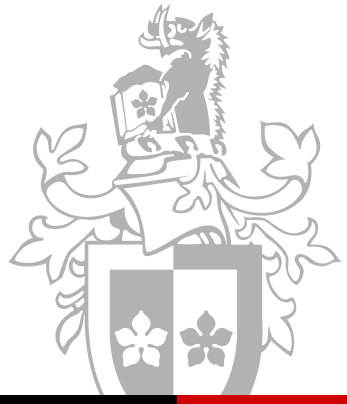
COS30041 Creating Secure and Scalable Software

Lecture 07a Securing Enterprise Applications



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Learning Objectives

- After studying the lecture material, you will be able to
  - Understand and describe the security issues in Enterprise Application
  - Understand and describe the advantages and disadvantages of using the JavaEE security model
  - Understand the issues involved in implementing Enterprise Security using JavaEE

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Pre-requisite

- Basic Java Security concepts

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Outline

- Characteristics of Application Security
- Overview of Enterprise Application Security

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Roadmap

- **Characteristics of Application Security**
- Overview of Enterprise Application Security

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Security Concerns

- Who is accessing the service?
- Are they who they say they are?
- Are they allowed to?
- Can anyone modify the data?
- Can anyone read this private data?

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Characteristics of Secure Application

- Authentication – Who you say you are
- Authorization – Do you have access to the resources
- Data integrity – Authorized users can modify the data
- Confidentiality – Only authorized users can view the sensitive data

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Other Concerns

- **Auditing** – Capture a tamper-resistant record of security-related events for the purpose of being able to evaluate the effectiveness of security policies and mechanisms
- Non-repudiation – Proving the transaction has happened
- Quality of Service – Provide better service to selected network traffic over various technologies

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Roadmap

- Characteristics of Application Security
- **Overview of Enterprise Application Security**

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Overview of Enterprise Application Security

- Container provides the security for their software components
- Security structure
  - Authentication requirements (who you say you are)
  - Access control requirements (who can access what)
  - User-based / role-based security
  - Security roles (what role you are with respect to the application)

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Password Security

- Password Authentication
- Storing passwords in database
  - Plain Text (e.g. “123456”)
  - HASH (e.g. “123456” →hash→ “4982796920”)
  - HASH + SALT (e.g. “123456” → hash → “4982796920” →salt→ “axez49827djfjl96920sljdfsl”)
  - …

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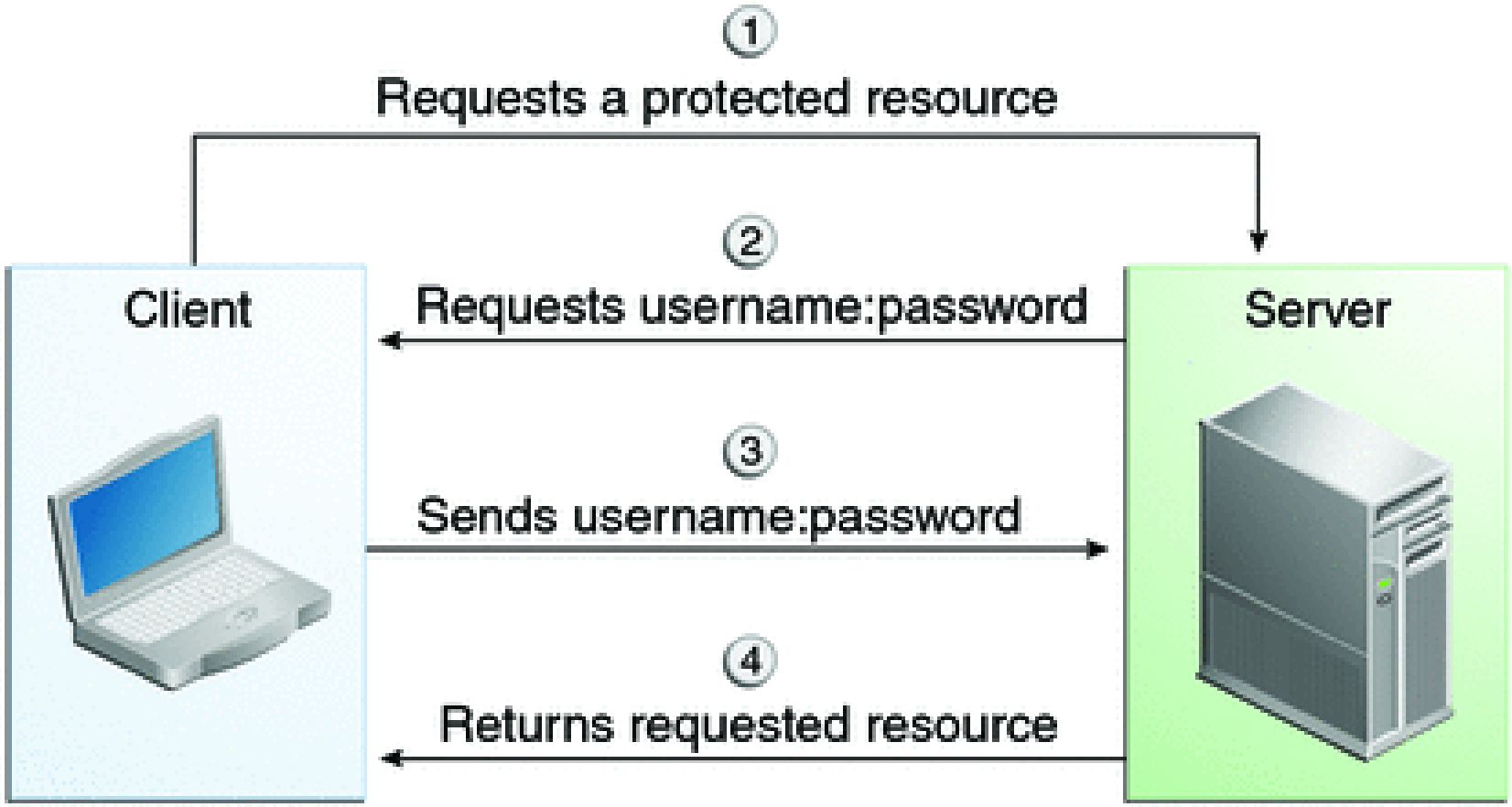
Default Security Behaviour in Ent. App.



Adapted from Fig. 40-2 [JEE6T]

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Authentication

- Purpose: To identify who you say you are
- Many ways of authentication
  - Entity
    - UserId and Password (simplest, we used this in the subject)
    - …
    - UserId, Password and (Answer to Security Question | Sec Device)
    - …
    - Certificate based authentication (most sophisticated ?)
  - Secure vs Non-secure connection
  - Encrypted vs Plain

Modes of communication

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Realm, User and Group [Java EE]

- A Realm = A security policy domain defined for a web or application server
  - Contain a collection of users with or without groups
- A User = An individual that has been defined in the [GlassFish] server
- A Group = A set of authenticated users defined in the [GlassFish] server

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Different types of Realm [JavaEE]

- File-realm*
  - Stores user credentials in a file
- Admin-realm
  - A file realm that stores administrators' user credentials
- JDBC-realm [Java EE]
  - Store user credentials in database records
- Certificate
  - Store user credentials in a certificate database

Note: We will only focus on file realm.

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Authorization

- Purpose: to verify whether you have access to certain (protected) resources in the application
- Need to define the “access control requirements”
- Approaches
  - Declarative security
  - Programmatic security

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Declarative vs Programmatic

Declarative Security

- Specify the application component's security requirements by using either
  - Deployment descriptors, or
  - Annotations
- @DeclareRoles
- @RolesAllowed
- @PermitAll
- See EX-SLSB-SecInfo

Programmatic Security

- Security decisions were programmed in the source code
- Useful when declarative security is not sufficient to express the security model of an application
- SessionContext.getCallerPrincipal()
- SessionContext.isCallerInRole()
- Principal.getName()
- See EX-SLSB-SecInfo

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Security Role

- simply, Role
- An abstract name for the permission to access a particular set of resources in an application

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Group vs Security Role [Java EE specific]

Group

- Designated for the entire GlassFish Server

Security Role

- Associated only with a specific application in the GlassFish server

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Associating Group with Role [Java EE specific]

- GlassFish server has a way to map security roles in an application to the groups
- Default – principal-to-role (group name = role name)
- Principal = an entity that can be authenticated by an authentication protocol in a security service that is deployed in an enterprise

Note*: In case, group names and role names are not the same, you need to use runtime deployment descriptor to specify the mapping

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Further Topics (for you to investigate)

- Different authentication mechanisms
- Defining different types of realm
- Configuring Security Using Deployment Descriptors
- Creating your own login module rather than the default provided by the application server

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References

- Java EE Tutorial

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