



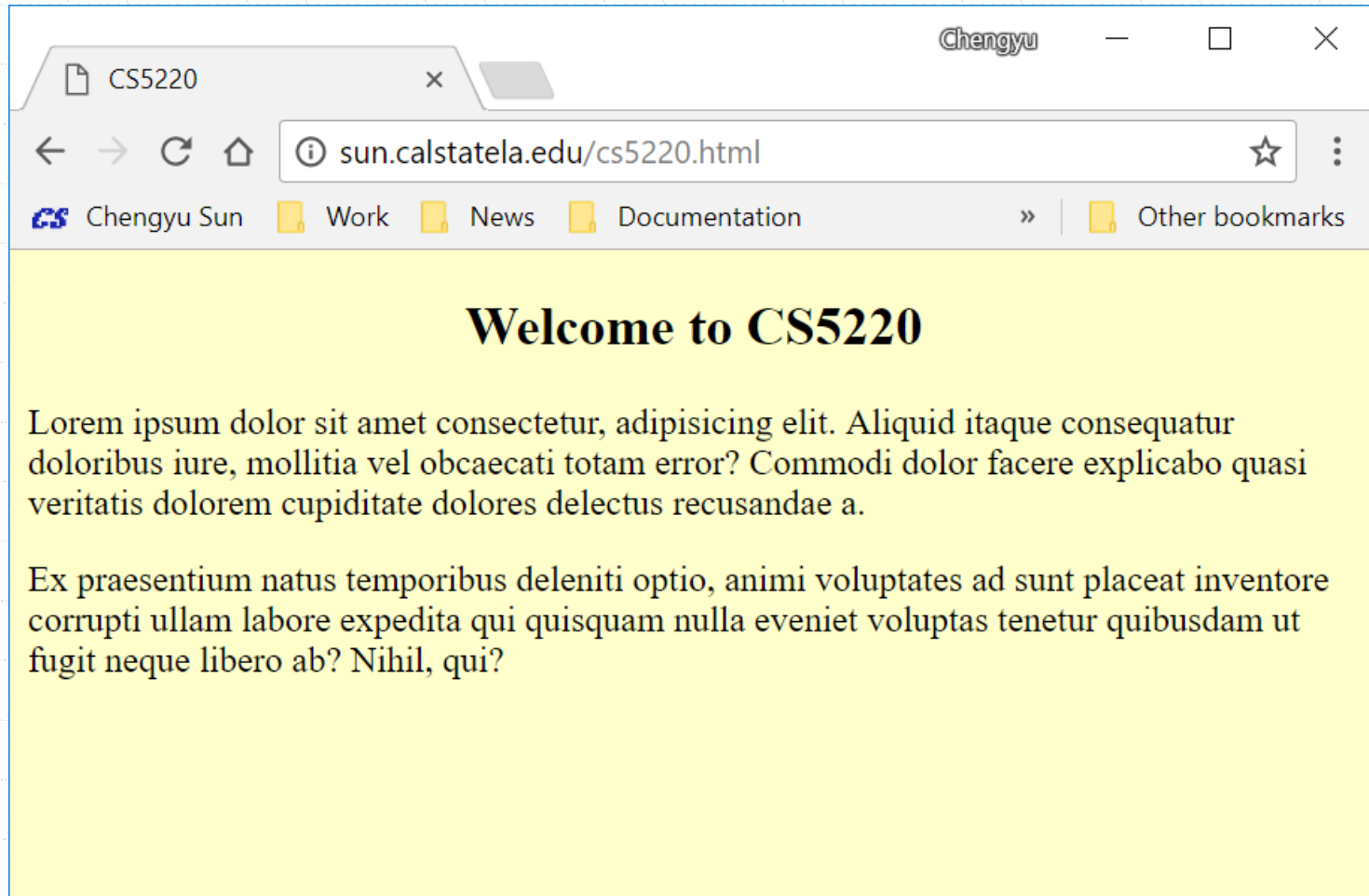
CS5220 Advanced Topics in Web Programming

Course Overview

Chengyu Sun
California State University, Los Angeles

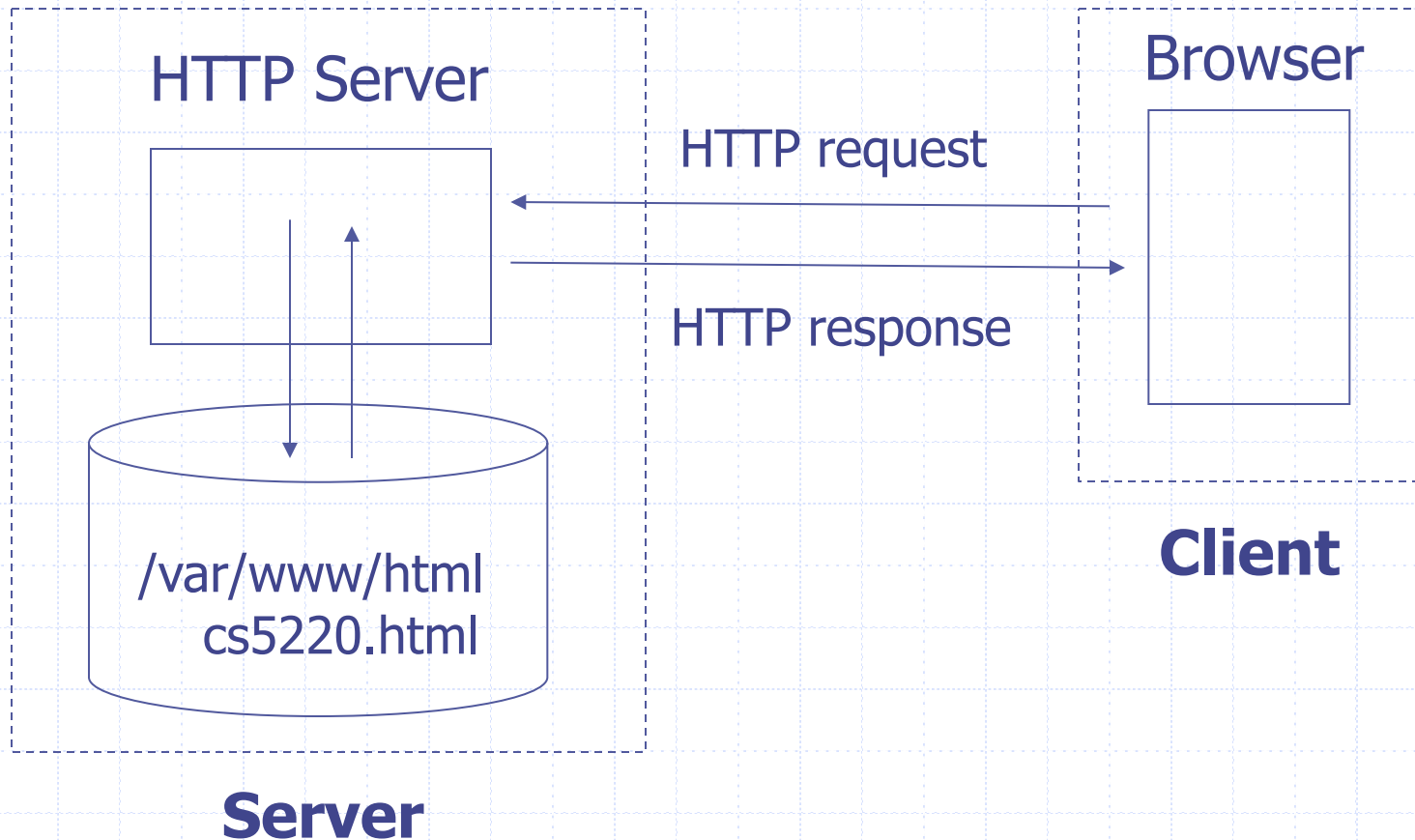


Static Web Page



How the Web Works

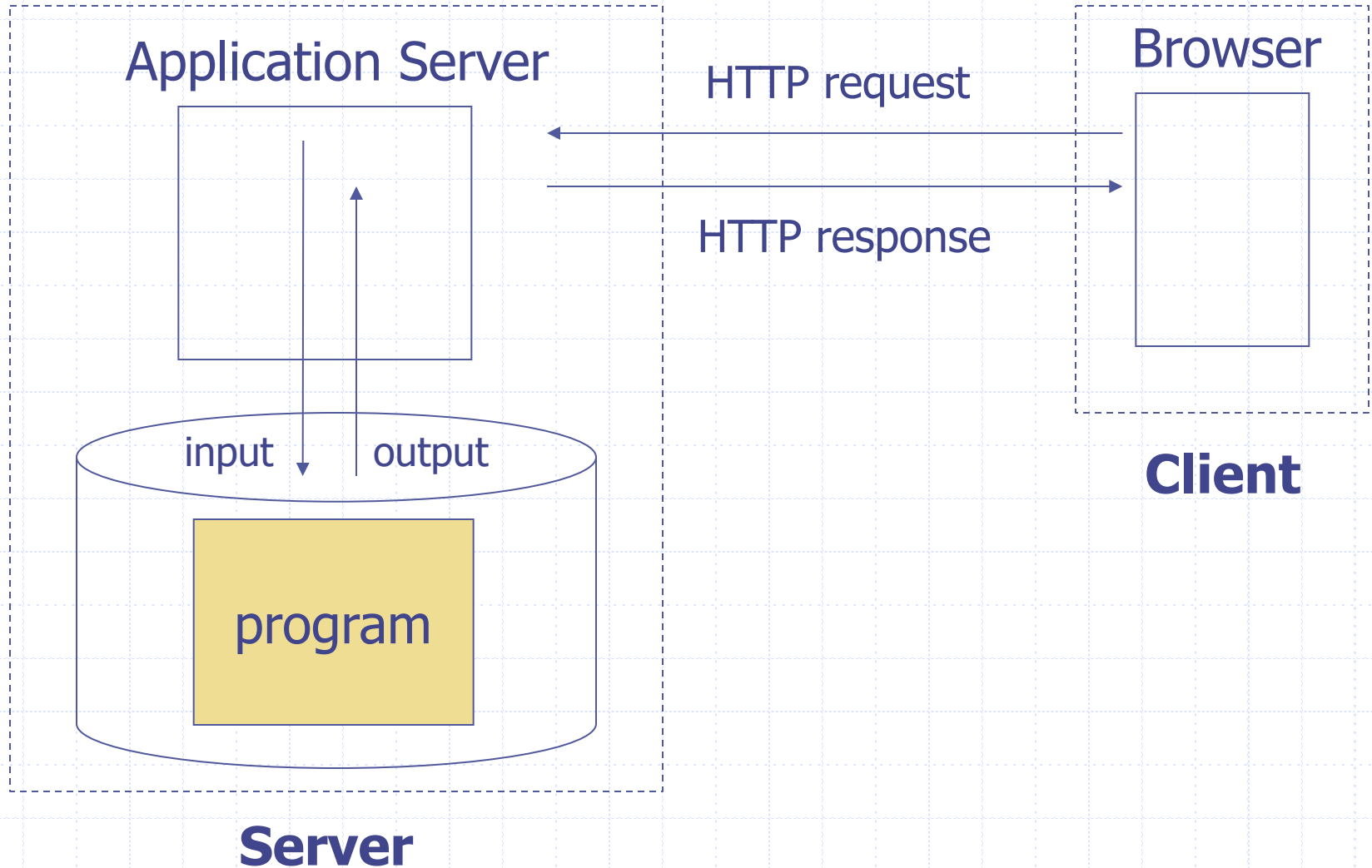
`http://sun.calstatela.edu/cs5220.html`



Dynamic Content

- ◆ Web search results
- ◆ Shopping cart
- ◆ ...
- ◆ Anything that need to be generated *on the fly* based on user request

Produce Dynamic Content



CGI – Perl

```
#!/usr/bin/perl
```

```
print "Content-type:text/html\n\n";  
print '<html>';  
print '<head>';  
print '<title>Hello</title>';  
print '</head>';  
print '<body>';  
print '<h2>Hello World in CGI!</h2>';  
print '</body>';  
print '</html>';
```

Embed Code in HTML – JSP

```
<!DOCTYPE html>
<html>
<body>
  <% if( Math.random() < 0.5) { %>
    <h1>Have a nice day!</h1>
  <% } else { %>
    <h1>Have a lousy day!</h1>
  <% } %>
</body>
</html>
```

Embed Code in HTML – ASP

```
<!DOCTYPE html>
```

```
<html>
```

```
<body>
```

```
<%
```

```
    If hour(time) < 10 Then
```

```
        response.write("Good morning!")
```

```
    Else
```

```
        response.write("Have a nice day!")
```

```
    End If
```

```
%>
```

```
</body>
```

```
</html>
```

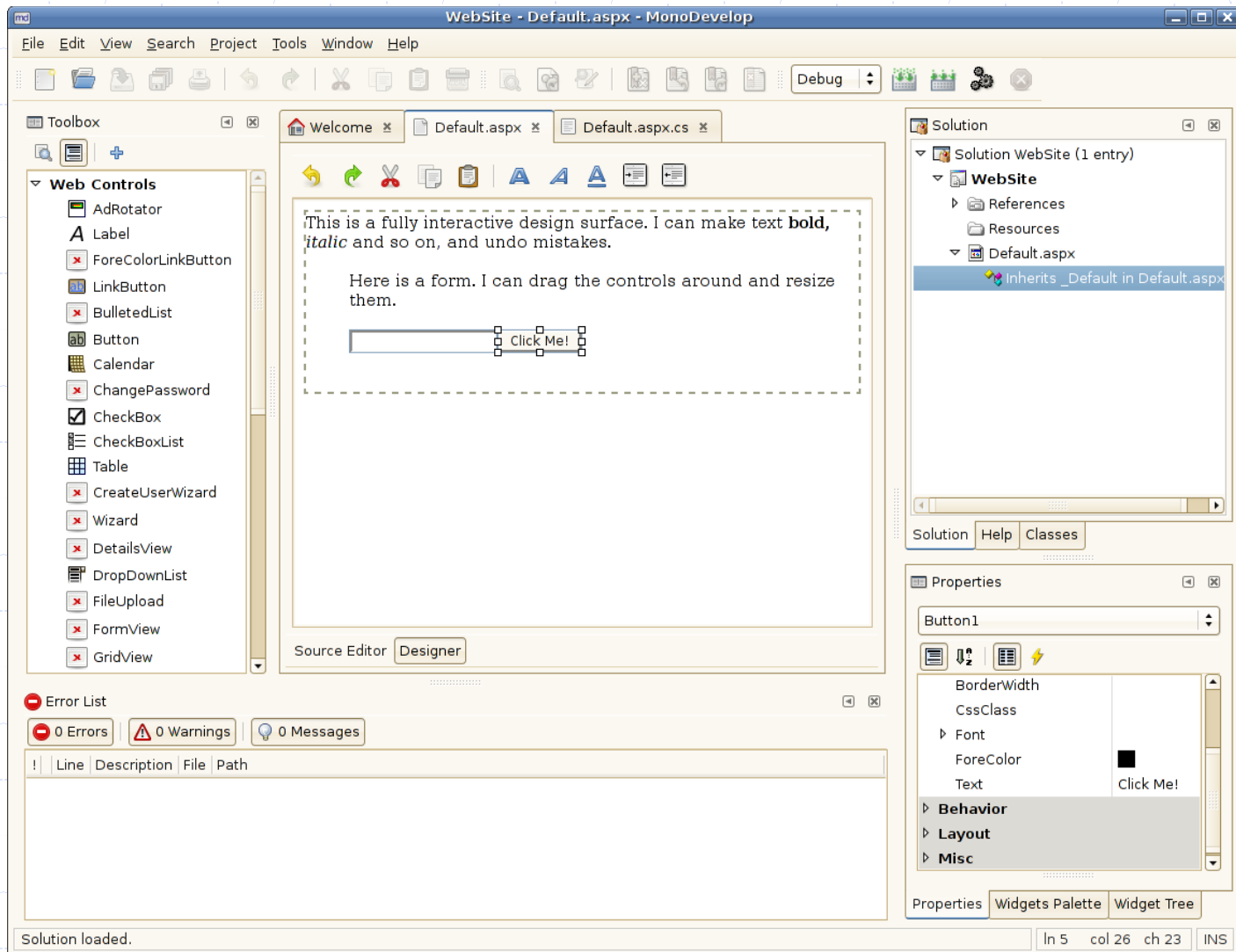

Embed Code in HTML – PHP

```
<!DOCTYPE html>
<html>
<body>
  <?php
    if (date("H") < "20") {
      echo "Have a good day!";
    } else {
      echo "Have a good night!";
    }
  ?>
</body>
</html>
```

The Problem with “Page with Code”

- ◆ Mixing presentation with processing – makes the application hard to read, test, reuse, or maintain

GUI Components + Event Handling Approach ...



... GUI Components + Event Handling Approach

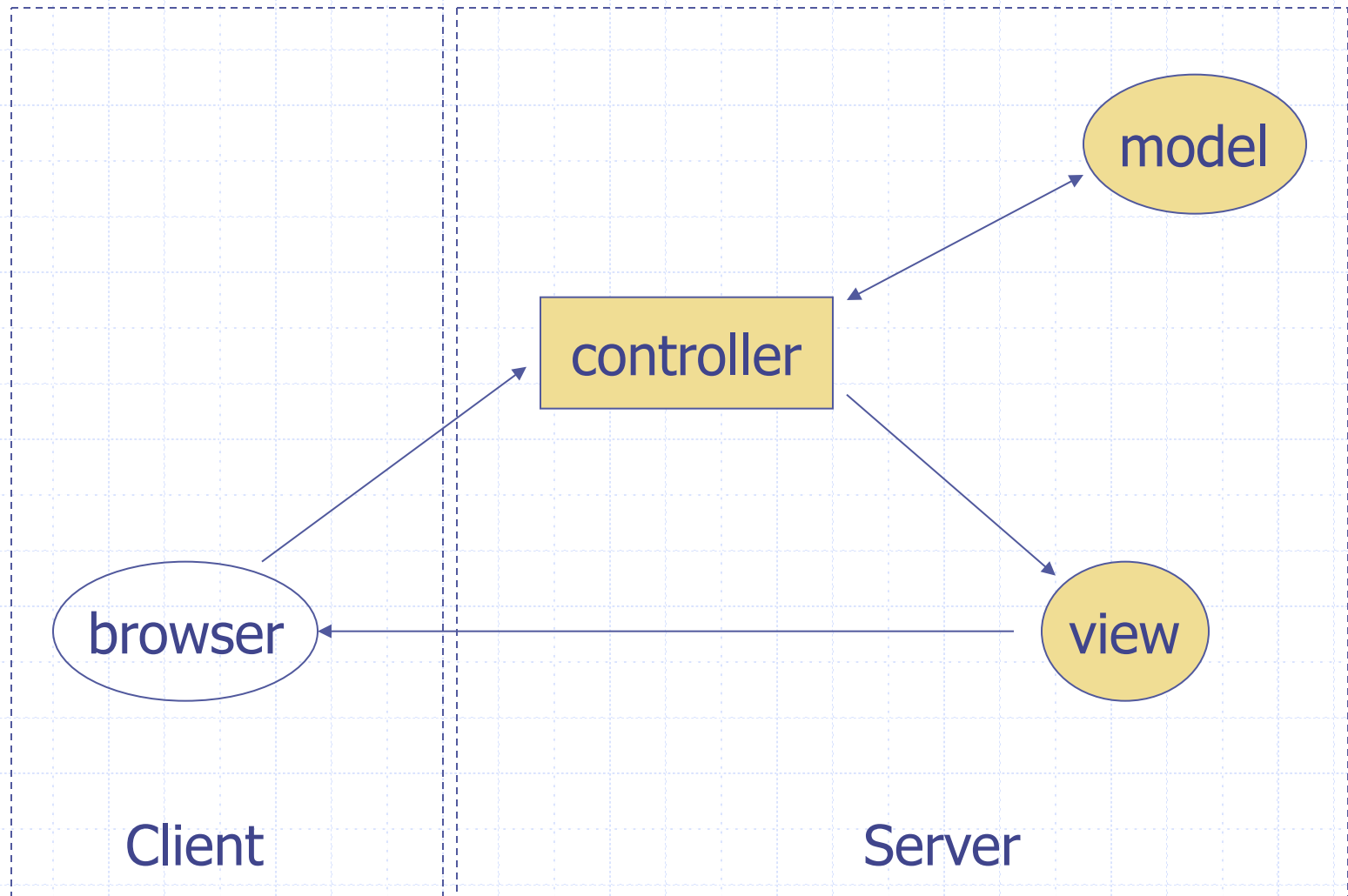
◆ ASP.NET, GWT, JSF

◆ Advantages:

- Pre-built GUI components
- Visual Designer
- Similar to developing desktop applications

◆ Disadvantages: see Advantages

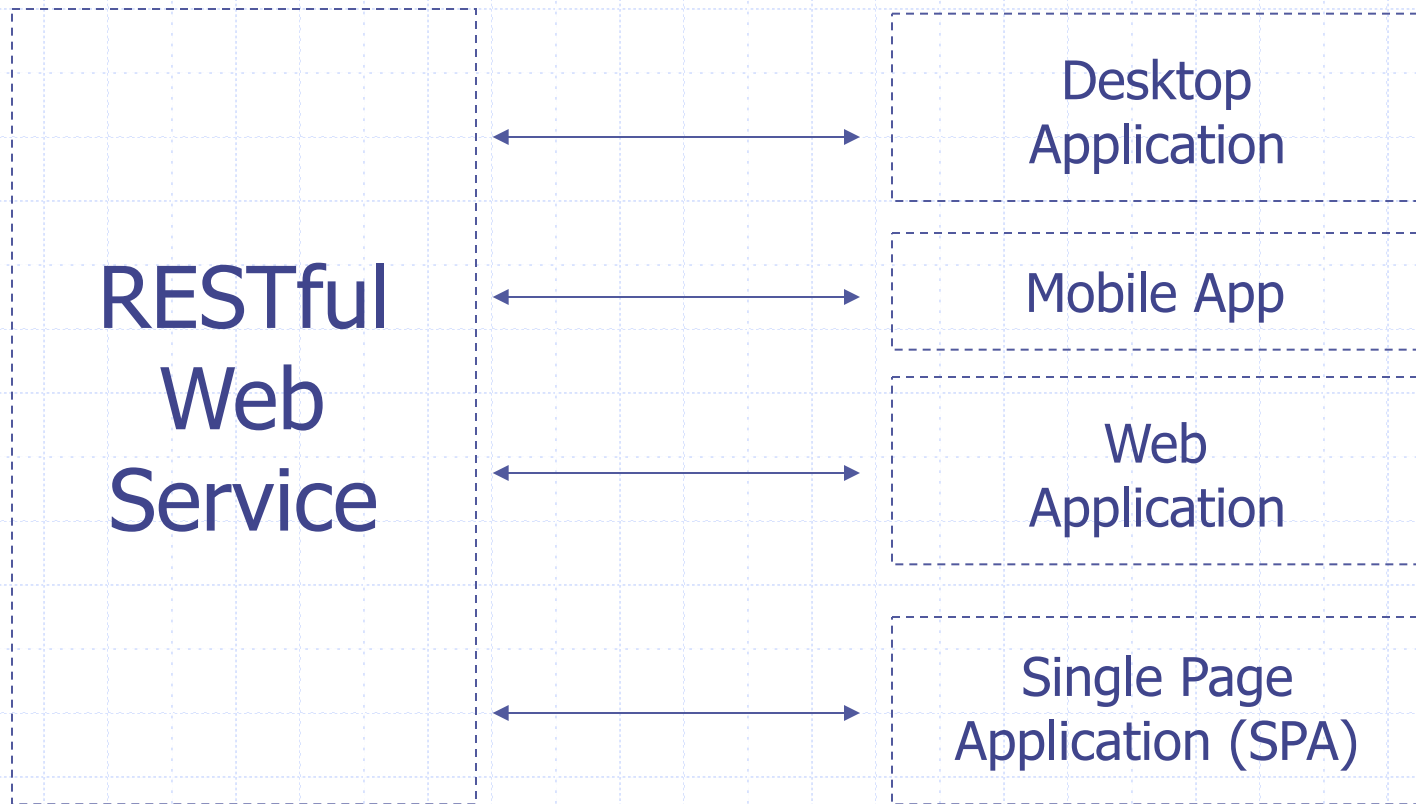
The MVC Architecture



MVC Web Frameworks

- ◆ Spring, Struts for Java
- ◆ ASP.NET MVC for C# and VB
- ◆ Zend for PHP
- ◆ Express for JavaScript
- ◆ Django for Python
- ◆ Rails for Ruby

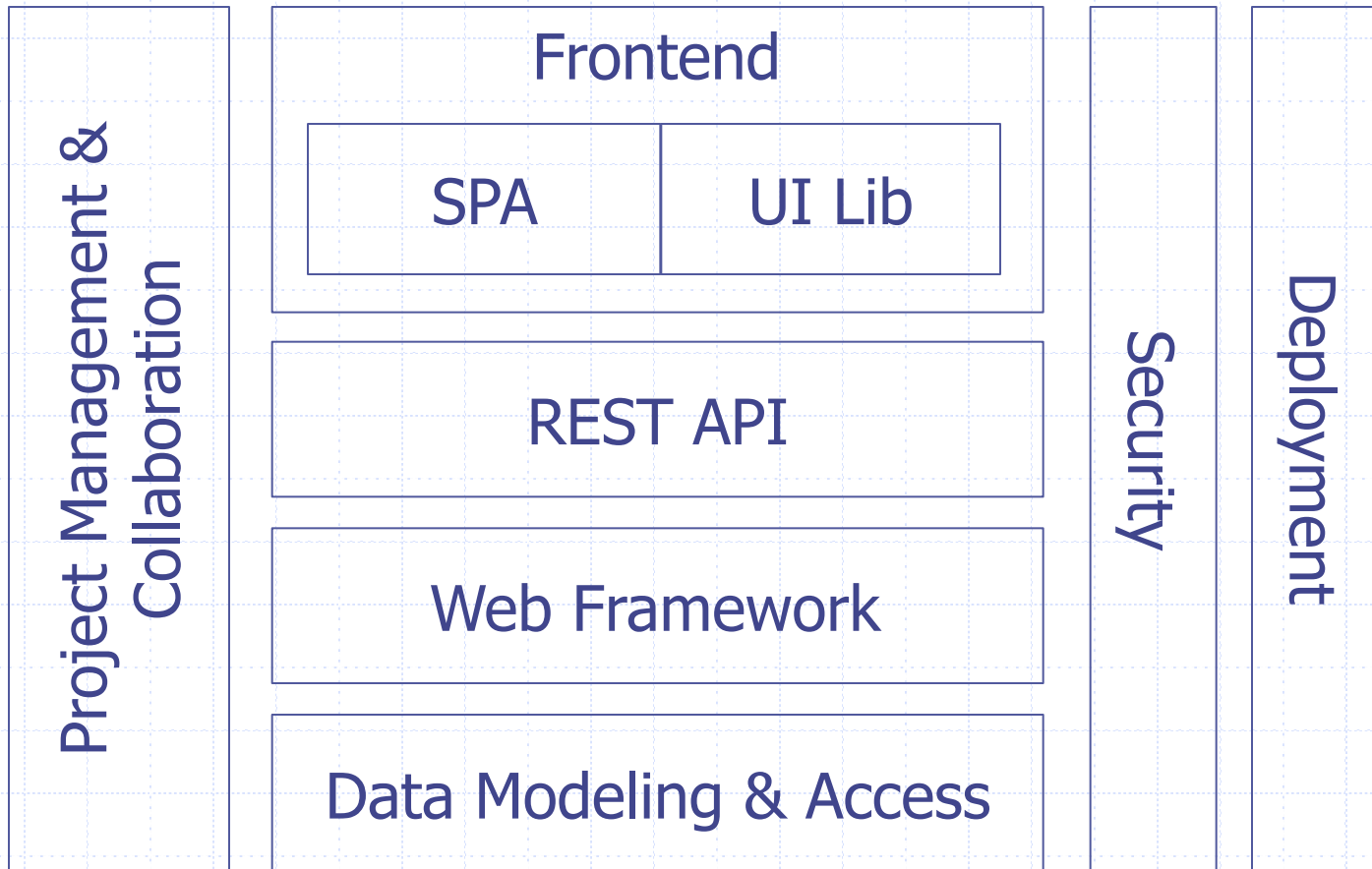
RESTful Web Service + Client



Benefits of REST + Client

- ◆ One backend serves multiple types of frontend
- ◆ RESTful web service is more scalable than traditional web applications

Course Overview



Project Management and Collaboration

- ◆ Build and build tools
 - Make, Ant, Maven, NPM
- ◆ Version control
 - Git and GitHub

Data Modeling and Access ...

- ◆ Relational Database

- PostgreSQL/MySQL

- ◆ NoSQL Database

- MongoDB

- ◆ ORM and ODM

- JPA, Hibernate, Mongoose

... Data Modeling and Access

◆ Full Text Search (FTS)

- Database-provided FTS
 - ◆ PostgreSQL/MySQL, MongoDB
- Standalone solutions
 - ◆ Lucene, Elasticsearch

Web Services

- ◆ Traditional web services
 - SOAP, WSDL, UDDI
- ◆ RESTful web services

Web Frameworks

◆ Frameworks

- Spring (Java)
- Express (Node.js)

◆ Implementing RESTful web services (a.k.a REST API)

◆ Other common tasks

- Logging, testing, validation, file upload, email ...

Frontend

- ◆ Single Page Application

- Angular

- ◆ UI libraries

- Bootstrap

Security and Deployment

◆ Web application security

- Spring Security (Spring)
- Passport (Express)
- JWT

◆ Deployment

- Deployment on servers and cloud services