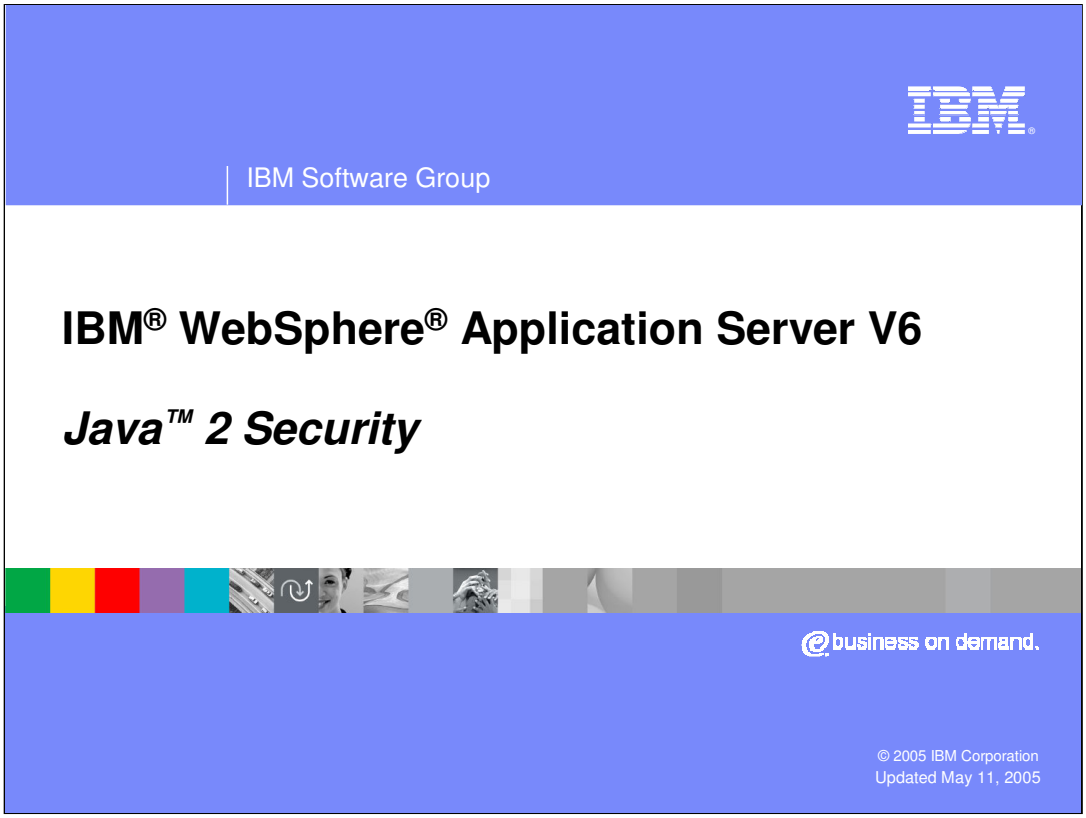


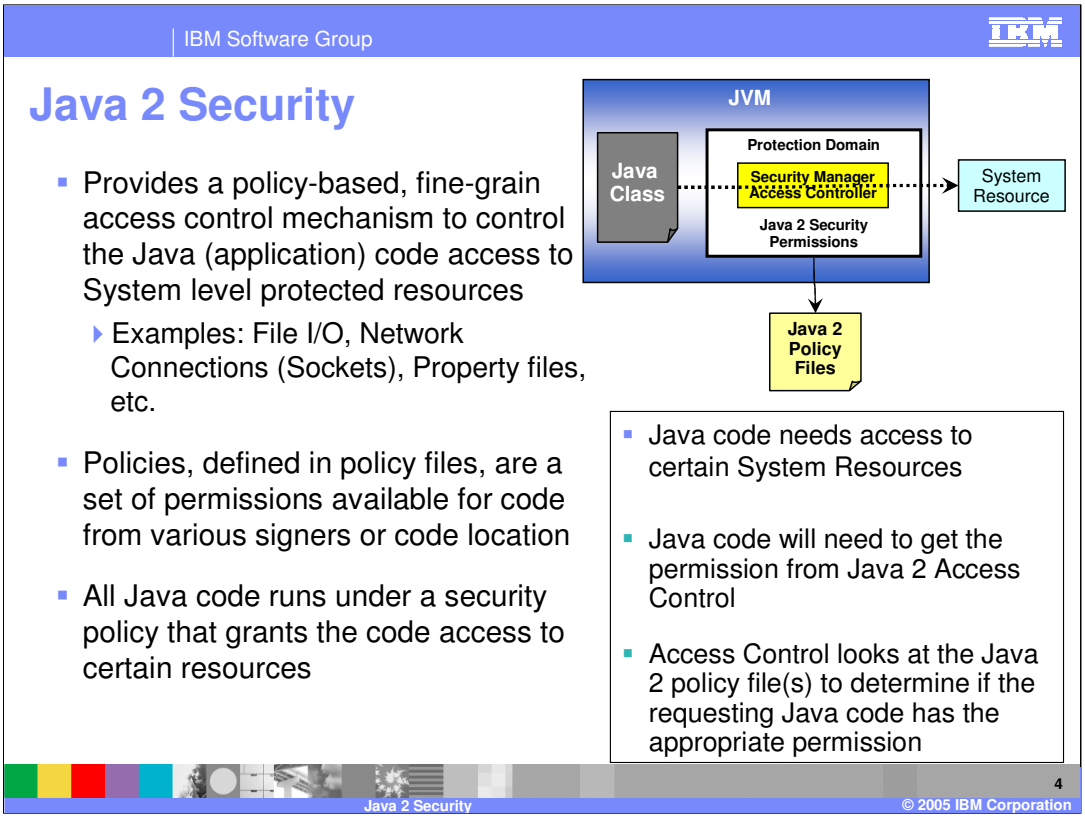
This presentation will focus on the Java 2 Security aspect of the J2EE Security architecture.

Goals

- Understand Java 2 Security in V6
- Understand IBM extensions for hierarchical policy files

The goal of this presentation is to help you understand the Java 2 Security component and IBM extensions. An understanding of the WebSphere Application Server V6 Security Architecture, which is covered in a separate presentation, will help you better understand this module.

This section will cover Java 2 Security.

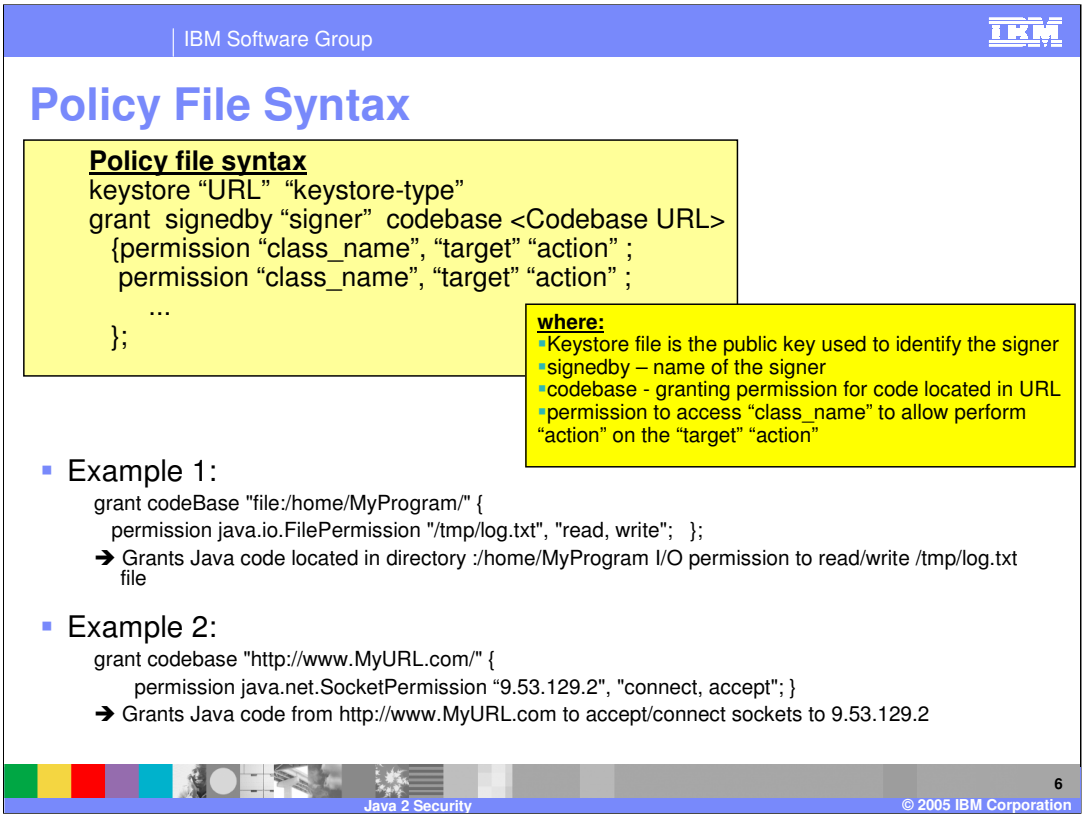


The purpose of Java 2 security is to prevent application code from gaining access to System resources such as files, ports, and sockets in a malicious or unintended manner.

If your application code must access System resources, you have to grant the necessary permission by means of a policy file. WebSphere Application Server supports a hierarchical definition of policy files at various levels, including application and server level, for code running within the Application Server.

Before allowing code to access a System resource, the access control mechanism of the JVM will read the policy files to determine if the correct permission is provided. If it is not, then no access will be given.

Here are some examples of System Resources that are protected by Java 2 Security. You must explicitly grant permission to the code or the user executing the code in order to access these resources. This list of System Resources is not comprehensive.



Java 2 Security permissions are granted through the use of policy files. Policy files must adhere to a strict format. Any formatting errors in the policy file will prevent it from being processed.

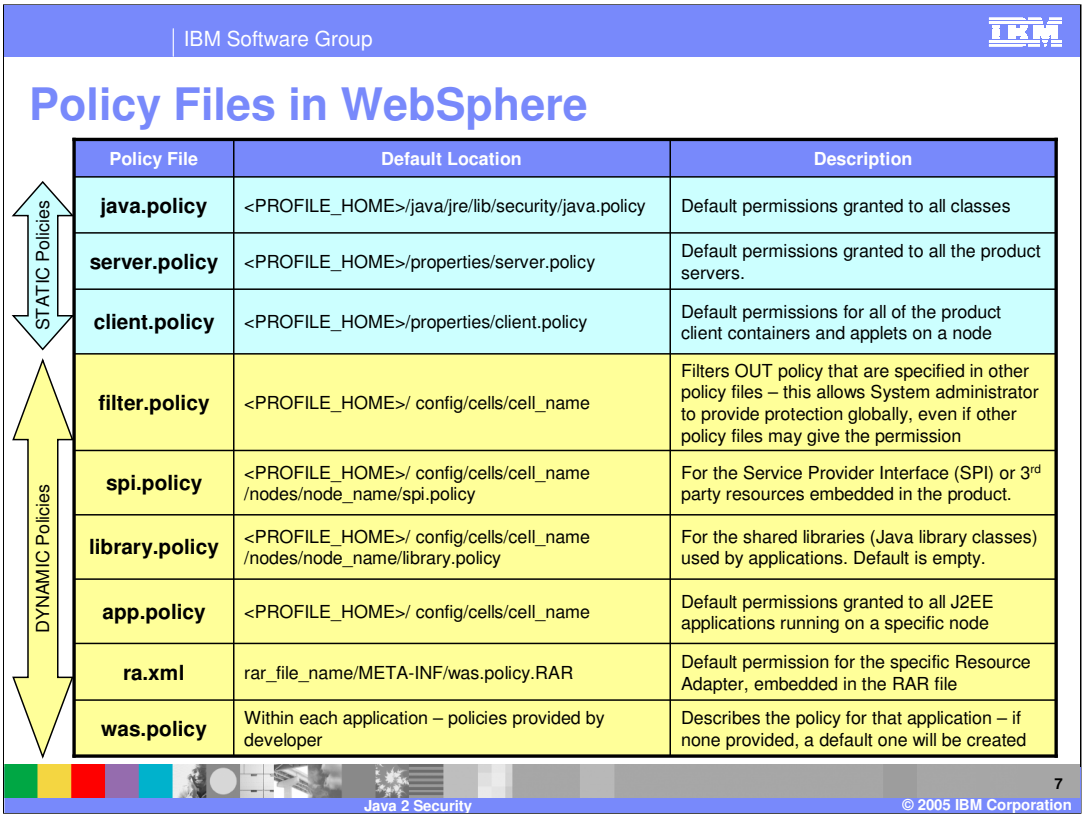
The syntax of the policy file is shown on this slide.

Permission can be granted by codebase, specifying the location of the Java code that will access the resources specified in the permissions, or by the signer of the code.

In the first example, I/O read and write permission on the log.txt file is granted in the policy file for all code running from the specified directory.

In the second example, permission is granted for code from the specified URL to connect and accept sockets to the IP address.

Without these permission in the policy file, attempts to access the resources by the Java code would fail with a missing Java 2 security Access control exception. Messages are written to the Application Server log files.



There are several hierarchical policy files that can be specified in the JVM and WebSphere Application Server that provide permissions for different code bases.

Both static and dynamic policy files are supported. Static policy files provide the default permissions, while dynamic policy files provide application permissions. You can use variables to define codebase locations in the Dynamic Policy files.

Valid Symbols used in Dynamic policy files

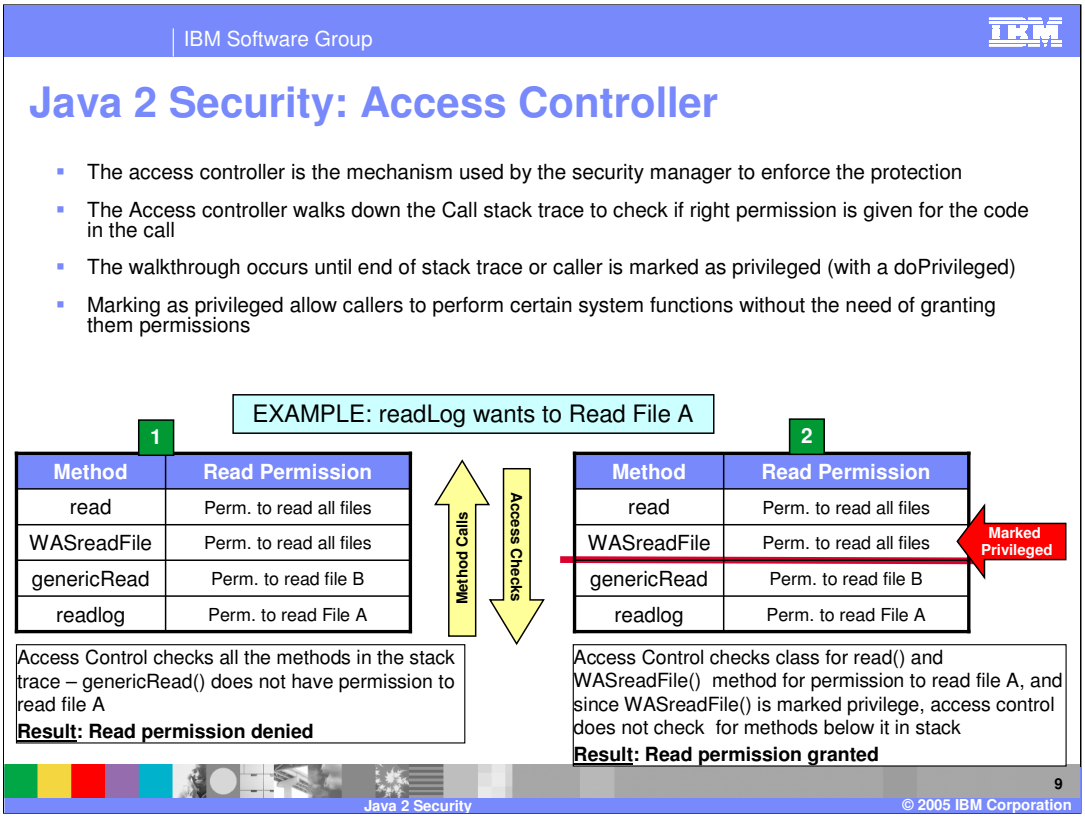
Valid symbols in Dynamic Policy file	Description
file:${application}	Permissions apply to all resources within the application
file:${jars}	Permissions apply to all utility Java archive (JAR) files within the application
file:${ejbComponent}	Permissions apply to EJB resources within the application
file:${webComponent}	Permissions apply to Web resources within the application
file:${connectorComponent}	Permissions apply to connector resources within the application

Example

grant codeBase "file:${application}" { permission java.io.FilePermission "${user.install.root}${/}bin${/}DefaultDB${/}-", "read,write,delete"; };

➔ Grants Java code in “IncCMP11.jar” file I/O permission to read/write files in WebSphere install root bin/DefaultDB directory

Shown here is a list of symbols that can be used in a dynamic policy file to grant permission based on resource type. The example demonstrates how these variables can be used in a policy file to grant permissions



The two methods of providing access control are shown here.

In the first example, all the classes or callers in the call stack trace must have the appropriate Java 2 permission before any of them are allowed to access the resource.

In the second example, a caller is marked as *privileged,* in the call stack. The callers below the privileged caller in the call stack are not checked for permissions. Only the callers above the privileged caller would require the permission.

Now consider two scenarios, one with no caller marked as privileged, and one with one of the callers marked as privileged.

In the first scenario, before the read() method is allowed to read a file, the Access controller checks to see if the read() method has the appropriate permission. If it does, it moves to the next caller in the call stack trace. If it does not, it throws an exception for every call in the call stack trace.

In this scenario, the check starts with the read() method, followed by WASreadFile() and down the stack. When it comes to genericRead(), access will be denied because that method does not have permission to read file A.

In the second scenario, if a caller is marked as privileged and has the appropriate permission, no further checking of the callers lower in the call stack trace is done.

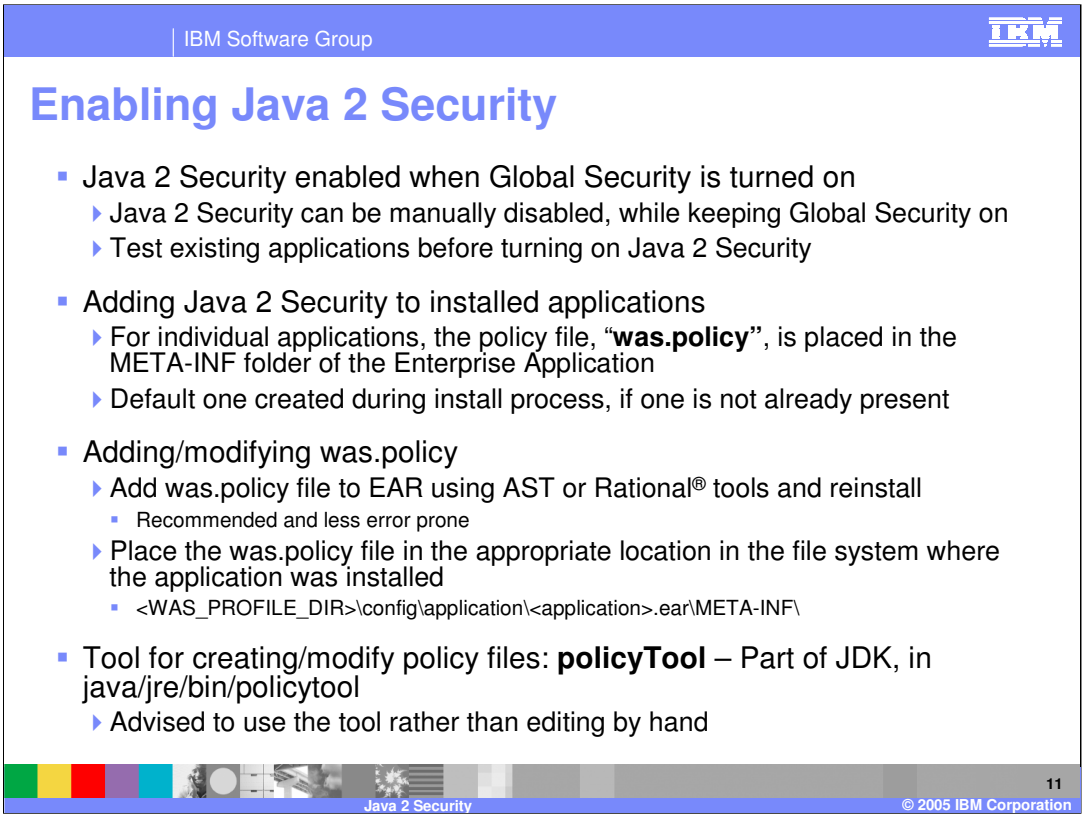
Java 2 Security: Filters

- Contains the list of permissions that require filtering from certain policy files in the cell - Enables selective disabling of Java 2 security
  - Provides sort of "filtering" for was.policy
  - Warn if custom defined permissions (not java.* or javax.*)
  - Warn if java.security.AllPermission
- This filtering mechanism only applies to the was.policy and app.policy files
- Default WebSphere policy file:

```
filterMask {
  permission java.lang.RuntimePermission "exitVM";
  permission java.lang.RuntimePermission "createSecurityManager";
  permission java.lang.RuntimePermission "setSecurityManager";
};
```

- **The effective Application policy becomes:**
  app.policy + was.policy + java.policy "-" filter.policy

Filters ensure that application developers do not grant applications permission to do things that could be dangerous, such as exit the JVM or create their own Security Manager and implement their own security. Even if the application grants permission, permissions specified in the filter.policy file will be disabled.



Java 2 Security is optional and can only be enabled if Global security is first enabled.

It is recommended that you use the policyTool to edit the policy files to ensure that the strict format is maintained. If a hand edit of the server.policy file introduces an error, it will prevent the server from starting.

Section

Summary and Reference

This section will provide a summary of this presentation.

Summary

- Java 2 Security provides mechanism to specify authorization for the Java code to access System resources
- This prevents application code with ill intent to access protected System resources
- Java 2 security is specified using policy files
- There are several different policy files that provide layered protection
- WebSphere Application Server V6 provides additional capability by allowing you to specify dynamic policy files

In summary, Java 2 security provides access control on System resources for your application code. WebSphere Application Server V6 adds additional capability with the dynamic policy files.

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