WebSphere security

Unit objectives

After completing this unit, you should be able to:

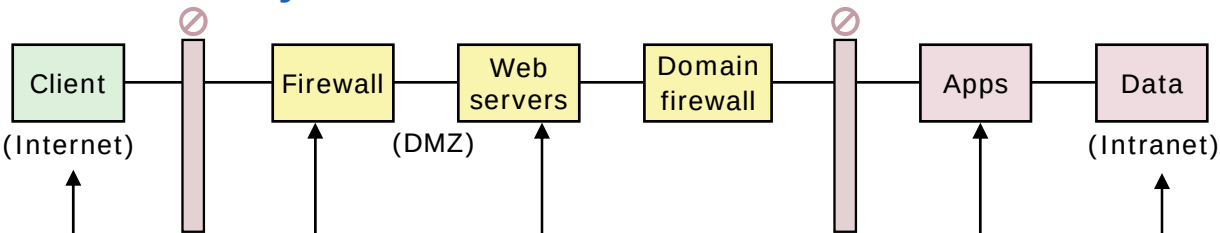
- Explain basic security concepts
- Describe the WebSphere Application Security architecture
- Describe enhancements to certificate management
- Configure fine-grained administrative security
- Configure application security
- Describe SSL concepts and configuration
- Describe support for multiple security domains
- Describe auditing features and functions
- Describe support for Java Platform, Enterprise Edition 6 (Java EE 6) security annotations

Topics

- WebSphere security basics
- WebSphere user registries
- Administrative security
- Application security
- Security domains
- Java 2 security
- SSL basics
- Certificates and certificate authorities
- SSL within a WebSphere cell
- Security auditing

WebSphere security basics

Basic security end-to-end model



The client is the customer. The client can be either a single user PC or a whole company. The devices are specified when necessary.

This server is the corporate web server. It provides the universal access to the business logic for the company. It allows browser access to the corporate site. In front of the web server is the router-access device for the site.

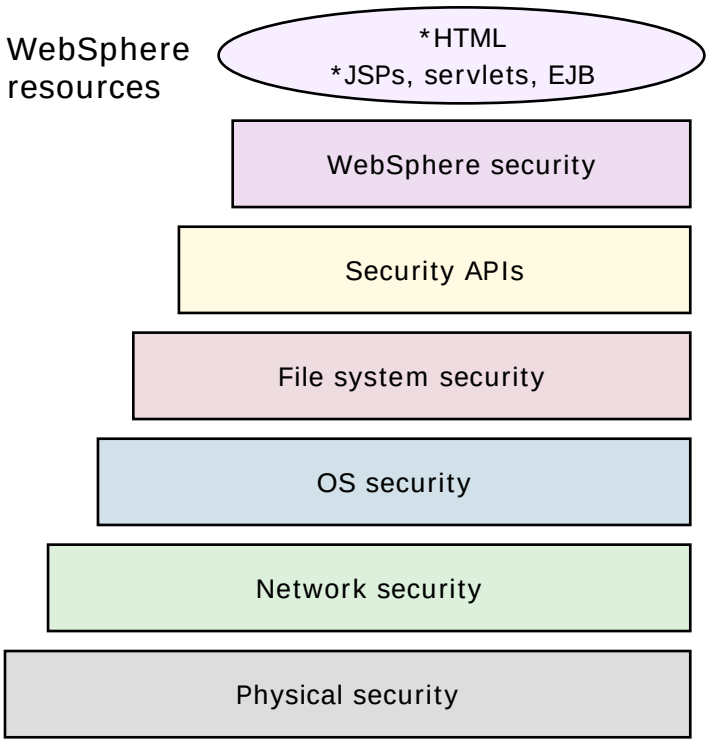
The “apps” are the business logic. These applications have access to the databases and provide the company business rules.

This firewall is the router to the Internet. An ISP (Internet service provider) typically provides it. This model, however, can apply to a corporate intranet. This router separates the internal network from the outside network.

This data is the corporate data. Ultimately, it is the information that the company wants to share with the customer. This data can be centralized or distributed. For this example, the data is accessed through business logic.

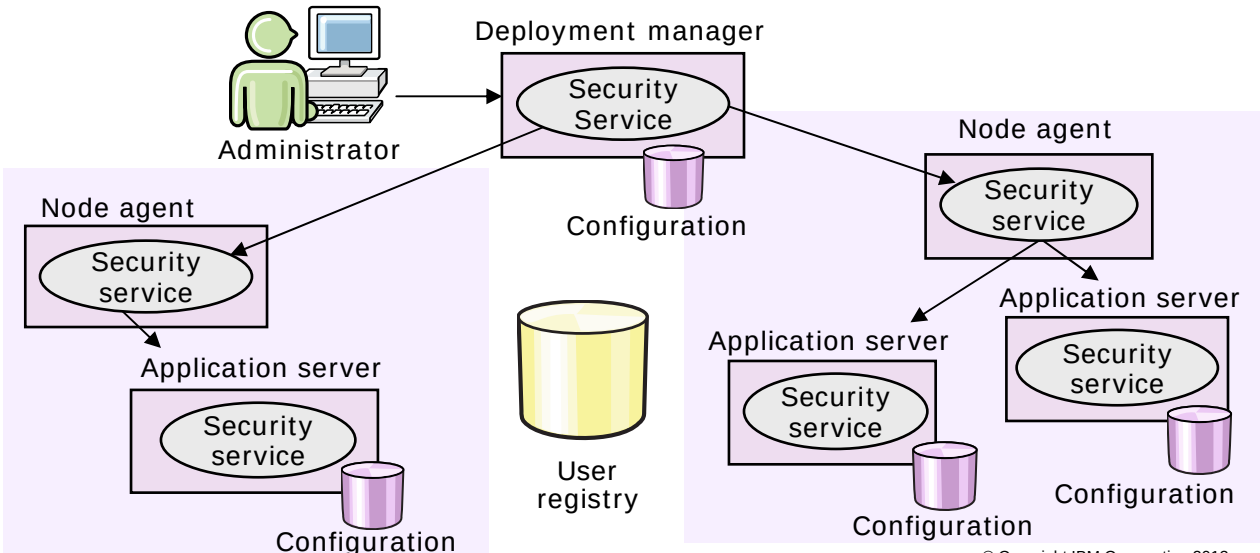
WebSphere Application Server security overview

- Security can be applied at different levels



WebSphere security service: Big picture

- Security service runs locally in each process (deployment manager, node agent, and application server)
  - Security workload not bottlenecked to a single process
  - Security service failure affects only a single process
- Separation of authentication mechanism and user registry

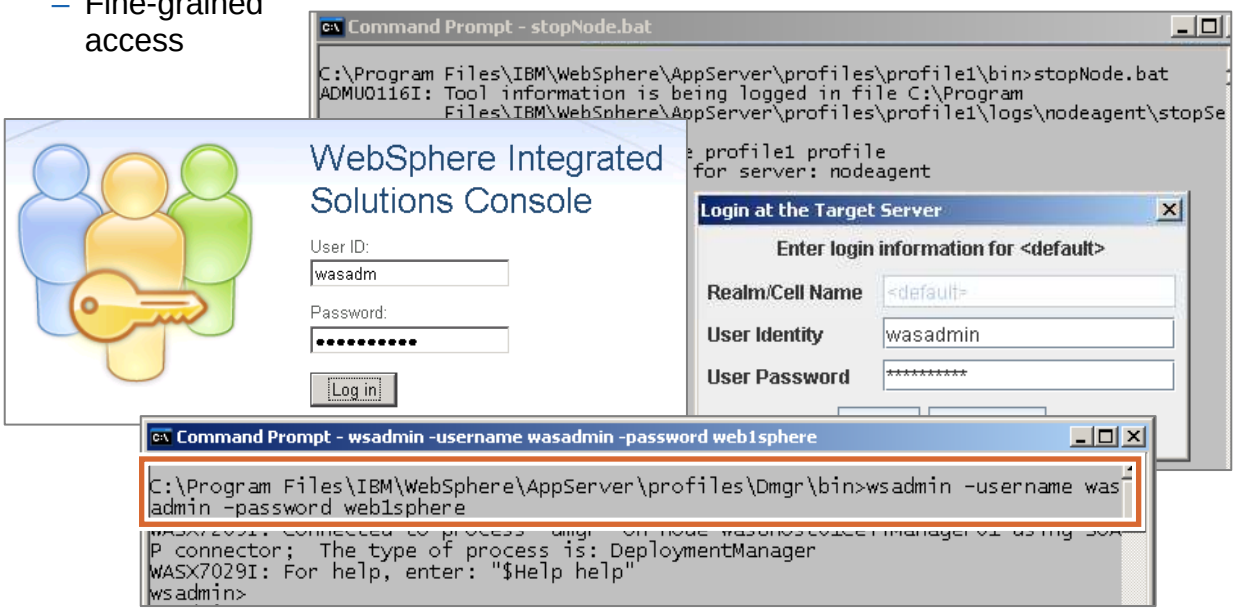


Types of security

- Administrative security
  - Protects things such as administrative console, wsadmin, scripts
- Application security
  - Protects access to the applications
- Java 2 security
  - Protects the local systems

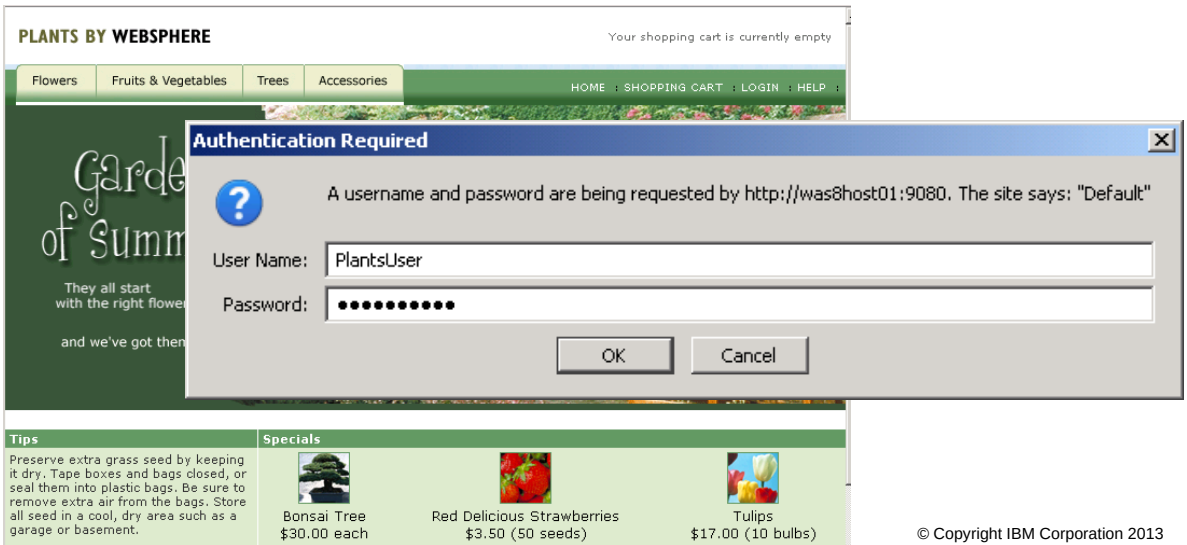
Administrative security

- Protects administrative console, scripts, wsadmin, and others
- Access can be restricted through:
  - Administrative roles
  - Fine-grained access



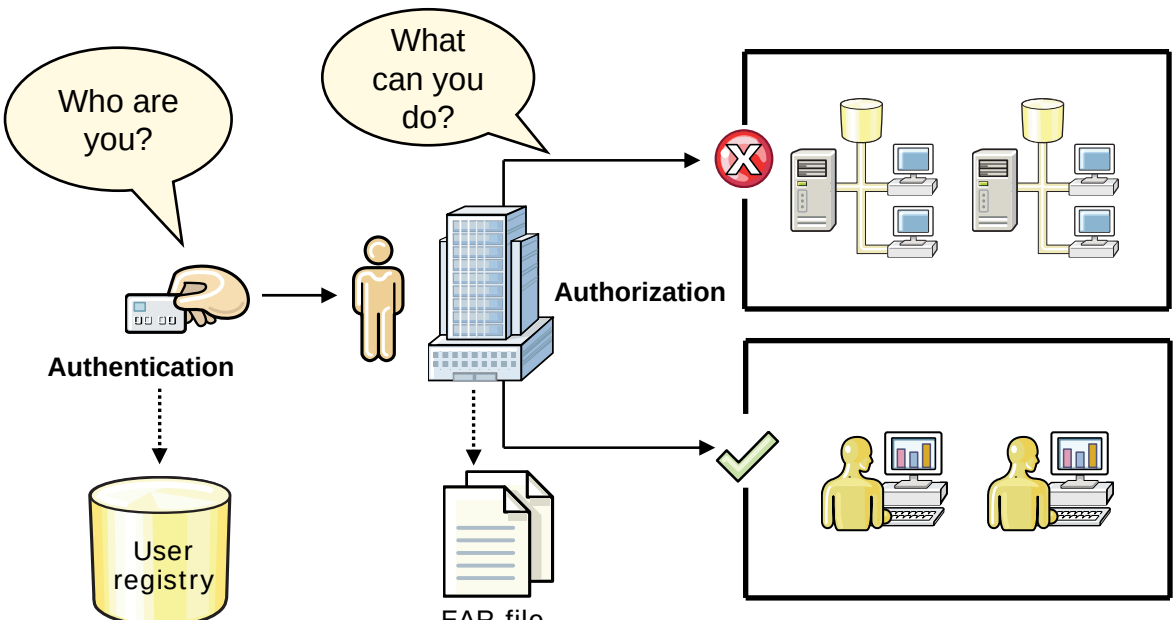
Application security

- Enables security for the applications in your environment
- Provides application isolation and requirements for authenticating application users
  - Security constraints protect servlets
  - Method permissions protect EJBs

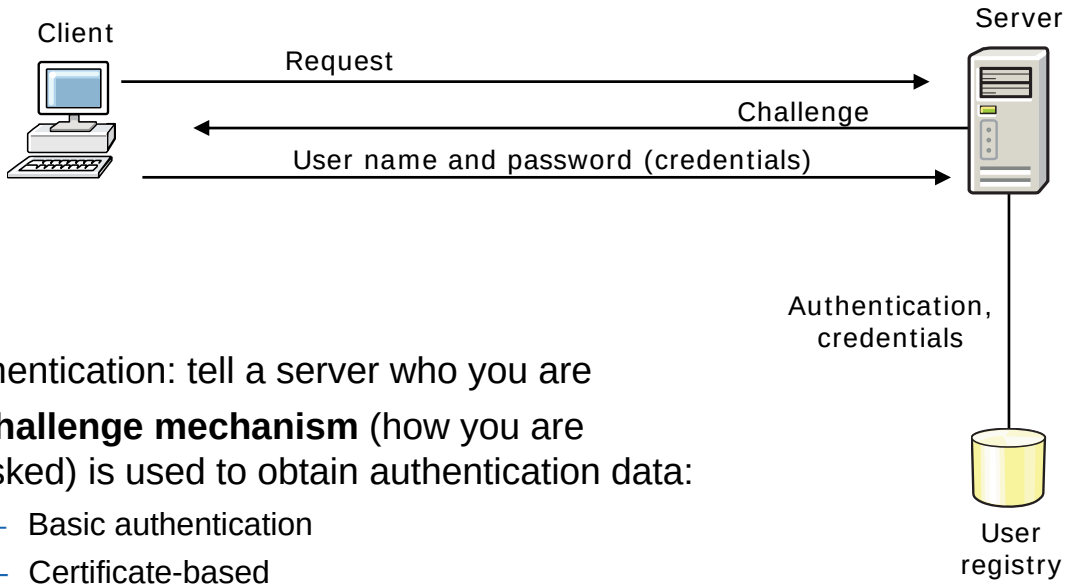


Authentication and authorization: What is the difference?

- There is a distinction between authentication and authorization
  - Authentication → Who are you?
  - Authorization → When authenticated, what are you allowed to do?



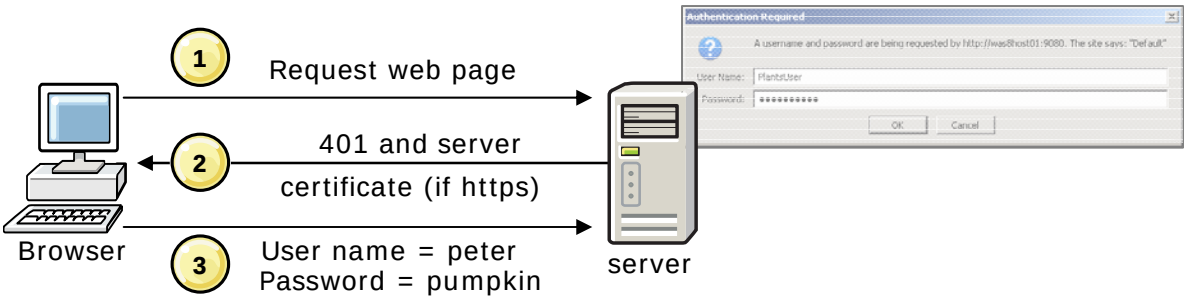
Challenge mechanism: Authentication basic steps



Authentication: tell a server who you are

- **Challenge mechanism** (how you are asked) is used to obtain authentication data:
  - Basic authentication
  - Certificate-based
  - Form-based authentication (preferred)
- Challenge mechanism is defined in the deployment descriptor
- Credentials are validated against user registry

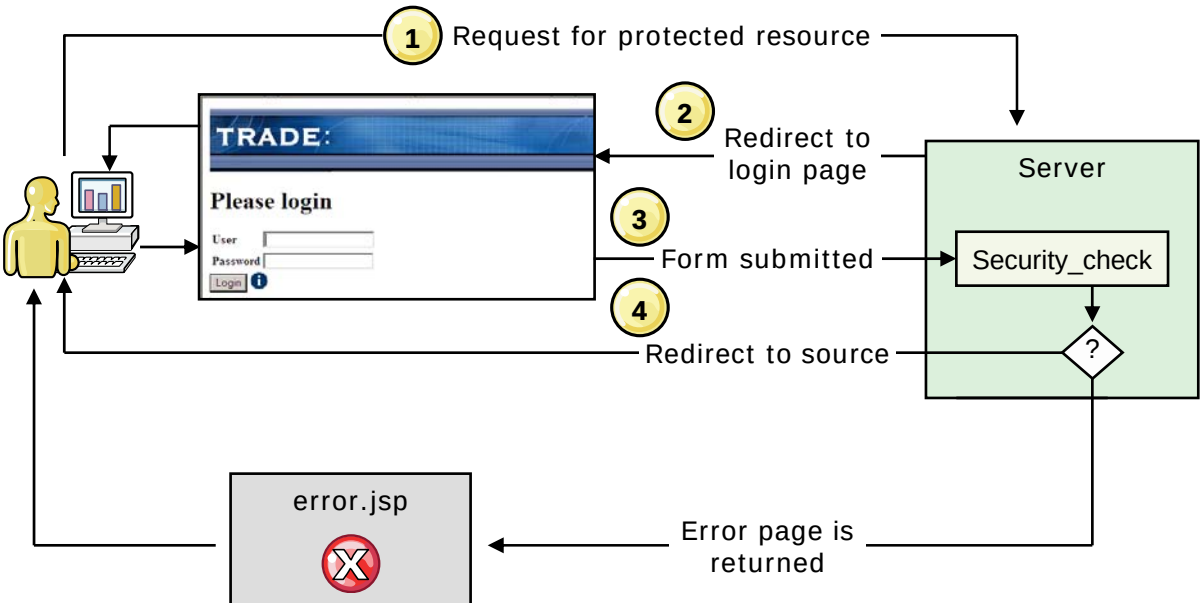
Challenge mechanism: Basic authentication



- Warning: password is not encrypted, merely encoded
  - Make sure that this channel is over HTTPS
- Warning: basic authentication token is sent across in the HTTP header
  - Danger: there is no way for the server to remove the token during a logout
  - If you walk away from a public browser, even if you log off, your credentials are still stored in the browser
  - Another person can walk up and be automatically logged in to your site
  - To remove the basic authentication token, close the browser or explicitly tell the browser to delete authentication credentials

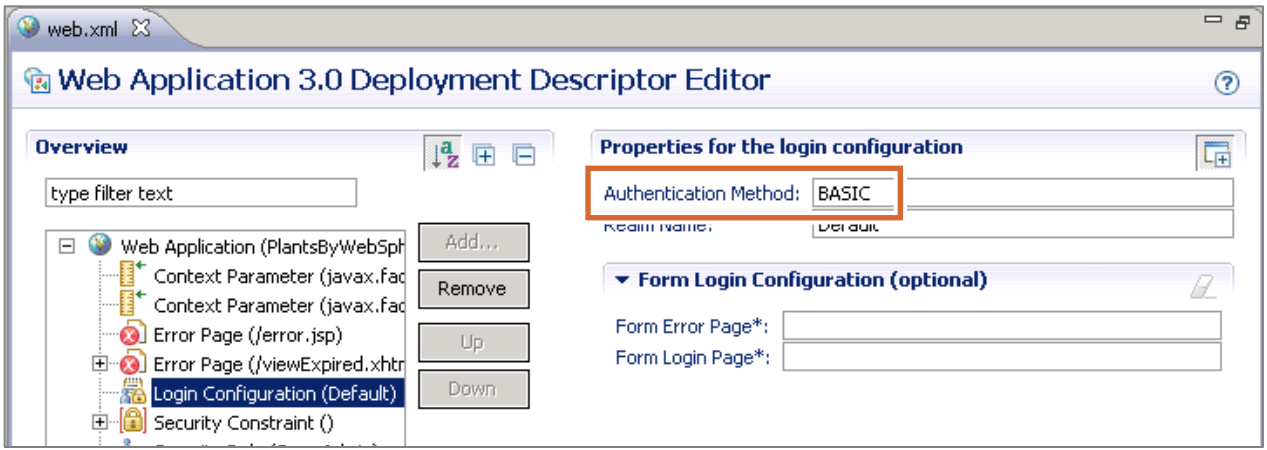
Challenge mechanism: Form-based authentication

- Defined within the application
- Suggested approach



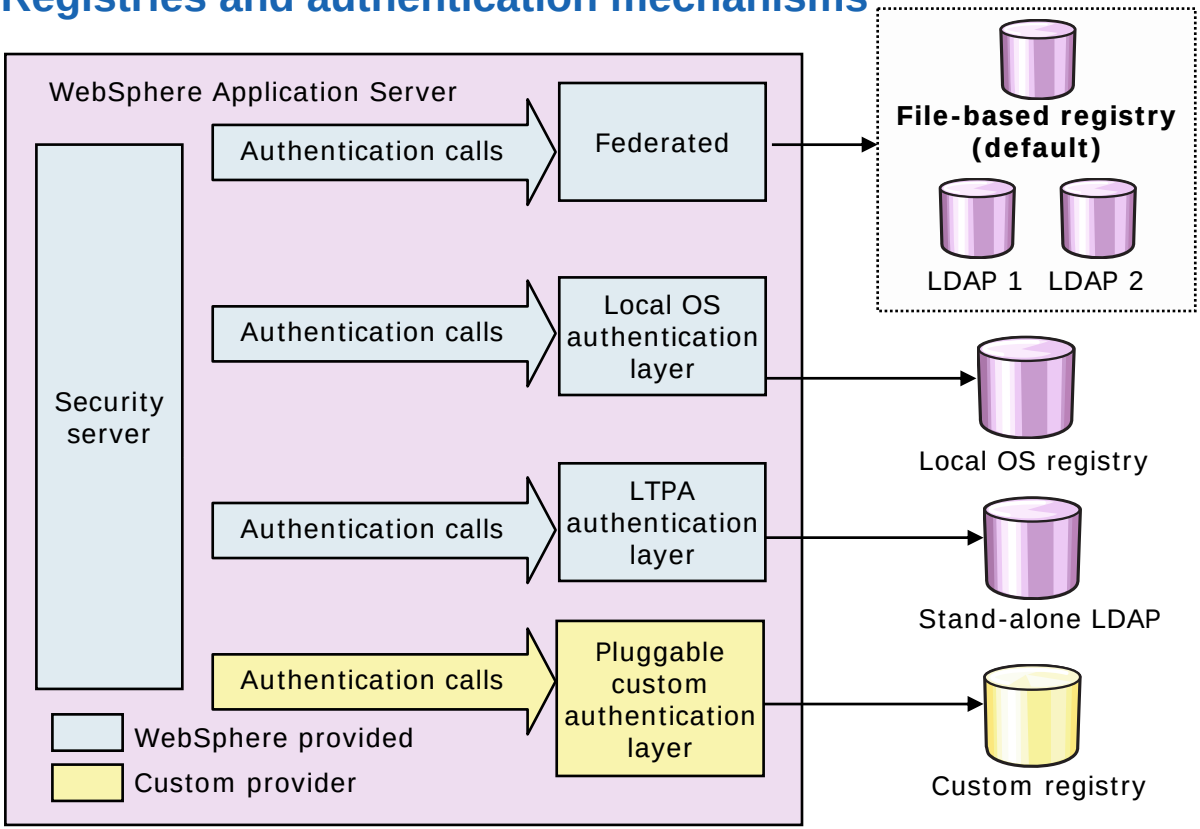
Defining the challenge type

- Challenge types are set in the EAR deployment descriptors
  - The default that Rational Application Developer uses is basic authentication
  - Form-based is defined by adding a login configuration



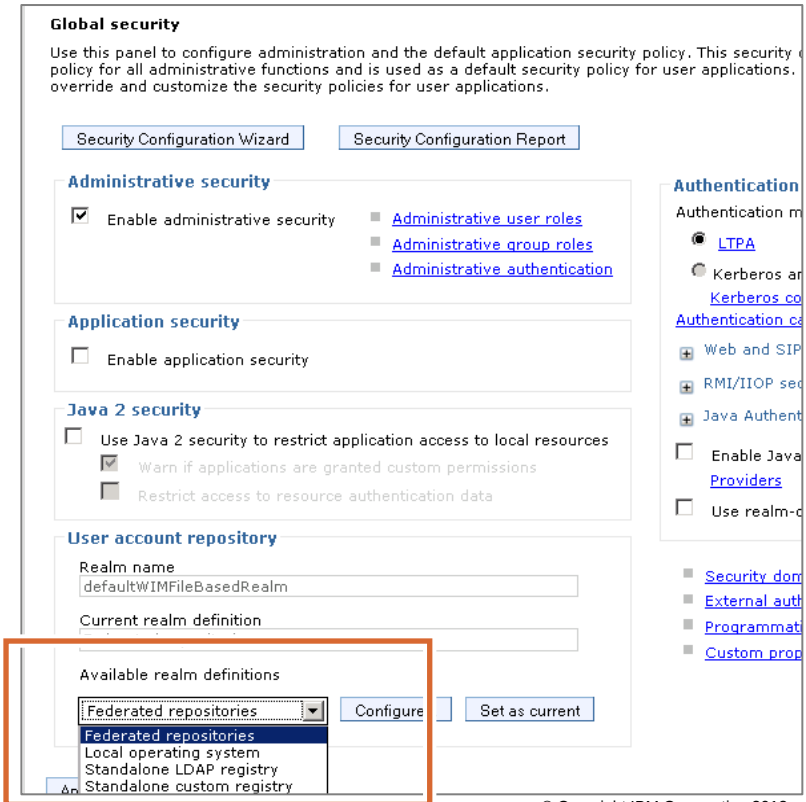
WebSphere user registries

Registries and authentication mechanisms

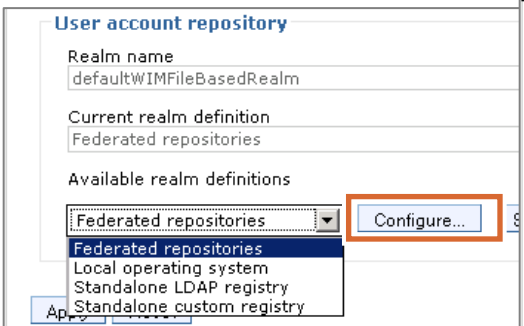


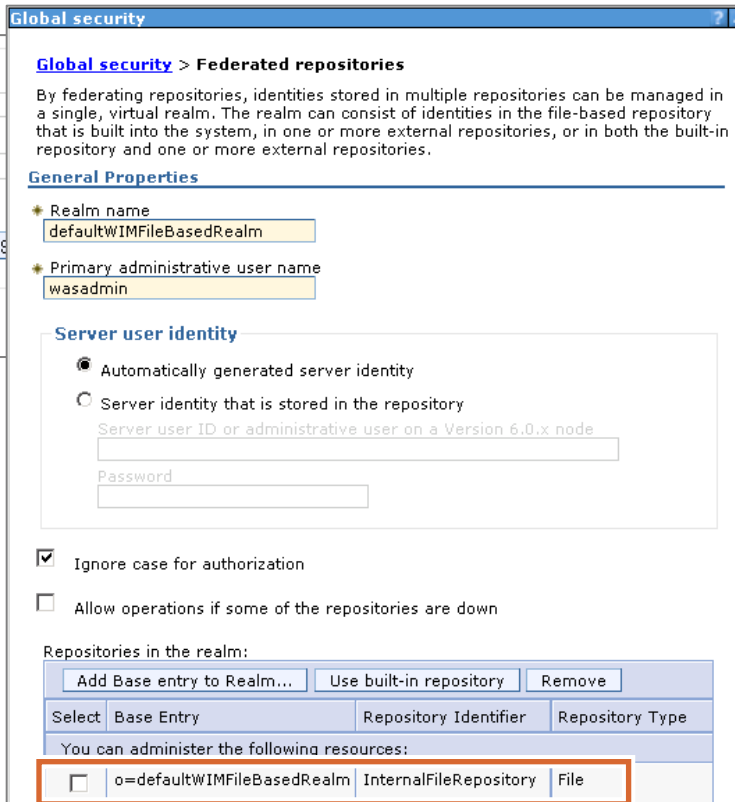
Defining user registries

- Use the administrative console to configure user registries
  - Manually (preferred)
  - Wizard (considered too simplistic)



Manual security configuration

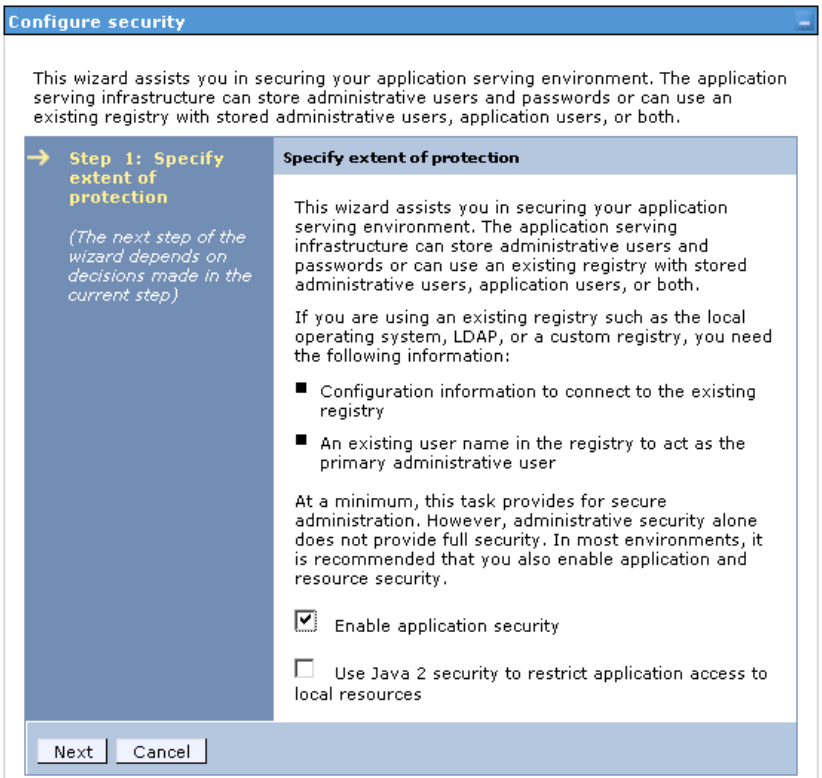




- The steps depend on the specific environment and which repository is being configured
- Much more detailed than the security wizard

Security wizard: Step 1

- Not detailed enough to be used for anything but simple environments



Security wizard: Step 2

Configure security

Secure the application serving environment

Step 1: Specify extent of protection

→ **Step 2: Select user repository**

(The next step of the wizard depends on decisions made in the current step)

Step 3: Summary

Select user repository

The user account repository stores users and group names that are used for authentication and authorization. The default repository is built into the application serving system and can be federated with one or more external Lightweight Directory Access Protocol (LDAP) repositories. You can also select a standalone external repository.

- (●) Federated repositories
- ( ) Standalone LDAP registry
- ( ) Local operating system
- ( ) Standalone custom registry

Previous | Next | Cancel

Security wizard: Step 3

Configure security

Secure the application serving environment

Step 1: Specify extent of protection

Step 2: Select user repository

→ **Step 3: Configure federated repository**

Step 4: Summary

Configure federated repository

A secure, file-based user repository is built into the system for storing administrative users or environments with a small number of users. The file-based user repository can be federated with one or more external LDAP repositories. If this is the first time security has been enabled using this repository, provide a new user name and password to act as an administrator. If security was previously enabled using this repository, provide the name of a user with administrator privileges that is in the built-in repository.

Note: Use this panel to configure a federated repository with a built-in, file-based repository in the realm. To configure a federated repository with a non file-based repository in the realm, you must use the User accounts repository section on the Global security panel.

* Primary administrative user name

wasadmin

Password

••••••••••

Confirm password

••••••••••

Previous | Next | Cancel

Security wizard: Step 4

Configure security

Secure the application serving environment

Step 1: Specify extent of protection

Step 2: Select user repository

Step 3: Configure federated repository

→ **Step 4: Summary**

Summary

Displays the list of values that are selected during the wizard and are used to enable security.

Options	Values
Enable administrative security	true
Enable application security	true
Use Java 2 security to restrict application access to local resources	false
User repository	Federated repositories
Primary administrative user name	wasadmin

Previous | Finish | Cancel

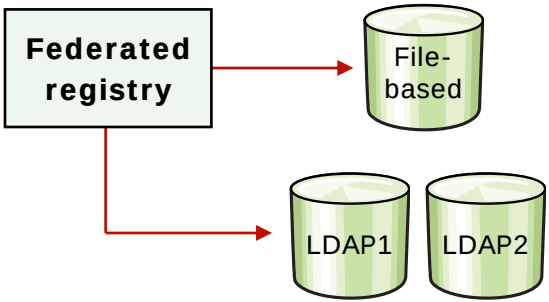
User registry support

- WebSphere Application Server supports some user registries

Local OS
NT Domain, NT WorkGroup, Windows
AIX
Solaris
HP-UX
Linux
OS/400

LDAP
IBM Tivoli Directory Server
IBM SecureWay Directory Server
Sun Java System Directory Server
IBM Lotus Domino
Microsoft Active Directory
Novell eDirectory
Custom (requires addition configuration)

Federated repositories



- The installation wizard and profile management tools have a default of enabling administrative security
  - The default repository type is a file-based federated repository
- Federated repositories provide for the use of multiple repositories with WebSphere Application Server
- Can be:
  - File-based
  - Single LDAP
  - Custom registry
  - Database
  - Multiple LDAPs
  - Subtree of an LDAP
- Defined and theoretically combined under a single realm
- All of the user repositories that are configured under the federated repository are invisible to WebSphere Application Server

Custom registry: Configuration

Global security > Standalone custom registry

Specifies a custom registry that implements the UserRegistry interface in the com.ibm.websphere.security package. For backward compatibility, the application server also supports a custom registry that implements the CustomRegistry interface in the com.ibm.websphere.security package. When security is enabled and any of the properties on this panel are changed, go to the Security > Global security panel. Click Apply or OK to validate the changes.

General Properties

* Primary administrative user name

Server user identity

Automatically generated server identity

Server identity that is stored in the repository

Server user ID or administrative user on a Version 6.0.x node

Password

* Custom registry class name

com.ibm.websphere.security.FileRegistrySample

Ignore case for authorization

Custom properties

Select	Name	Value

New

Delete

Apply OK Reset Cancel

Related Items

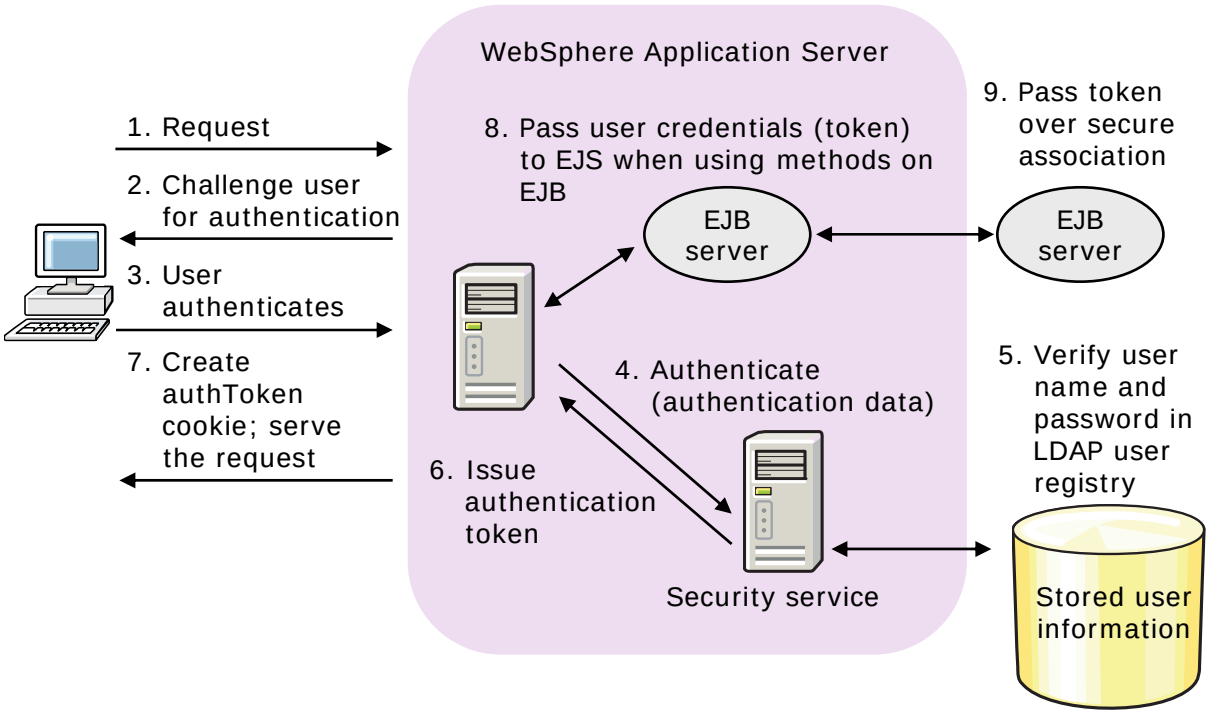
- Trusted authentication realms - inbound

Configured from administrative console:

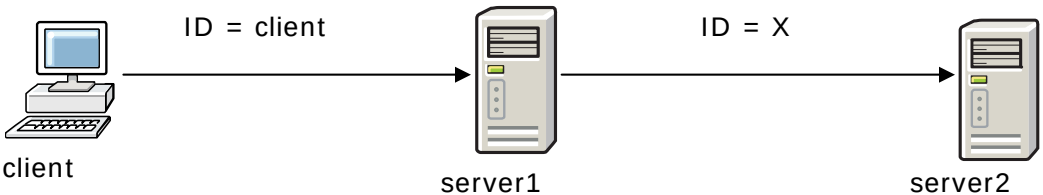
- **Security > Global security**
- Select **Stand-alone custom registry** from the **Available realm definitions**
- Click **Configure**
  - User name and password must exist
  - Class name must be implemented and in class path

Authentication mechanism: LTPA

- Allows the identity of a user to be passed around the distributed network



LTPA provides delegation



X can run as:

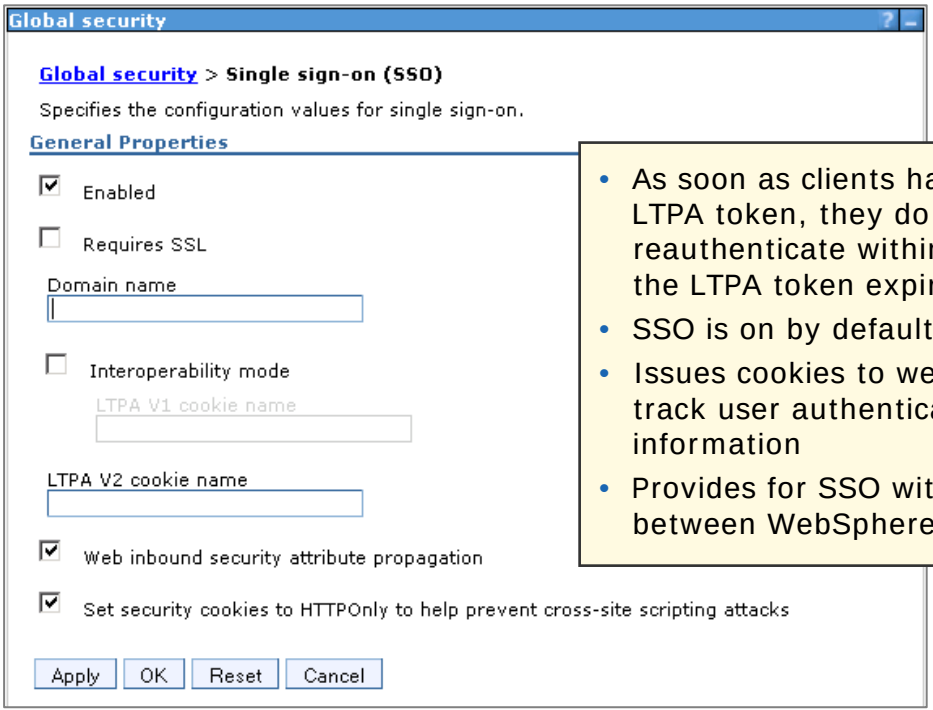
Option 1. Client

Option 2. Server 1

Option 3. Specified identity

- Using an LTPA token supports delegation

LTPA provides single sign-on (SSO)



- As soon as clients have a valid LTPA token, they do not need to reauthenticate within a cell (until the LTPA token expires)
- SSO is on by default
- Issues cookies to web browser to track user authentication information
- Provides for SSO within or even between WebSphere cells

Administrative security

Administrative security

Turning on administrative security enables many features, including:

- Authentication of HTTP and IIOP clients
- Administrative console security
- Naming security
- Use of SSL transports
- Role-based authorization checks of servlets, EJBs, and MBeans
- Propagation of identities (RunAs)
- The common user registry

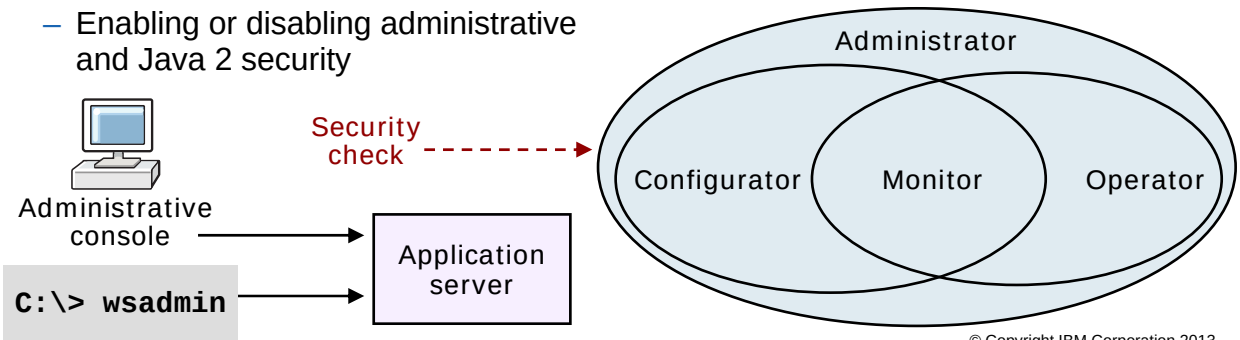
Console and other administrative tools: access is initially restricted to only the primary user

- You must create your administrative users and groups
- As of version 7, fine-grained access can be defined for console users
  - For example, Bob can be configured to have administrative access to application servers A and B
  - Fred can be configured to have operator access to only servers C and D

Console security

Defines which roles have access to the administrative tools

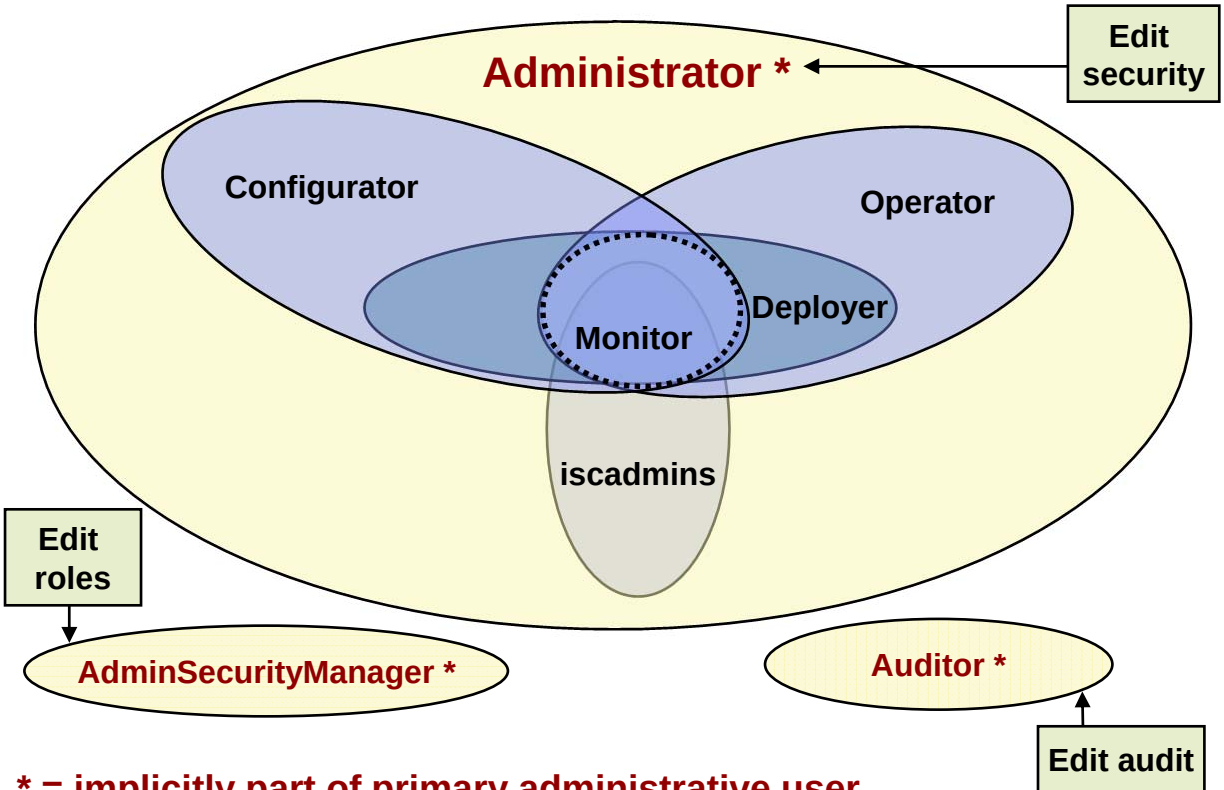
- **Monitor**: least privileged; allows a user to view the WebSphere configuration and current application server state
- **Configurator**: monitor privilege plus the ability to change the WebSphere configuration
- **Operator**: monitor privilege plus the ability to change runtime state, such as starting or stopping servers
- **Administrator**: operator, configurator, and iscadmins privilege, plus more privileges that are granted solely to the administrator role, such as:
  - Modifying the primary administrative user and password
  - Mapping users and groups to the administrator role
  - Enabling or disabling administrative and Java 2 security



Additional console security roles

- **iscadmins** (Integrated Solutions Console)
  - *Only available for administration console users*
  - Allows a user to manage users and groups in the federated repositories
- **Deployer**
  - Allows a user to change configuration and runtime state on applications that use wsadmin
- **Admin Security Manager**
  - Allows a user to map users to administrative roles by using wsadmin
  - When restricted access to resource authentication data is in effect, users can also manage authorization groups
- And others

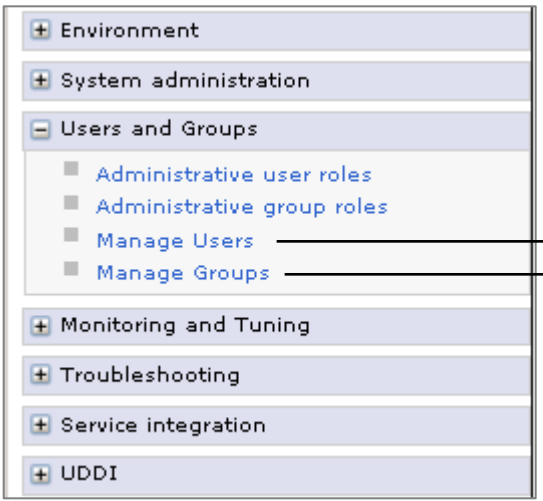
Administrative roles

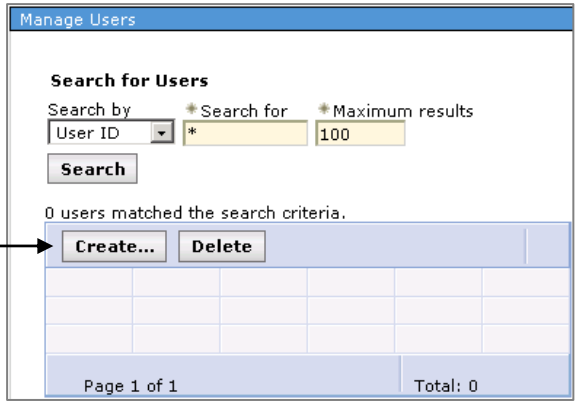


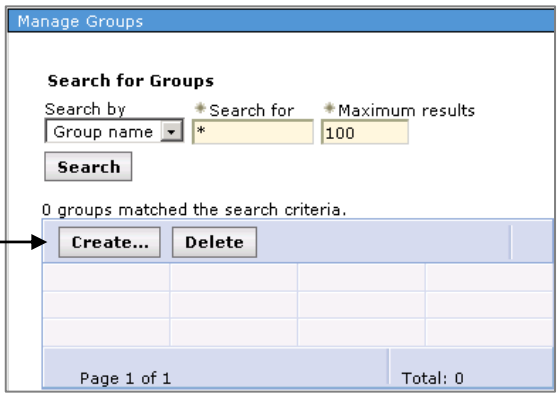
* = implicitly part of primary administrative user

Console security: Creating users and groups

- To set up console security
  - Turn on administrative security
  - **Create console users and groups**
  - Done in active user registry

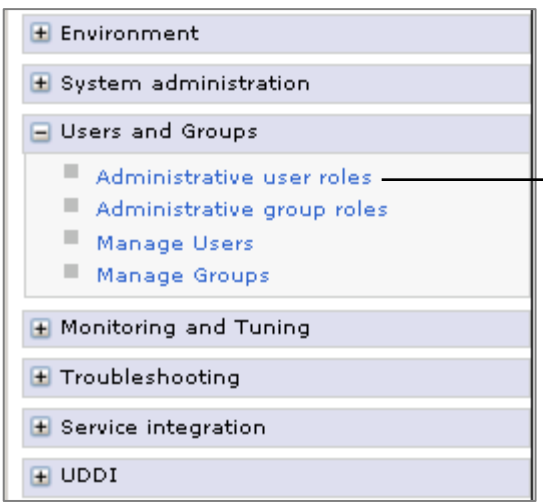


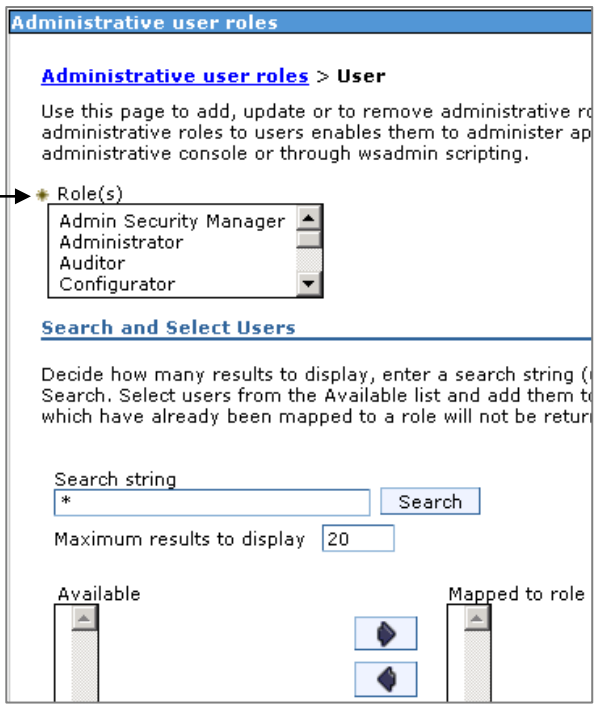




Console security: Mapping users and groups

- To set up console security
  - Turn on administrative security
  - Create console users and groups
  - **Map users and groups to administrative roles**





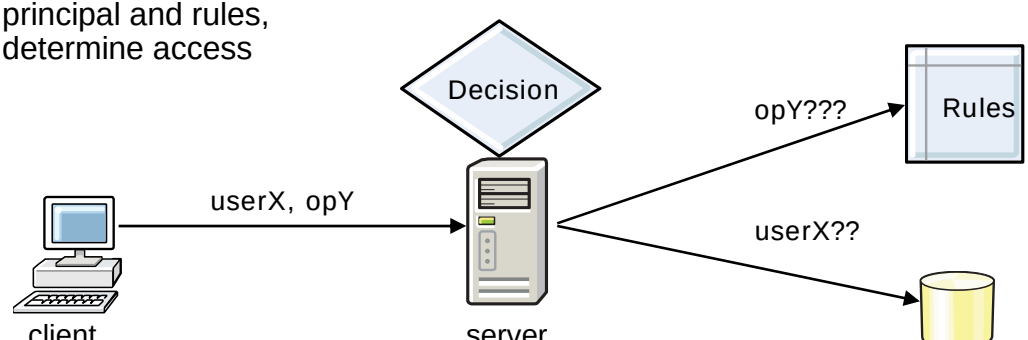
Application security

Authorization

Authorization involves granting trusted principals permission to perform actions on resources (web pages, servlets, JSPs, and EJB components)

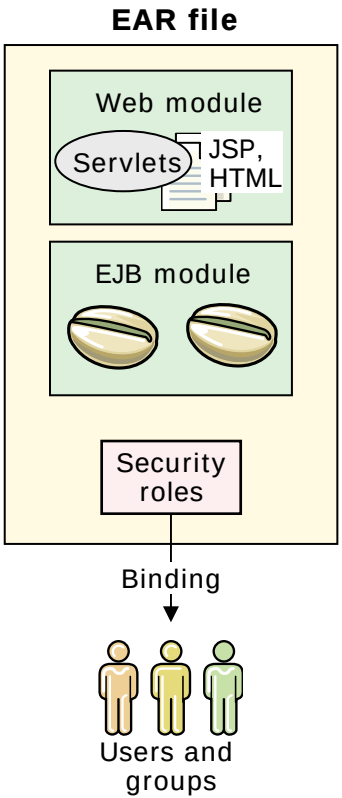
Control access to resources

- Security lookup (by server)
  - Determine security privileges for principal
  - Access information that is stored in registry
- Rule enforcement (by server)
  - Obtain rules from registry
  - Given privileges of principal and rules, determine access

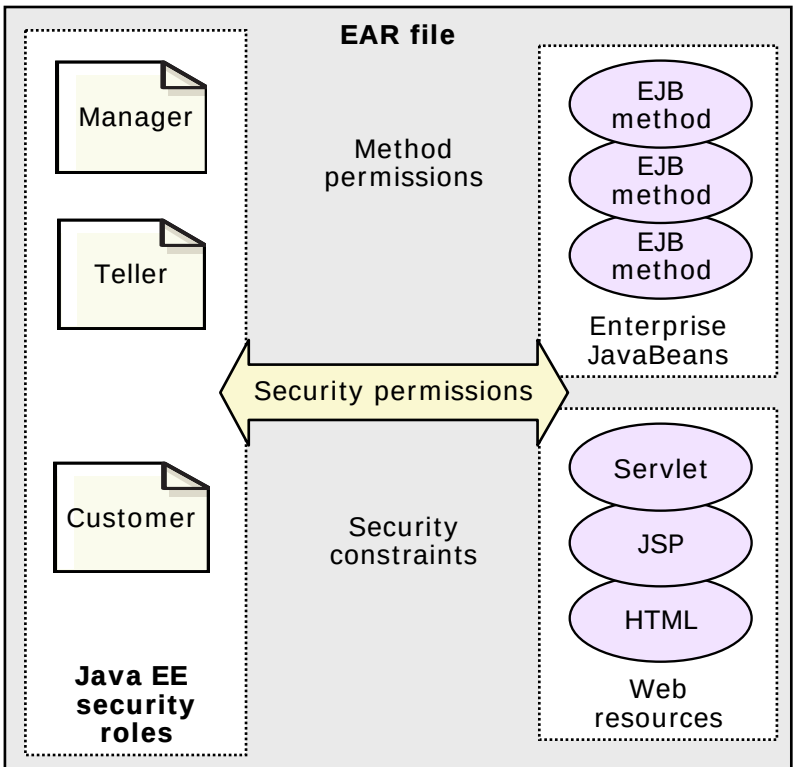


Security roles: Application authorization

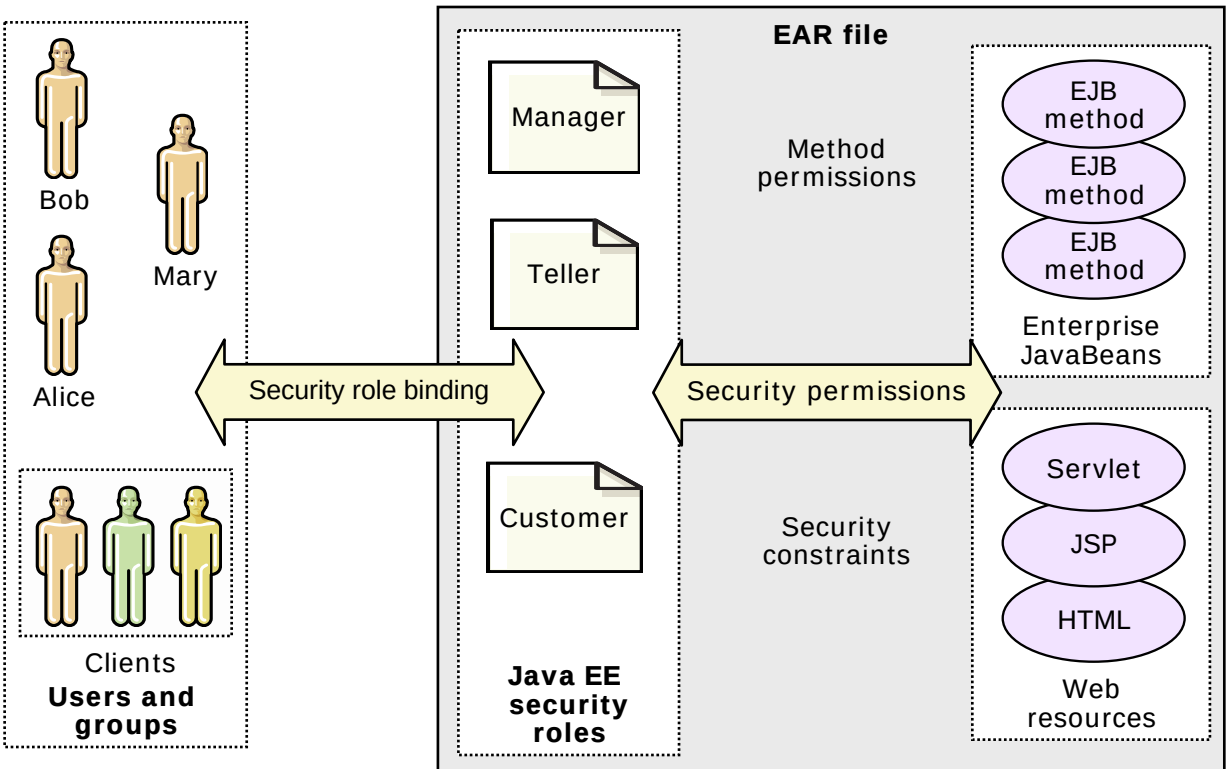
- Use security roles for authorization
  - Specify security at an abstract level without knowledge of actual users and groups
- Security roles are then applied to the web and EJB application components
  - Web URIs or EJB methods
- Binding of the users and groups to the security roles is generally done at the application installation time
  - Can be done post-installation as well



Securing Java EE application artifacts: Part 1

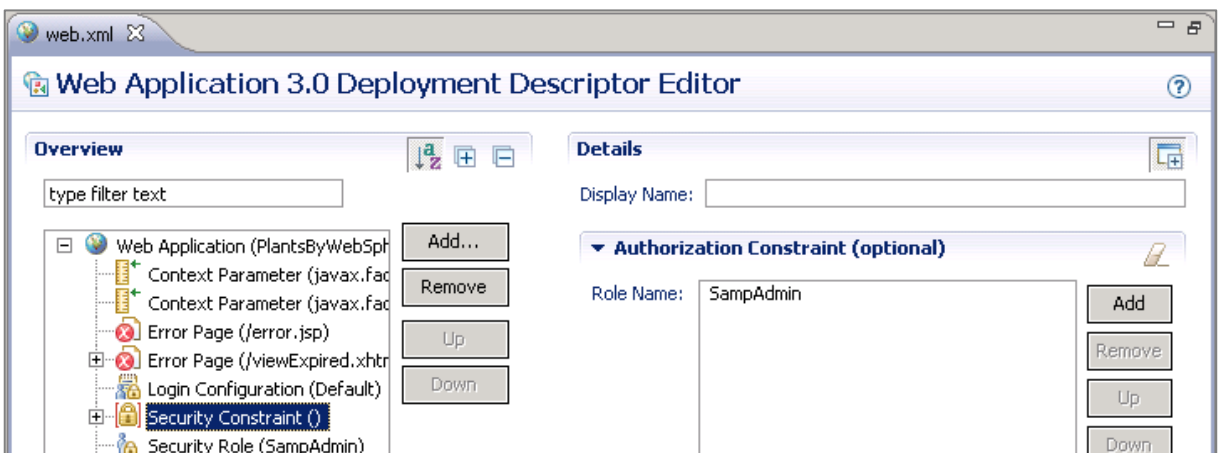


Securing Java EE application artifacts: Part 2



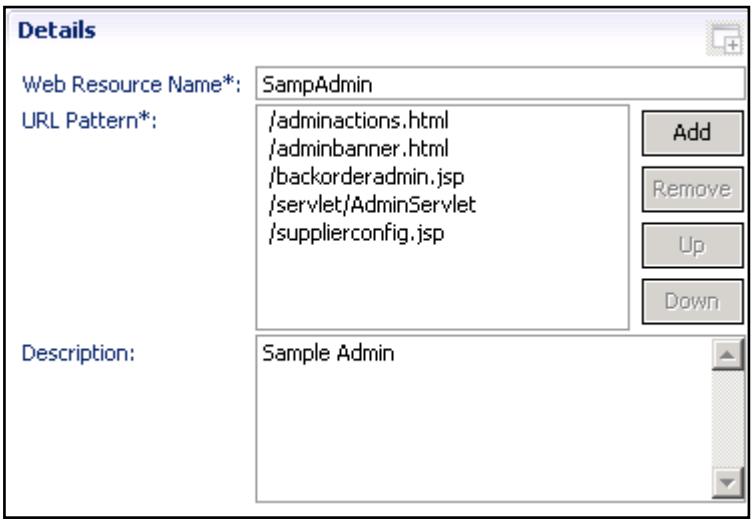
Applying application security

- Application security can be applied to resources within an EAR
  - Security roles are defined in the application deployment descriptor
  - Servlets and JSPs are protected with security constraints, which are mapped to the security roles
  - EJBs are protected with method permissions, which are mapped to the security roles
- The security roles are then mapped to actual users and groups during installation of the application



Creating security constraints

- After the security role is created, it can be mapped in a security constraint to protect web application artifacts



Using the console to map security roles

- The mapping of users and groups to security roles can take place during or after application installation
  - After installation, use the administrative console to go to the application and under Detailed Properties, select **Security role to user/group mapping**

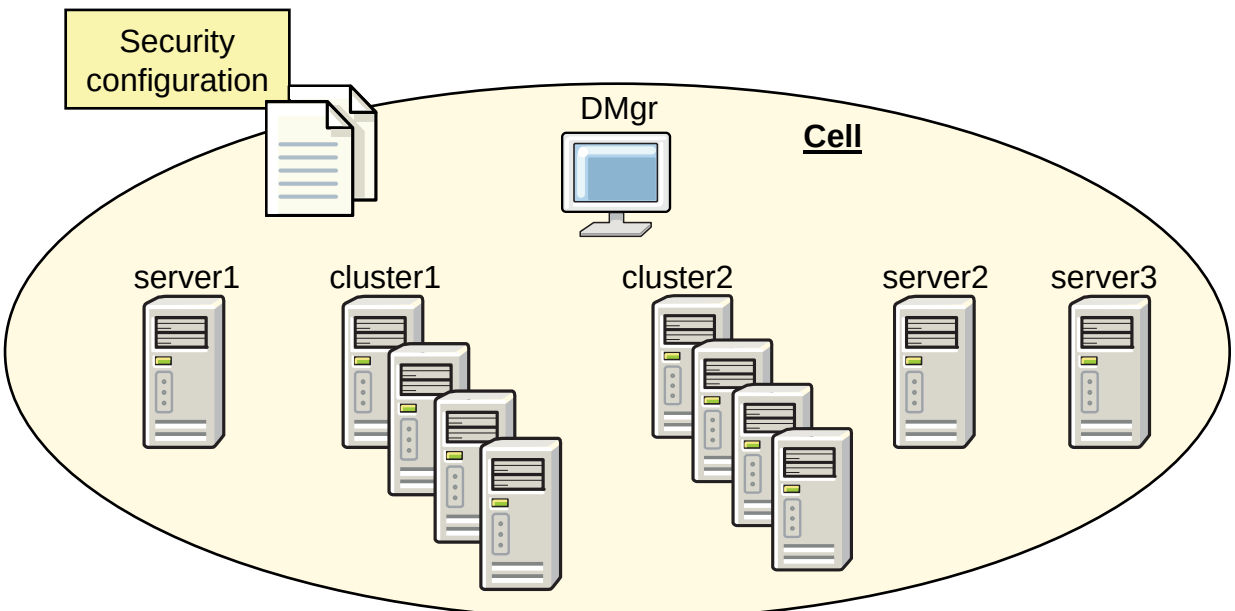
Security domains

Security domains

- Multiple security domains are supported as of WebSphere Application Server version 7
  - Can create different security configurations and assign them to different applications
  - Can configure different security attributes for both administrative and user applications within a cell environment
  - Can configure different applications to use different security configurations by assigning the servers, clusters, or service integration buses to the security domains
- Only users that are assigned to the administrator role can configure multiple security domains
- For example, with security domains, it is possible to have different user registries that are configured for distinct parts of the cell

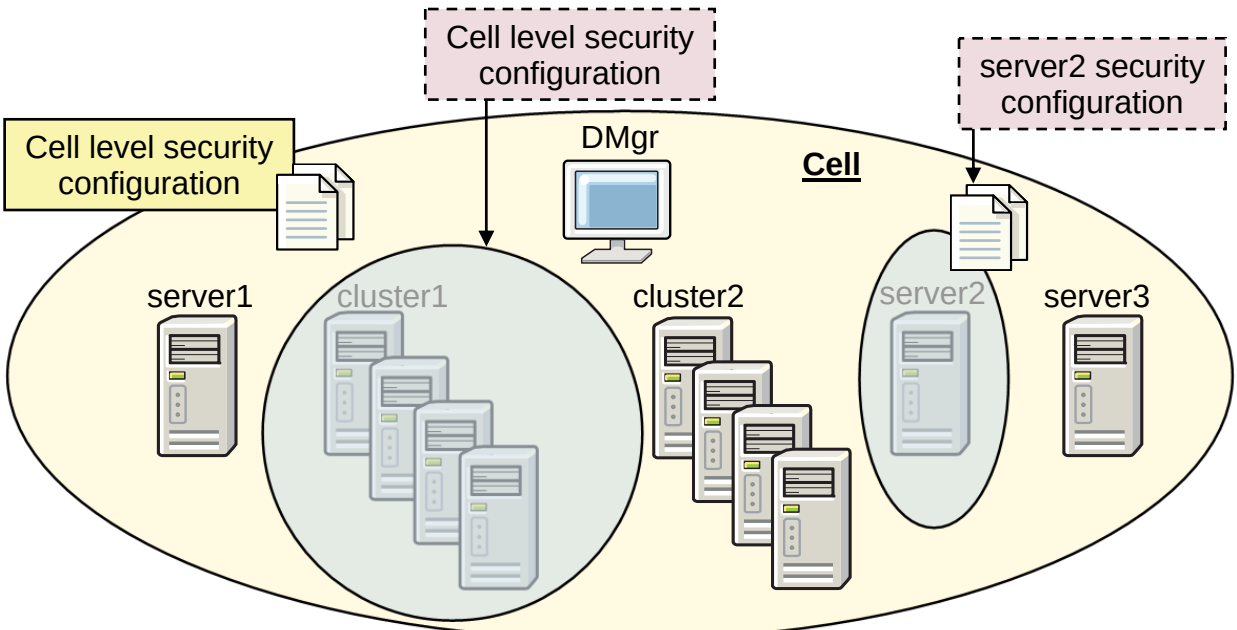
Security configurations

- Traditionally, the security configuration was defined at a cell level
  - A side effect was all elements of the cell shared the exact same security configuration



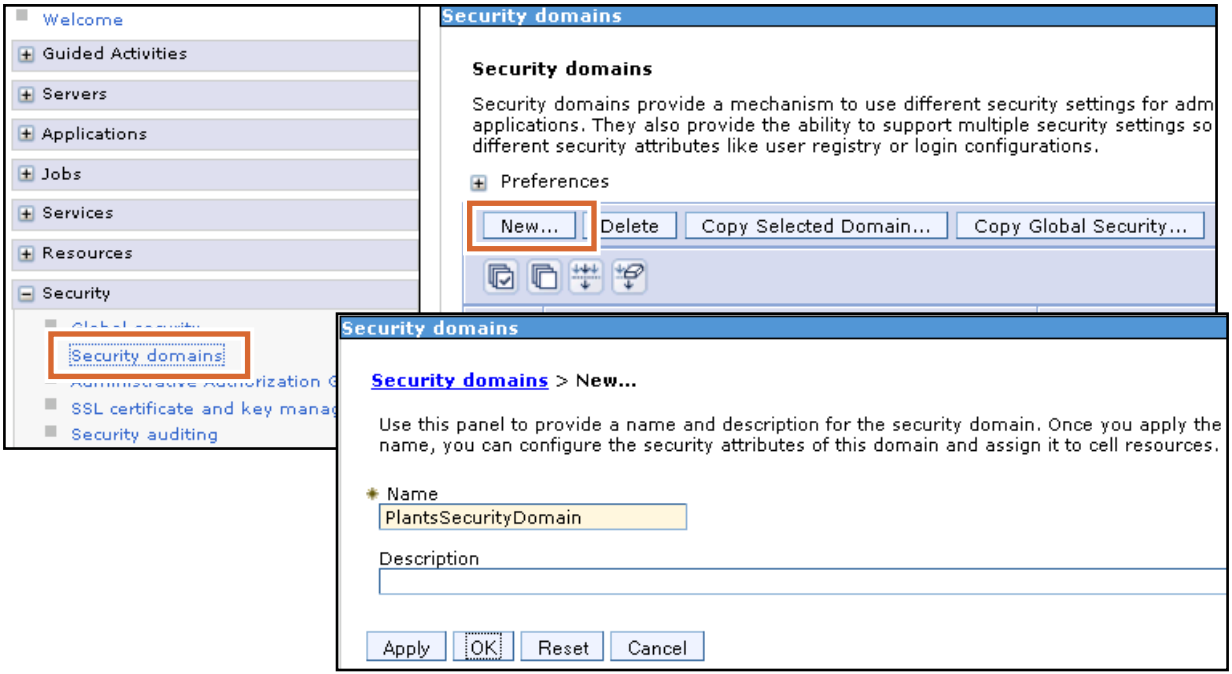
Security domains

- With security domains, it is possible to have a cell level security configuration, and multiple other security configurations at different scopes



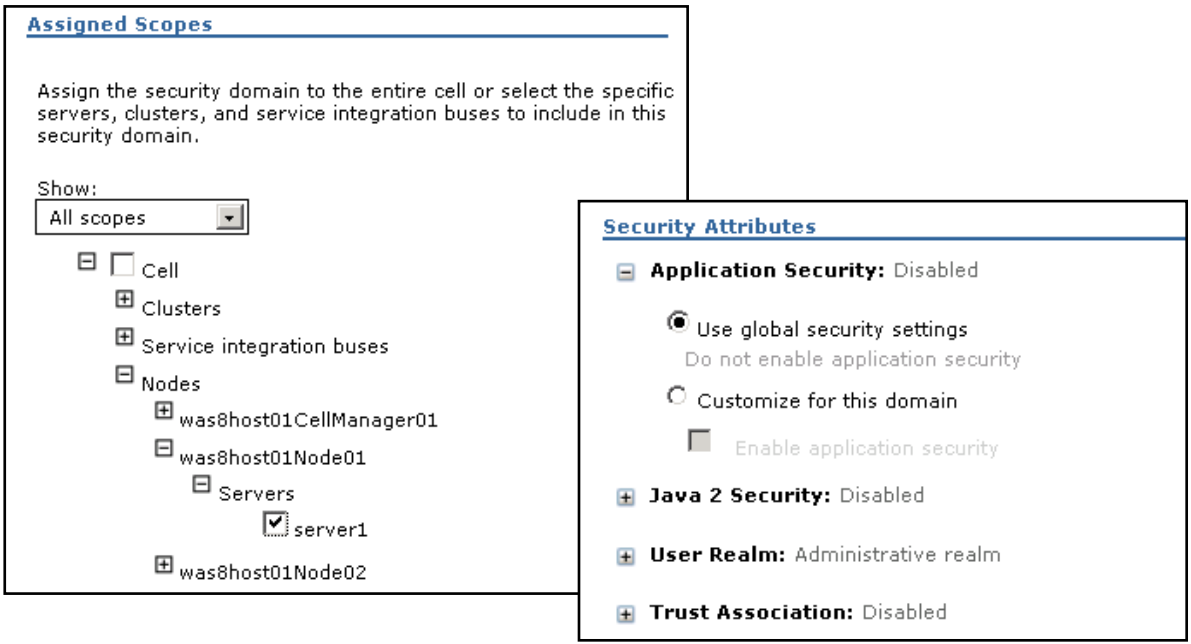
Creating a security domain

- Use the console to create a security domain
  - **Security > Security domains > New**



Configuring a security domain

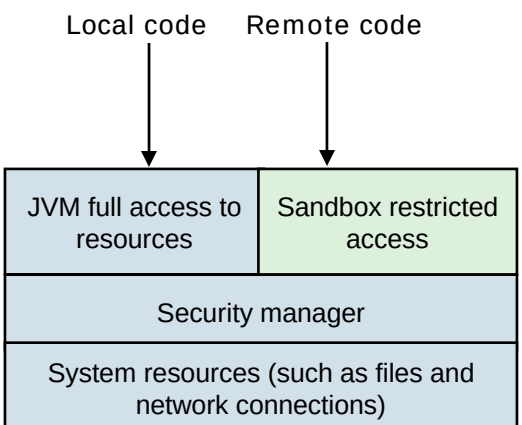
- Define a scope and configure the attributes
  - It is possible to enable application security for only the PlantsByWebSphere



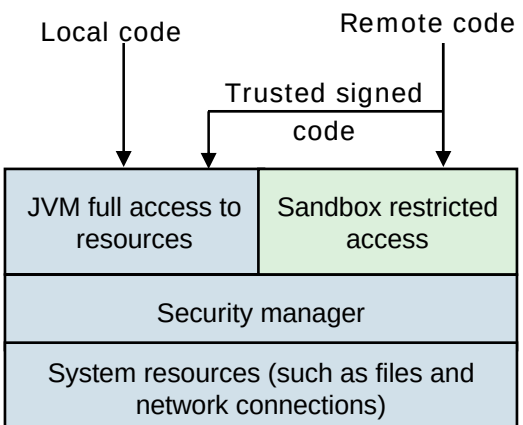
Java 2 security

Java security model

- Java 1.0 (sandbox model):
  - Downloaded code (untrusted) runs in a sandbox (restricted environment)
  - Application code (local Java classes) has full access to resources (trusted and no protection)

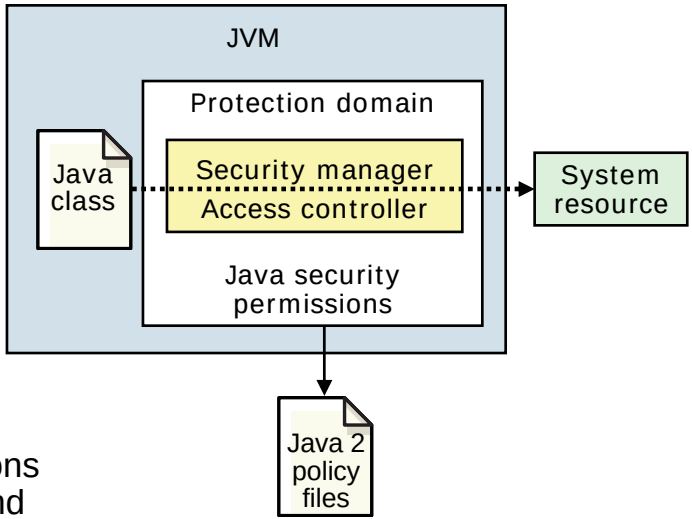


- Java 1.1 (signed code):
  - Extends 1.0 sandbox model. Introduces signed code. Digitally signed remote code is treated like local code if the public key used to verify that the signature is trusted



Java security overview

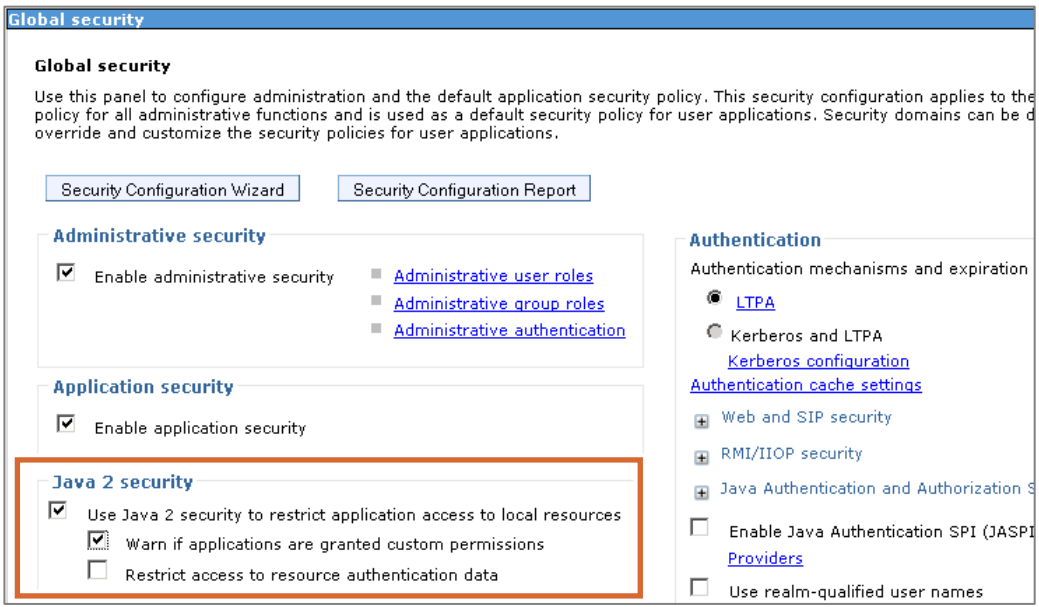
- Protects the system from the applications
- Provides an access control mechanism to manage the application access to system level resources
  - File I/O, network connections (sockets), property files
  - Policy-based
- Policies define a set of permissions available from various signers and code locations
  - Stored in policy files
- All Java code runs under a security policy
  - Grants access to certain resources
- Can be turned on or off independently of administrative security



- Java code needs access to certain system resources
- Java code must get the permission from Java 2 access control
- Access control looks at the Java 2 policy files to determine whether the requesting Java code has the appropriate permission

Enabling Java 2 security

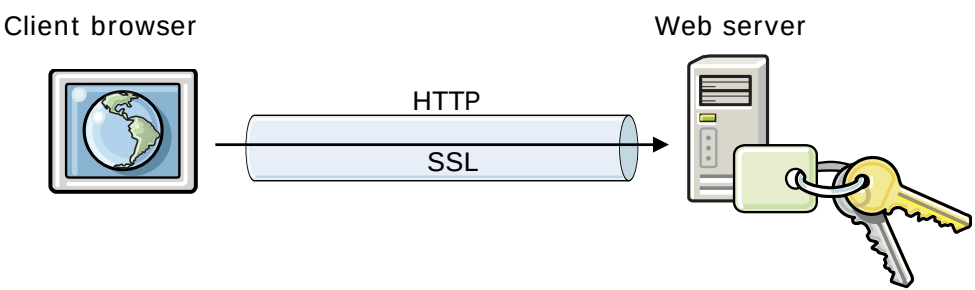
- Can be enabled and disabled independently of administrative and application security
- Java 2 security provides a policy-based, fine-grain access control mechanism that increases overall system integrity.
- Java 2 security checks for permissions before allowing access to certain protected system resources



SSL basics

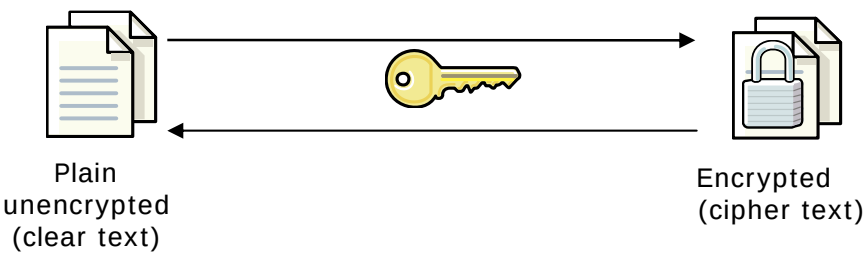
What is SSL?

- SSL stands for Secure Sockets Layer
- SSL provides connection security through:
  - Communication privacy: the data on the connection can be encrypted
  - Communication integrity: the protocol includes a built-in integrity check
  - Authentication: the client knows who the server is
- Creates a VPN
  - Uses both symmetric and asymmetric key encryption



Symmetric key encryption

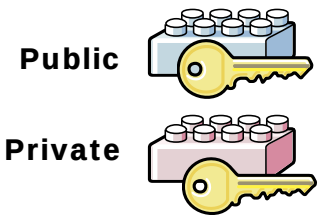
- Symmetric or secret key technology is a model in which two parties have a shared secret
- The same key is used for both encryption and decryption

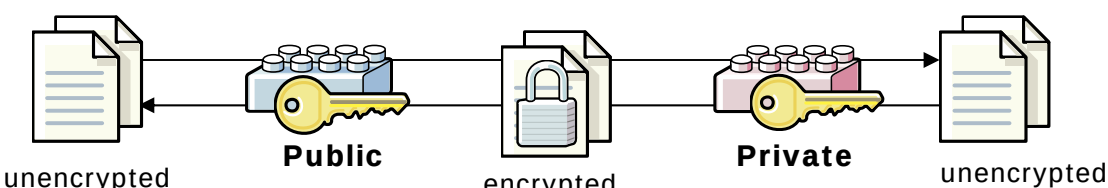


Asymmetric key encryption

Public key cryptography

- Two keys that are cryptographically related:
  - Public key (can share with everyone)
  - Private key (must never be shared; possession is proof)
- Keys are asymmetric:
  - Given message is encrypted with one key and decrypted with another
  - Symmetric, secret key technology uses the same key for encryption and decryption

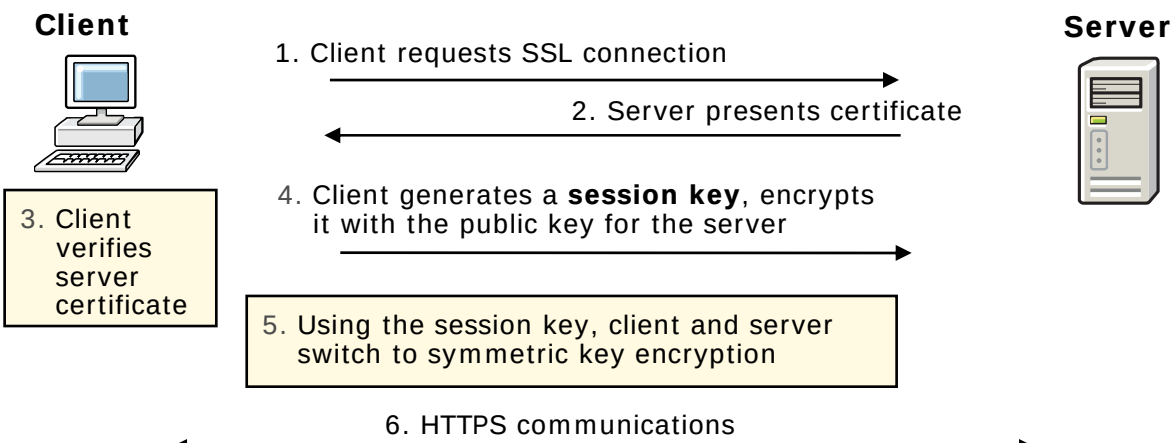




How does SSL work?

SSL uses a combination of asymmetric and symmetric encryption to create a session between the client and server

- Asymmetric encryption is used to negotiate a session key (shared secret)
  - Asymmetric encryption is slow but does not require a shared secret
- Symmetric encryption is used to transfer data between the client and server
  - Symmetric encryption is fast but requires a shared secret



Certificates and certificate authorities

What is a certificate?

Simple answer:

- It is an electronic document that identifies you, and a third-party vouches for both you and the certificate itself
- Examples:
  - Employee badge (vouched for by your employer)
  - Drivers license (vouched for by your state)
  - Passport (vouched for by your country)

More information:

- Includes information about you
- Includes public key
- A certificate authority digitally signs it

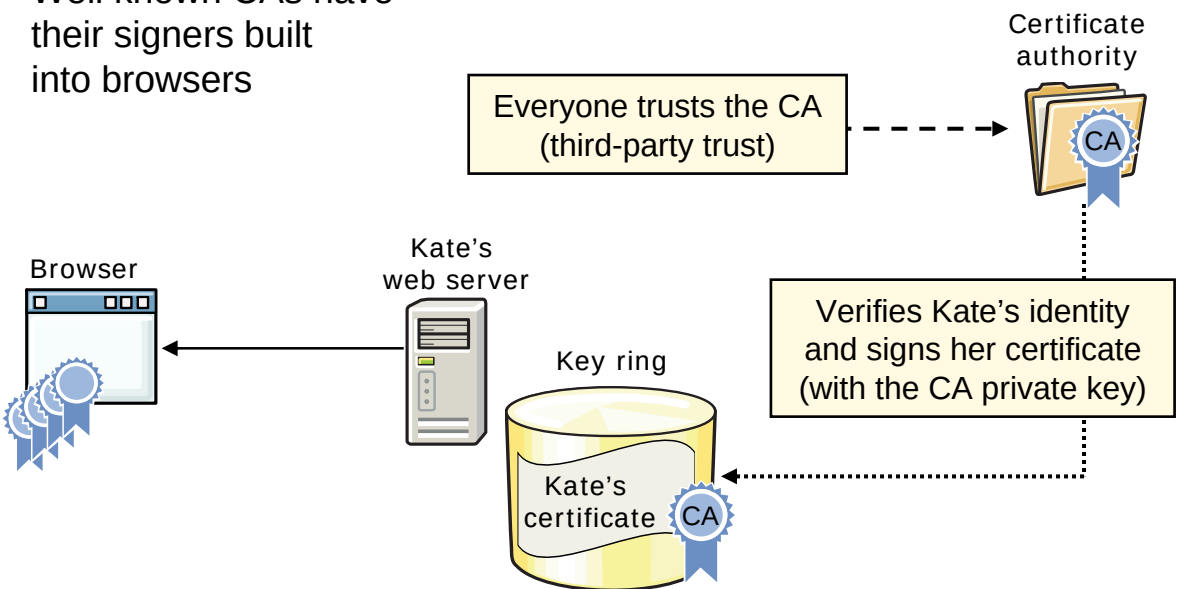
Types of certificates

There are different types of certificates:

- **Certificate**
  - Contains a public key that is signed
  - Contains information about the owner of the certificate
  - Contains certificate expiration date
- **Personal certificate**:
  - Typically meant as the certificate along with private key data
- **Signer certificate**:
  - The certificate that corresponds to the private key used to digitally sign another certificate

What is a certificate authority (CA)?

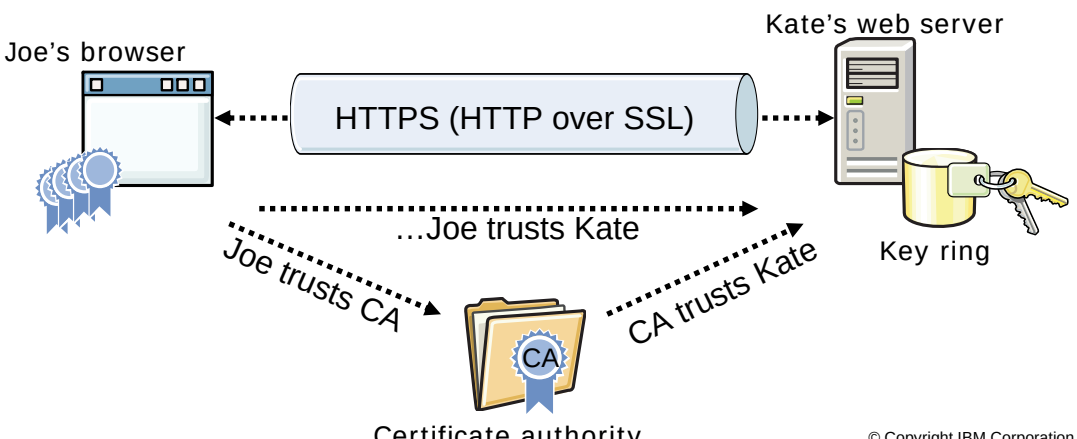
- An entity that signs public keys, thus creating certificates
  - A CA validates Kate's identity before vouching for her (signing her certificate)
  - A special type of signer (a trusted signer)
- Well known CAs have their signers built into browsers



SSL: Putting it all together

The SSL handshake establishes:

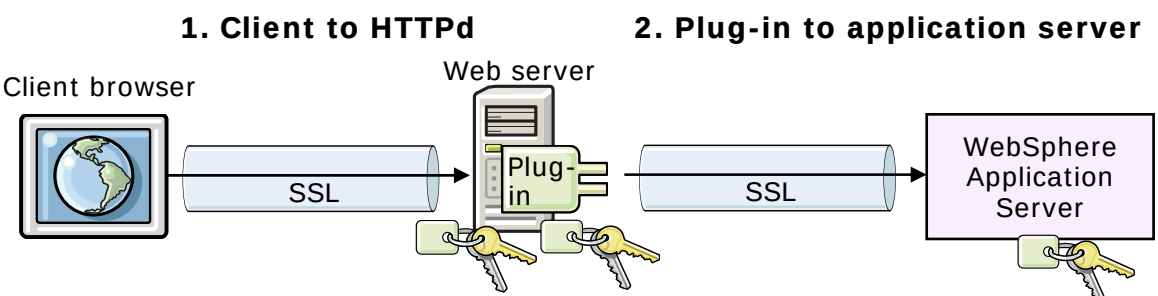
- The identity of the server (based on trusting the CA)
  - The server provides a CA signed certificate
  - The server proves that it has the corresponding private key
  - Therefore, Joe trusts that Kate really is Kate
- Encrypted (with symmetric key) channel between the browser and server



SSL within a WebSphere cell

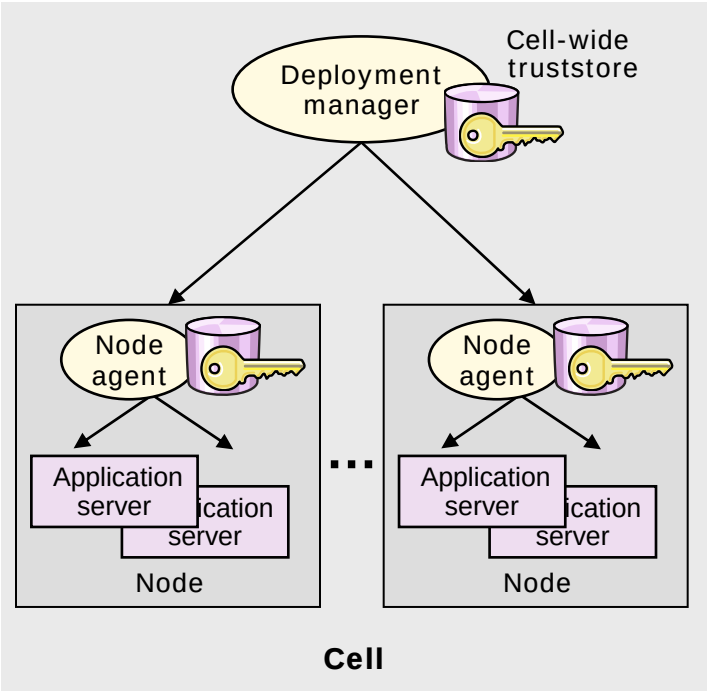
SSL within WebSphere Application Server

- SSL can be used to secure network traffic for a number of links
  - From the client to the web server
  - From the plug-in to the application server
  - Other network links can also be secured (LDAP and others)
- The **administrative console** (or iKeyman) can be used to create and manage the necessary keys and keystores
  - Keystores contain digital certificates that are needed for SSL to establish secure communication between two points

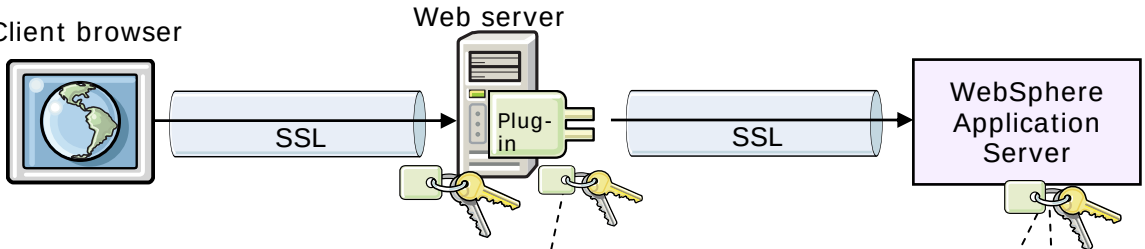


WebSphere SSL management

- WebSphere automatically creates node certificates
  - The cell root certificate (called a “chained certificate”) signs the node certificates
  - Node certificates are stored in a node-specific keystore
- Cell-wide truststore includes cell root signer certificate
  - Each node can therefore validate certificates that other nodes present
- An expiration manager automatically renews expiring keys (default behavior)
- The keystores and truststores are stored within the cell configuration and therefore distributed to the nodes through file synchronization

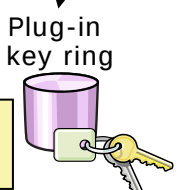


What are key rings, keystores, and truststores?

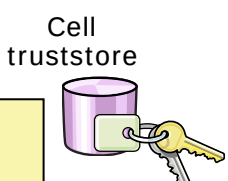


Key rings, keystores, and truststores are all encrypted files that contain certificates

Keystores hold node personal certificates



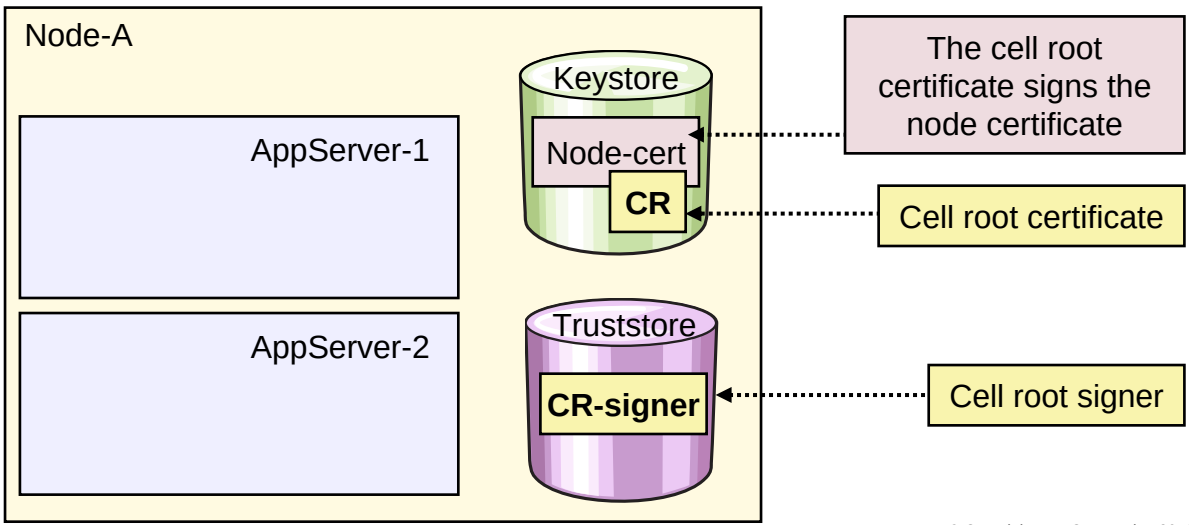
Plug-in key rings hold both the personal and signer certificates



Truststores hold the cell root signer certificate

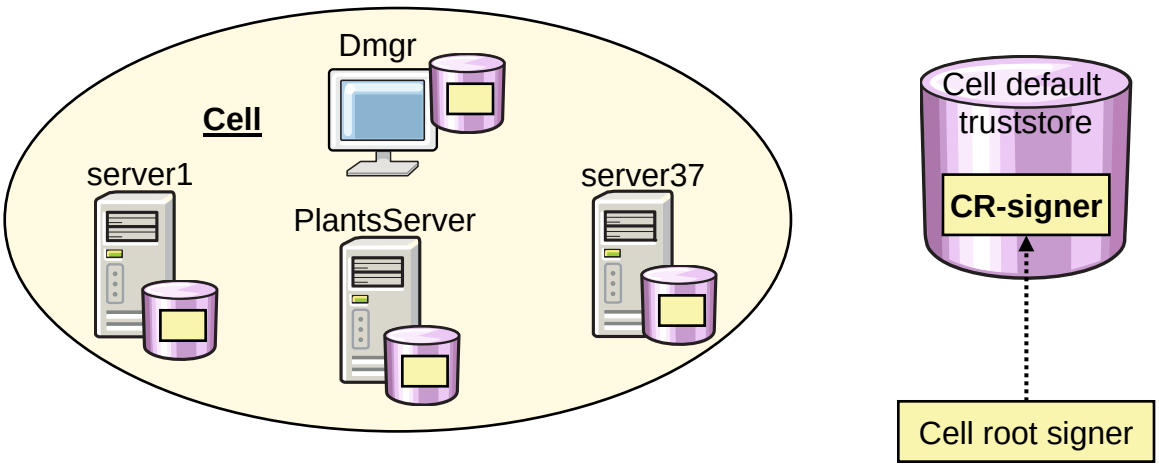
Node certificates

- Each node has a node certificate
  - The cell root certificate (a chained certificate) signs the node certificate
  - The cell root signer is therefore needed to validate the node certificate
  - The application servers, by default, all use the local node certificate



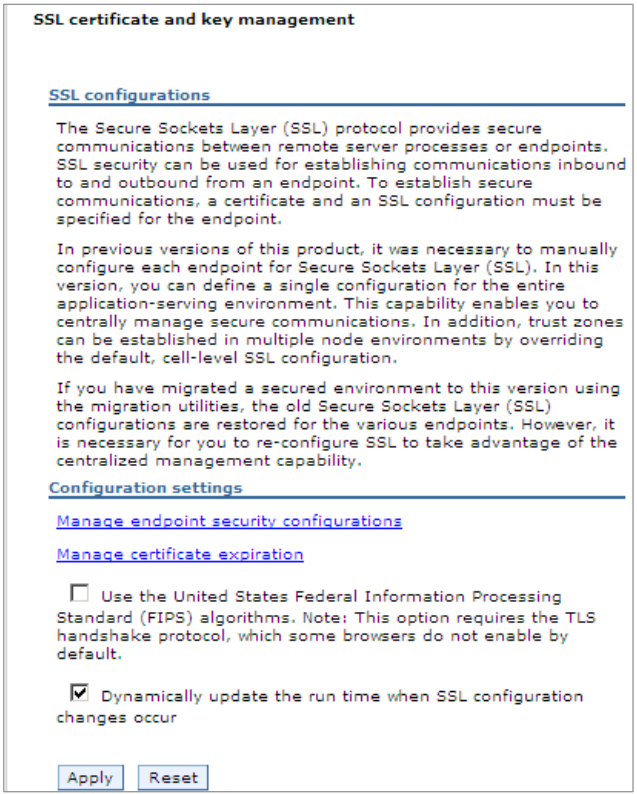
Cell default truststore

- The cell default truststore contains signers, include the cell root signer
  - It is synchronized to all the members of the cell
  - All the nodes use the common cell default truststore
  - Although there are node truststore files, they are not used by default



Managing WebSphere keystores

- Keystores and certificates for the cell, nodes, and plug-ins can be managed directly from the console
- Expiration management
- Keystores
- Trust files
- Certificates



Creating keystores and certificates

Create | Delete | Receive from a certificate authority... | Replace... | Extract... | Import... | Export... | Revoke... | Renew

Select		Alias	Issued To	Issued By	Serial Number	Expiration
You can administer the following resources:						
☐		default	CN=192.168.136.128, OU=was8host01Node02Cell, OU=was8host01Node03, O=IBM, C=US	CN=was8host01, OU=Root Certificate, OU=was8host01Cell01, OU=was8host01CellManager01, O=IBM, C=US	32492542466710	Valid from Oct 20, 2011 to Oct 19, 2012.
			CN=was8host01, OU=Root Certificate, =was8host01Cell01, =was8host01CellManager01, IBM, C=US	CN=was8host01, OU=Root Certificate, OU=was8host01Cell01, OU=was8host01CellManager01, O=IBM, C=US	577457852324	Valid from Aug 14, 2011 to Aug 10, 2026.

General Properties

Alias
default

Version
X509 V3

Key size
2048 bits

Serial number
32492542466710

Validity period
Valid from Oct 20, 2011 to Oct 19, 2012.

Issued to
CN=192.168.136.128, OU=was8host01Node02Cell, OU=was8host01Node03, O=IBM, C=US

Issued by
CN=was8host01, OU=Root Certificate, OU=was8host
OU=was8host01CellManager01, O=IBM, C=US

Fingerprint (SHA digest)
97:A6:3A:19:68:F8:13:13:7E:3E:C3:8D:D5:83:1D:A

- Keystores for WebSphere are managed through the administrative console
  - Creating keystores
  - Requests and imports CA certificates
  - **iKeyman** can also be used

What is a chained certificate?

- A chained certificate is merely a certificate that another certificate signs
- The cell root certificate (sometimes called a mini-CA) signs the node certificate

Chained certificate
- The cell root certificate signs it

ey stores and certificates > NodeDefaultKeyStore > Personal certificates

rtificates.

Preferences

Create | Delete | Receive from a certificate authority... | Replace... | Extract... | Import... | Export... | Revoke... | Renew

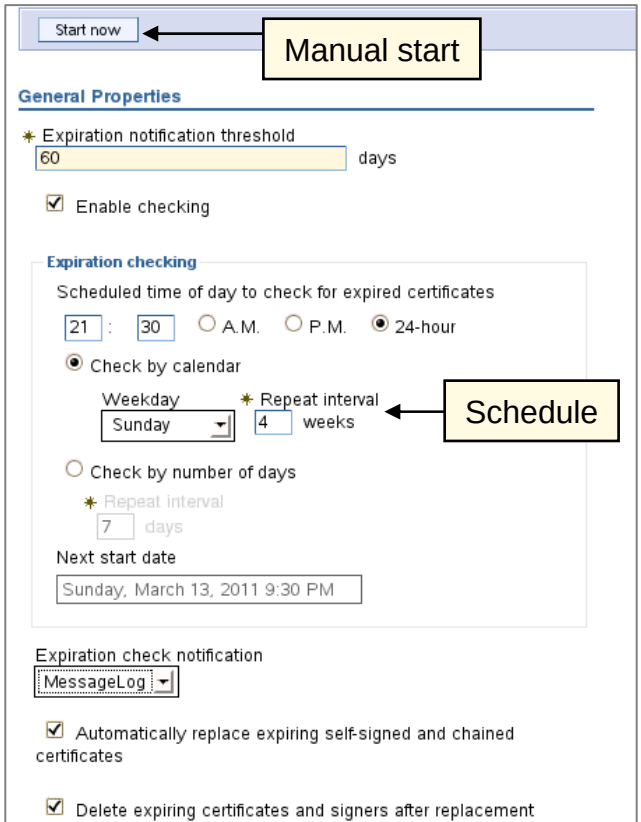
Select		Alias	Issued To	Issued By	Serial Number	Expiration
You can administer the following resources:						
		default	CN=was8host01.localdomain, OU=was8host01Node01Cell, OU=was8host01Node01, O=IBM, C=US	CN=was8host01.localdomain, OU=Root Certificate, OU=was8host01Cell01, OU=was8host01CellManager01, O=IBM, C=US	4100991604240	Valid from Nov 16, 2011 to Nov 13, 2021.
			CN=was8host01.localdomain, OU=Root Certificate, OU=was8host01Cell01, OU=was8host01CellManager01, O=IBM, C=US	CN=was8host01.localdomain, OU=Root Certificate, OU=was8host01Cell01, OU=was8host01CellManager01, O=IBM, C=US	3264426922974	Valid from Nov 16, 2011 to Nov 12, 2026.
al 2						

Node certificate

Cell root certificate

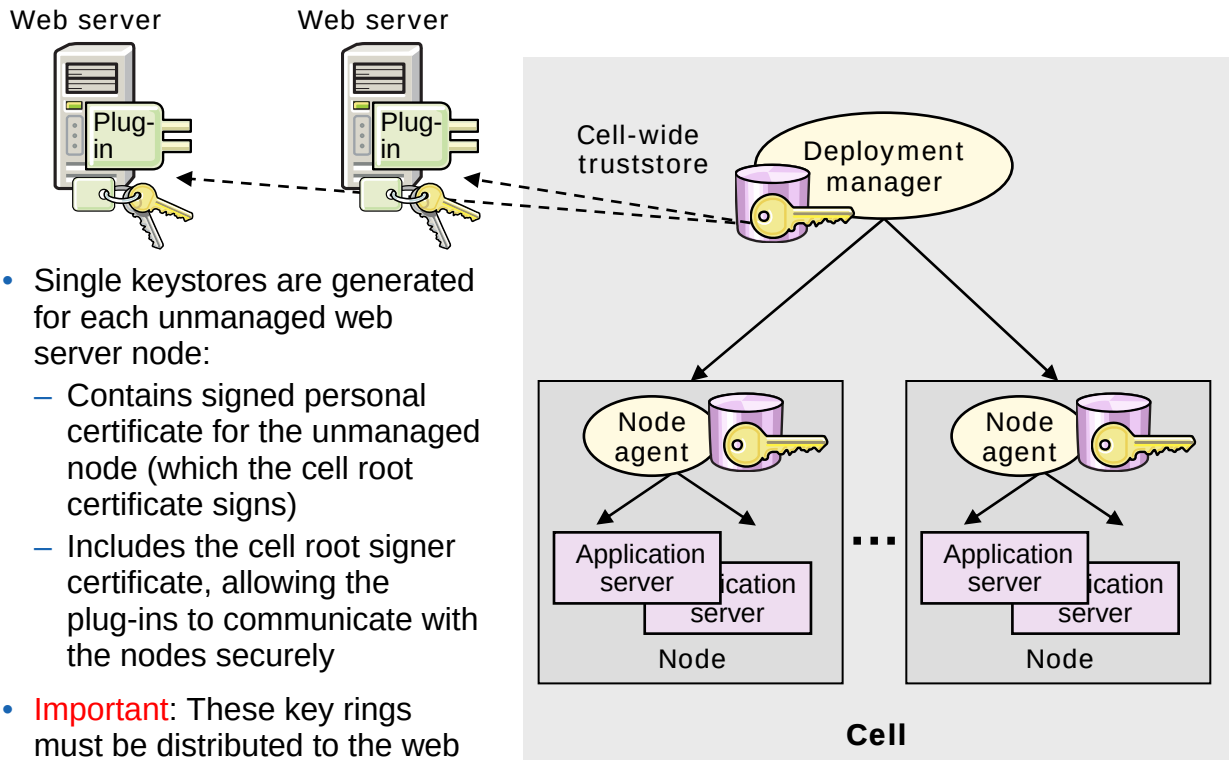
Notice: these two are the same

Expiration manager scheduling



- The expiration manager can be run manually or through a schedule
- Running manually can be useful since you actively monitor the log file and thus generate a list of certificates that are going to expire soon

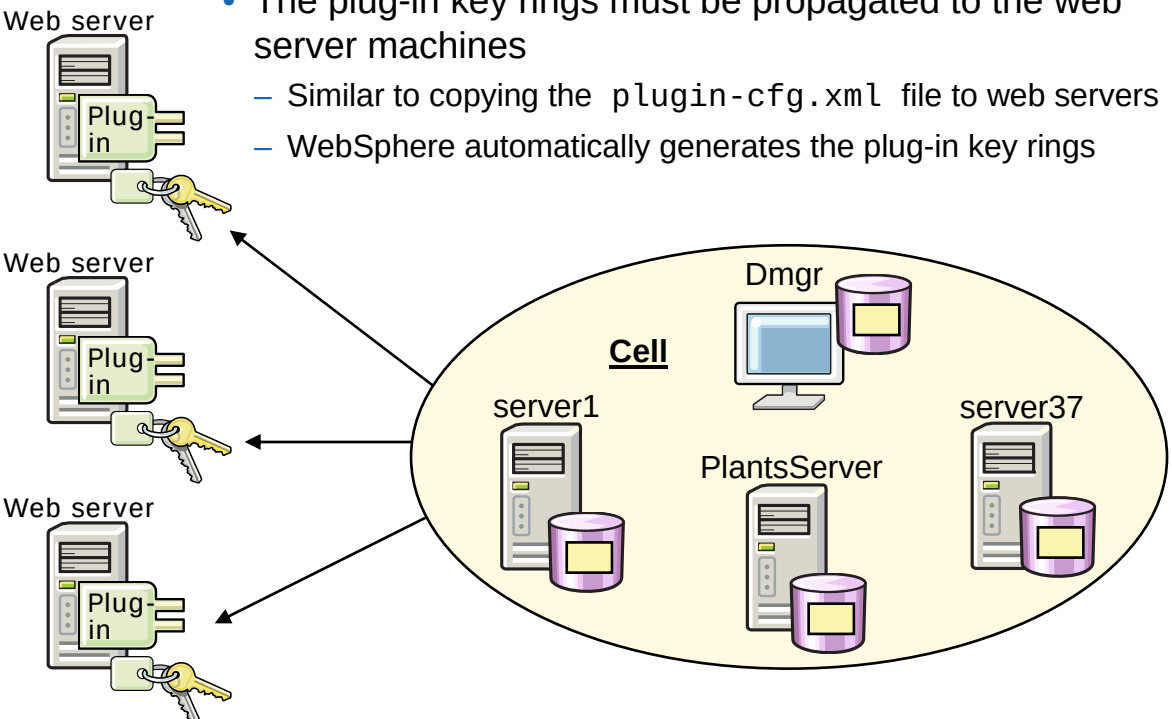
Keys for web servers



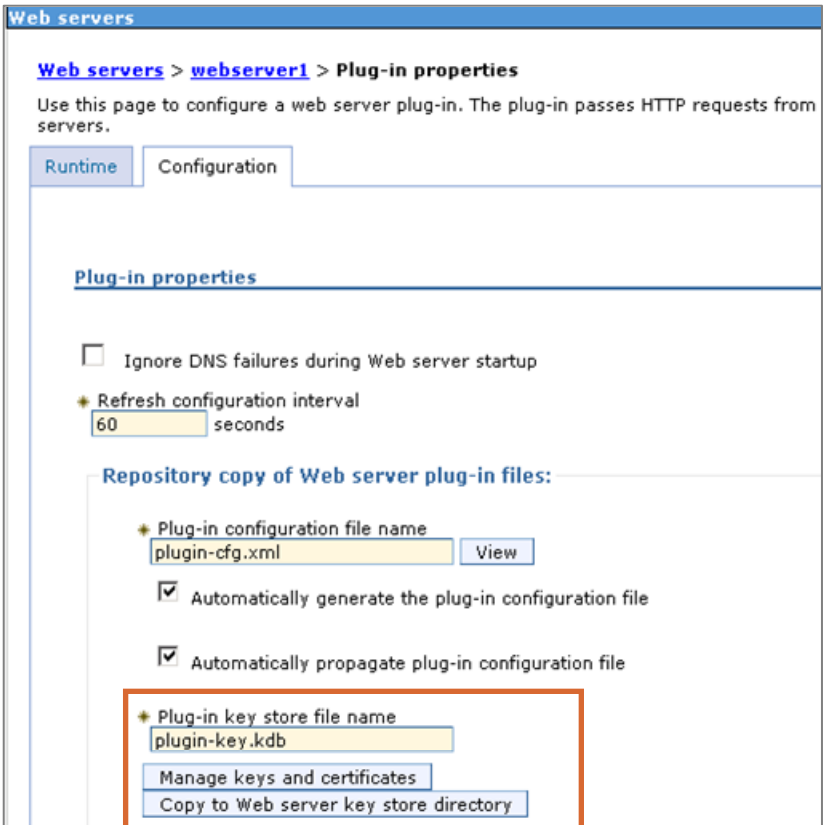
- Single keystores are generated for each unmanaged web server node:
  - Contains signed personal certificate for the unmanaged node (which the cell root certificate signs)
  - Includes the cell root signer certificate, allowing the plug-ins to communicate with the nodes securely
- Important: These key rings must be distributed to the web servers

Web server plug-in keystores propagation

- The plug-in key rings must be propagated to the web server machines
  - Similar to copying the `plugin-cfg.xml` file to web servers
  - WebSphere automatically generates the plug-in key rings



IBM HTTP Server key ring propagation



- Web server keystores are automatically generated
  - Can be managed from the administrative console
- The keystore for IBM HTTP Server servers can be remotely propagated

Security auditing

Security auditing

- The security auditing subsystem was introduced in WebSphere Application Server Version 7 and has two primary goals:
  - Confirm the effectiveness and integrity of the existing security configuration
  - Identify areas where improvement to the security configuration might be needed
- The security auditing subsystem can capture the following types of auditable events:
  - Authentication
  - Authorization
  - Principal and credential mapping
  - Audit policy management
  - User registry and identity management
  - Delegation
  - Administrative configuration management

Enabling security auditing

- Configuration is necessary before auditing can be enabled
  - Create an audit-specific set of console users or groups and map to Auditor role
  - Define notification mechanism (log file, email)
  - Enable monitoring
- Enabling auditing

Viewing audit data

- Audit data can be viewed as:
  - Text
  - An HTML report (through wsadmin)

```
************* Start Display Current Environment *************
WebSphere Platform 7.0.0.0 [ND 7.0.0.0 r0835.03] running with process name was7host01Cell
Host Operating System is Windows XP, version 5.1 build 2600 Service Pack 3
Java version = J2RE 1.6.0 IBM J9 2.4 Windows XP x86-32 jvmwi3260-20080816_22093 (JIT enab
J9VM - 20080816_022093_lHdSMr
JIT  - r9_20080721_1330ifx2
GC   - 20080724_AA, Java Compiler = j9jit24, Java VM name = IBM J9 VM
was.install.root = C:\Program Files\IBM\WebSphere\AppServer
user.install.root = C:\Program Files\IBM\WebSphere\AppServer\profiles\DmgrProfile
Java Home = C:\Program Files\IBM\WebSphere\AppServer\java\jre
ws.ext.dirs = C:\Program Files\IBM\WebSphere\AppServer/java/lib;C:\Program Files\IBM\WebS
Classpath = C:\Program Files\IBM\WebSphere\AppServer\profiles\DmgrProfile/properties;C:\P
Java Library path = C:\Program Files\IBM\WebSphere\AppServer\java\jre\bin;.;C:\Program Fi
Current trace specification = *=info
************* End Display Current Environment *************
Seq = 0 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
Seq = 1 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
Seq = 2 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
Seq = 3 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
Seq = 4 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
Seq = 5 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
Seq = 6 | Event Type = SECURITY_RESOURCE_ACCESS | Outcome = SUCCESSFUL | OutcomeReason =
```

Audit Records - Windows Internet Explorer

C:\basicAuditReport.html

Audit Records

Page Tools

ResourceName=placeReport	ResourceType=SM_MBEAN	ResourceUniqueId=0
243	**SECURITY_RESOURCE_ACCESS**	**SUCCESS**
CreationTime=Wed Jan 28 15:21:21 EST 2009	Action=preinvoke MBean	ProgName=StatusCache
RemoteAddr=192.168.58.135	RemotePort=3570	RemoteHost=192.168.58.135
ResourceName=placeReport	ResourceType=SM_MBEAN	ResourceUniqueId=0
244	**SECURITY_RESOURCE_ACCESS**	**SUCCESS**
CreationTime=Wed Jan 28 15:22:01 EST 2009	Action=preinvoke MBean	ProgName=Server (module)
RemoteAddr=192.168.58.135	RemotePort=3570	RemoteHost=192.168.58.135
ResourceName=getProcessType	ResourceType=SM_MBEAN	ResourceUniqueId=0
245	**SECURITY_RESOURCE_ACCESS**	**SUCCESS**
CreationTime=Wed Jan 28 15:22:14 EST 2009	Action=preinvoke MBean	ProgName=StatusCache
RemoteAddr=192.168.58.135	RemotePort=3570	RemoteHost=192.168.58.135
ResourceName=placeReport	ResourceType=SM_MBEAN	ResourceUniqueId=0

Securing audit records

- Access to audit configurations is restricted
  - To change audit settings, Auditor access is required (Administrator access is not sufficient)
- Audit data can be digitally protected
  - Can be digitally signed
  - Can be encrypted with a separate audit certificate

Unit summary

Having completed this unit, you should be able to:

- Explain basic security concepts
- Describe the WebSphere Application Security architecture
- Describe enhancements to certificate management
- Configure fine-grained administrative security
- Configure application security
- Describe SSL concepts and configuration
- Describe support for multiple security domains
- Describe auditing features and functions
- Describe support for Java Platform, Enterprise Edition 6 (Java EE 6) security annotations

Checkpoint questions

1. Which type of security restricts access to the application?
   A. Administrative security
   B. Application security
   C. Java 2 security
   D. File system security
2. Which type of security restricts access to the operating system?
   A. Administrative security
   B. Application security
   C. Java 2 security
   D. File system security
3. Which type of security restricts access to the console?
   A. Administrative security
   B. Application security
   C. Java 2 security
   D. File system security

Checkpoint answers

1. Which type of security restricts access to the application?
   B. Application security

2. Which type of security restricts access to the operating system?
   C. Java 2 security

3. Which type of security restricts access to the console?
   A. Administrative security

Exercise 12

Configuring WebSphere security

Exercise objectives

After completing this exercise, you should be able to:

- Enable WebSphere security
- Configure administrative security by configuring access to administrative functions
- Configure fine-grained administrative security

Exercise 13

Configuring application security

Exercise objectives

After completing this exercise, you should be able to:

- Define Java EE security roles
- Define access for resources in an application
- Enable and verify application security

Exercise 14

Configuring SSL for WebSphere

Exercise objectives

After completing this exercise, you should be able to:

- Define the certificate life span of a profile
- Use the administrative console to find and view certificates within the cell
- Configure and run the certificate expiration service
- Propagate the generated plug-in keystore out to the plug-in
- Create a keystore for a web server
- Generate a self-signed key
- Configure IBM HTTP Server to load and use HTTPS