Java EE:

Servlets API 4.0

SoftUni Team

Technical Trainers

Software University

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Java Servlets

Overview

What are Servlets?(1)

- Servlets:
  - Component-based
  - Platform-independent
  - Method for building Web based applications
  - Have access to the entire family of Java APIs

What are Servlets?(2)

- Java Servlets:
  - Programs that run on a Web or Application server
  - Middle layer between a requests
- Servlets can:
  - Collect input
  - Present records from a database or another source
  - Create web pages dynamically

Servlets Tasks(1)

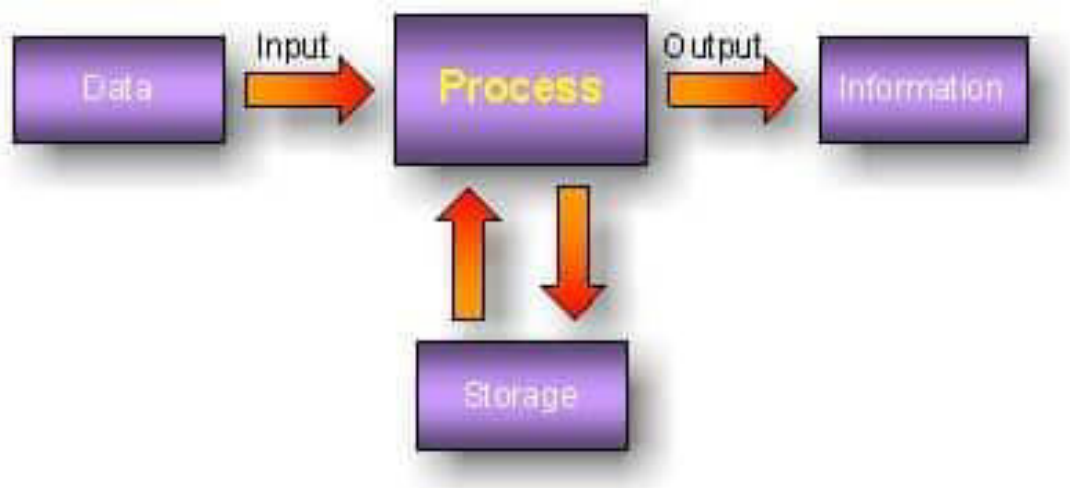
- Read the explicit data sent by the clients (browsers):
  - HTML form on a Web page
  - Applet
  - Custom HTTP client program

Servlets Tasks(2)

- Read the implicit HTTP request data sent by the clients (browsers):
  - Cookies
  - Media types
  - Compression schemes the browser understands

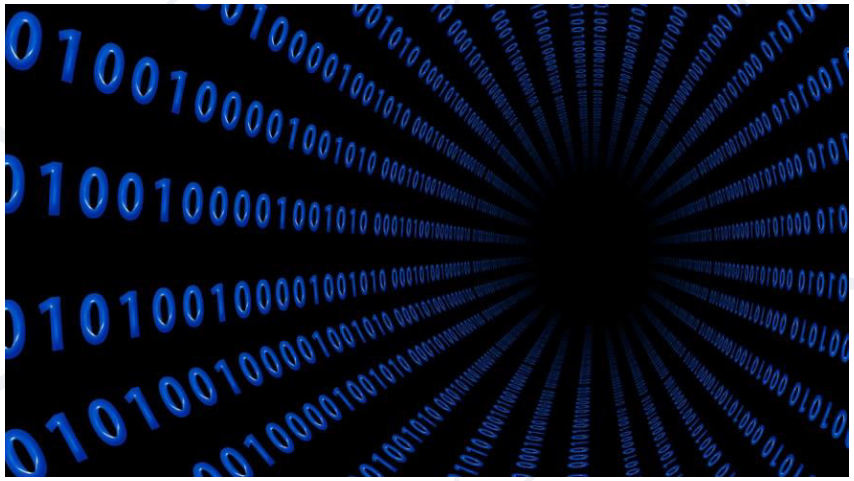
Servlets Tasks(3)

- Process the data and generate the results:
  - Talking to a database
  - Invoking a Web service
  - Computing the response directly



Servlets Tasks(4)

- Send the explicit data to the clients (browsers):
  - Text (HTML or XML)
  - Binary (GIF images)
  - Excel



Servlets Tasks(5)

- Send the implicit HTTP response to the clients (browsers):
  - Telling the browsers or other clients what type of document is being returned (e.g., HTML)
  - Setting cookies
  - Caching parameters

Servlet Life Cycle

- A servlet life cycle:
  - init() method – initialize servlet
  - service() method - process client's request
  - destroy() method - servlet is terminated

The init() Method

- The init() method:
  - Called only once when the servlet is created
- Servlet is created when a user first invokes a URL corresponding to the servlet

The service() Method

- The service() method:
  - The main method to perform the actual task
  - Called by the servlet container to:
    - Handle requests coming from the client
    - Write response back to the client
  - Checks the HTTP request type (GET, POST, PUT, DELETE, etc.) and calls the appropriate method – doGet(), doPost(), etc.

The doGet() Method

- A GET request:
  - Results from:
    - Normal request for a URL
    - HTML form that has no METHOD specified
  - Should be handled by doGet() method

Servlet.java

```
@WebServlet("/")
public class Servlet extends HttpServlet {
  protected void doGet(…) {
    // Servlet code
  }
}
```

The doPost() Method

- A POST request:
  - Results from an HTML form
  - Should be handled by doPost() method.

Servlet.java

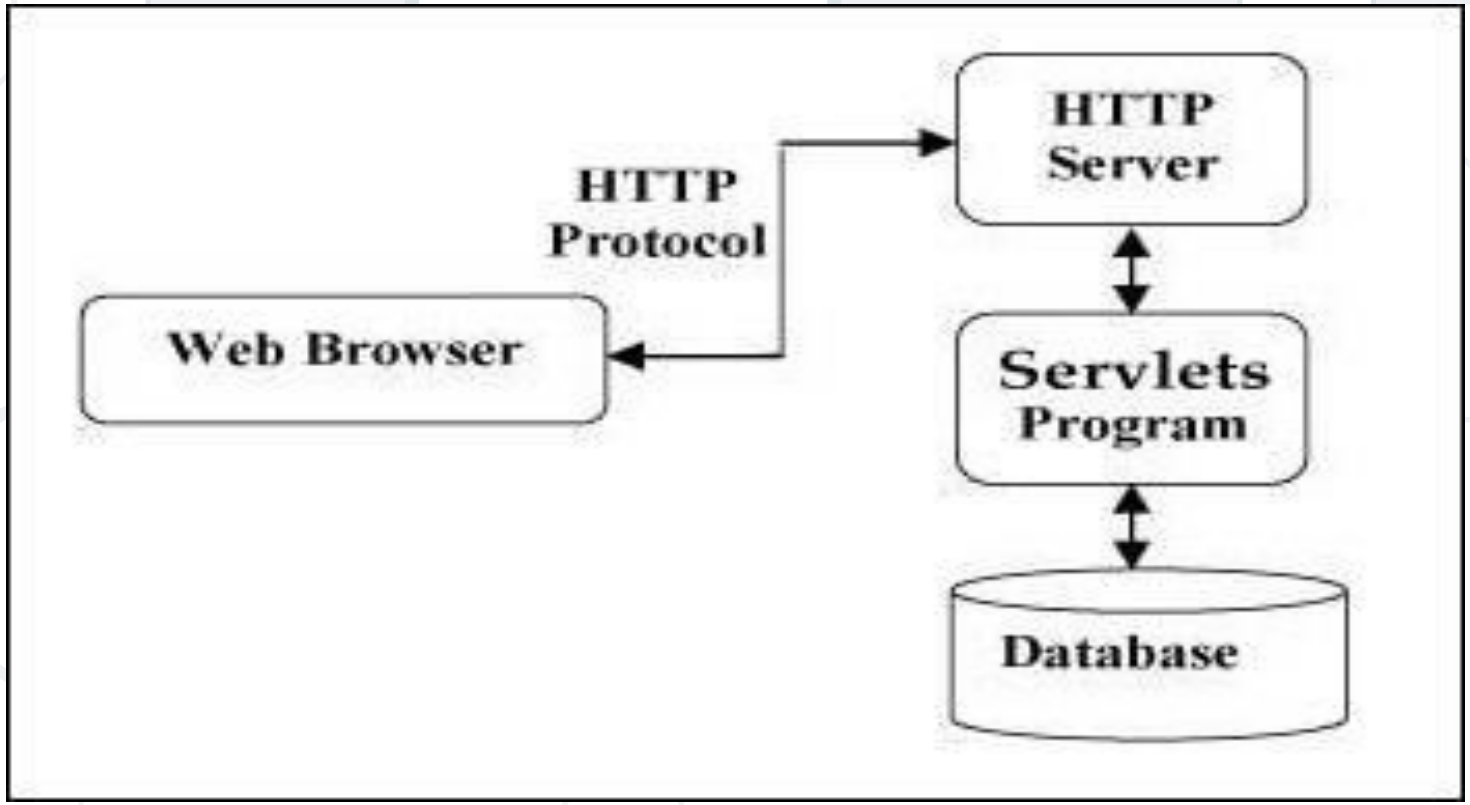
```
@WebServlet("/")
public class Servlet extends HttpServlet {
  protected void doPost(…) {
    // Servlet code
  }
}
```

The destroy() Method

- The destroy() method:
  - Called only once at the end of the lifecycle of a servlet
  - Gives your servlet chance to:
    - Close database connections
    - Halt background threads
    - Write cookie lists
    - Hit counts to disk
    - Perform other such cleanup activities

Servlets Architecture

- The following diagram shows the position of Servlets in a Web Application:



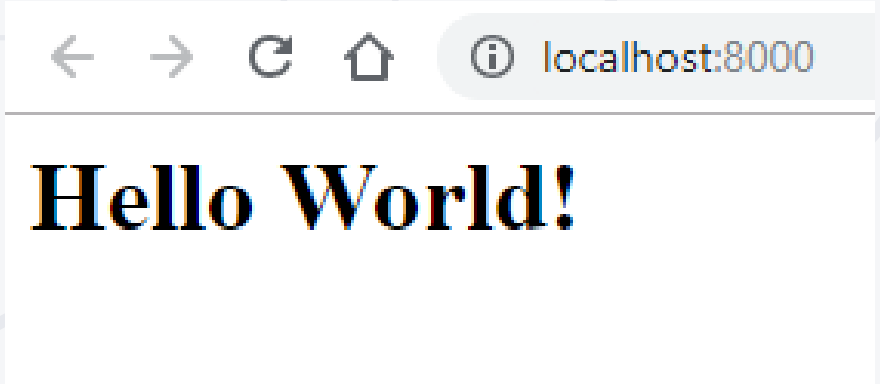
Java Servlets

Examples

Hello World!

Servlet.java

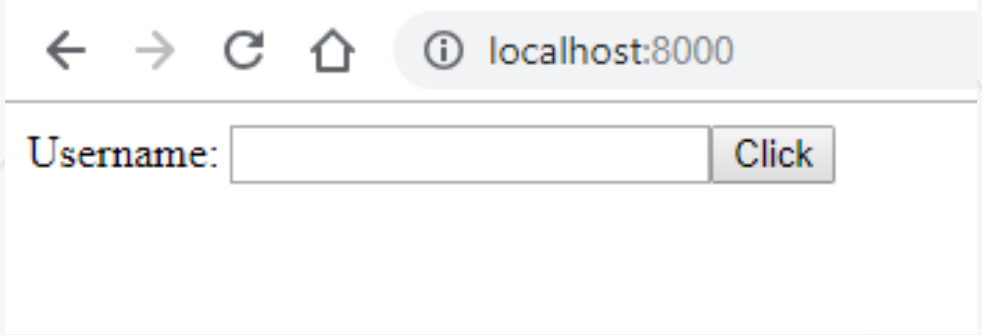
```
@WebServlet("/")
public class Servlet extends HttpServlet {

  private String message;

  protected void init(…) {
    this.message = “Hello World!”;
  }

  protected void doGet(…) {
    response.setContentType(“text/html”);
    PrintWriter out = response.getWriter();
    out.println(String.format(“<h1>%s</h1>”, this.message));
  }
}
```



Greeting!(1)

FormServlet.java

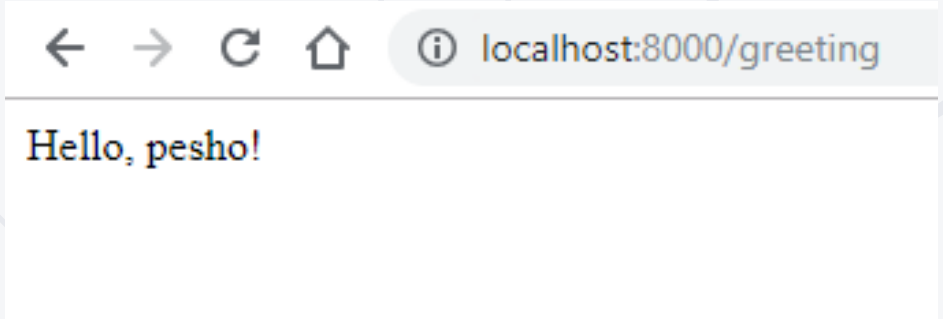
```
@WebServlet("/")
public class FormServlet extends HttpServlet {
  private String form;
  protected void init(…) {
    this.form = "" +
                "<form action=\"/greeting\" method=\"post\">" +
                    "<label>Username: " +
                    "<input name=\"username\"/></label>" +
                    "<button>Click</button>" +
                "</form>";
  }
  protected void doGet(…) {
    response.setContentType("text/html");
    PrintWriter out = response.getWriter();
    out.println(this.form);
  }
}
```



Greeting!(2)

GreetingServlet.java

```
@WebServlet("/greeting")
public class GreetingServlet extends HttpServlet {
  protected void doGet(…) {
    response.setContentType("text/html");
    response.setStatus(200);
 }

  protected void doPost(…) {
    response.setContentType("text/html");

    PrintWriter out = response.getWriter();
    out.println(String.format("Hello, %s!", request.getParameter("username")));
  }
}
```



Hibernate

Overview

What is JDBC?

- JDBC:
  - Java Database Connectivity
  - Provides a set of Java API for accessing the relational databases from Java program
  - Enables Java programs to:
    - Execute SQL statements
    - Interact with any SQL compliant database

What is Hibernate?(1)

- Hibernate:
  - **O**bject-**R**elational **M**apping (ORM) solution for Java
  - Powerful
  - High performance
  - Object-Relational Persistence
  - Query service
  - Maps:
    - Java classes to database tables
    - Java data types to SQL data types

What is Hibernate?(2)

- Hibernate:
  - Sits between traditional Java objects and database server
  - Handles all the works in persisting objects based on the appropriate O/R mechanisms and patterns

Java EE and Hibernate(1)

- Hibernate dependency:

pom.xml

```
<dependency>
    <groupId>org.hibernate</groupId>
    <artifactId>hibernate-core</artifactId>
    <version>5.4.0.Final</version>
</dependency>
```

- Hibernate .jar file: http://central.maven.org/maven2/org/hibernate/hibernate-core/5.4.0.Final/hibernate-core-5.4.0.Final.jar
  - Put the .jar file into TomEE/lib folder.

Java EE and Hibernate(2)

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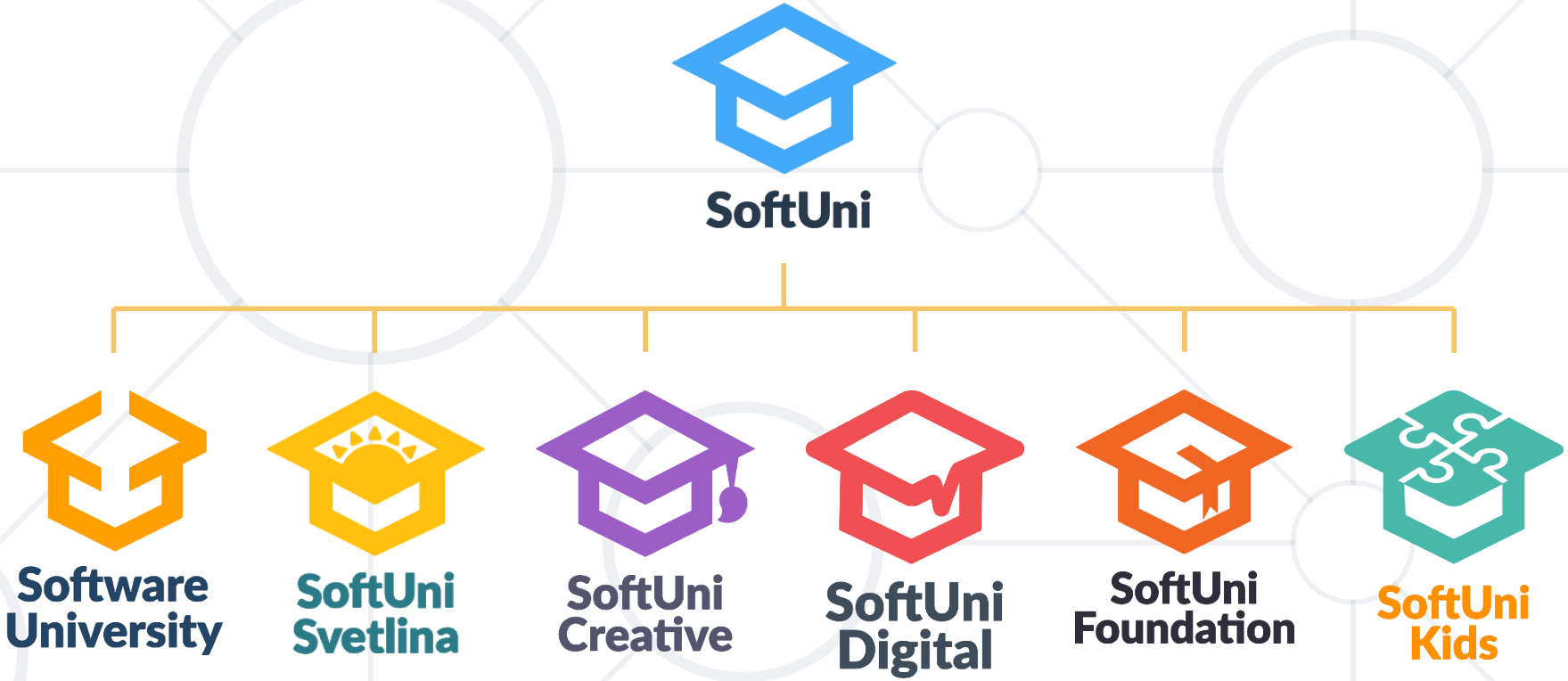
persistence.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<persistence xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xmlns="http://xmlns.jcp.org/xml/ns/persistence"
          xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/persistence
          http://xmlns.jcp.org/xml/ns/persistence/persistence_2_1.xsd" version="2.1">
          <persistence-unit name="soft_uni" transaction-type="RESOURCE_LOCAL">
                    <properties>
                              <property name = "hibernate.connection.url"
value="jdbc:mysql://localhost:3306/soft_uni_db?useSSL=false&amp;createDatabaseIfNotExist=true&amp;serverTimezone=UTC"/>
                              <property name = "hibernate.connection.driver_class" value="com.mysql.jdbc.Driver"/>
                              <property name = "hibernate.connection.username" value="root"/>
                              <property name = "hibernate.connection.password" value="*****"/>
                              <property name = "hibernate.dialect" value="org.hibernate.dialect.MariaDBDialect"/>
                              <property name = "hibernate.hbm2ddl.auto" value="update"/>
                              <property name = "hibernate.show_sql" value = "true" />
                              <property name = "hibernate.format_sql" value = "true" />
                    </properties>
          </persistence-unit>
</persistence>
```

Summary

- Java Servlets:
  - Servlets provide a component-based, platform-independent method for building Web based applications
- Hibernate:
  - Hibernate is an **O**bject-**R**elational **M**apping (ORM) solution for Java

Questions?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