Web Application -Servlet

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Session Objectives

Introducing the web technology

importance of Http protocol

Introducing J2ee architecture and Life cycle of Servlet

Request Dispatching

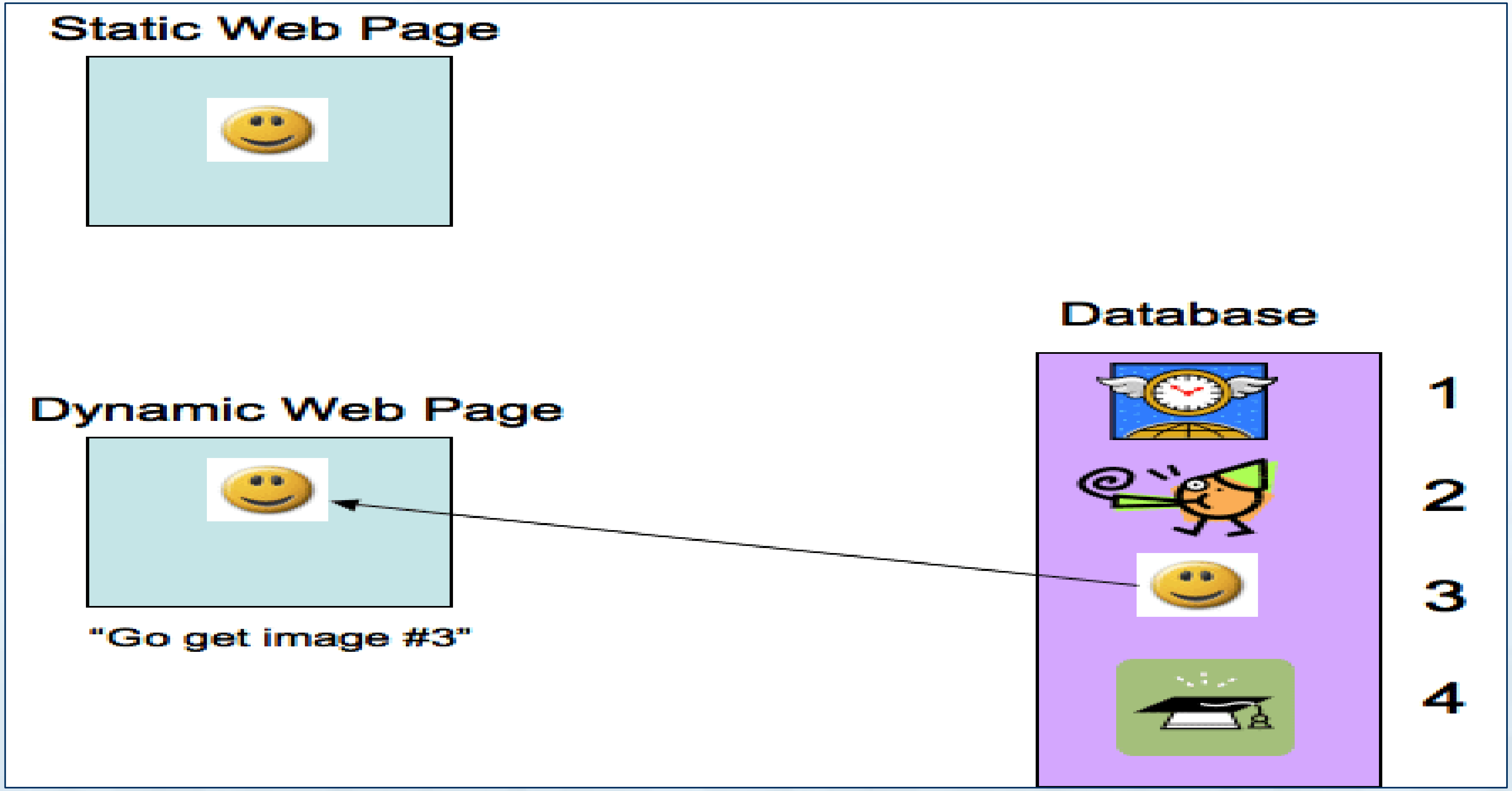
Send Redirecting

Hidden fields

Session tracking

Cookies

URL Rewriting



Static Web Page

Dynamic Web Page

"Go get image #3"

Database

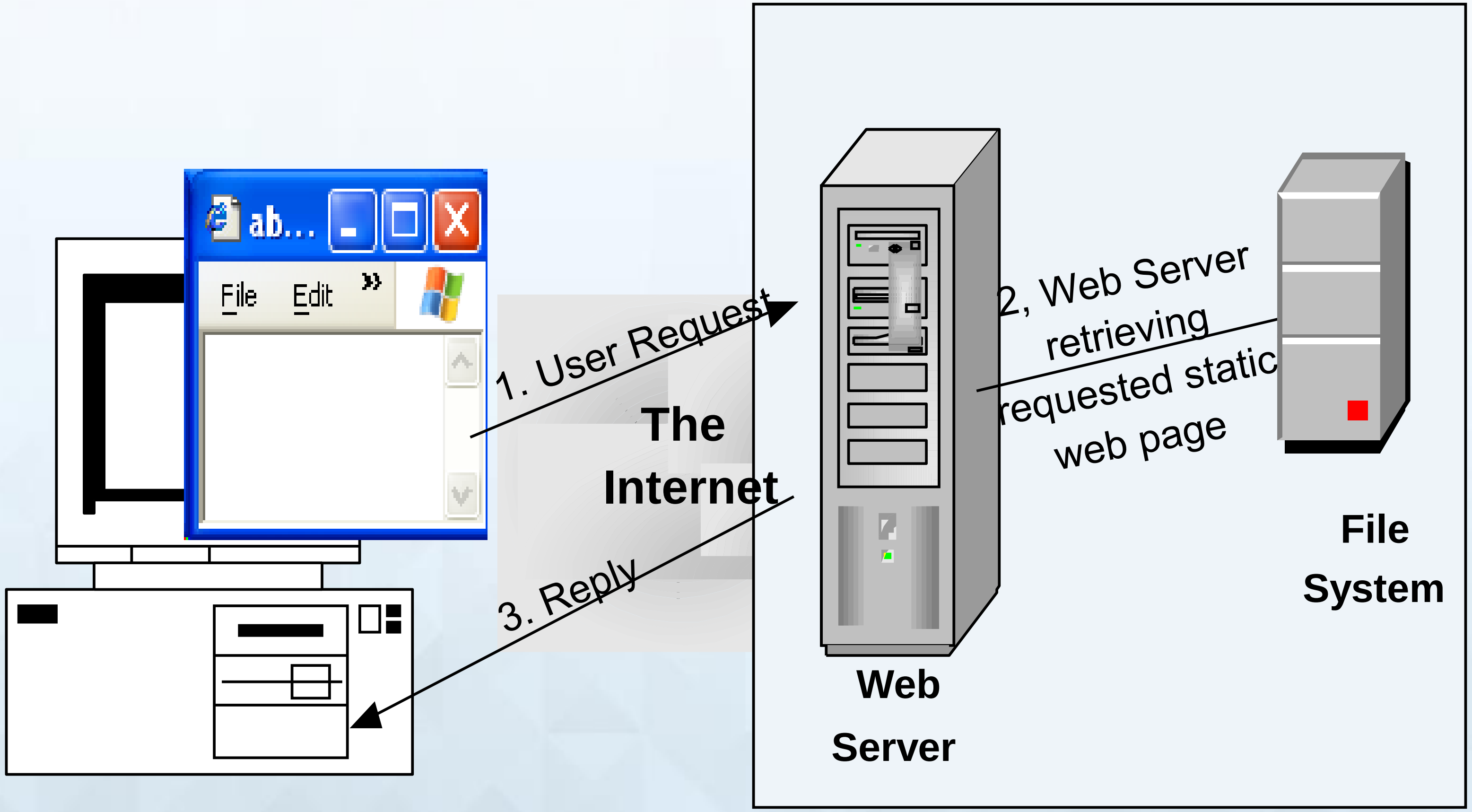
1

2

3

4

Working of a Web Application

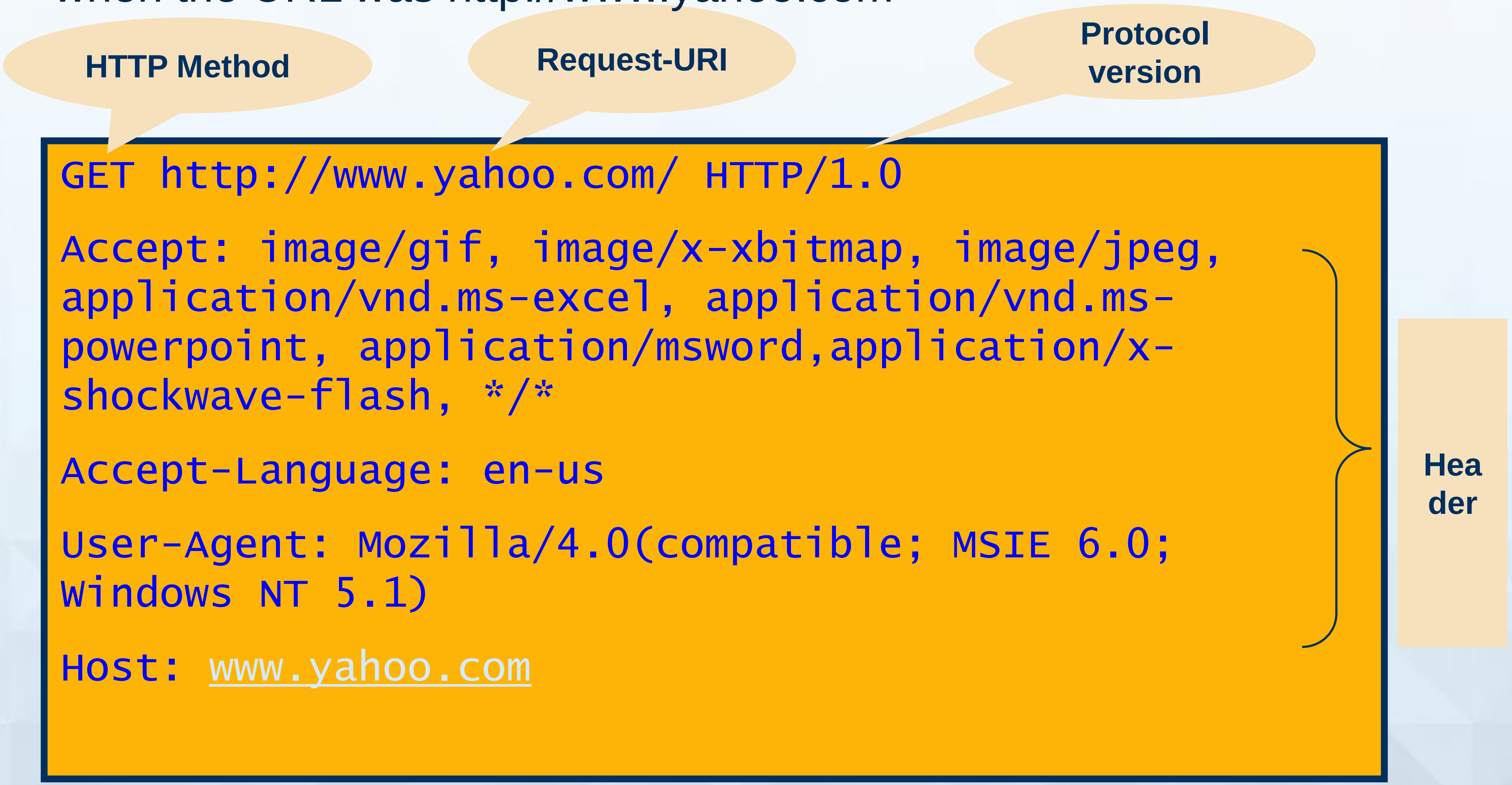


Hypertext Transfer Protocol

- Hyper Text Transfer Protocol or HTTP is the protocol used by the world wide web
- The Hypertext Transfer Protocol (HTTP) supports serving up documents in the Hypertext Markup Language (HTML):
- HTML documents include links to other web documents.
- Web documents can also include forms to pass data from the user to the web server.
- HTTP can serve any type of document.
- The Multipurpose Internet Mail Extensions (MIME) specification defines a canonical naming convention for documents of various media.

HTTP Request

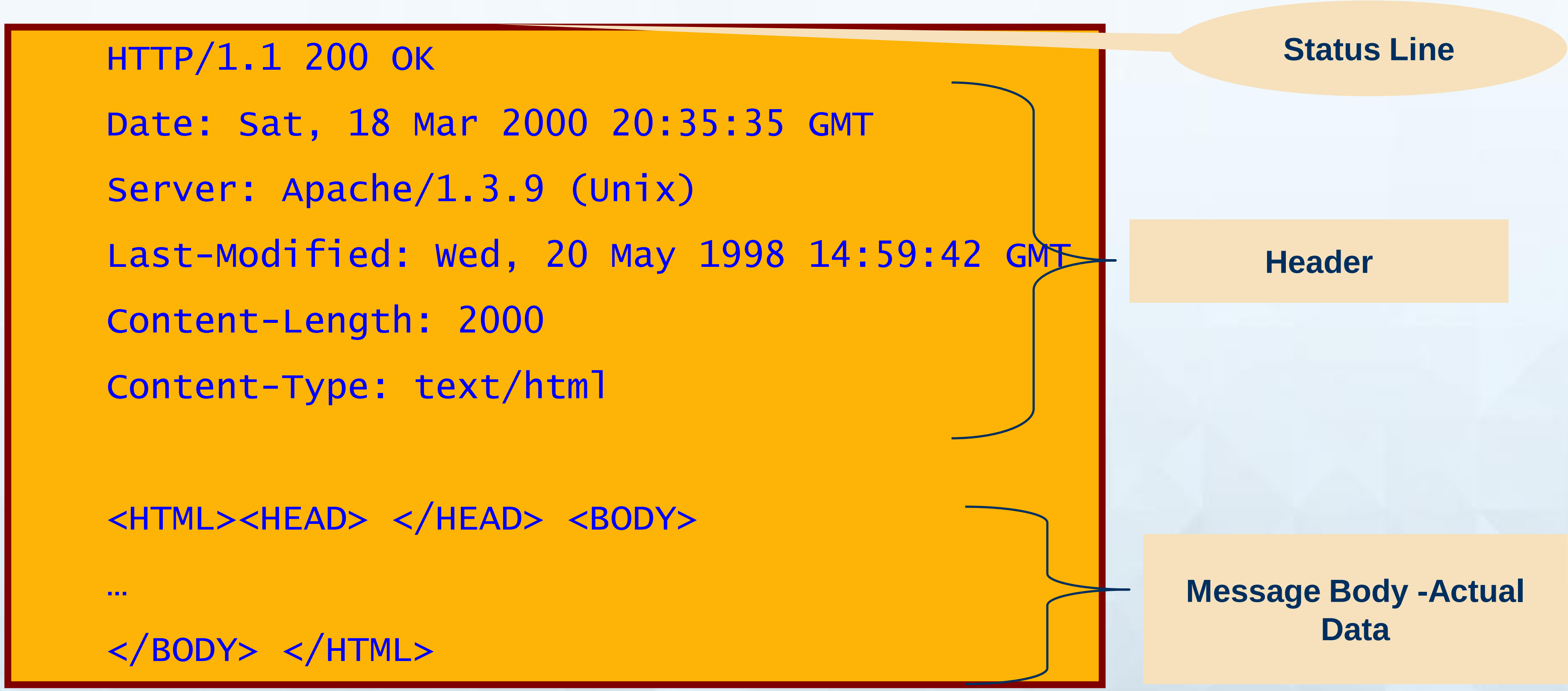
- The following is the request generated by Internet Explorer when the URL was http://www.yahoo.com



```
GET http://www.yahoo.com/ HTTP/1.0

Accept: image/gif, image/x-xbitmap, image/jpeg,
application/vnd.ms-excel, application/vnd.ms-
powerpoint, application/msword,application/x-
shockwave-flash, */*

Accept-Language: en-us

User-Agent: Mozilla/4.0(compatible; MSIE 6.0;
Windows NT 5.1)

Host: www.yahoo.com
```

HTTP Response

- The server processes the request and sends a Response
- The following is an example of a response



```
HTTP/1.1 200 OK
Date: Sat, 18 Mar 2000 20:35:35 GMT
Server: Apache/1.3.9 (Unix)
Last-Modified: Wed, 20 May 1998 14:59:42 GMT
Content-Length: 2000
Content-Type: text/html

<HTML><HEAD> </HEAD> <BODY>
…
</BODY> </HTML>
```

Status Line

Header

Message Body -Actual Data

Http methods

Get

- Get is the default method
- The GET method means retrieve whatever information
- (in the form of an entity) is identified by the Request-URI
- Get Method is Idempotent
- Get method carry only 266 characters at a time

Post

- In post method Data is not Visible
- You can send huge amount of data through post method

Websites and Web Applications

A web site is a collection of static HTML pages.

A web application is a web site with dynamic

functionality on the server (or sometimes on the client using applets or other interactive elements).

Web applications use HTML forms as the user interface to code that is running on the server:

Data is passed from the HTML form to the server using the CGI.

The CGI data is sent in the HTTP request stream.

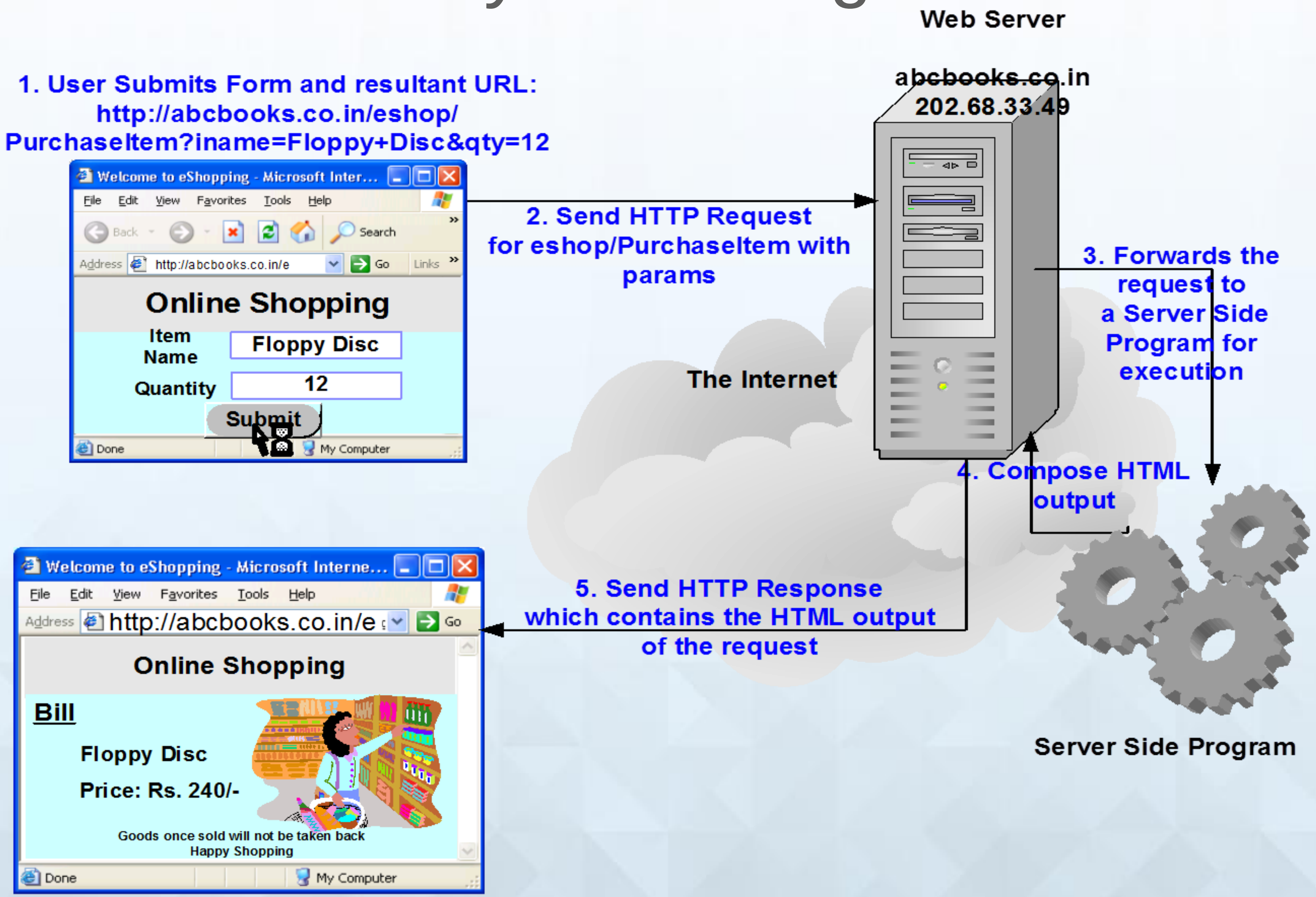
Static Page Vs Dynamic Page

From the web, we get static pages as well as dynamic pages

Static Page	Dynamic Page
Can be created and stored in web server **in advance** as **HTML** file.	Can **NOT** be created and stored in web server **in advance** as **HTML** file.
Static page does not change with user and/or time.	Dynamic page changes as per the user and/or time.
For delivery of static page, all we require at server side, HTML files in Web Server.	**For delivery of dynamic page, apart from Web Server, we require program to generate dynamic content.**

The software component that runs the server side program to generate the dynamic content is known as the Web Container

Generation of Dynamic Pages



1. User Submits Form and resultant URL: http://abcbooks.co.in/eshop/PurchaseItem?iname=Floppy+Disc&qty=12

Welcome to eShopping - Microsoft Inter...

Address: http://abcbooks.co.in/e

Online Shopping

Item Name: Floppy Disc

Quantity: 12

Submit

2. Send HTTP Request for eshop/PurchaseItem with params

Web Server

abcbooks.co.in
202.68.33.49

The Internet

3. Forwards the request to a Server Side Program for execution

4. Compose HTML output

Server Side Program

5. Send HTTP Response which contains the HTML output of the request

Welcome to eShopping - Microsoft Interne...

Address: http://abcbooks.co.in/e

Online Shopping

Bill

Floppy Disc

Price: Rs. 240/-

Goods once sold will not be taken back
Happy Shopping

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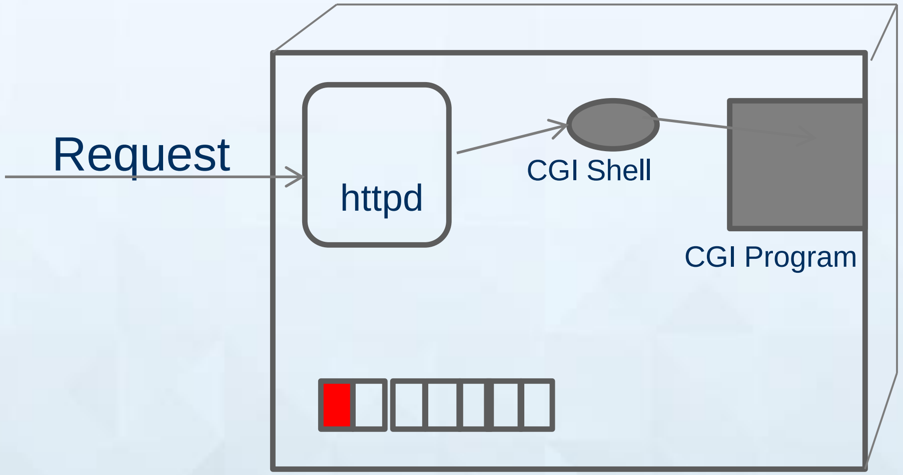
server

J2ee Server - classification

- Webserver
- Application server

Resource Utilization of CGI

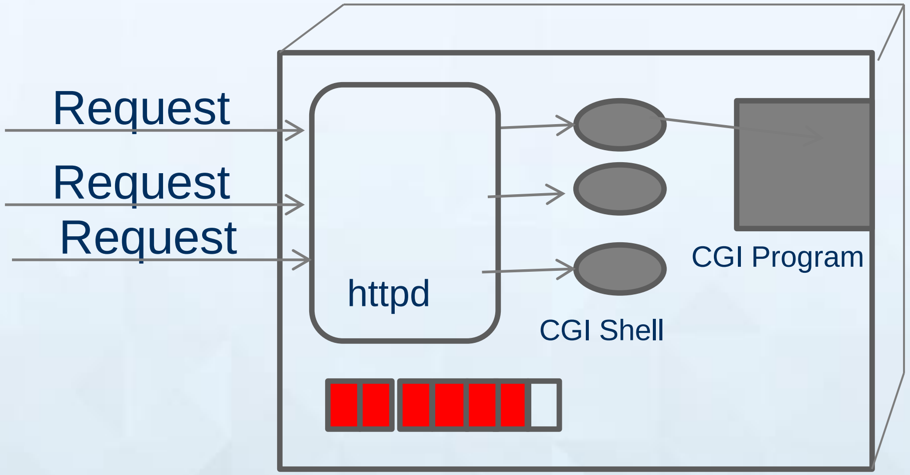
CGI Program in Server



For each request CGI program will create one processes shell.

Resource Utilization of CGI

CGI Program in Server



Each request from user
will create a process

Advantages and Disadvantages of CGI

CGI program advantages:

Written in a variety of languages

Relatively easy for a web designer to reference

CGI program disadvantages:

Each shell is heavyweight

Not scalable

CGI processing code (business logic) is mingled with HTML (presentation logic)

Language is not always secure or object-oriented

Language is not always platform independent

SERVLETS

Java Servlets

A servlet is a Java technology component that executes on the server. Servlets perform tasks similar to those performed by CGI programs, but servlets execute in a different environment.

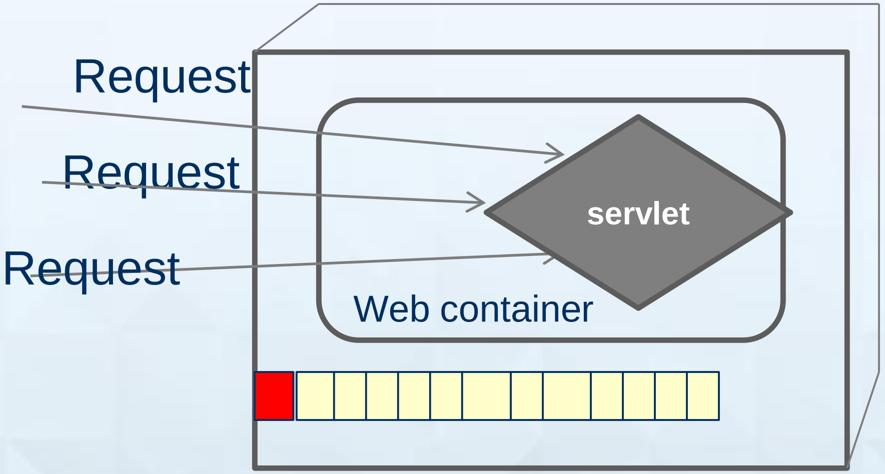
Servlets perform the following:

- Process the HTTP request
- Generate the HTTP response dynamically
- A web container is a special Java™ Virtual Machine (JVM™) that is responsible for maintaining the life cycle of the servlets, as well as issuing threads for each request.

Resource Utilization of Servlet

Each Request from the user will create a thread in Servlet

Thread is light weight but process is heavy weight



Advantages and Disadvantages of Servlets

Java servlet advantages:

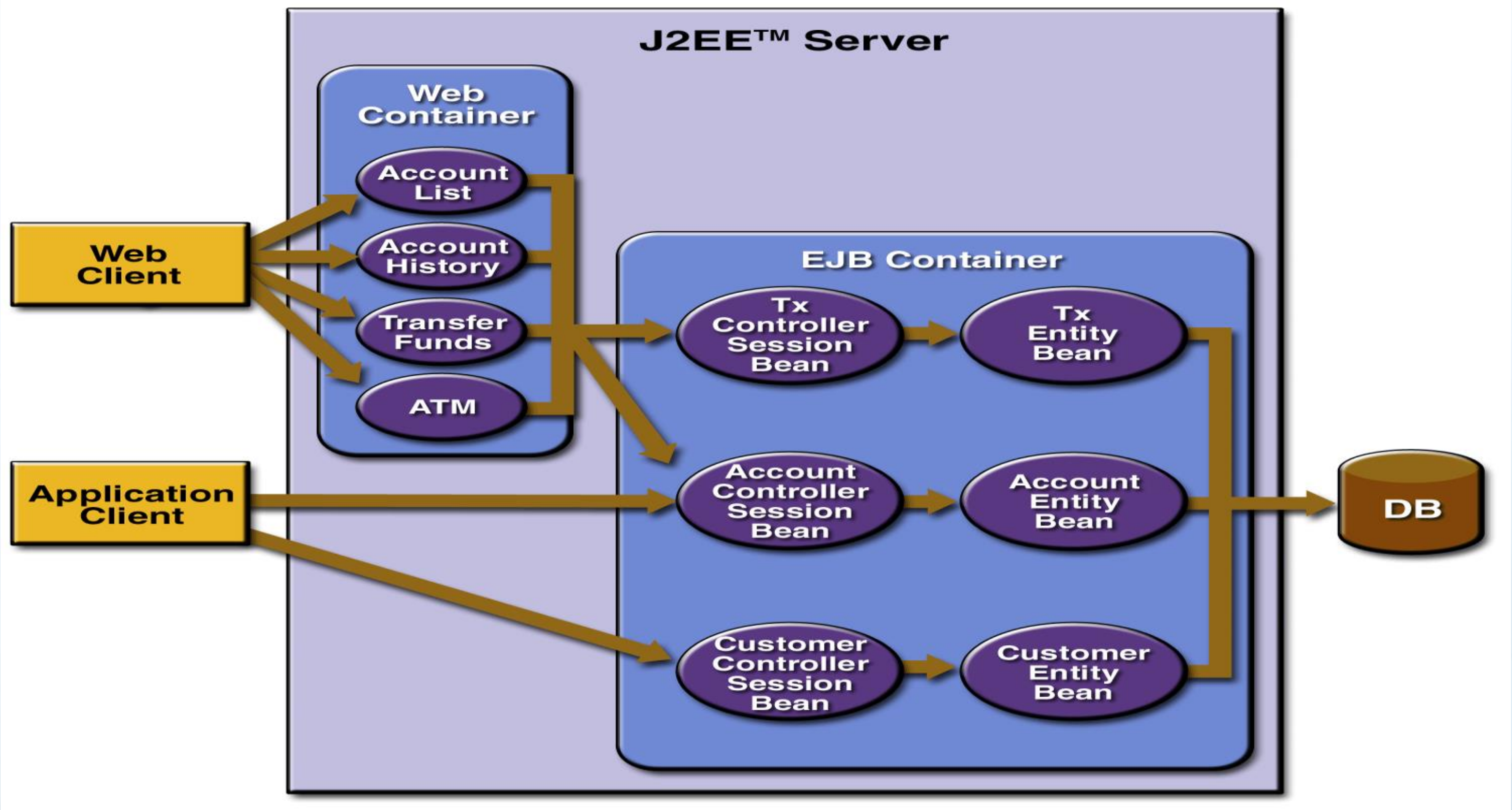
- Performance (threads are faster than processes)
- Scalable
- The Java programming language is robust and object-oriented
- The Java programming language is platform Independent

Java servlet disadvantages:

- Separation of concerns: business and presentation logic
- Concurrency issues

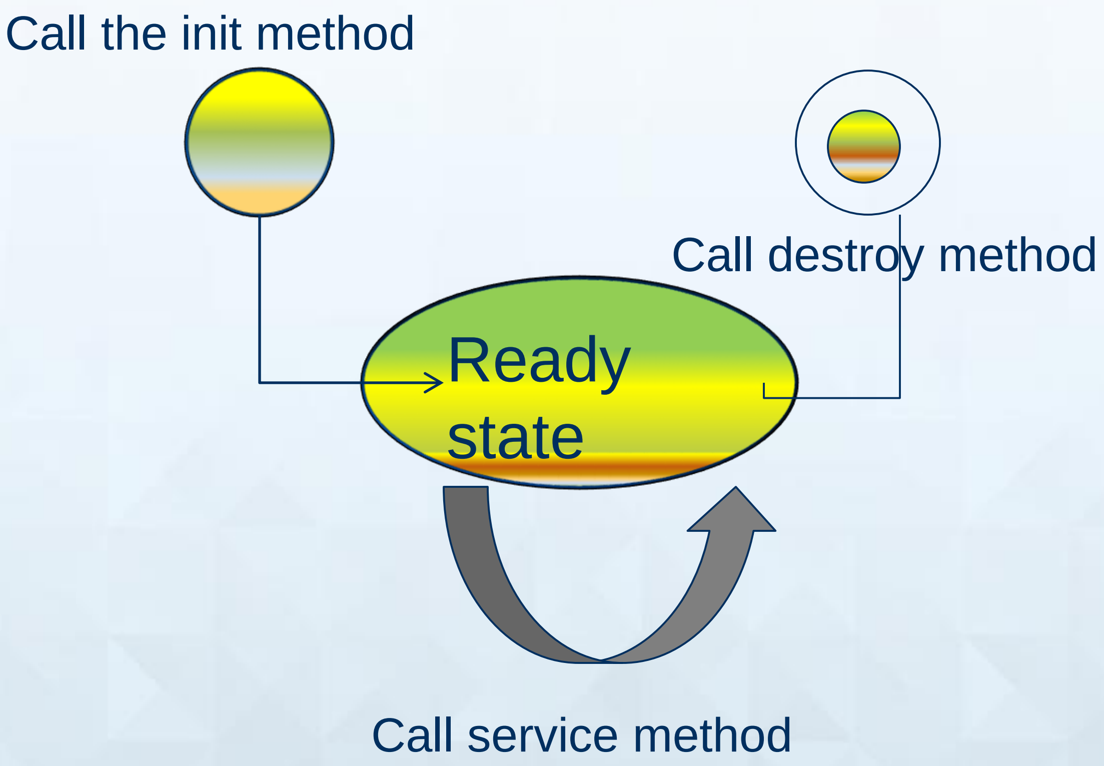
J2EE Architecture

J2EE Architecture Contains Container, Component and services



Servlet Life Cycle

1. Load servlet class.
2. Create servlet instance.
3. Call the init method.
4. Call the service method.
5. Call the destroy method.



Servlet Package

javax.servlet package:

javax.servlet.Servlet
javax.servlet.ServletRequest
javax.servlet.ServletResponse
javax.servlet.ServletConfig
javax.servlet.ServletContext

javax.servlet.http package:

javax.servlet.Servlet.http.HttpServlet
javax.servlet.Servlet.http.HttpServletRequest
javax.servlet.Servlet.http.HttpServletResponse

Request and Response

HttpServeltRequest

request.getParameter()

request,getParamaters()

request.getparameterNames()

HttpServletResponse

response.setContentType()

response.getWriter()

Simple servlet

```
import javax.servlet.http.HttpServlet;
 import javax.servlet.http.HttpServletRequest;
 import javax.servlet.http.HttpServletResponse;
 import java.io.IOException;
 import java.io.PrintWriter;

 public class SimpleServlet extends HttpServlet
 {
                     public void doGet(HttpServletRequest request, HttpServletResponse response) throws
                    IOException
                    {
                                        response.setContentType(“text/html”);
                                        PrintWriter out = response.getWriter();
                                        out.println(“<html>”);
                                        out.println(“<head>”);
                                        out.println(“<p>”);
                                        out.println(“Welcome to First Servlet Session “);
                                        out.println(“</p>”);
                                        out.println(“</body>”);
                                         out.println(“</html>”);


                    }

}
```

Simple servlet

- HttpServlet
  - Current Time example with HttpServlet
  - A Hello <UserName> example with HttpServlet

HelloUserHttpServlet.java

helloUserHttpServletForm

Quiz

Quiz

1) Which of the following denote the type of servlet?

   a) GenericServle

   a) HttpServlet

   a) Both of the Above

   a) None of the Above

Quiz

2) Choose the false statement among these?

a) Servlets have GUI interface

b) Servlets are server side components

c) Applets have GUI interface

Quiz

3) CGI Is safer than Servlet

a) True

a) False

4) Creation and destroy of objects in servlet will be taken care by

a) Servlet
b) Html
c) Xml
d) Container

Quiz

5) Get method is safer than post

   a) True

   b) False

6) In which method the data will be carried in the first line of the request object

   a) post

   b) Put

   c) Get

   d) Trace

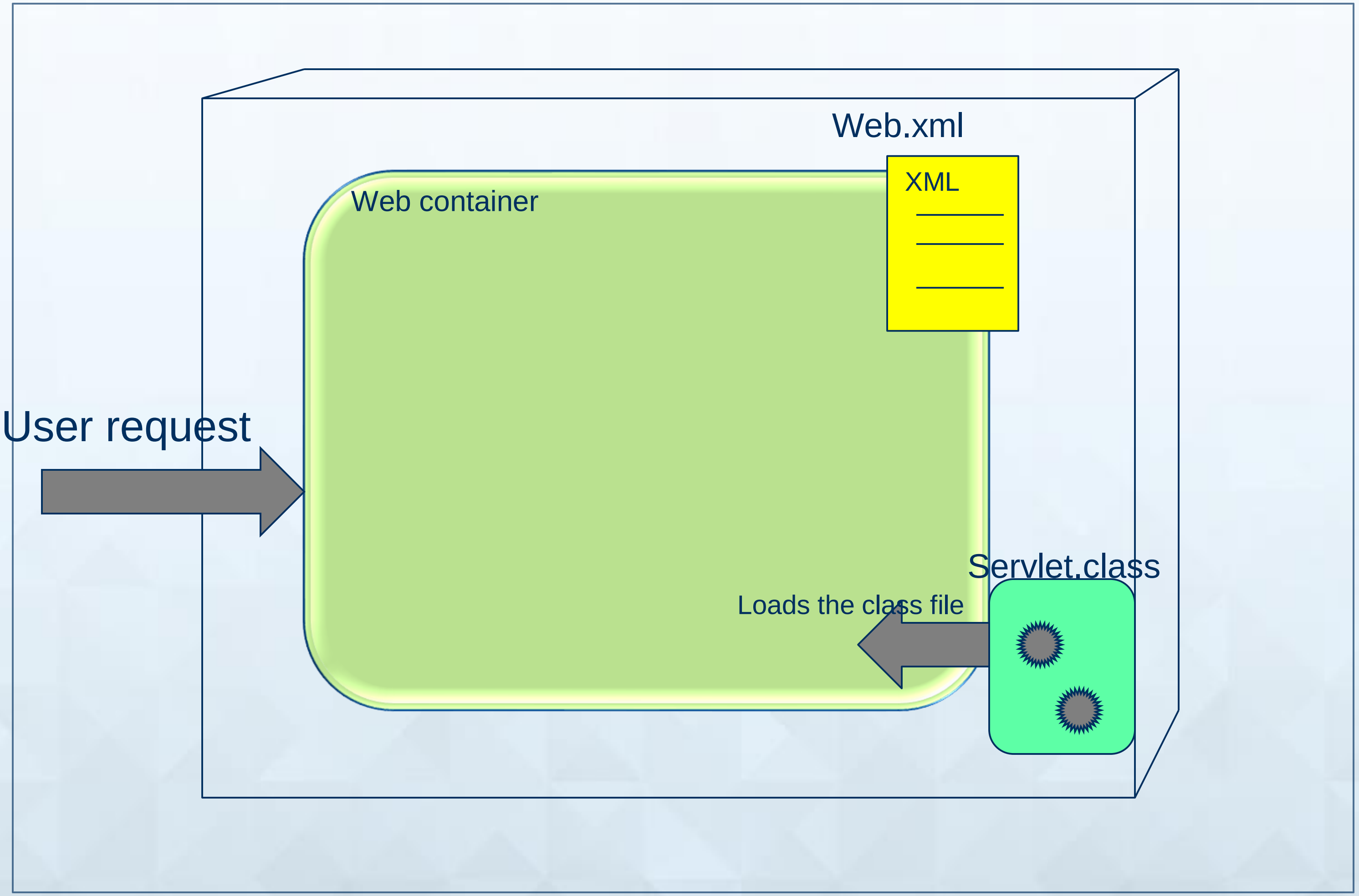
Life Cycle of Servlet

- User Request Reaches the servlet
- Server will check the location of the file through web.xml
- Server Load the required class file in to the container
- Container call the Init()
- Instance for the class will be created
- Multiple User requests will be carried by multiple service methods to same instance
- Destroy will be called by container

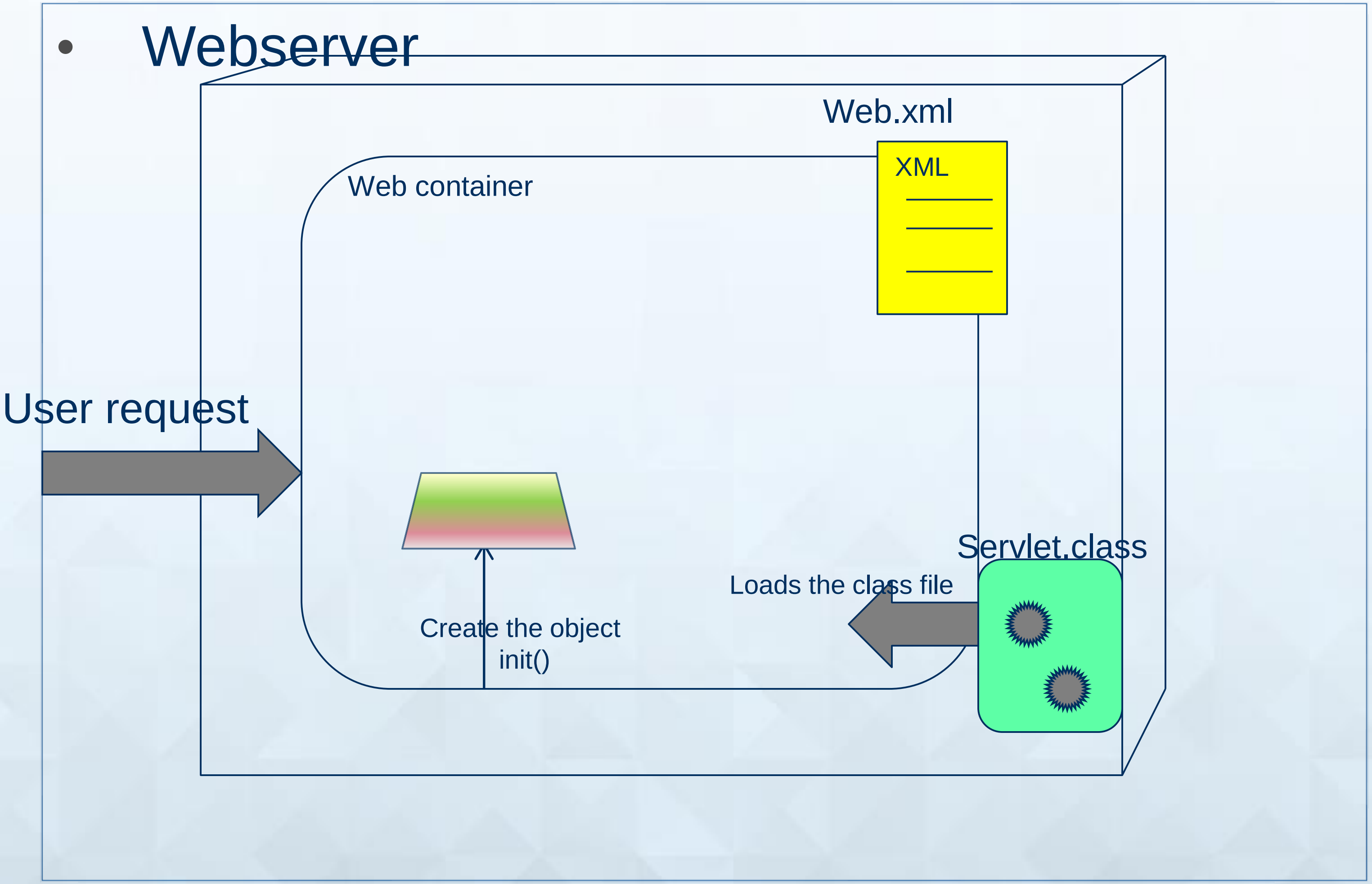
Deployment Descriptor – web.xml File

```
<web-app>

 <servlet>
 <servlet-name>abc</servlet-name>
<servlet-class>pack.com.SimpleServ</servlet-class> </servlet>

<servlet-mapping>
<servlet-name> abc</servlet-name>
<url-pattern>  /*</url-pattern>
 </servlet-mapping>

 </web-app>
```

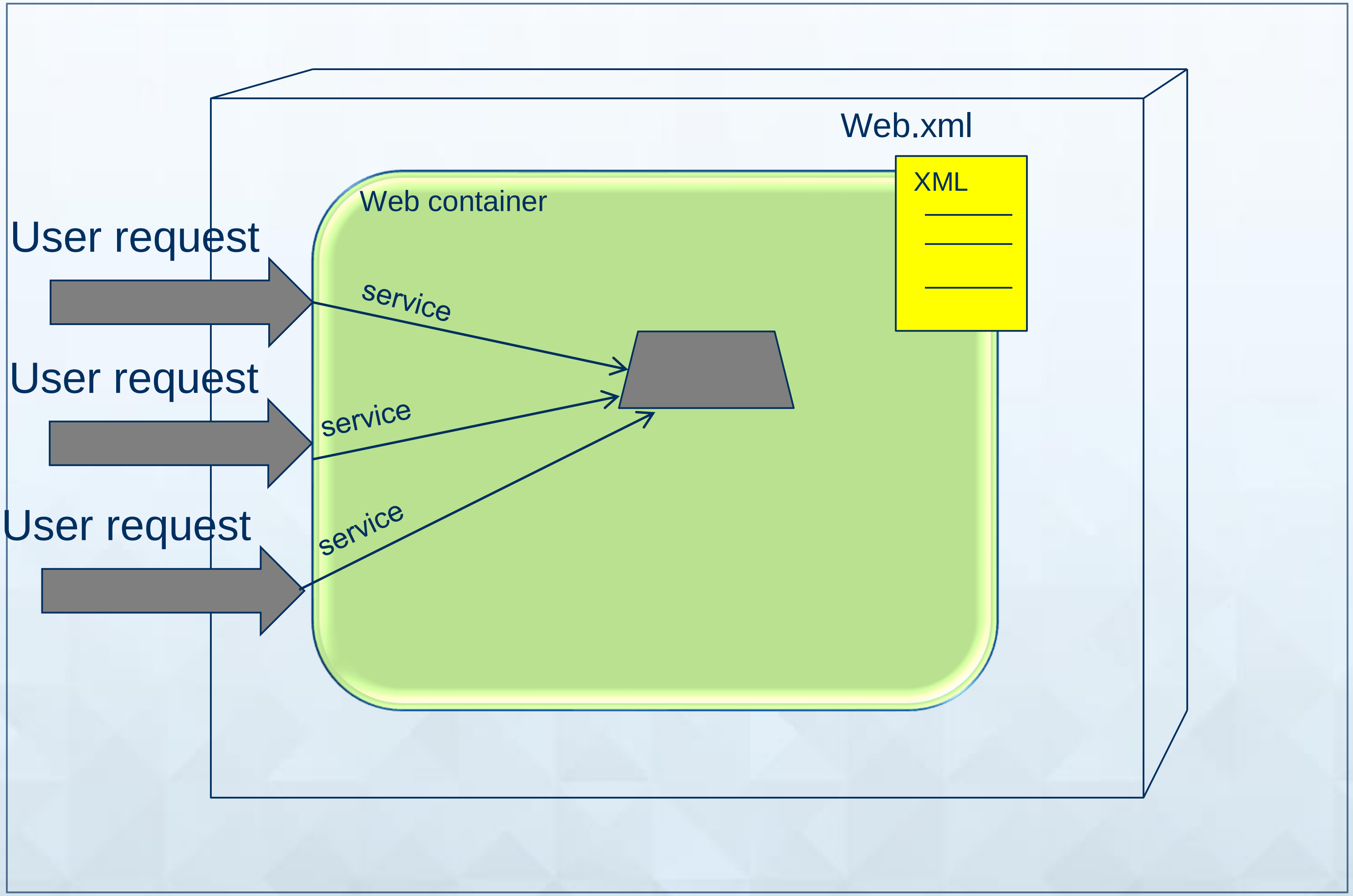
Life Cycle of Servlet



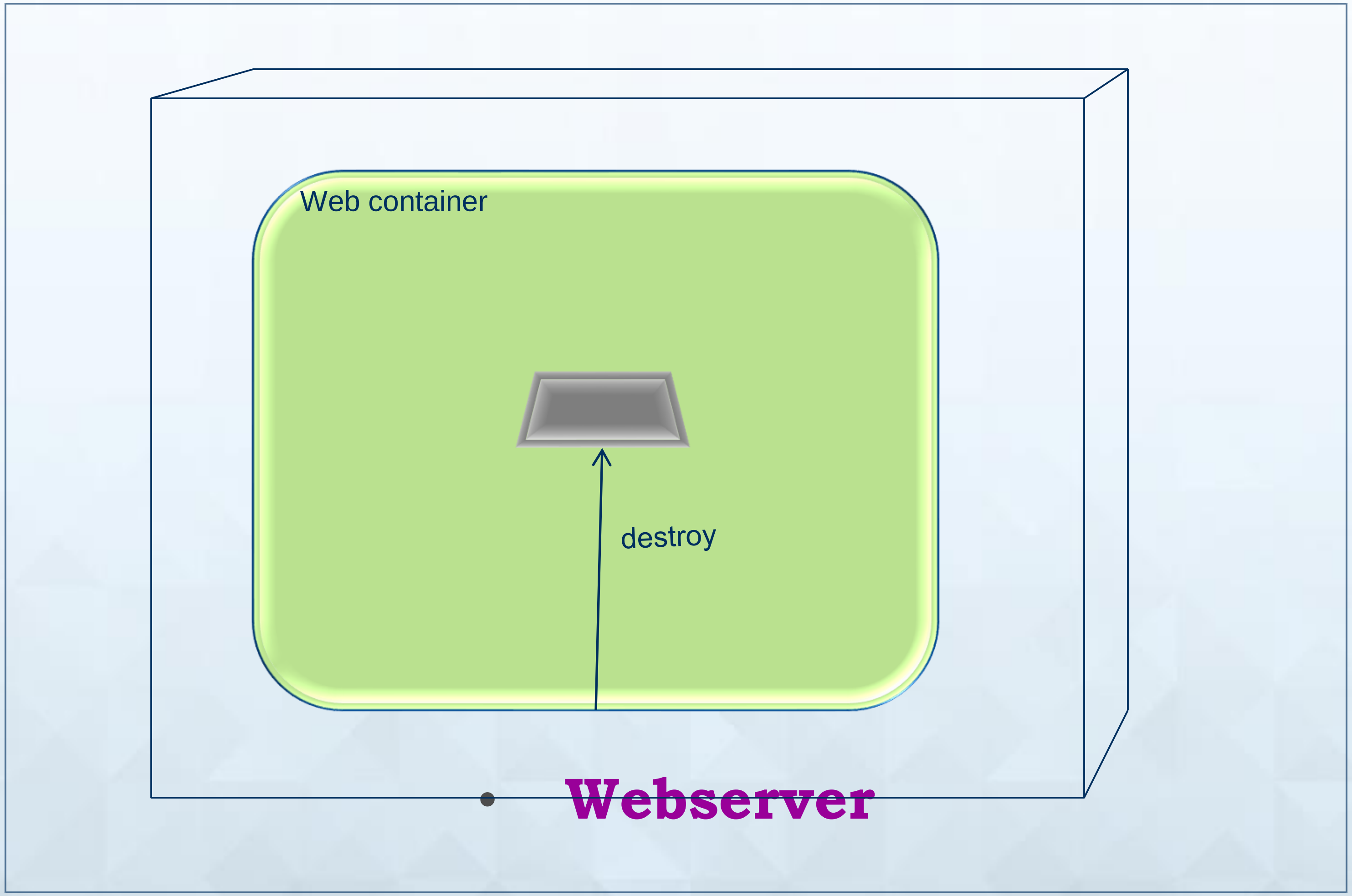
Life Cycle of Servlet



Life Cycle of Servlet

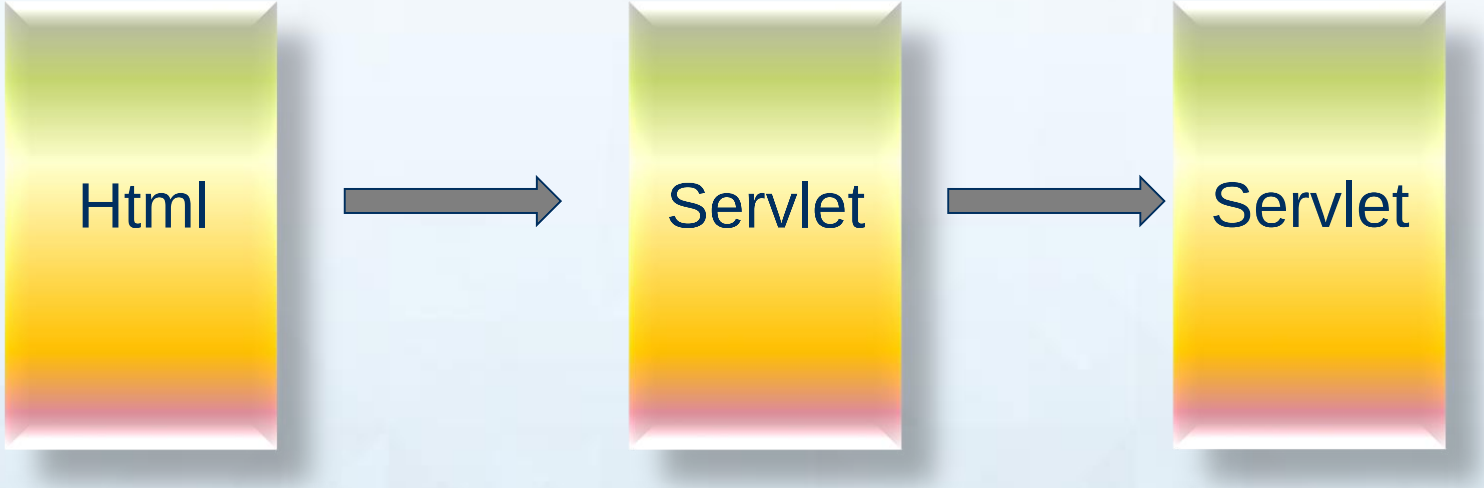


Life Cycle of Servlet



Request Dispatching

Request Dispatching



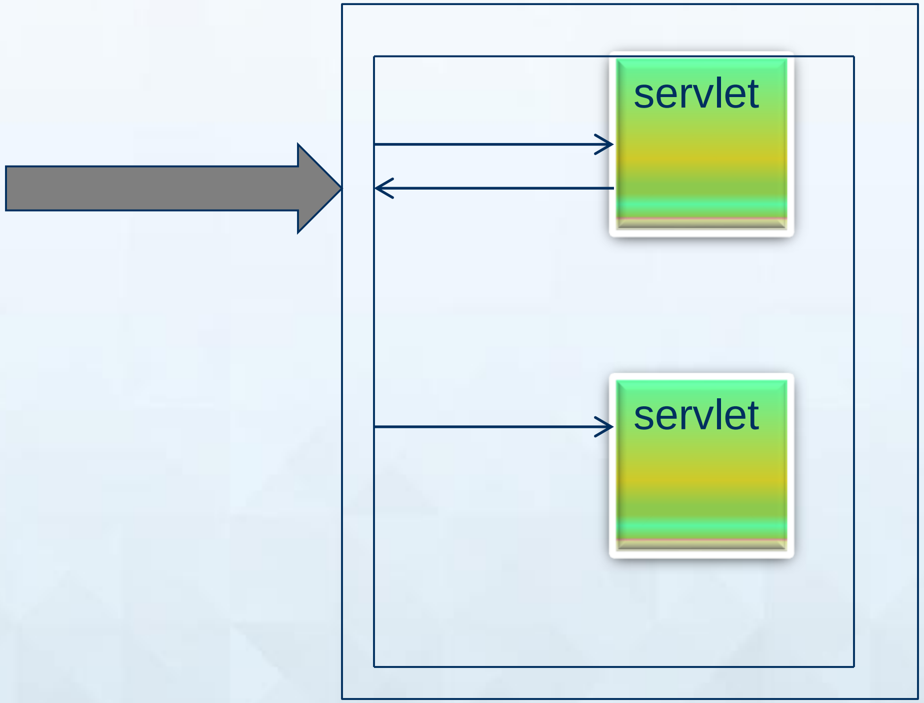
Control moved from one servlet to another servlet

Send Redirecting

Send Redirect

User request reaches the servlet
When it needs to move the control to next servlet

It move back to the container and fresh request reaches the next servlet



QUIZ

Quiz

1) Service Method will be called only once in the life cycle of the servlet

   a) True

   b) False

1) Jdbc Service was provided by container to component

   a) True

   b) False

Quiz

3) Security service was provided by component to container

   a) False

   b) True

4) Send Redirect method was provided by Request object

   a) False

   b) True

Quiz

5) Which of the following is correct about ServletResponse:

a) Used to generate and send response to browser
b) Provides information about the request
c) Provides initialization parameters for a Servlet

6) HTTP Servlets extend

a) javax.servlet
b) javax.servlet.http
c) javax.servlet.http.HttpSerlvet

Quiz

3) What is servlet Chaining?

a) Request of first servlet is passed as an input to second servlet
b) Request of second servlet passed as an input to first servlet
c) Response of first servlet is passed as an input to second servlet
d) Response of second servlet passed as an input to first servlet

Session Tracking

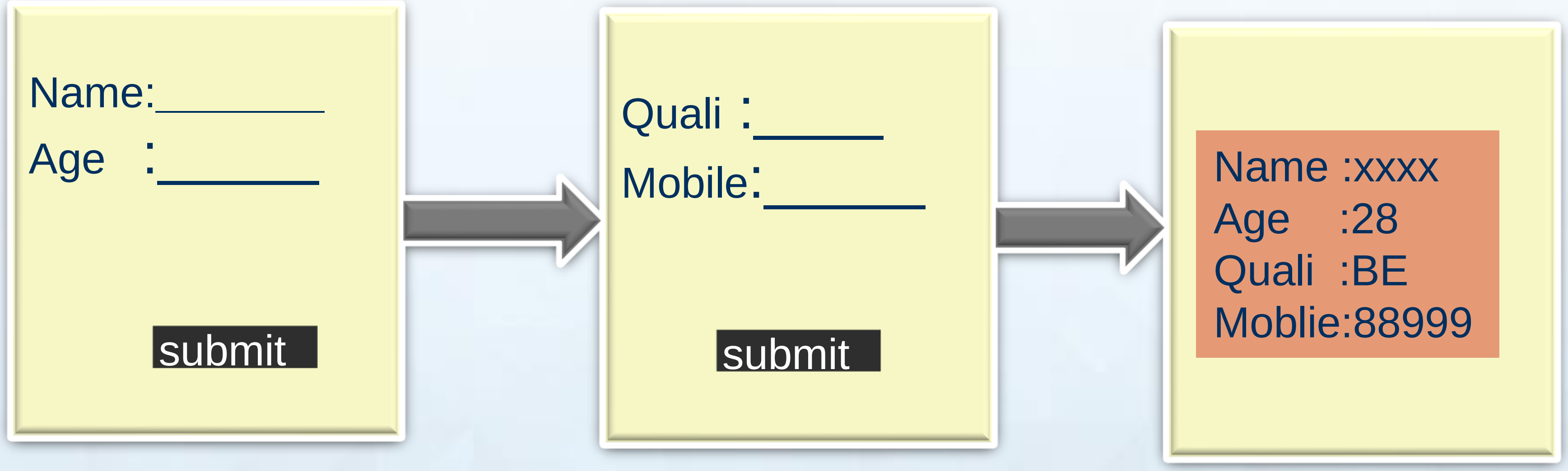
Session Tracking

Session:
A session is a conversation between the server and a client. A conversation consists series of continuous request and response

Why should a session be maintained?
When there is a series of continuous request and response from a same client to a server, the server cannot identify from which client it is getting requests. As the HTTP is a stateless protocol it will not maintain the conversational state ,we are in need of tracking the user for multiple request in one session . The ways we are using to track the sessions are

- Hidden fields
- Session tracking
- Cookies
- Url Rewriting

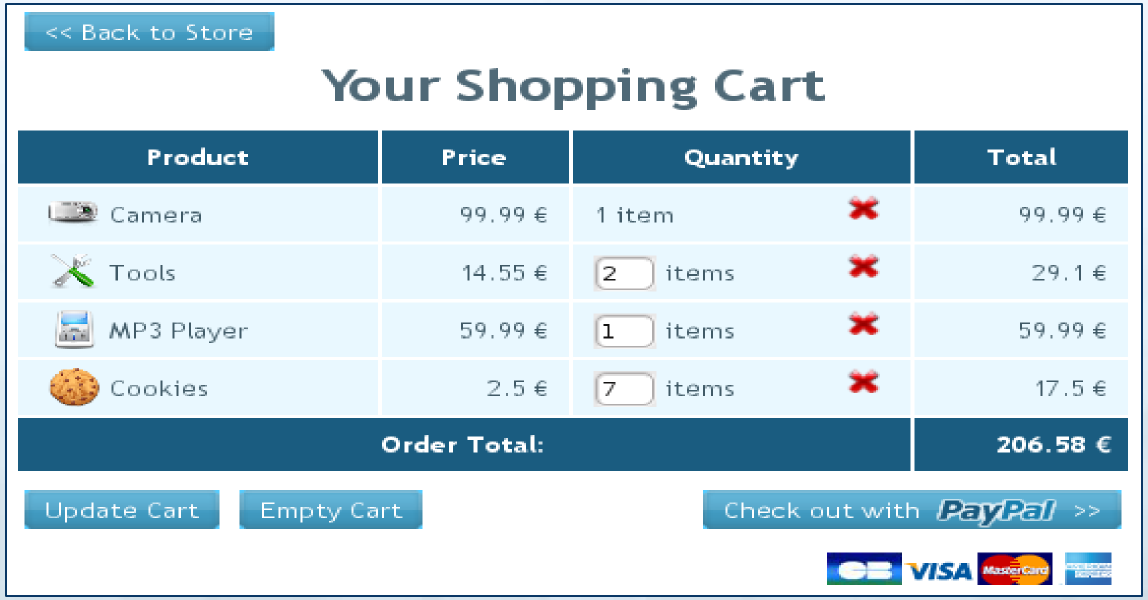
Hidden Fields



Data retrieved from first page will be carried to the third page put it is not visible in the second page

Session Tracking

HTTP is a stateless protocol. Each request and response message connection is independent of all others. Therefore, the web container must create a mechanism to store session information for a particular user.



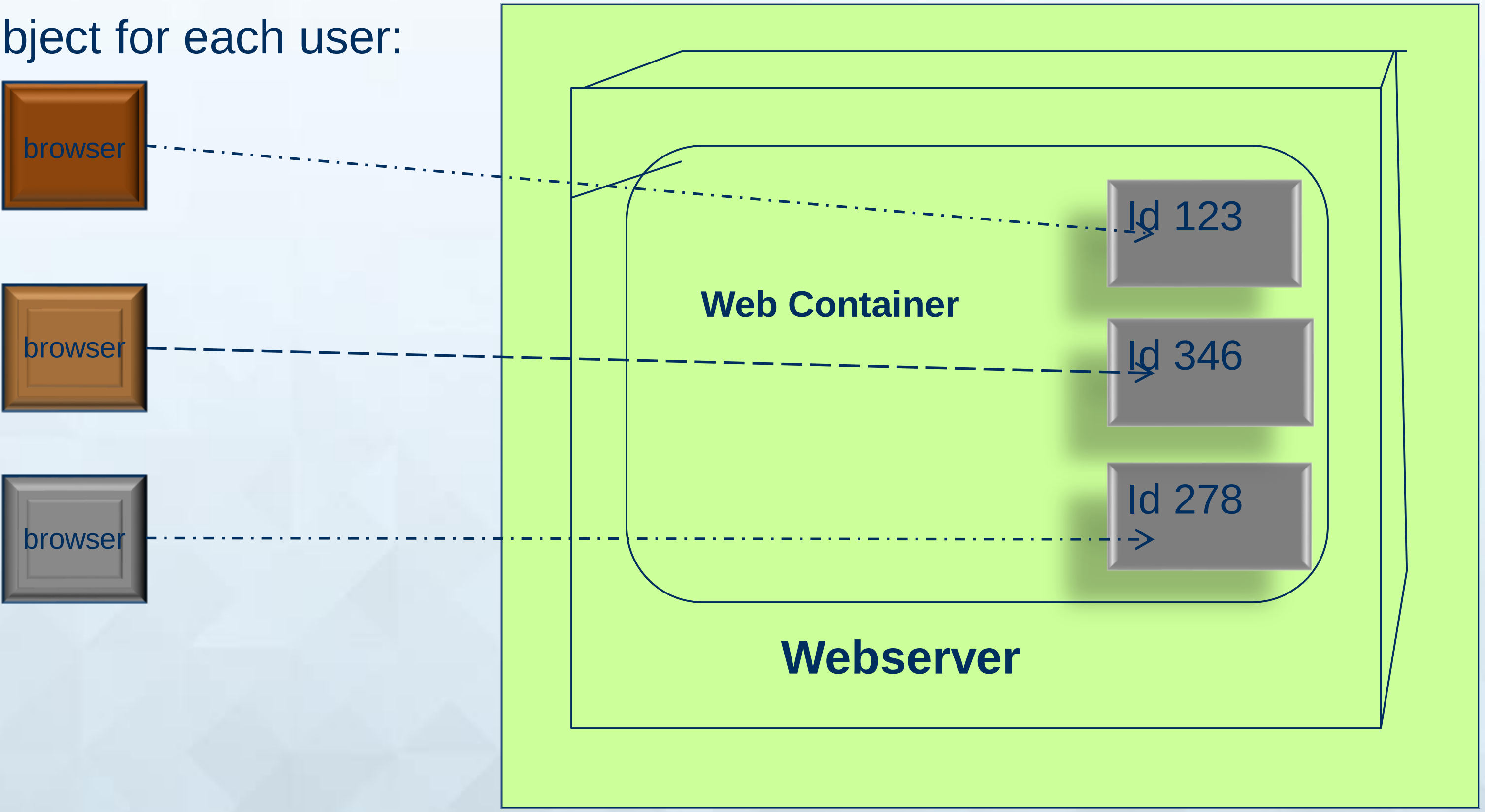
Your Shopping Cart

Product	Price	Quantity		Total
Camera	99.99 €	1 item	✖	99.99 €
Tools	14.55 €	2 items	✖	29.1 €
MP3 Player	59.99 €	1 items	✖	59.99 €
Cookies	2.5 €	7 items	✖	17.5 €
Order Total:				206.58 €

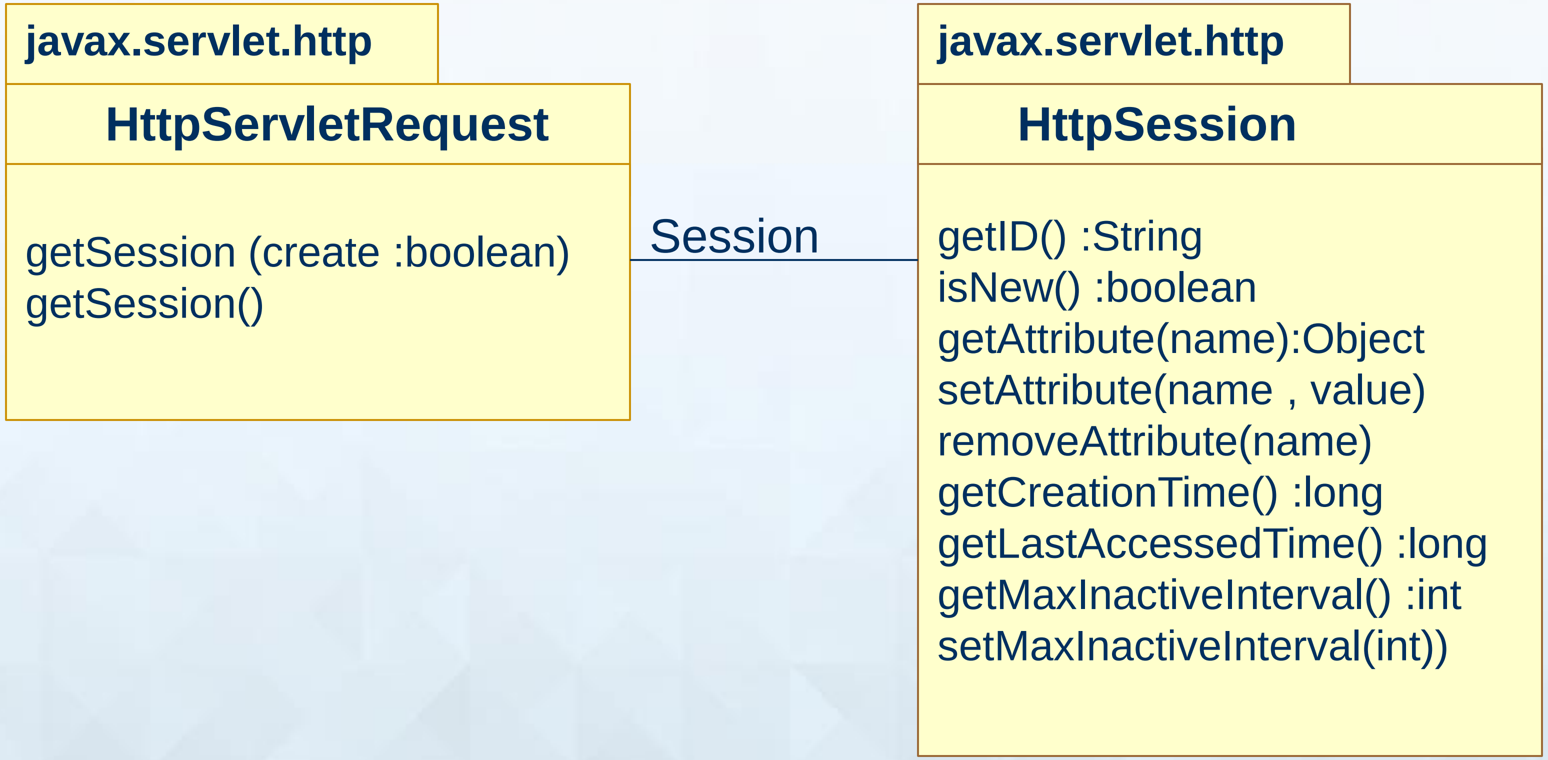
Session Tracking

Web Container Sessions:

The web container create and maintain an individual session object for each user:



Session Api



javax.servlet.http

HttpServletRequest

getSession (create :boolean)
getSession()

Session

javax.servlet.http

HttpSession

getID() :String
isNew() :boolean
getAttribute(name):Object
setAttribute(name , value)
removeAttribute(name)
getCreationTime() :long
getLastAccessedTime() :long
getMaxInactiveInterval() :int
setMaxInactiveInterval(int))

Syntax for session

Setting the value in session Object:

```
HttpSession session=request.getSession();

            session.setAttribute("name",name);

            session.setAttribute("loc",loc);
```

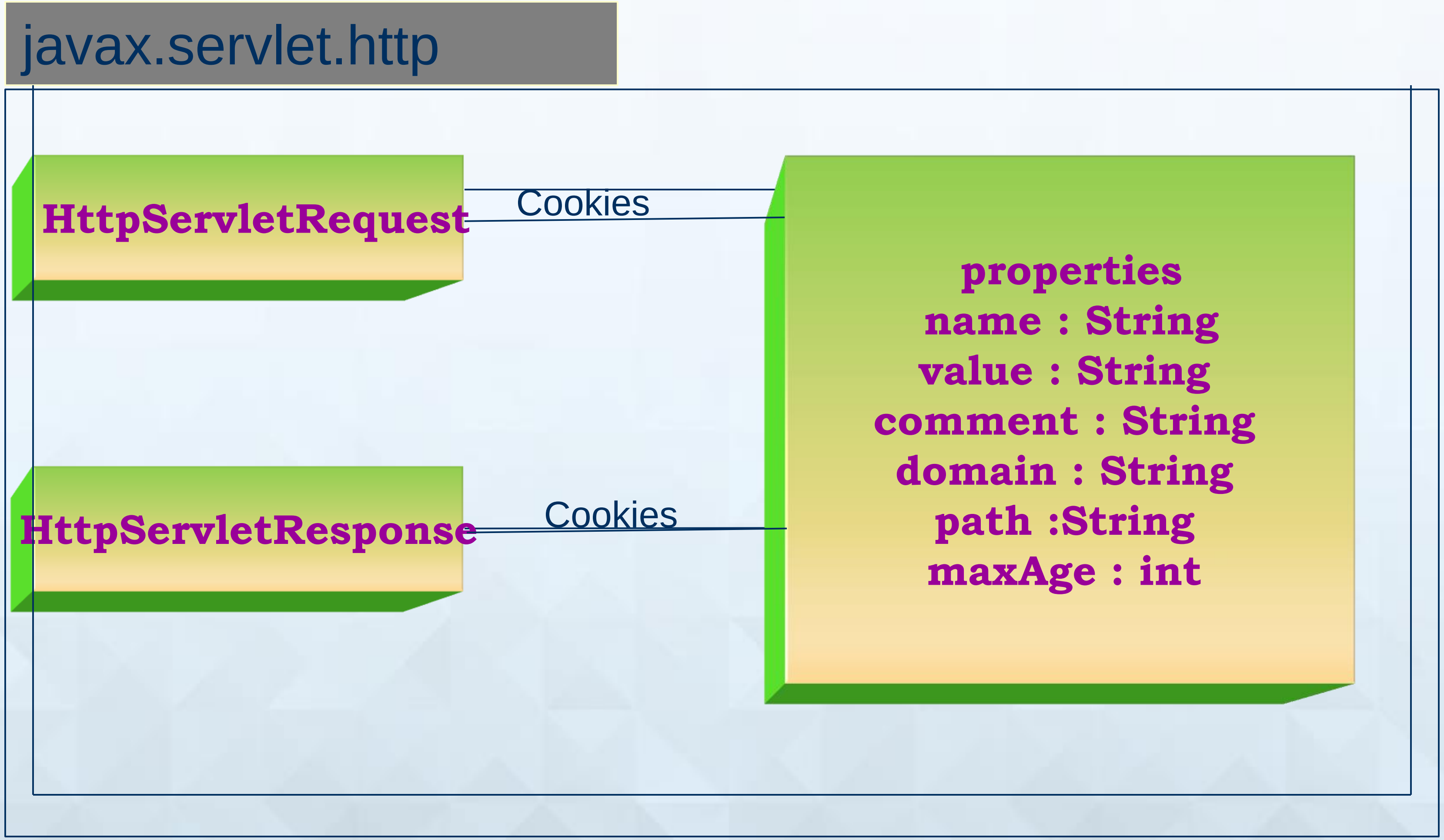
Getting the value in session Object:

```
HttpSession session=request.getSession();

            session.getAttribute("name");

            session.getAttribute("loc”);
```

Cookies

- Cookies are sent in a response from the web server.
- Cookies are stored on the client's computer.
- Cookies are stored in a partition assigned to the web server's domain name. Cookies can be further partitioned by a path within the domain.
- All cookies for that domain (and path) are sent in every request to that web server.
- Cookies have a lifespan and are flushed by the client browser at the end of that lifespan

Cookies Api



javax.servlet.http

HttpServletRequest

Cookies

HttpServletResponse

Cookies

properties
name : String
value : String
comment : String
domain : String
path :String
maxAge : int

Syntax for session Tracking

The code to store a cookie in the response:

```
String name = request.getParameter("firstName");
Cookie c = new Cookie("yourname", name);
response.addCookie(c);
```

The code to retrieve a cookie from the request:

```
Cookie[] allCookies = request.getCookies();
for ( int i=0; i < allCookies.length; i++ ) {
if ( allCookies[i].getName().equals(“yourname”) ) {
name = allCookies[i].getValue();
}
}
```

Cookies

Performing Session Management Using Cookies:

- The Cookie mechanism is the default session management strategy.

- There is nothing special that you code in your servlets to use this session strategy.

- Unfortunately, some users turn off cookies on their Browsers

- Then we suppose to turn to URL ReWriting

UrlRewriting

Using URL-Rewriting for Session Management :

- URL-rewriting is used when Cookies cannot be used.

- The server appends extra data on the end of each URL.

- The server associates that identifier with data it has stored about that session.

- With this URL: http://host/path/file;jsessionid=123 session information is jsessionid=123.

UrlRewriting

- Every HTML page that participates in a session (using URL-rewriting) must include the session ID in all URLs in those pages. This requires dynamic generation.
- Use the encodeURL method on the response object to guarantee that the URLs include the session ID information.

Syntax

```
out.println(“<form action=‘ “+ response.encodeURL(“sample.do”)
 + “‘ method=’POST’>”);
```

QUIZ

Quiz

1) What are the various ways of session tracking in a servlet?
2) In which are the objects getAttribute() and setAttribute() are available
3) Session can be turned off after particular seconds of Idle stage of the user through xml file ?
4) Which is the default Session Tracking mechanism
5) Hidden Fields is the Session Tracking mechanism which is mostly used as default mechanism
6) Cookies can be manually turned off in the client system
7) Statement: Cookies are getting the session id from its own system.-Explain

Summary

- Use cases that must share data across multiple HTTP requests require session management.

- The web container supplies a session management mechanism because HTTP is a stateless protocol.

- A web application can store and retrieve session-scoped data in the HttpSession object which is retrieved from the request object.

- The default session management mechanism uses HTTP cookies.

- Web containers must also support URL-rewriting for session management when the client has cookies turned off.

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