

Developing the Tools Montreal 2004

Thread Safe Web Applications

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Multi-User Access

- Almost all application containers are designed to be multi-threaded
- Typically one thread per client
- Each client is accessing the same instance of a servlet class in the container VM

Thread Safe Code

- Multiple users can access the same code instance, without unknowingly altering the state of another users objects.

Example - Unsafe

```
public class ThreadServlet extends HttpServlet {  
  
    private String firstName;  
    private String lastName;  
    private String address;  
  
    public void service(HttpServletRequest request,  
        HttpServletResponse response) throws IOException,  
        ServletException {  
  
        //Get Form Parameters  
        this.firstName = request.getParameter("firstName");  
        this.lastName = request.getParameter("lastName");  
        this.address = request.getParameter("address");  
  
        PrintWriter out = response.getWriter();  
        generateView(out);  
    }  
}
```

Results of Thread Unsafe Code

1. Joe



ThreadServlet.java

```
this.firstName = "Joe";  
this.lastName = "Developer";  
this.address = "No Where";
```

```
this.firstName = "Jane";  
this.lastName = "Developer";  
this.address = "Some Where";
```

```
generateView(out);
```



Jane Developer
Some Where

2. Jane



ThreadServlet.java

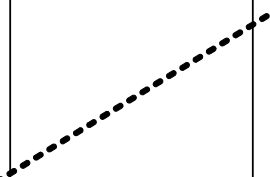
```
this.firstName = "Jane";  
this.lastName = "Developer";  
this.address = "Some Where";
```

```
generateView(out);
```



Jane Developer
Some Where

=



Determining If You Might Have A Thread Problem

- Do you use member variables in your servlets?
- Do you use the `<%! %>` tag in your JSPs?
- Does your code modify objects stored in the application (ServletContext)?
- Does your code modify objects stored in the session?
- Are you using any 3rd party libraries that might not be thread safe?

Example - Safe

```
public class ThreadServlet extends HttpServlet {  
  
    public void service(HttpServletRequest request,  
        HttpServletResponse response) throws IOException,  
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        private String firstName;  
        private String lastName;  
        private String address;  
  
        //Get Form Parameters  
        this.firstName = request.getParameter("firstName");  
        this.lastName = request.getParameter("lastName");  
        this.address = request.getParameter("address");  
  
        PrintWriter out = response.getWriter();  
        generateView(out);  
    }  
}
```

Synchronization

- Allows you to put locks on objects / method so that only one thread can access it at any one time
- Can declare a method to be **synchronized**
- Can declare a JSP to be synchronized using `<%@ page isThreadSafe="false"%>`