell"

All **of the configuration files and definitions are kept in the HFS**

Files (XML, properties and applications) held in the HFS structure

Definitions

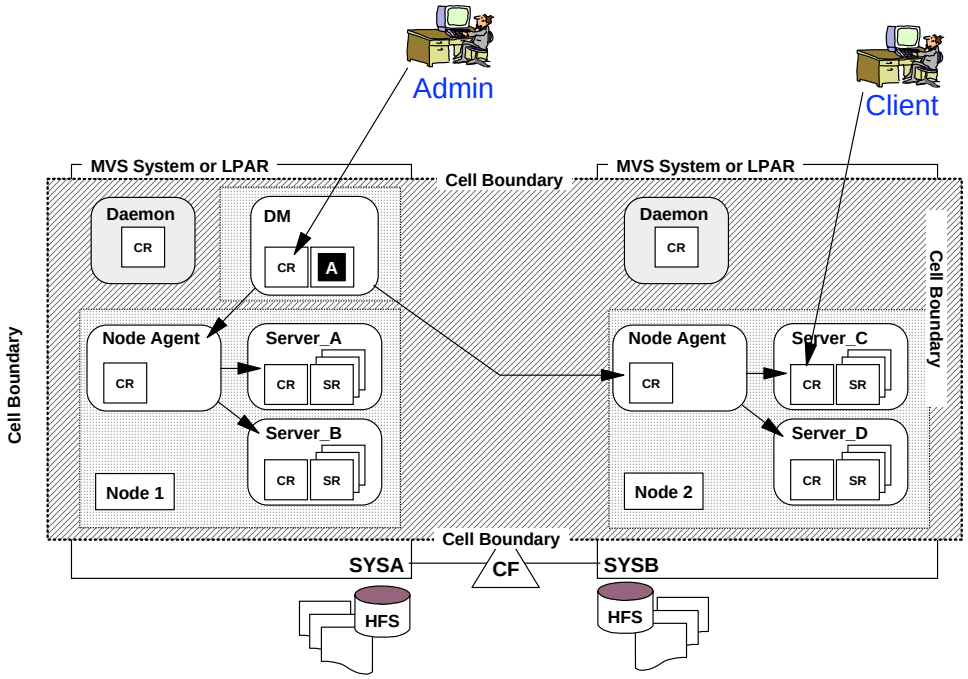
Cell: **the boundary of the administrative domain.**

Node: **a collection of servers grouped together for the purposes of administration.**

Server : One Controller region (CR) and one or more associated Servant regions (SR). .

Daemon: **the location service daemon. One is required per cell per system or LPAR.**

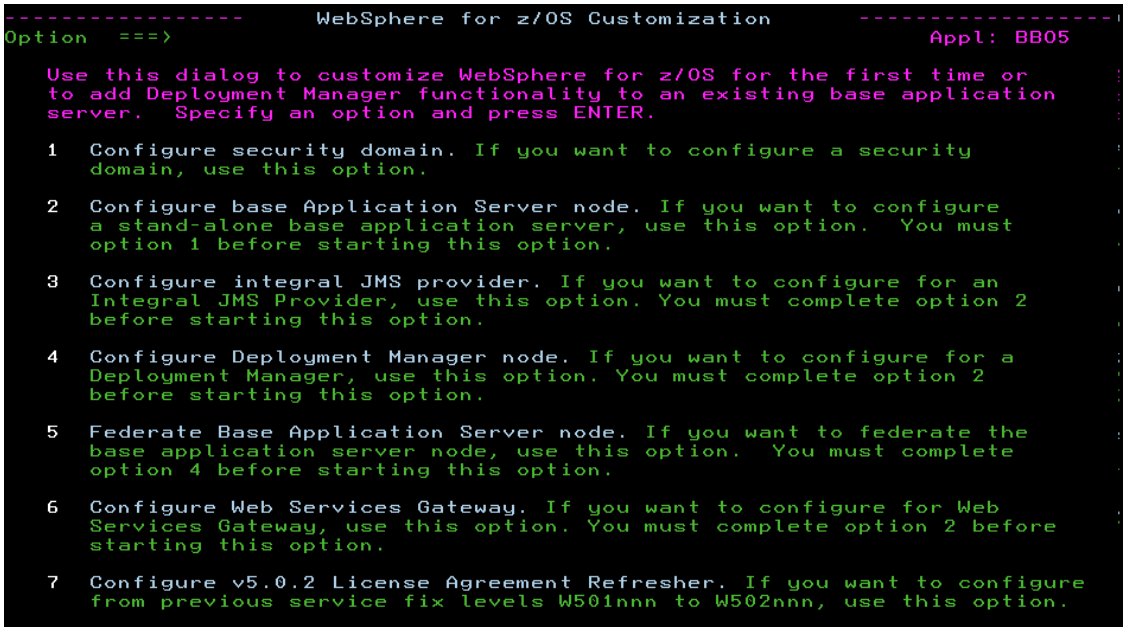
Network Deployment Cell



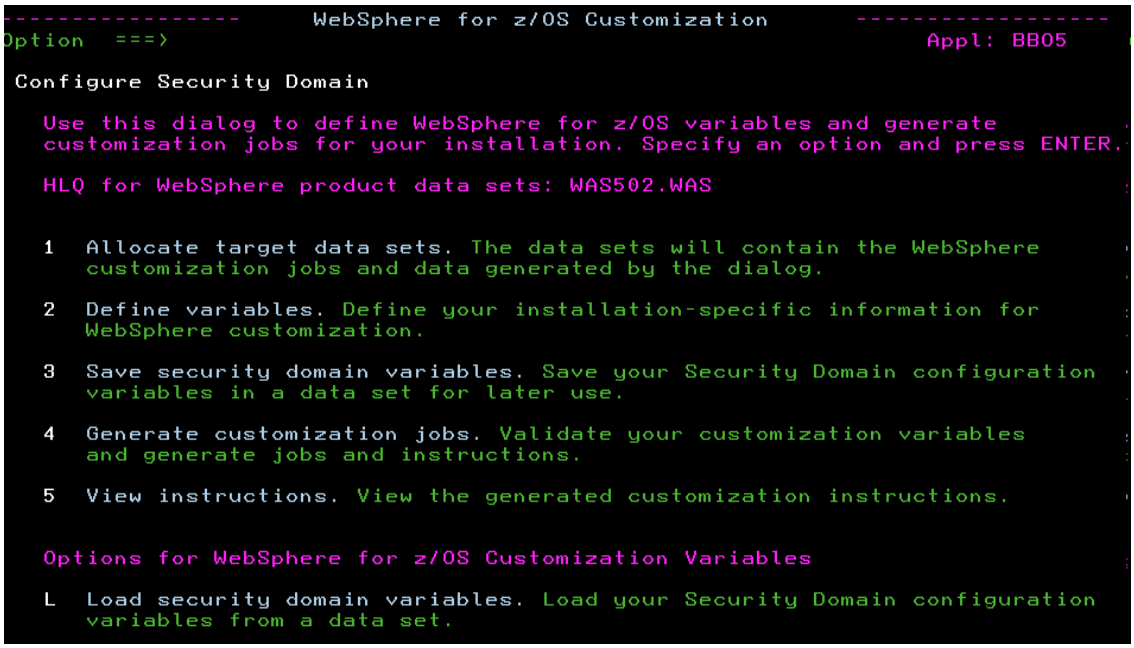
Building a WebSphere Cell

- A WebSphere cell is too complex to build by hand. The WebSphere developers provide WebSphere Customization ISPF scripts to generate the commands and jobs needed to build a cell.
- The WebSphere Customization ISPF Scripts generate most/all of the RACF commands for you to run.
- We'll discuss the Customization Scripts and the RACF commands they produce.
- Start the Scripts with the TSO command:
  - **exec 'WAS502.WAS.SBBOCLIB(BBOWSTRT)'**
  - You might use a different HLQ than this example.

Customization Panel Main Menu



Configure Security Domain



Step 1: Configure Security domain (1 of 2)

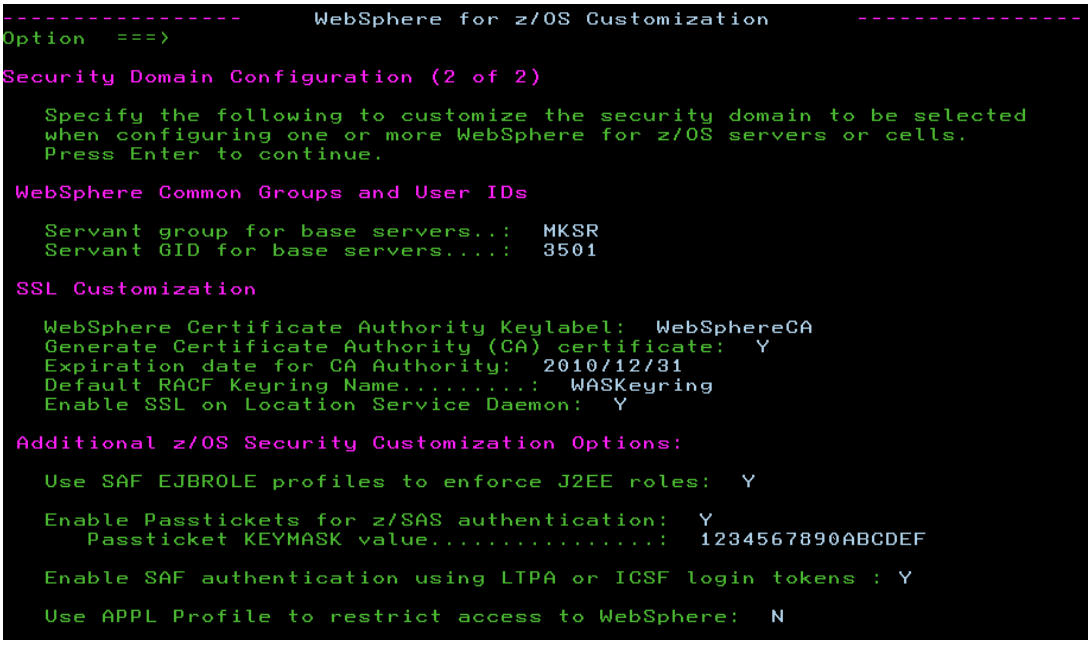
```
------------------      WebSphere for z/OS Customization      --------------------
Option  ===>

Security Domain Configuration (1 of 2)

   Specify the following to customize the security domain to be selected
   when configuring one or more WebSphere for z/OS servers or cells.
   Press Enter to continue.

 Use Security Domain Identifier in RACF Definitions:  Y
     Security Domain Identifier.....................:  MKCELL

 Sysplex Name:  WSCPLEX

 Generate default RACF realm name:  N
     Default RACF realm name ....:  WSCPLEX

 WebSphere Configuration Group Information
   Group....:  KWCFG           GID..:  3500

 WebSphere Administrator Information
   User ID..:  KWADMIN         UID..:  3403
   Password.:  KWADMIN

 Unauthenticated User Definitions for Base Servers
   User ID..:  KWGUEST         UID..:  3402
   Group....:  KWGSTGP         GID..:  3502

 WebSphere Asynchronous Administration Task
   User ID..:  WSADMSH         UID..:  2504
```

What's a Security Domain?

Security Domain is new to WebSphere 5.0.2

- **A security domain provides cell-level granularity of security permissions.**
  - Similar in concept to SECPRFX used in CICS RACF security.
  - Provides cell-level granularity of roles.
    - Different administrators can be assigned to test and production.
    - More detail on this in a few foils....
  - Also used as the APPL profile for servers in the cell.

Step 1: Configure Security domain (2 of 2)



Output of Customization Scripts

- **The jobs produced by the Customization scripts do various things:**
  - Build the file system used by WebSphere.
  - Build many control files used by WebSphere
    - Control statements for WebSphere are usually XML.
  - Build JCL for starting the various WebSphere regions.
  - **Build RACF commands for defining the cell.**
    - The book recommends you look them over before you run them.
    - As if you'd trust RACF commands generated by someone else....
- **The jobs produced by the Customization steps go into the .CNTL library.**
- **These jobs execute commands which are stored in members in the .DATA library.**

Output of Customization Scripts

- **These Customization Steps produce RACF commands:**
  - Step 1: **Configure security domain**
    - Creates the BBOSBRAJ job in the .CNTL library, which when run creates RACF commands in the BBOSBRAK member in the .DATA library. These are executed by the BBOSBRAK job in the .CNTL library.
  - Step 2: **Configure Base Application Server node**
    - Creates the BBOCBRAJ job in the .CNTL library, which when run creates RACF commands in the BBOWBRAK member in the .DATA library. These are executed by the BBOCBRAK job in the .CNTL library.
  - Step 4: **Configure Deployment Manager node**
    - Creates the BBODBRAJ job in the .CNTL library, which when run creates RACF commands in the BBODBRAK member in the .DATA library. These are executed by the BBODBRAK job in the .CNTL library.
  - These are commonly known as the BRAK jobs

Output of Customization Scripts

- **The BRAK jobs contain RACF commands to create:**
  - Userids and groups used by the cell.
  - STARTED class profiles
  - CBIND class profiles
  - SERVER class profiles
  - EJBROLE class profiles
  - APPL class profile (optional)
  - PKTDATA class profile (optional)
  - Keyrings and Digital Certificates
  - FACILITY class profiles
- **We'll review these in the following charts.**

Users and Groups

- **For a Base app server configuration:**
  - Userids are created for the:
    - Daemon region
    - Application Server Controller region
    - Application Server Servant region
    - Administrative userid
      - Owns the files used by the server, has initial administrative authority over the cell.
    - Asynchronous Admin Task userid
      - A 'protected' userid under which some administration tasks run.
    - Unauthenticated guest userid
      - A 'restricted' userid used for access to applications that do not require authentication.

Users and Groups

- **For a ND configuration:**
  - Userids are created for the:
    - Daemon region
    - Application Server Controller region
    - Application Server Servant region
    - Deployment Manager Controller region
    - Deployment Manager Servant region
    - Node Agent
    - Administrative userid
    - Asynchronous Admin Task userid
    - Unauthenticated guest userid

Users and Groups

- **For a Base app server or ND configuration:**
  - Groups are created:
    - The 'config' group
      - The Daemon, Application Server Controller region, Application Server Servant region, Administrative userid and Asynchronous Admin Task userid belong to this group.
      - In an ND configuration, the DM controller region, DM servant region and Node Agent regions also belong to the 'config' group.
    - The 'guest' group
      - The unauthenticated guest userid belongs to this group.

Users and Groups

- **'Best Practices' Recommendation:**
  - All the Servant Regions run under one RACF userid.
    - Application Server servant regions, DM servant region.
      - Applications run in these regions.
      - These regions don't access any keyrings.
  - All the 'WebSphere Plumbing' regions run under another RACF userid.
    - The Daemon, Application Server Controller regions, DM Controller region, NA regions.
      - Application code doesn't run in these regions.
      - Some run authorized code.
      - They all need access to keyrings and certificates for SSL.
        - They can share a single cert and keyring. More on this later...
  - If you want to use a different userid for each started task, go ahead, but don't say I didn't warn you....

STARTED Class Profiles

- **STARTED class profiles are generated to assign userids to the various WebSphere regions.**
- **Regions include:**
  - Daemon
  - Deployment Manager (controller and servant)
  - Node Agent
  - Application Server(s) (controller and servant)

CBIND Class Profiles

- **CBIND profiles control access to WebSphere servers and to objects in the servers, from Java application clients and other WebSphere servers.**
- **Access to Servers**
  - CB.CBIND.<cluster>
  - CB.CBIND.<security domain>.<cluster>
- **Access to objects within servers**
  - CB.<cluster>
  - CB.<security domain>.<cluster>

SERVER Class Profiles

- **SERVER class profiles control whether a servant region can call authorized routines in the associated controller region.**
- **Access to Controller using Static Application Env.**
  - CB.<server>.<cluster>
  - CB.<security domain>.<server>.<cluster>
- **Access to Controller using Dynamic Application Env.**
  - CB.<server>.<cluster>.<cell>

APPL Class Profile

- **An APPL class profile controls whether an authenticated user can use any applications in the cell.**
- **If a Security Domain is specified, the APPL class profile name will be the Security Domain name.**
- **If Security Domain is not specified, the APPL class profile name will be CBS390.**

PKTDATA Class Profile

- **A PKTDATA class profile indicates the PassTicket key value used by servers in the cell when handling PassTickets.**
- **If a Security Domain is specified, the PKTDATA profile name will be the Security Domain name.**
- **If no Security Domain is specified, the PKTDATA profile name will be CBS390.**

EJBROLE Class Profiles

- **Used for J2EE Role-Based Authorization, EJBROLE class profiles control access to applications in a cell.**
  - Access to Servlets or EJB methods is based upon the 'role' (job title, function, etc.) of the user or caller.
  - Roles are associated with Servlets or EJBs at assembly time.
  - The Role needed to use a Servlet or EJB method is named in the application's .ear file.
  - Which users and groups have which Roles is determined by RACF, using profiles in the EJBROLE class.
    - If a user is in the access list of an EJBROLE profile, he has that role.
    - If a group is in the access list of an EJBROLE profile, users in that group have that role.
    - If the EJBROLE profile has UACC of READ, all users have that role.
  - Roles are managed through RACF.
  - Works the same way in WebSphere V4 for z/OS.

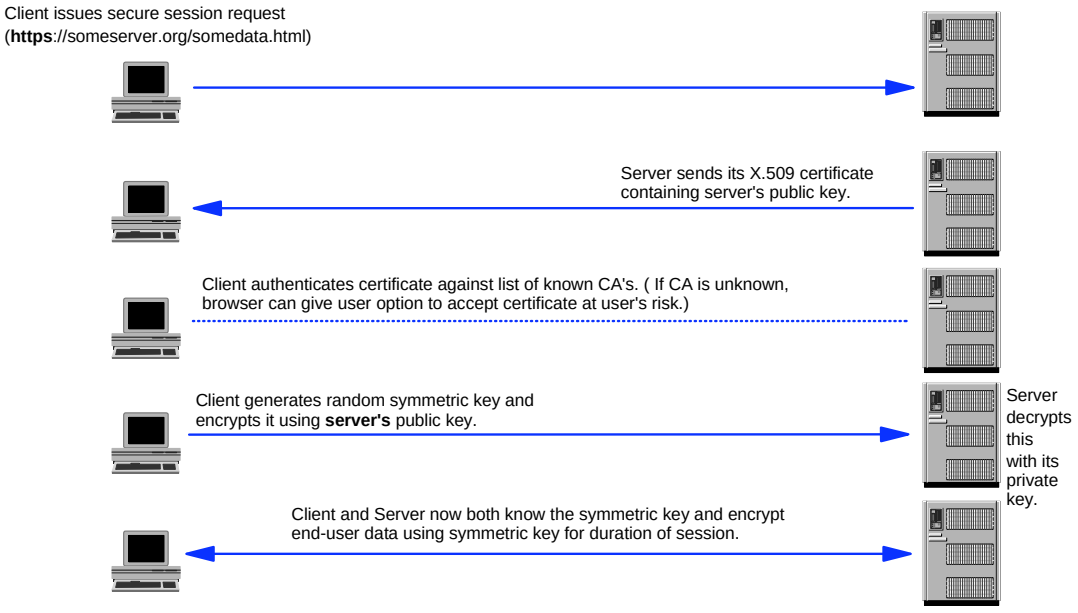
How Does the Security Domain Affect EJBROLE profile names?

- The Security Domain, if specified, becomes a prefix used by WebSphere and RACF when checking EJBROLE profiles.
  - This provides cell-level granularity of roles.
  - No need to modify roles in the applications to achieve this.
- Example:
  - Test Cell has Security Domain=TEST
  - Production Cell has Security Domain=PROD
  - An application using role Clerk is deployed on both Cells.
  - On the Test Cell, users need READ access in EJBROLE profile TEST.Clerk
  - On the Production Cell, users need READ access in EJBROLE profile PROD.Clerk

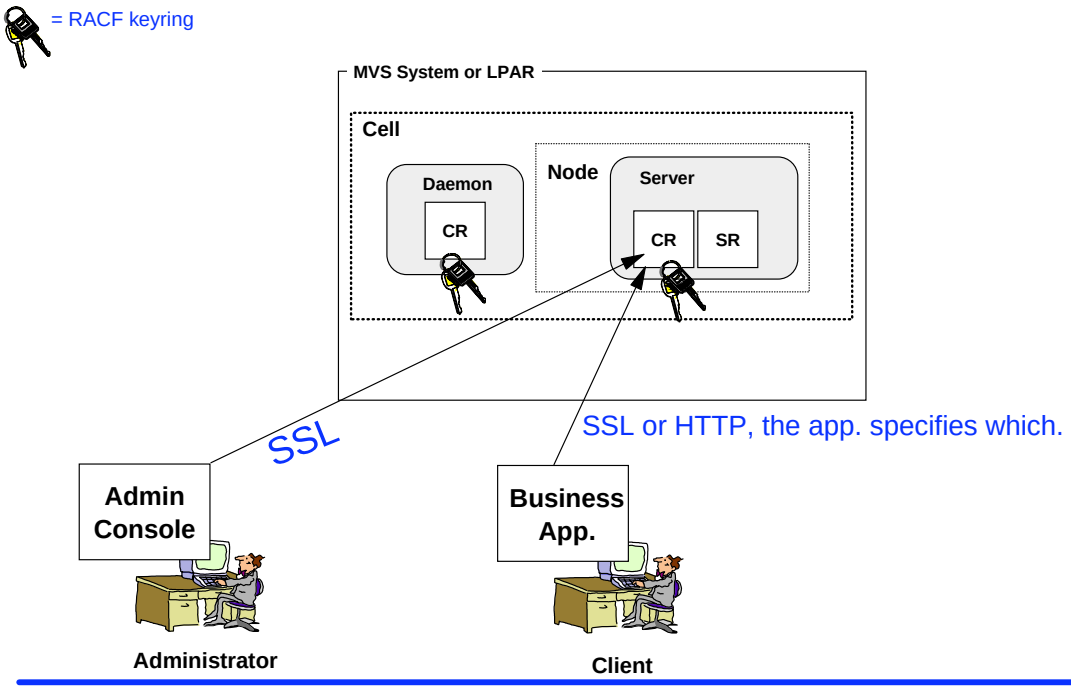
SSL Certificates and Keyrings

- **WebSphere uses SSL for inter-server communication when global security is enabled, and (sometimes) for communication with clients.**
- **WebSphere uses only RACF (or CA-TS or CA-ACF2) certs and keyrings. No GSKKYMAN keyfiles, etc.**
- **The BRAK jobs will create RACF keyrings and certs for you.**
  - If you use an outside Certification Authority, you may have to create some yourself.
  - RACDCERT commands are OK, but the RACF panels are easier.
    - Option 7, DIGITAL CERTIFICATES AND KEY RINGS.

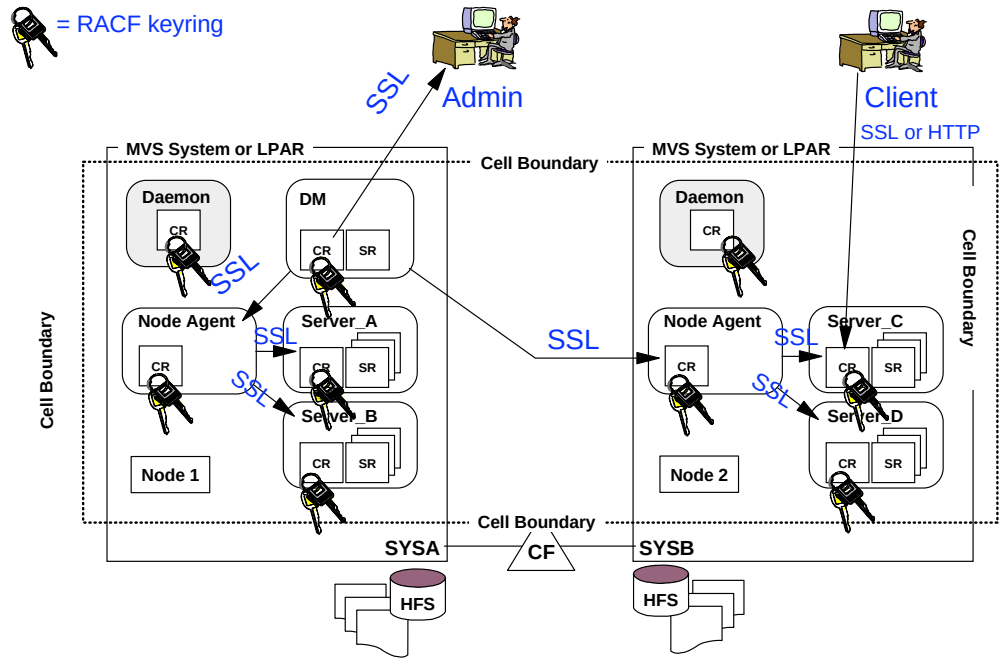
SSL Overview



SSL in a Base Application Server



SSL in an ND Configuration



SSL Certificates and Keyrings

- **The cell needs a Certification Authority (CA).**
  - The CA signs the certs used by all the servers in the cell.
  - You can use Verisign, Entrust or another 'outside' CA.
  - Or the ISPF dialogs can create a CA in RACF for you.
- **The BRAK jobs create a keyring and certificate for:**
  - The Daemon, DM Controller region, Node Agent, App Server Controller region.
    - They use SSL for administrative conversations (JMX).
    - Different userids for each region means a cert and keyring for each.
      - Another advantage of a single userid for WebSphere 'plumbing'.
  - The Administrative userid.
    - Used for the administrative shell scripts.

SSL Server Keyring

- **A Working SSL Keyring Should Contain**
  - The Server's Certificate, signed by a Certificate Authority
  - The Server's Private Key (you can't display this)
  - Root certificate of Certificate Authority that signed the Server's Cert.
- **Questions or Problems with Keyrings/Certs?**
  - Contact Mike Kearney
    - kearney@us.ibm.com
    - (301) 240-3760

FACILITY Class Profiles

- **FACILITY class profiles are generated to permit servers access to their keyrings and certificates.**
- **Access by a server to its cert:**
  - IRR.DIGTCERT.LIST
- **Access by a server to its keyring:**
  - IRR.DIGTCERT. LISTRING

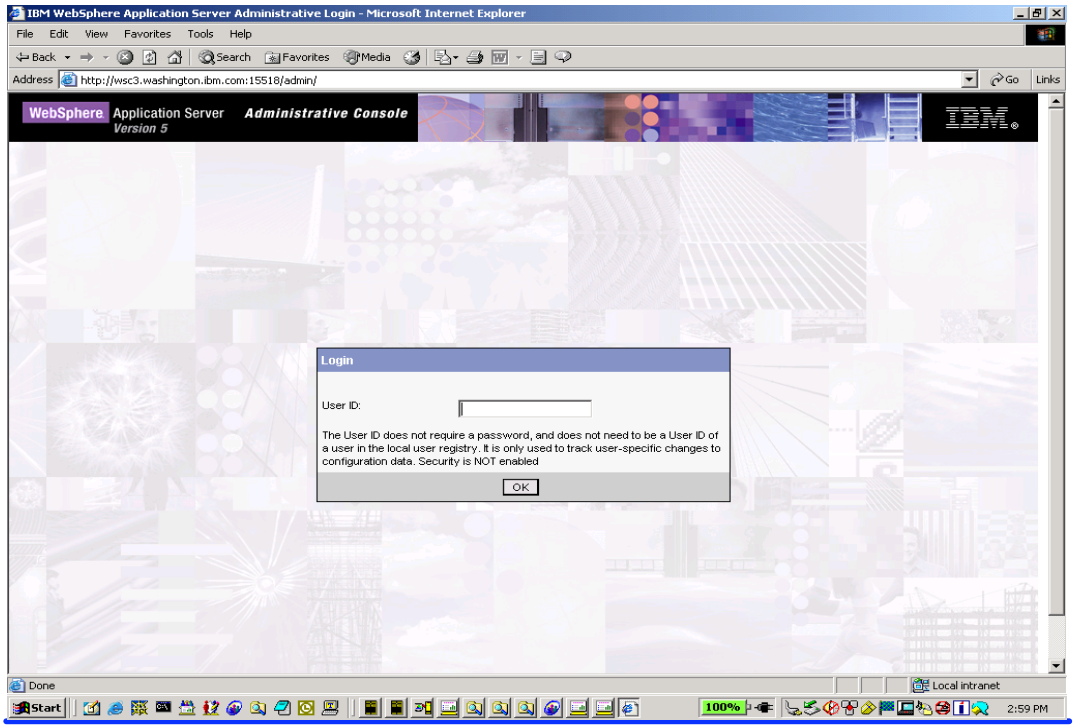
Troubleshooting SSL Problems

- If your Administrative Console doesn't answer...
  - See if your server(s) came up.
  - Check for SSL problems. (find 'gsk')
  - gsk return codes indicate problems with RACF keyrings or certs.
    - See 'System SSL Programming', Chapter 13, SC24-5901-02 for return code meaning.
      - Look in z/OS 1.4 library for SC24-5901-02.
    - Double check BBOxBRAK jobs.
  - ICH408I messages may indicate the server doesn't have access to ICSF CSFSERV class profiles.
  - If ICSF/crypto hardware is available, but WebSphere doesn't have permission, System SSL stops.

Troubleshooting SSL Problems: Example

- Server(s) abend at startup.
- Check for SSL problems. ('find gsk' in server sysout)
  - Found BBOO0036E FUNCTION gsk_environment_init FAILED WITH RC=202.
  - Checked SC24-5901-02 for gsk return code meaning.
    - "Error detected while opening the key database"
    - RC=202 has several possible causes:
      - The keyring the server is using doesn't exist, or the keyring name has a typo.
      - The server's userid doesn't own the keyring (or the cert).
      - The server's userid (or group) doesn't have READ access to FACILITY class profile IRR.DIGTCERT.LIST or LISTRING.

With Global Security Off

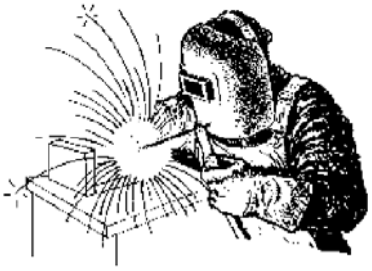


What's Global Security?

- **One big WebSphere 'switch' that activates many settings related to WebSphere V5 security. The settings include:**
  - User Registry
  - Authentication Mechanisms
  - Secure Sockets Layer (SSL)
  - Administrative Console Security
  - Other Misc. Security Stuff
- **Global Security is specified at the administrative console, and indicated in the security.xml file.**

When to Enable Global Security

- After WebSphere V5 is up and running, and you are familiar with WebSphere and the Administrative Console, it's time to Enable Global Security.
- Global Security must be active in order to secure the Administrative Console.
- Global Security must be active in order to secure any applications (Basic Authentication, Form Based, etc.).
- Don't wait until it's time to go into production to enable Global Security!



Preparing for Global Security

1. **System SSL for z/OS or OS/390 must be installed**
   - Part of z/OS and OS/390 base.
   - Provides SSL libraries for WebSphere, HTTP Server, etc.
   - Put *hlq*.SGSKLOAD in LPA.
   - You've probably already installed System SSL.
2. **Crypto hardware and ICSF has benefits, but is not required.**
   - Crypto hardware reduces CPU utilization from SSL workload.
   - Integrated Cryptographic Services Facility (ICSF) provides crypto APIs for System SSL and other applications.
   - ICSF provides administrative interface for managing crypto hardware.

Preparing for Global Security (cont.)

3. **Build your cell using the Customization Scripts.**
   - Be sure to check the BRAK jobs.
4. **If you plan to use ICSF in support of login tokens, configure that before enabling Global Security.**
   - http://www-1.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD100745
   - Other choice is LTPA, which does not require the crypto hardware.
5. **If you plan on using Java 2 security, investigate the access requirements of your apps.**
   - If in doubt, leave Java 2 security off until you Global Security is working properly.
   - Or set **com.ibm.websphere.java2secman.norethrow** property to log Java 2 violations without stopping them.

Java 2 Security

- **Java 2 security prevents unauthorized applications from:**
  - Opening sockets.
  - Reading/writing to hfs files (even if the server is permitted).
  - Reading/writing JVM system properties.
  - Calling certain WebSphere APIs.
- **New to WebSphere V5**
- **Requires planning, preparation to activate.**
  - The server will work with Java 2 security turned on, but your applications probably won't.
- **Can enable Global Security without enabling Java 2 security.**

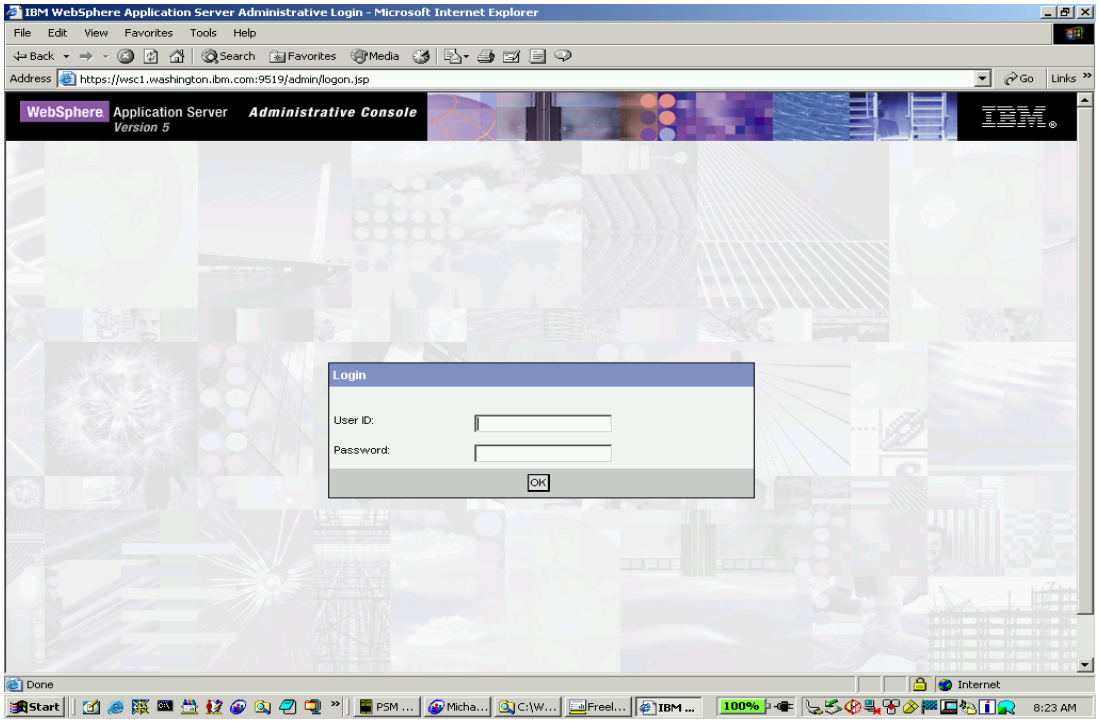
Preparing for Global Security (cont.)

6. **Give administrative permissions to your administrators.**
   - Role based authority:
     - Specified in Admin Console if you use WebSphere bindings.
     - Specified in RACF EJBROLE profiles if you use RACF roles.
     - Remember that the Security Domain is used as a prefix, if specified.
   - **monitor** - can view, but not change admin settings.
   - **configurator** - can change cell configuration.
   - **operator** - can change cell state (e.g. start, stop).
   - **administrator** - can do anything.
   - Remember the Security Domain is used as a prefix, if specified.
7. **Now you can enable Global Security....**

Enabling Global Security

1. **Logon to the Admin Console web application.**
2. **Select Authentication Mechanism**
   - ICSF or LTPA
3. **Select User Registry**
   - Local OS, LDAP or Custom
4. **Select Active Protocol**
   - CSI and SAS, or CSI
5. **Click Enable Global Security**
   - Unclick Enforce Java 2 Security
6. **Restart the Server(s).**

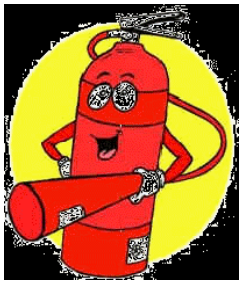
With Global Security On



Deactivating Global Security

- If you can log on to the Administrative Console,
  - Click 'Security-->Global Security'. Uncheck 'Enabled'.
  - Restart the server.

- If you can't log on to the Administrative Console,
  - From the bin directory of the Deployment Manager and each Node Agent, issue:
    - ./wsadmin.sh -conntype NONE
  - At the command-line prompt for wsadmin, issue:
    - securityoff
  - Restart the server.



Deactivating Global Security

- One more (unapproved) way:
  - Telnet to the server.
  - Edit (viascii) security.xml
    - In a base application server, edit the server's security.xml
    - In a DM server, edit the server's security.xml and the app server's security.xml.
  - Find '<security:Security'. Change 'enabled=true' to 'enabled=false'. Save and quit (:wq).
  - Then run the BBOxC2N jobs to synchronize the security.xml files with was.env
    - BBOWC2N for each Node
    - BBODC2N for the Deployment Manager.
  - Restart the server(s).

In Summary...

- **RACF provides security services in support of WebSphere Application Server and J2EE.**
- **The Customization dialogs generate the RACF definitions needed.**
- **Enabling Global Security enables cell security settings.**
- **Most production environments will require Global Security.**
- **SSL is the most likely thing to go wrong.**
- **Proper planning ensures success.**