Back end Development

CS 4640
Programming Languages for Web Applications
How User Interact With Web Apps

http://www.virginia.edu/

Usability

Web client

HTTP Request

HTML
JS
CSS

Response

HTTP Response

Web application

Request

Response

Web component_1

Web component_2

Web component_n

Web server

DB or persistent data

PHPs

revisit
Web Development (General View)

Front End Development
- UI/UX design, usability
- Web design
- Responsive design

Client side
- HTML, CSS, JS (and JS libraries, frameworks)
- Fixed huge amount of data, no database interaction

$42k - $108k, avg = $67k

Back End Development
- Server side
- Speed, performance, scalability, security, availability, accessibility, reliability
- Business logic
- Java, PHP, Python, Ruby on Rails, and back end frameworks
- Database interaction

$38k - $117k, avg = $70k

Full-Stack Development
- Variety of skills (both front end and back end)
- Horizontal technology development (+)
- Not expert in particular skill (-)

$38k - $142k, avg = $87k

[ Salaries reference: PayScale ]
How the Web Software Works

**PHP: Form Handling**

- **Name:** Awesome Dev
- **Email:** awesome@virginia.edu
- **Comment:** PHP is fun!

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```php
<?php
if ($_SERVER['REQUEST_METHOD'] == 'POST') {
    # param => value
    $name = $_POST['name'];
    $email = $_POST['emailaddr'];
    $comment = $_POST['comment'];

    echo "Thanks for this comment, $name <br/>"
    echo "<i>$comment</i> <br/>"
    echo "We will reply to $email <br/>";
}
?>
```

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```html
<form action="form-handler.php" method="post">
    <label>Name: </label>
    <input type="text" name="name" autofocus />
    <br/>
    <label>Email: </label>
    <input type="email" name="emailaddr" />
    <br/>
    <label>Comment: </label>
    <textarea rows="5" cols="40" name="comment"></textarea>
    <br/>
    <input type="submit" value="Submit" />
</form>
```
Server Side Processing

HTTP Request data

UI implemented and rendered in a browser

Client

HTTP Response

HTML

Web server

Container engine

Program components

PHPs

Database server

Server

XAMPP

revisit
Execution Overview

As soon as the request is made and fulfilled, the connection is terminated.
Session Management

How can servers keep track of state of different clients?

1. **Session**: A single coherent use of the system by the same user
   - Example: *shopping carts*

2. **Cookies**: A string of characters that a web server places on a browser’s client to keep track of a session
   - Usually used as an index into a table (*dictionary*) on the server
   - Most dictionaries expire after a period of time (15 to 30 minutes)

Additional mechanisms
- URL rewriting
- Hidden form control

We will come back to this later …
Additional Web Features

User’s ability to control web application via web browser features

- Simple link transition
- Form link transition
- Redirect transition
- Operational transition

Diagram:

- Index:
  - Submit a form
  - Post (userid, password)
- Login:
- Redirect
- Back
- Record_add:
  - Submit a form
  - Post (name, category, content)
- Record_insert:
- Redirect
- Browse
Additional Web Features (2)

Communication among web components depending on requests through the HTTP

- Simple link transition
- Form link transition
- Redirect transition
- Operational transition
Additional Web Features (3)

Control connections: forward, include, redirect

- simple link transition
- form link transition
- redirect transition
- operational transition
Requests are made to a main component and the main component response to clients.
Requests are sent to a dispatcher that then forward the requests to another component (using *forward* or *redirect* control connection)
Back End Component and Model View Controller

**Model**
- Encapsulates application state
- Responds to state queries
- Exposes application functionality
- Notifies views of changes

**View**
- Renders the model
- Requests updates from the model
- Sends user inputs to controller
- Allows controller to select view

**Controller**
- Defines application behavior
- Maps user actions to model updates
- Selects a view for response
- One view for each function

[Graphic from Designing Enterprise Applications with the Java 2 Platform, Enterprise Edition, Nicholas Kassem et al., October 2000]