

# Essentials of Information Technology

PC-CS-305

## Session Management

### Topic & Structure of the lesson



- Http Session
- How Session Works
- How Container know Who Client Is
- Ways of Getting Session
- URL Rewriting
- HttpSession Methods
- Ways Session Times Out
- Cookie

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## Topic & Structure of the lesson



- Servlet Creating & Setting Cookie
- Servlet Getting the Cookie
- Key MileStones of HttpSession
- Session Migration

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## Http Session



- HttpSession object hold the conversational state across multiple requests from the same client.
- HttpSession persist for an entire session with a specific client.

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## How Session Works



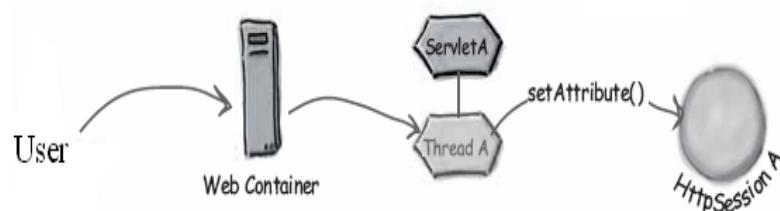
User select an option “Dark” and hit the submit button.

The container sends the request to a new thread of the servlet.

The thread finds the session associated with user and store his choice “Dark” in the session as an attribute.

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## How Session Works



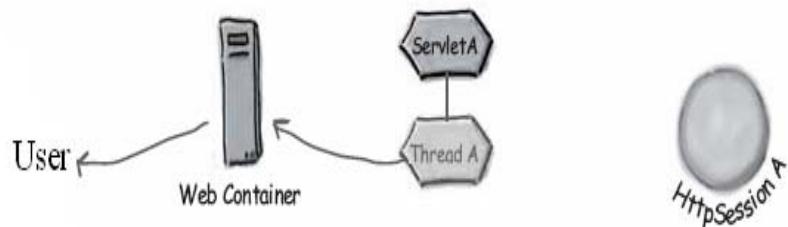
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## How Session Works



The servlet runs its business logic (including calls to the model) and returns a response .... In this case another question “ What’s price range ?”



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## How Session Works



User considers the new question on the page.  
Select “Expensive” and hits the submit button.

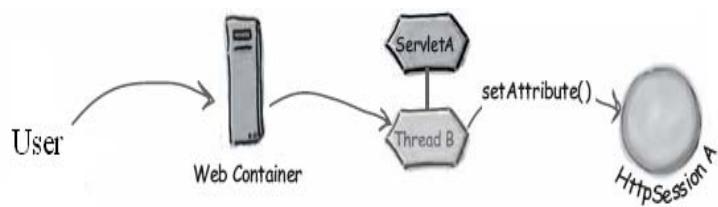
The container sends the request to a new thread of the BeerApp servlet.

The BeerApp thread finds the session associated with user and stores his new choice (“Expensive”) in the session as an attribute.

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## How Session Works

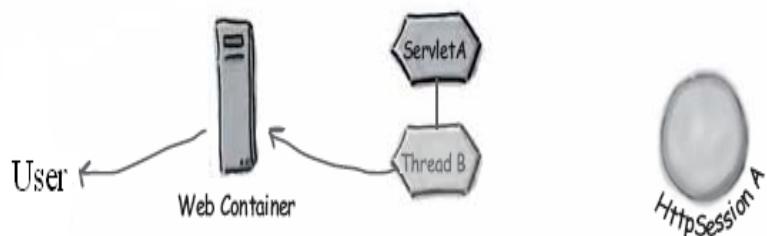


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## How Session Works



The servlet runs its business logic (including calls to the model) and returns a response, in this case another question.



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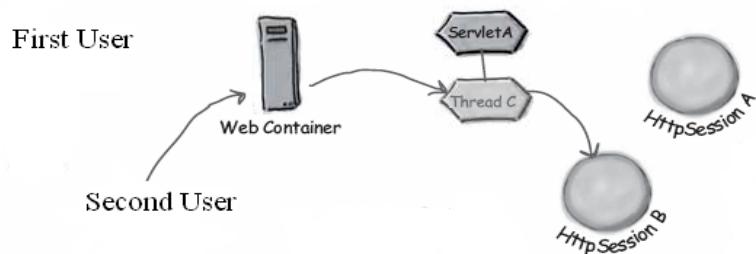
## How Session Works



- First user session is still active, but meanwhile second user select “Pale” and hits the submit button.
- The container sends the second user request to a new thread of the BeerApp servlet.
- The BeerApp thread starts a new session for second user and call setAttribute() to store his choice (“Pale”).

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## How Session Works



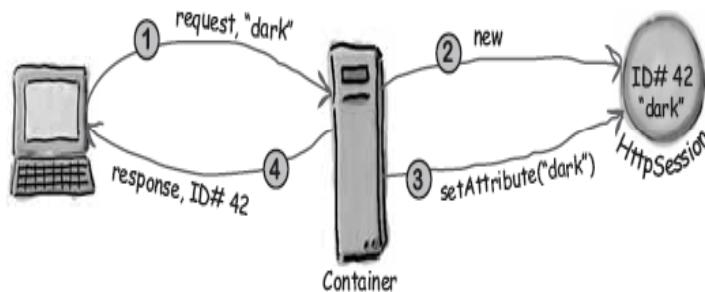
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## How Container know Who Client Is



- On the client first request the container generate a unique session ID and gives back to the client with the response.

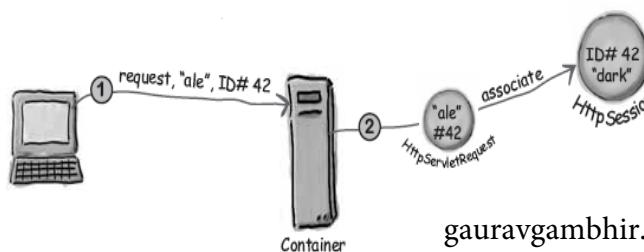


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## How Container know Who Client Is



- The client sends back the session ID with each subsequent request
- The container sees the session ID find the matching session and associate the session with the request.



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## How Client & Container Exchange Session ID



- Container has to get the session id to the client as a part of the response and client has to send back the session id as part of request.
- The simplest way to exchange the info is through cookies.

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## HTTP Response



HTTP/1.1 200 OK  
Set-Cookie: JSESSIONID=0AAB6C8DE415  
Content-type: text/html  
Content-length:397  
Date: Wed 19, Nov 2003 03:25:40 GMT  
Server:Apache-Coyote/1.1  
Connection: Close  
<html>  
</html>

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## HTTP Request



```
POST /select/selectBeerTaste2.do HTTP/1.1
Host: www.wickedlysmart.com
User-Agent: Mozilla/5.0
Cookie: JSESSIONID=0AAB6C8DE415
Accept: text/xml, application/xml, image/jpeg
Accept-Language: en-us
Accept-Encoding: gzip, deflate
```

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## Note



- Container is responsible for generating the session ID, creating a new cookie object, stuffing the session id into the cookie and setting the cookie as a part of response.

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## Remember



Sending the session cookie in the response

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

Getting the session ID from the request

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

Method for getting a session id cookie is the same  
as sending a session id cookie.

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## Question



*How do we know whether the session already exist or  
was just created ?*

session.isNew() returns true if the client has not yet  
responded with this session id.

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## Ways of Getting Session



### 1. From request object

Request is made from a particular client so the session is for the client associated with request.

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

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## Ways of Getting Session



### 2. From session event object

Event handling methods defined by listener interface related to sessions take an argument of type HttpSessionEvent or its subclass

HttpSessionBindingEvent that has got getSession() method.

```
public void sessionCreated(HttpSessionEvent event){  
    HttpSession session=event.getSession();  
}
```

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## Question



What in case if you want an existing session and do not want to create a new session?

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

Passing false means the method returns a pre-existing session or null if there was no session associated with this client.

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## URL Rewriting



- If cookies disabled, URL rewriting takes the session ID in cookie onto end of every URL that comes in to app.
- The extra work that needs to be done here is to encode the URL.



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## URL Rewriting



- Each web page link has a little bit of extra info tracked onto end of the URL.
- When the user clicks that “enhanced” link, the request goes to the container with that extra bit on the end.

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## URL Rewriting



- The container simply strip off the extra part of the request URL and use it to find the matching session .
- The container will first attempt to use cookies for session for session management and fall back to URL rewriting only if the cookies approach fails.

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## URL Rewriting



```
public void doGet(HttpServletRequest request, HttpServletResponse response) throws  
IOException{  
    response.setContentType("text/html");  
    PrintWriter out=response.getWriter();  
    HttpSession session=request.getSession();  
    out.println("<html><body>");  
    out.println("<a href=\""+response.encodeURL("/BeerTest.do")+"\">Click me</a>");  
    out.println("</body></html>");  
}
```

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## Question



**How the container knows that cookies are not working, At what point container decide to use URL rewriting ?**

- Container sees a call to getSession()
- Container didn't get a sessionID with the client's request.
- The container starts a new session with the client.

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## Question (Continued)



- The container doesn't know if cookies will work so with this first response back to client, it tries both cookies and URL rewriting.
- Container sends the response with both a "Set-Cookie" header for the session ID and the session ID appended to the URL,

Client makes a request with session ID appended to request URL but if client accepts cookies the request will also have a session ID cookie.

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## Question (Continued)



Servlet call `request.getSession()` the container read the session ID from the request find the session, now since the container know that the client accepts cookies so it will ignore the `response.encodeURL()`.

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## URL Rewriting



- URL rewriting is automatic but only if you encode your URL.
- Run all your URLs through a method of response object encodeURL() or encodeRedirectURL() and the container does everything else .

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## Question



***How does the container know when its safe to destroy the session ?***

The container checks the state of session and find that no request have come in with that session ID for long time so, it finally destroy the session.

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## HttpSession Methods



	What it does	What you'd use it for
<b>getCreationTime()</b>	Returns the time the session was first created	To find out how old the session is or to restrict certain session to a fixed length of time.
<b>getLastAccessedTime()</b>	Return the last time the container got a request with this session ID.	To find out when a client last accessed this session
<b>setMaxInactiveInterval()</b>	Specifies the maximum time, in seconds that you want to allow between client requests for this session	To cause a session to be destroyed after a certain amount of time has passed without a client making any request for this session.

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## HttpSession Methods



	What it does	What you'd use it for
<b>getMaxInactiveInterval()</b>	Returns the max time in seconds that is allowed between client requests for this session.	To find out how long this session can be inactive and still be alive
<b>invalidate()</b>	Ends the session. This includes unbinding all session attributes currently stored in this session	To kill a session if the client has been inactive or if you know the session is over.

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## Ways Session Can Die



Three ways session can die

- It times out
- You call invalidate() on the session object.
- The application goes down.

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## Ways Session Times Out



Configuring session timeout in the DD

```
<web-app>
    <servlet>
    </servlet>
    <session-config>
        <session-timeout>15</session-timeout>
    </session-config>
</web-app>
```

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## Note



session-timeout value is specified in minutes.

session-timeout value of 0 or less means that the session will never expire

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## Ways Session Times Out



Setting session timeout for a specific session.

```
session.setMaxInactiveInterval(20*60);
```

Note: setMaxInactiveInterval() method accept seconds.

negative value means session will never expire.

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## Cookie



- Cookie is a piece of data exchanged between the client and server.
- The server sends the cookie to the client, and the client returns the cookie when the client makes another request.

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## Cookie



### *Creating a new cookie*

```
Cookie cookie=new Cookie("username",name);
```

### *Setting how long a cookie will live on the client*

```
cookie.setMaxAge(30*60);
```

### *Sending the cookie to the client*

```
response.addCookie(cookie);
```

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## Cookie



Getting the cookie from the client request

```
Cookie[ ] cookies = request.getCookies();
for(int i=0;i<cookies.length;i++){
    Cookie cookie=cookies[i];
    If(cookie.getName().equals("username")){
        String username=cookie.getValue();
        out.println("Hello"+userName);
        break;
    }
}
```

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## Servlet Creating & Setting Cookie



```
import javax.servlet.*;
import javax.servlet.http.*;
import java.io.*;
public class CookieTest extends HttpServlet{
    public void doPost(HttpServletRequest req,HttpServletResponse res)
        throws IOException,ServletException{
        res.setContentType("text/html");
        String name=req.getParameter("username");
        Cookie cookie=new Cookie("username",name);
        cookie.setMaxAge(30*60);
        res.addCookie(cookie);

        RequestDispatcher view=req.getRequestDispatcher("cookieresult.jsp");
        view.forward(req,res);
    }
}
```

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## Servlet Getting the Cookie



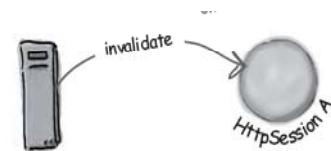
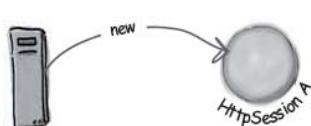
```
import javax.servlet.*;
import javax.servlet.http.*;
import java.io.*;
public class CheckCookie extends HttpServlet{
    public void doPost(HttpServletRequest req,HttpServletResponse res)
        throws IOException,ServletException{
        res.setContentType("text/html");
        PrintWriter out=response.getWriter();
        Cookie[ ] cookies=req.getCookies();
        for(int i=0;i<cookies.length;i++){
            Cookie cookie=cookies[i];
            if(cookie.getName().equals("username")){
                String userName=cookie.getValue();
                out.println("Hello"+userName);
                break;
            }
        }
    }
}
```

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## Key Milestones of HttpSession



The session is created or destroyed



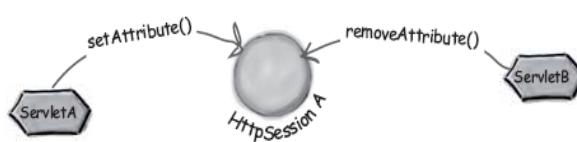
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## Key Milestones of HttpSession



The session attributes are added, removed or replaced

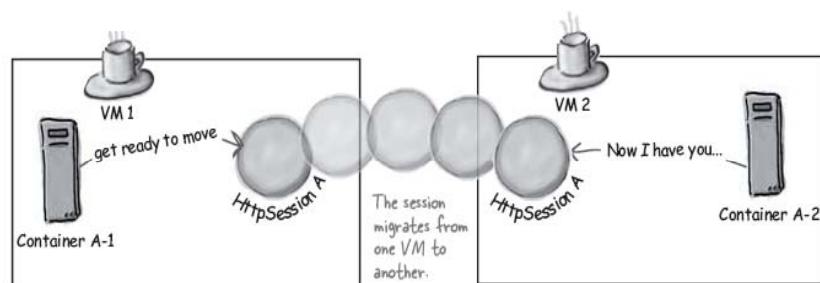


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## Key Milestones of HttpSession



The session is passivated in one VM and activated in another



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## Life Cycle Events



### Milestone

#### *Lifecycle*

##### ***The session was created***

### Event and Listener Type

HttpSessionEvent

When the container first creates a session, at this point the session is still considered new.

##### ***The session was destroyed***

### HttpSessionListener

When the container invalidates a session.

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## Life Cycle Events



### Milestone

#### *Attributes*

### Event and Listener Type

##### ***An Attribute was added***

HttpSessionBindingEvent

When some part of the application call setAttribute() on session.

##### ***The session was removed***

When some part of the application call removeAttribute() on a session.

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## Life Cycle Events



### Milestone

#### *Attributes*

***An Attribute was replaced***

### Event and Listener Type

HttpSessionAttributeListener

When some part of the application call setAttribute() on session.  
and name of the attribute has already been bound to session.

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## Life Cycle Events



### Milestone

#### *Migration*

### Event and Listener Type

***The Session is about to be passivated***

HttpSessionEvent

When the container is about to migrate the session into a different VM. Called before the session moves so that attributes have a chance to prepare themselves for migration

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## Life Cycle Events



**Milestone**

*Migration*

**Event and Listener Type**

HttpSessionActivationListener

When the container has just migrated the session into a different VM. Called before any other part of app can call getAttribute() on the session

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## Examples



<http://localhost:8080/UsingSessionsServlet/UsingSessions>

<http://localhost:8080/SessionAttributes/Session>

<http://localhost:8080/SessionDisplay/SessionDisplay>

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## Question and Answer Session



# Q & A

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