Chapter-7
CLASSIC TAGS

❖ .**Difference between simple and classic tags?**

Simple tag	Classic Tag
1. Tag handler must be implement the **javax.servlet.jsp.tagext.SimpleTag** interface	1. Tag handler must be implement the **javax.servlet.jap.tagext.Tag** interface
2. Tag functionality encapsulated within the **doTag()** method.	2. Tag functionality encapsulated within the two methods **doStartTag()** and **doEndtag()**.
3. A unique tag handler instance is created for each usage of a simple tag on a page.	3. A single tag handler instance could be created and reused to service all invocations of that custom tag per page.
4. **setJspContext(JspContext)** method used to set the context.	4. **setPageContext()** method used set the context.
5. setJSPContext(JSPTAG)the reference is jspTag	5.setparent(Tag) the reference is Tag.
6. Simple tag can invoke it's body repeatedly calling it's invoke().	6. With the tag interface it is not possible.

Method of the tip fragment:

1. There are three mechanism for building custom tag
   a. tag files
   b. simple tags
   c. Classic Tags
2. PageContext actually extends JSPContext.

Chapter - 07

#. The tag life cycle:

1. setpagecontext(pagecontext)
2. setparent(tag)
3. doStarttag()
4. doEndtag()
5. release()

1. **Creating a tag handler instance:**
   This is parformed by invoking the default arguments

2. **setting the context:**
   The next step in the tag life cycle is to make the tag handler instance aware of the environment is which it is running, this invoking passing he tag handler a reference to the current pageContext through the setPageContext() method,

3. setting the parent:
   Like simple tags classic tags can be nested

The setparent() method is called and passes reference to the closeset enclosing tag handler or null if the tag isn't nested

4. **Executing the Functionlity:**
   In Classic tag we call the doStartingTag() and doEndTag().
   Custom tag can be used the page by conform <prefine:myTag> </pre fine.mytag> or Shortened form <prefine:myTag/>

#The Start Tag:

int doStartTag() throws jspExecption:

- Two values can be returned from tags implementing this interface
  - SKIP-BODY and EVAL-BODY-INCLUDE which are defined as constants within the tag interface
- **SKIP-BODY :**Any body content for the tag should be ignored
- **EVAL-BODY_INCLUD:** singnals that any body context should be evaluated

#The EndTag

int doEndTag() throws jspException:

- This mothed also specifies an integer return type
- Two constants defined within the tag interface
  - SKIP-PAGE and EVAL-PAGE
- **SKIP-PAGE:** return values is rarely used

5. Refeasing stade:

- The final mothed to be called as part of the tag life cycle is the refease() method
  This method is called to ask the tag handler to refease any state it may be storing
- Java.util.Collection instance confain the items that are to be displayed in the list

#Describing the <select> tag:

Cho7.tld:

```
<attribute>
        <name> name</name>
        <required> true<required>
        <rtxprvalue>false</rtxprvalue>
</attribute>
```

Property Descriptory object: provides an easy way to find the getter an scatter mothed associated with a javaBean.

#Using the <select >tag:

<cho7: select Name = "country" lable ="Name" value="id" items="<%=(java.util.collection)
Pagecontext. Find attribute("country")%>

<rtexprvalue>true</rtexprvalue>

this tag use to pass object attribute into tag handlers is to every were that they support request time expression for item attribute value is **(true).**

#Dynamic attributes:

- The jsp 2.0 specification introduce the concept of dynamic attributes is which the attributes for any tag do not have to be determined and defined is the TLD life

- The benefit of dynamic attributes is increased flexibility , particularly when the full set of attributes is either very large or unknown of the time of development,

- Dynamic attributes within the javax.servlet.jsp.tagext package.

- The parameter of the setDynamicAttribute() method provide the information about the namespace, name and value of the attribute
  - Public void setDynamicAttribute(String Uri, String localName, Object value) throw Execption
- **<selectWithDynamicAttributes tag:**

```
<ch07:selectwithDynamic Attributes name="country"
Lable="name" value="id" items="${countries}"
Size="3/>
```

- **Iteration tag:**

For evaluating and reevaluating body context multiple times we use the iterationTag interface

- **The Iteration Taglife cycle:**
  - Initilize context and attributes
  - doStartTag(),
  - Evaluatebody,
  - doAffterBody(),
  - doEvdTag(),
  - Evaluate rest of page

- The purpose of the doStartTag() : is to find the first item in the collection, put it into the page Scope, and evaluate the body context. If there are more items in the collection, the method repeats the action again.

- The doAfterTag() checks for more items, if find gets the next one, puts it into page Scope and ask the jsp container to evaluate the body context again.

#Using the Iteration Tag:

```
<ch07:iterate var="country" collection="${containers}">
        <li>${country.name}
</ch07:iterate>
```

#The TagSupport Class:

- **Simple TagSupport** Class provides a default implementation of SimpleTag interface.
- **TagSupport class** provides us to build classictag.

#BodyTags:

The **bodyTag** interface extends the interface to add even **more flexibility** and capability.

#The body Tag Life Cycle:

1) Selecting the context

2) The Start Tag------doStartTag()
3) Setting the body context-----setBodyContext()
4) After the body-------doAfterBody()
5) The end tag------doEndTag()

#The BodyTag Support Class:

BodyTagSupport provides to use as a Starting Point where building body tags.

#Filtering Context:

Features: Ability to hide email address from users so that potential Spammers cannot obtain this information

Chap-08

#Custom tag advanced features and best practices

- There are two methods for placing Scripting variables into the JSP page.
  1) Writing the TLD file (declarative)
  2) By using a tagExtraInfo class (programmatically)

#Define variables in the TLD file:

- TagSupport Class makes easier to gain access to some of the Http specific class that we need to access cookies.
-

#Describing the cookie Tag:

<body-context> JSP</body-context>

The body context of the tag is evaluated

<name-given>

Allow us to statically define the name of the seripting variable

<naeme-from-attribute> id </naeme-from-attribute>

Instead of statically define the name of the variable, if tells the JSP container to use the value of the named variable

<variable-class>

This is just the fully qualified class name of the seripting variable

<declare> true</declare>

We can decide whether a new variable should be declared on the page with the <declare> element if we specify (true) the default value, a new variable is automatically created.

<scope>

<scope> elements has 3 values-

1) AT-BEGIN
2) NESTED (default value)
3) AT-EDN

This element allows us to define where on the page the scripting variable will be accessible

#Using the cookie Tag:

<ch08:cookie id=”useCookie” name=”lastvisited”>

You last visited this web site on <%=***myCookie.getvalue()***%>

<ch08:cookie>

#Defining variables in a TagExtraInfo Class:

- By using a TagExtraInfo class we can declare scripting variables in the page programmatically.
- It allows for on additional lavel of flexibility in the way that variable are defined.
- The <variable> element in the TLD file allow us to be flexibility in the way that variables are defined.
- The variableInfo class constructor takes four parameters. These parameters map to the subelements of the <variable> element within the TLD file-
    1) Name (name given or name from attribute)
    2) Variable-class
    3) Declare
    4) Scope

#Co-operating tags:

The most common way that tags co-oparate is by sharing information, which is typically implemented by using one of the variable scope- request, page, session or application.

→ **The HashMap** is initialized within the public no-artument constructor.
→ **addEventHandler** (String, String) : methods places the information info the HashMap the tag handler maintains.
→ **JspTag** the super class of all tag interfaces.

#Tag validation:

The Jsp specification provides two mechanisms to performs validation-

1) TagLibrary validator and
2) TagExtraInfo classes

#Validation with a TagExtraInfo class:

The TagExtraInfo (TEI) classes **are inherently** much simpler to use than TLV Classes.
The validation logic would be implemented within a nethod called isValid(), returning true if valid and false other wise.
→ **Building the TagExtraInfo class:** <eventhandlers> tag EVENT-HANDLERS.add("onblur")

#The TryCatchFinally Interface:

The interface provides a way to gracefully handle exeption that may occur during the processing of classic tags, regardless of the Tag or BodyTag interface.

```
Package javax.servlet.jsp.tagest;
Import javax.servlet.jsp.*;
Public interface TryCatchFinally{
        Void doCatch(throwable) throws Throwable;
        Void doFinally()
}
```

→ **This interface has two methods-**
1)doCatch()
2) doFinally()
a) doCatch(): The doCatch() method will be called it an exception is thrown in the doStartTag()
b) doFinally(): The tag handler will always be called

Using the tag Library:

<%@ taglib var=http://www.appress.com/projsp/ch06
Frefix="ch06"%>

Chapter 9

Data Access Options for WEB Applications:

There are 5 data access technologies:-

 # Data Access technologies:

There are data access technologies-

1. JSP tag for SQL
2. JDBC
3. O/R frameworks
4. EJB entity beans
5. JDO

- JSP tags for SQL
  - JSTL allows us to access a database via SQL directory from the JSP page.
- Advantage
  - The obvious advantage of the JSP tags for SQL is simplicity.
  - It's easy to query the database and to throw the result up on a web page
  - This is great for simple application that need only to display database data on a web page and mage simple database table updates.
  - The <sql:query> tag execute on SQL query and returns a resultset object that we can iterate over and display with other JSTL tags.
  - The <sql:update> executes an SQL update.
- Disadvantages
  - We must embed SQL queries with table and field, name into the jsp page. If database table and field names change, we have to make the corresponding changes in our JSP files. This is a problem to build large project.
  - Another disadvantage is updates. The JSP tags database, but we have to build the SQL update string ourself. This is also a problem for big project.
    - Example
      - <sql:queary var="src" dataSource="jdbc/testDB">
        Select ID, Name from testDate
        </sql:query>
  - The <sql:query > has two attribute specifies the name of an object of type (javax.server.jsp.jstl.sql.Result) that will be created by the query to hold the result of the query.
  - The dataSource attribute specifies the database connection string. This is a comma separated string with the format connection URL, the JDBC driver class name the username and password.
    The password is a empty String and can be omitted from the connection string.
    - <c:forEach var="row" items="${rs.rows}">
      ID:${row.ID} ,
      Name: ${row.Name}
      </c:forEach>
- JDBC(Java Database Connectivity):
  - JDBC is a standard part of Java and provides a uniform API that can be used to access any relational database.
- Advantage /Disadvantages
  - The advantage of JDBC are simplicity and flexibility. There are only about 25 class and interfaces in JDBC.
  - The simplicity of JDBC is also a disadvantage. IF we have a lot of quires and updates to do, using JDBC can be a lot of work.
  - JDBC gives us cross-database probability which is wonderful ,but that probability is not perfect .
- Two database connection mechanisms provided by JDBC-

- Java.sql.DriverManager
- Javax.sqlDataSource

#Using the Java.sql.DriverManager

We will need to provide the following database connecton parameters

- The name of the JDBC Driver class to be used
- The JDBC connection URL for the database
- The database username-password combination.
  Class.forName("com.mysql.jdbc.Driver");
  Connection con = DriverManager.getConnection ("jdbc:mysql://localhost/loginjdbc", "root", "bari123");
  - If we need to load multiple drivers, they can be separated by using a colon as a delimiter.

When we are using this technique , it is no longer needs to call Class.forname() . The jvm will automatically load the Driver class .

- There is a problem when using the Driver manager , we will have to mange those connection parameters.

Using javax.sql.Datasource:

- Using javax.sql.Datasource approach ,we no longer have to manage database connection paramiters.
- We need to declare this data source by adding a resource reference to the application`s **web.xml** file as shown here :

```
<resource-ref>
    <res-ref-name>jdbc/agdb/</res-ref-name>
    <res-type>javax.sql.Datasource</res-type>
    <res-auth>container</res-auth>
</resource-ref>
```

3.**Objecet-Relationl persistence frameworks:**

- O/R persistence frameworks make it easy to store and retrieve java objects in a relational database.
- O/R frameworks come in a variety of shapes and size but generally speaking an O/R framework is a class library and a small set of development tools that support the storage and retrieval of java object in a relational database.

Advantages :

1. Easier to program
2. Better cross –database support
3. Better performance

- There are numbers of way to use on O/R framework.

Name	Description
a.Top-down	starting with an existing set of java objects .
b.Botom-up	starting with an existing database schema.
c.Midlle –out	starting by writing a mapping specification that describe the object and their relationships.
d.meet-in –the middle	take this approach if there already have an existing databse schema.

- Some open –source o/r framework are castor, hibernate and Jakarta OJB.

- Popular commercial O/R framework include Toplink (oracle) and cocoBase(thought ine)

4. java Data objects(JDO):
JDO is a relatively new java API special fiction designed to provide a standard API to enable the persistent storage of database and other enterprise information system.

Advantage:
It provides the same benefits as using an O/R framework,

5. EJB Entity Beans(Enterprise java Bean):

- EJB is a java API specification that provides a component architecture for the development and deployment of distributed business object. But many java programmers use EJB only for its database access and java object persistence capabilities.

- If any application is highly transactional requires high availability and is likely to have many concurrent users. We might want to conceder EJB.

- An EJB container can support three type of component –

1. Entity Beans
2. Session Beans
3. Message Beans

An entity bean can be persisted to data store by using one of the following mechanism.

1. containire managed persistence(CMP):

This specifies how to map fields from entity bean object to fields in database.

2. Bean-managed persistence(BMP):
We implement to persistence the object by using JDBC an O/R framework, JDO or some other technology.

Advantages of EJB:
a. Built –in O/R framework
b. Scalability and high availability.
c. Declarative transaction support
d. Declarative object support.
e. Declarative method –level security

Disadvantages:
a. The technology is complex and the learning curve is steep.
b. EJB is deployment overhead .when EJBS were first introduced, we need to create at least three (often four) files for a single EJB.
c. Tools such as xdoclet made the process easier but until recently there was a lot of complexity in developing even simple beans.

- Comparison of various Data access Options

Option	Pros	Cons
JSTL	Simple and easy to use with JSP.	Useful only for displaying query result and performing simple updates.
JDBC	Simple and easy to use, Also very flexible and powerful.	Can-require repetitive, tedious and error-prove boilerplate coding.
O/R	Make it easy to persist object to DB.	Each O/R framework has its own nonstandard

	Eliminates much repetitive boilerplate coding. Good too support. Better support for portability . Make open and closed-source implementations.	API and query language.
JDO	The official standard Java Persistence API with growing momentum among developers . Easy to persist object to DB. Easy to use API and OQL. Most of the same benefits an O/R framework.	Currently supported only by small vendors.
EJB	Widely supported, well-known, well-documented, and standard JAVA API. Stability and high availability features. Declarative transactions and security. Distributed object Support .	Compels Solution, lots of learn, High development overhead, poor performance if used in properly.

- Data Access Architectures
  - Example : RSS Newsreader
    RSS is a simple XML-based format for representing the current news stories available on a website. A web site that supports RSS may provide several RSS news feeds, each covering over topic and each available at a different URL.
  - One –Layer Architecture
    Single layer architecture is acceptable for smaller application but for big application it will make.
    - Difficult to maintain
    - Difficult to reuse
    - Not resilient to change
  - Two- Layer Architecture.
  - Three Layer Architecture.
    Advantage
    - Reusability
    - Resilience to change
- The Data Access Object (DAO) pattern
  - The DAO pattern is generally design for encapsulating data access.
  - <c:forEach> tag use to iterate through the rows that are contained in the items object.
  - <c:out> tag use to display each-column of data.
- The directive which declares the JSTL core tags is
  - <c%@ taglib uri="/WEB-INF/c.tld" prefix="c"%>
    dereictive which declares the JSTL SQL tags is.
  - <c%@ taglib uri="/WEB-INF/sql.tld" prefix="sql"%>
  - Two TLD file must be available in the WEB-INF
    - C.tld
    - Sql.tld
  - There are six steps required for RSS newsreader development powers
    - Implementing the Object Model.
    - Creating One On object –Relational Mapping.
    - Creation the Database Tables.
    - Implementing the aggregator DAO.
    - Implementing the Business Layer Interface.
    - Implementing the web user Interface.

- What do you mean by Hibernation?

  Hibernation is the collection of classes and interfaces that can be used to communicate between java object and databases, JDBC code is written use then directly in the code. It's framework for persistence.

  - <hibernate-mapping>
    <class name="com.appress.projsp.Newsfeed" table="newsfeed">
    <id column="id" name="id">
    <generator class="uuid.hex/>
    </id>
    <property name="url" column="url" type="string" not-null="true"
    unique="true" unique="true"/>
    <set role="items" table=item" cascade="delete">
    <key column="newsfeed-id"/>
    <one-to-many class="com.appress.projsp.Subscription"/>
    </set>
    <set role="subscriptions" table=" subscriptions" cascade="delete">
    <key column="newsfeed-id"/>
    <one-to-many class="com.appress.projsp.Subscription"/>
    </set>
    </hibernate-mapping>

  - Hibernate –support 10 primary key generation methods. The class ="uuid.hex" method returns a 32-character key that is generated by using the IP address of the mechanism upon which hibernate is running.
  - <arg value="—output=../ag.ddl"/>
    the –output argument tells the SchemaExport to generate a database creation script named rss.ddl
  - <arg value="—properties=hibernate.properties"/>
    The-properties argument tells SchemaExport where to find the Hibernate properties file. Which contains the database connection parameters needed to connect to the target database.
  - All the action classes implement the com.appress.projsp.web.Action interface.
    Each action class follows the same pattern:-
    - Perform an action
    - Load some objects (the model) in to scope.
    - Forward the request to a JSP page (this is the vies)
  - Action classes and JSP pages in the RSP application:-

Name	Application	JSP Page	Description
Login or change User	Com.appress.projsp.hbb.LoginAction	Login.jsp	Allow user to log in by entering a user name
Manage Subscription	Com.appress.projsp.web.SubscriptionAction	Subs.jsp	Allow user to add new subscriptions and to remove existing subscriptions
Read news	Com.appres.projsp.web.Aggregation Action	newrs.jsp	Allow users to view newrs items

- Castor is an open-source persistence framework like Hibernate.

Chapter-10

Introducing to Filtering

Some popular use of filter s include –
Authentication

Auditing
Compression
Encryptions
On the fly format transformation

- ❖ Common filter application:
    1. Filter can intercept request header information before it reaches the resource in the processing pipeline and can therefore be used to create customization authentication.
    2. Filter can be written to perform sophistication logging and auditing.
    3. Filter is also useful in data transformation.
    4. Filter can present the serving of a particular resource altogether and generate their own response.
- ❖ The big picture of filtering:
  The middle tier component of the java EE archive true consists of an application server often fronted by a web server.
  The middle- tier server becomes a server that serves one of the three type of resources based on incoming requests-
    1. Static content (HTML , images and so on)
    2. A servlet
    3. A JSP page

Filters are positioned in the processing pipeline. between the application server and the client. A filter provides application level access in the request handling pipeline of the container.

Filtering pipeline :

Filters can be used to do the following:-

1) Inspect the request header and data before it reaches the resource.
2) Inspect the response header and data after it has been send by the resource.
3) Provide a modified version of the request to the resource being processed by the container.
4) Access and modify the response from the resource before returning it.
5) Stop a request from reaching a resource altogether.

The Filtering interface :

→A filter is simply a class that implement the javax.servlet.Filter interface similar to the javax.servlet.Servlet interface.

→There are three life cycle method that a filter must implement.

1) Public void init(FilterConfic config) throws Servlet Exception.
2) Public void doFilter(SrevletRequest req,ServletResponse res,FilterChain chain) throws IOException ,ServletException.
3) Public void destroy() when filter is being taken out of service.

Configuration and deployment of filters:

→ Filter are typically created by developers and delivered as bytecode classes within a web application.

→ A web application filters are configured and by specifying the following-

a) Which filter(s) to use
b) Any initialization parameters to the filter
c) Where to apply the filter
d) The order in which multiple filters are chained together(if applicable)

→ The servlet container supporting filters will parse the following two types of filter related declarations present within this file-

1) Filter definition :-Tells the container the textual name associated with the filter.
2) Filter mapping :- Tells the container which resources the filter will be applied to.

The life cycle of a filter:

→ The filter life cycle is almost identical to that of servlet life cycle-

1) Instantiation
2) Initialization[init()](explicit stage)

3) Filter execution[doFilter()](explicit stage)
4) Destruction[destroy()]

→ The constructor is called during instantiation phase.
→The init() method is called for initialization.
→ The doFilter() method contains all the filter processing logic,handles the filter execution phase.
→ The destroy() method is used in the destruction phase.
→ the initialization must occur before the first request is mapped through the filter interface.
→During the initialization, the container passes a FilterConfig object via the init() method of the javax.servlet.Filter interface.
→The filterConfig can be used by the filter to obtain-
-- initialization parameter of the filter
--the textual name of the filter

The FilterConfig interface

→ the FilterConfig interface declares four methods

1) public String getFilterName(): obtain the textual name of the filter, as defined in the web.xml deployment descriptor.
2) public String getInitParameter(String paramName) : obtain the string value of the specific initialization parameter by name.
3) public Enumeration getInitParameterName(): obtain a java.util.Enumeration consisting of all the names of the initialization parameter for this interface in web.xml<fliter>
4) public ServletContext getServletContext(): obtain the ServletContext that the filter is execute within the server.xml.

→ we must take care of to write filters that are thread safe.
→ the filter instance will kept alive to process a request until the container(or a VM in the container) shuts down or the associated web application is undeployed.

Filter Defination:

The filter definition appear in the web.xml deployment descriptor inside the <filter> element. Each <filter> element must have the following child element.

```
<filter>
<filter-name>AuditFilter</filter-name>
<filter-class>Filters.Audit Filter</filter-class >
</filter>
```

And optionally one or more <init-param> child element. It contains <param-name> and <param-value> subelement.

Filter Mapping:

→Filter mapping are XML-based entries, specified per web application within the web.xml file

```
<filter-mapping>
<filter-name>VusialAudit Filter</filter-name>
<servlet-name>mylocate</servlet-name>
</filter-mapping>
```

→ the servlet name is defined within the same web.xml file like this

```
<servlet>
<servlet-name>mylocate</servlet-name>
<servlet-class>FindProd</servlet-class>
</servlet>
```

Matching URL patterns:

→ the real power of mapping becomes evident when we use URL patterns matching

URL Pattern	Matches
/*	Everything that is served by this web application including static pages, servlets and JSP pages.
/servlet/*	All servlets
/jsp/*.jsp	All jsp pages located on the /jsp path
/dept/accounting/*	All resources in the accounting department branch of web application.

```
<filter-mapping>
<filter-name> </filter-name>
<url-pattern>/* </ url-pattern>
</filter-mapping>
```

Insertion of filters into the request flow:

→Tomcat 5.5 have full flexibility to insert filters into the request flow even in between programmatically dispatched point

Consider a filter mapping similar to the following;

```
<filter-mapping>
<filter-name>F1</filter-name>
<url-pattern>/* </ url-pattern>
</filter-mapping>

<filter-mapping>
<filter-name>F2</filter-name>
<url-pattern>/* </ url-pattern>
</filter-mapping>

<filter-mapping>
<filter-name>F3</filter-name>
<url-pattern>/* </ url-pattern>
</filter-mapping>
```

→ **incoming request**→

←**Outgoing response**←

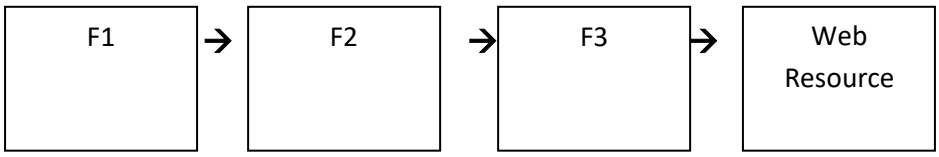


Fig: an incoming request is processed by zero or more filters and the response from web resource can be processed by the some set of filters.

Note: when the primary web resource used the request dispatcher to include other processing resources, the include processing resource cannot be filtered. The same thing happens when the web resource use the request dispatcher to forward the request to other processing resources.

→ The <dispatcher> subelement of a filter mapping allow us to specify the filtering is to be performed during regular request.

→ <dispatcher> subelement of <filter-mapping> is optional.

```
<filter-mapping>
```

<filter-name>F3</filter-name>
<url-pattern>/* </ url-pattern>
<dispatcher>REQUEST</dispatcher>
</filter-mapping>

<dispatcher> Value:

1) REQUEST
2) FOEWARD
3) INCLUDE
4) ERROR

Filter chaining :

Chaining is the action of passing a request through multiple filters in a sequence before accessing the resource request.

The FilterChain interface :

Javax.servlet.FilterChain interface through the doFilter() method

public void doFilter(ServletRequest req , ServletResponse res) throws IOException ,ServletException.

***All filters are Chainable:**

>All filter are intrinsically chainable.

*** Unique properties of filters chaining:**

Each of the filterchain dofilter() method calls are stacked upon one another. So program flow is blocked in a nested fashion across all the filters involved.

The order of chained filters execution on the incoming request is down the filter stack, whereas the order of chained filter execution on the outgoing path is up the filter stack.

- Initial Parameters for filters:

```
<filter>
<filter-name> stop Games filter</filter-name>
<filter-class> filters StopGamesFilter</filter-class>
<init-param>
        <param-name> starthour</param-name>
        <param-value>10</param-value>
</init-param>
</filter>
```

  - The starthour will be accesssiable within the filter via a call to the filterconfig object:
    String start Hour= filterConfig.getInit Parameters("starthour");

- **Filter writers method:**

Method	Service
Object getAttribute(String name)	Obtain the value of a named attribute.
Void setAttribute(String name, Object object)	Attaches a named attribute to the Servlet Contest.
Void removeAttribute(String name)	Remove a previously attached attribute.
Enumeration getAttributeNames()	Return a java.util. Enumeration consisting of the nnames of all the currently attached attributes.
Void log(String msg)	Writes a String to the currently active logging facility associated with the context.
Void log(String msg, Throwable throw)	Writes a String and an Stack trace to the log.

- Testing the filter:
  1. Go to Tomcat's logs subdirecting and delete all files.

2. Create a web application with the filter and index.jsp and deploy it.
3. Start Tomcat 5.
4. Start a browser and navigate to http://localhost:8080/filters1/index.jsp.
5. After the web page gas located in the browser, shut down Tomcat.

❖ **Make the code Thread –Safe:**

There is typically only one instance of a filter per java VM. This makes it inevitable that the dofilter() method will be encounter by many threads simultaneously. So the filter must be thread-safe. This means the following:

1. Local variable in the filter class scope should be read-only, or the scope access must be synchronized.
2. Beware of calling methods that may modify instance variable indirectly or outside of synchronization.

What is filter?

- ✓ Filters enable web-application programmers to tap into the request-processing pipeline of the container.
- ✓ Filters are packaged code components in a web-application, at the same level as servlet and JSP pages.
- ✓ Filters are deployed at the same way as servlet and JSP pages, through the deployment descriptor for the application.
- ✓ The filter has access to in coming requests before they reach the final resource and to the outgoing response immediately after the resource processing.
- ✓ Filter can also substitute their own version of the request and response (typically wrapped) for consumption of the resource.
- ✓ Symbiotic, well-define interactions between the request dispatcher and filter enable us to create filter that act as in-series processors for request- switching web-application and application frameworks such as Apaches Struts and Turbine.

Chapter-11

❖ **Filter for five problem domains:**

Application Domain	Filter Sample
1.Auditing	A visual auditing filter that includes audit information inline with every resource that it services.
2. Authorization	A filter that disallows access to the server during certain hour of the day.
3.Adapater	An adapter filter that allows newly formatted queries to work with a legacy set of resources.
4.Authentication	An ad hoc authentication filter that can add simple login protection to any (group of) resource.
5.Pipeline Processing	A data-processing filter that takes advantage of the request flow along the processing pipeline.

❖ **Techniques and filters:**

Techinque Illustrated	Filter
1.Transforming incoming request headers	Adapter filter
2.Transforming outgoing respose content	Auditing
3.Wrapping request objects	Adapter
4.Wrapping response	Aduting
5.Dinamically adapting filter behavior based on incoming requests	Authentication filter
6.Stopping downstream request flow	Authorization filter Authentication filter
7.Generating response	Authorization filter Authentication filter

8.Adding to or modifying the attributes of a request is a processing pipeline	Pipeline processing filter Authentication filter
9.Interacling with the request dispatcher's include() and forward actions	Pipeline processing

- **A brief word on terminology:**
  - The request originates from the Clint and foes though a chain of filters before reaching the final resource processor.
  - First the request travels from the client, through the first filter, the second filter and soon. This call the down stream or inbound trip. The downstream trip is always toward the final goal.
  - After the resource process has finished with the request a response then will travel upstream or out bound back through all the filter and onward to the client.

Form client downstream-→inbound
Client ->filter1->filter2->filter3-> response
Upstream <--outbound to client

- **Wrapping the response object for content modification:**
  - We must wrap the response with our own custom version during the request's inbound trip, before calling the chain dofilter()
    In fact the following happens
    1. The filter supplies a custom wrapped version of the response to downstream fitness when it calls the chain. Dofilter().
    2. The custom wrapped response object hands down a custom output stream or printwriter object that is actually a byte array managed in the code.
    3. When downstream filters, ot the resource processor, writ4e to the custom output stream or printwriter, its buffering all the output.
    4. When downstream filters, or the resource processor flush or close the custom output stream or Printwriter,we examine the buffering all the output.
    5. When downstream filters or the resource processor, flush or close the custom output stream or Printwriter, we examine the buffered output for the closing </body> tah and insert the auditing information just before it(if found).
- **The Replace ContentOutputStream class:**
  - This class wraps an outputStream and does the following:
    1. Supplies its own byte array-based stream for the write() method, called by downstream filter and the resource processor.
    2. Handles the close() method by calling a child replaceContext() method to transform the byte array stream.
    3. Provides the transformed content through the getResult() method. This method is called by the filter when the filter write the response.
  - ServletOutputStream is the base class of OutputStream which is refused by getoutputStream() on a response.
  - ServletOutputStream requires the write(int) method to be implemented by its subclass.
    It implements all the other writer() variants based on this method.
- The ReplaceContextOutputStream requires the replaceContext( ) method to be implemented by all in subclass.
- The flag variable closed, initially false, is used to ensure that the wrapped stream is closed only once, regardless of how many times the close( ) method maybe called.
- The write( ) method writes to the in-memory by array stream called stream, this ensure that all writes on this stream write to Stream(essentially a buffer).
- The processStream( ) method call the replaceContext() method to transform the in-memory stream and write the transform output to the wrapped output stream.

Authorization filtes

It allows or disallows an incoming request to reach it destined resource processor depending on the time of day.
Fig. when a request is made outside the allowable hours, the filter denies access to the request resource.

- Thread safety considerations:

  After a instance of a filter has been created and before the very fast do filter() method is called. The container calls the init() method to set the filterconfig object for the filter. This is a natural point at which to perform any initialization required and it is conceptually equivalent to the init() method of a servelet.
  Filter for adapting to legacy resources
- Writing the legacy AdapterFilter:
  This filter will perform several tasks:-
  1. Determining the awning IP address.
  2. Map the IP address from which the request originates to department.
  3. Add the DEPT parameter to the request before it reaches the underlying jsp resource.

Ad Hoc authentication Filter

- When we need simple, temporary protection of selected resources, the AdHokAuthenticate filters can be the best choice.
- The action of this filter is Straightforward. It triggers basic authentication on the client browser.
- Almost all known browsers, including even the earliest version support basic authentication.

The authentication process works like this:-

1. A client attempts to access a protected resource.
2. The server examines the clients request to determine whether theirs any authorization data in the "Authorization" heder.
3. If authorization data is not found, the server sends back HTTP status code 401(Unauthorized access) and a header with www-authenticate:BASIC realm=<realm>, where realm is a next string that will be displayed to the client.
4. The client browser pops up a login screen in which the user should enter a username and password.
5. When the user enters the username and password, the client encodes the username and password by using simple base64 encoding and sends both to the server.
6. The server examines the client request to determine whether there's any authorization data, decoding the base64 extended password if necessary. If there is no authorization data, the process goes back to step 3.
7. The server verifies the password and either allows or reject access.

Filter in the request-processing pipeline

- Understanding the pipeline model:-
  There are many name given to pipeline data processing model. It's often identified as the enabling element of Model-view controller(MVC) web application design, and sometimes it refferd to as the push model of application design, contrast with the more conventional pull model.

Some of the highly desirable properties of a application model:-

1. The request stays intact as it traverse the pipeline with work being carried out only on attached attributes (sometimes called decorators).

2. Data management, business logic, and presentation logic can be clearly separated into different processors and renderers.
3. The processor can be designed to be completely composable (that is chained in any order) or highly specialized.
4. Multiple renderers can compose the final output(such as data to XML to HTML via XSTL).
5. The state of the request travels with the request through the pipeline.

- In general, designing request-handling login by using the pipeline model provide the following-
  - Processors and renders those are readily reusable as components.
  - Strong and clear separation between data management, business logic, and presentation logic in a application.
  - Application that are more maintainable.
  - Application that are more adaptable to changing business request requirements
  - Robust applications that will be sealable with container technology and hardware advancer.
  - Web applications whose performance is highly optimizable.

Chapter-12

#Overview of Application security:

➔ Authentication is the process by while a web application verifies that "you are who you say you are". For example-when a user logs into web page with a user name and password, the web application validates the entered credentials against it used data store

➔ Authorization: to delete a user from the database, we need to be a authorization-administrator.

➔ The security features that all servlet containers provide are as follows-
1) Authentication: The process of providing the identify to an application
2) Access control for resources: this means by which interactions are limited to users, roles or programs
3) Data integrity: That means for providing that a third party hasn't modified information while it was in transit
4) Confidentiality or data privacy: The means used to ensue that is made available only to users who are authorized to access it.

➔ DOS attack: Denial of service attack, in which a application or site is attacked by an enmous number of hits at the same time

✓ By using Container-managed-security, an application will be much easier to maintain and comprehend. We can easily add new roles to the application by adding or altering a few lines in the application's deployment descriptor.

✓ Using Container-managed-security also makes it easy to switch from using a file-based user data store (or realm) to a database or LAPD-based realm.

✓ Deployment descriptor is the primary vehicle to implement security

Using Authentication:

✓ One of the most popular JSP/Servlet sample applications produced today is the "how to log in"application.

✓ A Realm is a database of usernames and passwords that identify valid users of a web application

Configuration setting in web.xml file

```
<Security-constraint>

    <web-resource-collection>
        <web-resource-name> My Application </ web-resource-name >
        <url-pattern> /* </ url-pattern >
    </web-resource-collection>

    <auth-constraint>
```

```
        <role-name>  *  < /role-name >
    </auth-constraint>

</Security-constraint>
<login-config>
    <auth-method> BASIC </auth-method>
</login-config>
```

- ✓ The significant elements in the preceding code are <url-pattern> , <role-name> , <auth-method>

    1) The <url-pattenrn> element defines the characters to look for in a client's request. This value can be a path based pattern (such as /admin/*)or an extension based pattern (such as /admin/*.jsp) and it doesn't include the context path. Any resources that match this path will be secured by the container.
    2) The <role-name> element indicates the roles allowed to view the secured resources
    3) The <auth-method> defines the type of authentication mechanism to use such as basic (a simple dialog box with the username/password) or form (a direct to an HTML based login page)

- ✓ When we add the <security-constraint> element to the deployment descriptor of a web application installed in Tomcat , the application will be protected by Tomcat's default memory realm.

```
<tomcat-users>
<role rolename="tomcat"/>
<role rolename="role1"/>
<role rolename="manager"/>
<role rolename="admin"/>
<user username="tomcat" password="tomcat" roles="tomcat"/>
<user username="both" password="tomcat" roles="tomcat,role1"/>
</tomcat-users>
```

- ⇨ Authentication options:

Mechanism	Configuration
• HTTP basic authentication	<auth-method> BASIC </auth-method>
• HTTP digest authentication	<auth-method> DIGEST </auth-method>
• HTTP client authentication	<auth-method> CLIENT-CERT </auth-method>
• Form- based authentication	<auth-method> FORM </auth-method>

    - ⇨ When using HTTP basic authentication , the server will authenticate a user by using a username and password from the client.

- The target server is not authenticated; therefore this is not a secure mechanism. The client has no proof that the server is who it says it to for a server to prove it identically, it needs to obtain a SSL certificate from a certificate authority (such as VeriSign)
- If we need greater security but still wish to use basic authentication , we combine it with a virtual private network(VPN)

- ⇨ HTTP digest authentication , the used is prompted with a username/password dialog box that looks similar to the basic authentication dialog box
- ⇨ HTTP client authentication requires the user to posses a Public Key Certificate(PKC) and is based on HTTP over SSL, hence the name HTTPS

- PKCs are useful in applications with strict security requirements and also for single sign on form within the browser.

⇨ Form-based authentication is the final option when using the declarative security.Unlike the others it allows the developer to customize the look&feel on the login screen.

⇨ session.invalidate() method use to loging out a JSP page or Servlet.

⇨ JDBC Realm:

The JDBC Realm allows us to configure declaratively the location for storing user's information

⇨ JNDIRealm:
Configuring a JNDI Realm is similar to configuring a JDBC Realm,however the realm attributes are slightly different.

⇨ SSL:
Secure Sockets Layer(SSL) is a technology that allows web browsers and web servers to communicate over a secure channel.

⇨ SSL hand Shake:
IN SSL, data is encrypted at the browser (before transmission) and then decrypted at the server before reading the data. This same process takes place when the server returns data to the client. The process is known as SSL handshake.

⇨ There currently three levels of encryption supported by this protocol:40-bit, 50-bit,128-bit

⇨ With HTTP basic authentication, user may find if frustrating when their login fails.

SSL Configuration

```
<user-data-constraint>
   <description>
Encryption is not required for the Application in general.
  </description>
<transport-gurantee> NONE </transport-gurantee>

</user-data-constraint>
```

Specify how data should be sent between the client and server.

<transport-gurantee> values:

Value	Description
NONE	The application does not required any transport-gurantee.This is the same as not including <user-data-constraint> element in web.xml
INTEGRAL	The data can not be changed in transit
CONFIDENTIAL	The data will be transmitted in a fashion that presents other entities from observing the contents of the transmission.

SSL drawback

One drawback to using SSL in a web application is that it tends to significantly decrease the throughput of the server. This is mainly due to the encryption and decryption process on each end of the connection.

Java Authentication and Authorization Service(JAAS)

- ⇨ JAAS provides a framework and standard programming interface for authenticating users and for assigning priviliges.
- ⇨ JASS can be helpful when we use complex authentication schema or when we grant resource specific privileges to users(for example-inserting a row in a database, or assigning write permission to a file)

#Servlet 2.5 Security Changes:

HttpServlenRequest interface gives us the following methods -

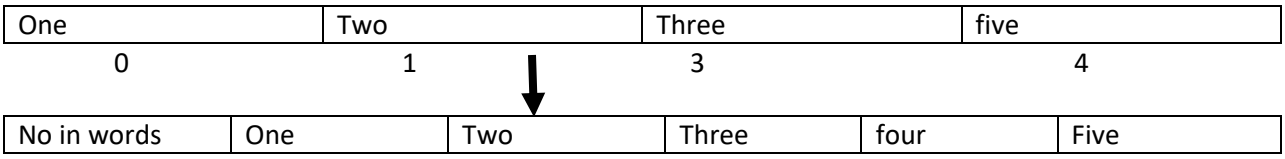
1. getRemoteUser()
2. idUserInRole(String rootName)
3. getUserPrincipal()

```
<Security-role-ref>
        <role-name> admin </role-name>
        <role-link> accounting </role-link>
</Security-role-ref>
```

#the purpose of <security-role-ref> is to create link.

Core-java

Vectorinplementation.java




```
import java.util.*;

public class VectorImplimentation {

   public static void main(String[] args) {

      Vector vect = new Vector();
      vect.addElement("one");
      vect.addElement("two");
      vect.addElement("three");
      vect.addElement("five");

      vect.insertElementAt("numbers in words", 0);
      vect.insertElementAt("four", 4);

      System.out.println("size" + vect.size());
      for (int i = 0; i < vect.size(); i++) {
         System.out.println(vect.elementAt(i) + ",");
      }
      vect.removeElement(5);
      System.out.println(vect.size());
      for (int i = 0; i < vect.size(); i++) {

         System.out.println(vect.elementAt(i) + ",");

      }
```

```
   }
}
```

Stackimplimentation.java

```
import java.util.*
public class stackimplementation
{
        public static void main(String args[])
        {
        stack bag=new stack();
        bag.push("one");

        bag.push("two");
        bag.push("three");

        System.out.println(bag.peek());
        while(!bag.empty)
                {
                System.out.println(bag.pop());
                }
        }
}
```

DateImplementor.java

```
public class Dateimplementer{

   public static void main(String[] args) {

     Date date=new Date();
     System.out.println(today.toString());
       System.out.println(today.toLocalString());
         System.out.println(today.toGMTSString());
   }

}
```

PropertiesImpletnter.java

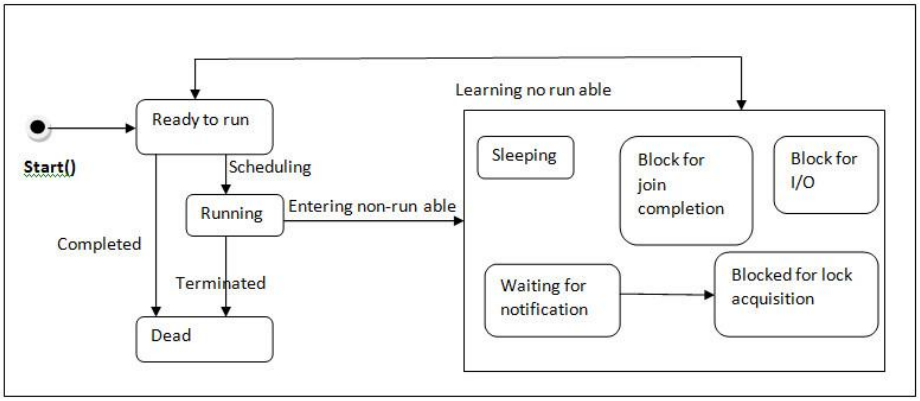
```
public class PropertiesImpletnter {
  public static void main(String[] args) {
     properties props System.getProperties();
     props.list(System.out);
  }
}
```

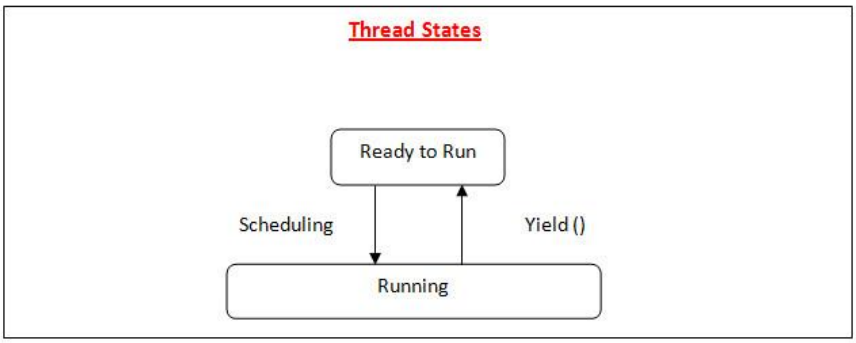
HashtableImplements.java

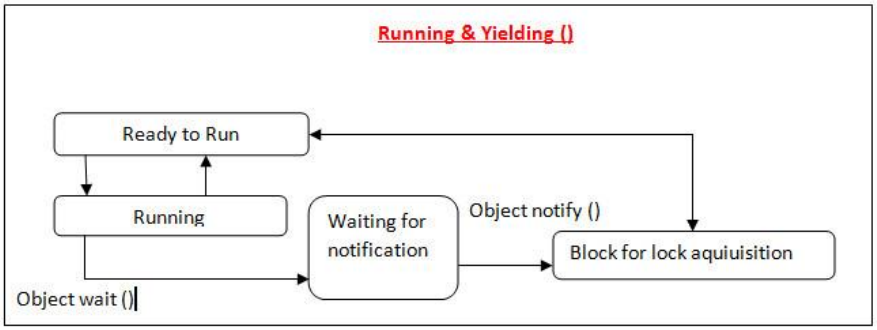
```
import java.util.AbstractCollection.*;
public class HashtableImplements {
   public static void main(String[] args) {
```

```
    Hashtable ht- new Hashtable();
    ht.put("pules", new Integer(1995));
    ht.put("dark side of the room", new Integer(1973));
    ht.put("Wish you are here", new Integer(1975));
    ht.put("Animal", new Integer(1975));
    ht.put("Ummegum", new Integer(1975));
    System.out.println("Initialy:"+ ht.toString());
    if(ht.contaius(new Integer(1969)));
    System.out.println("An album from 1969 exist");
     if(ht.containskey("Animal"));
     System.out.println("Animal was found");
     Integer year(Integer)ht.get("Wish you were here");
    System.out.println("Wish were was released in't year".toString());
    System.out.println("Removing Ummegum\r\n");
    ht.remove("Ummegum");
    System.out.println("Remailing:\r\n");
    for(Enumaration enum1=ht.keys(); enum.hasMoreElement();)
       System.out.println(String)enum1.nextElement();
  }
}
```

Thread







For oracle connectivity

C:\program Files\Java\JDK1.5.0-14\jre\lib\ext

We have to put two jar files in this path

1. Classic 111.jar (oracle\ora92\jdbc\lib)
2. Classic 12.jar