Databases on the web
The Web Application Stack

Server <-> Network <-> You
The Web Application Stack

Server

Network

Operating System

You
The Web Application Stack

Server

Network

Operating System

Web Browser

You
The Web Application Stack

Network

Server

Operating System

Web Browser

Operating System

You
The Web Application Stack

Web Server

Operating System

Server

Network

You

Web Browser

Operating System
Let’s make a webpage to advertise sailors and boats

http://web.cecs.pdx.edu/~britell/cs386/boats_sailors.html

<html>
    <body>
        <h1>Sailors and Boats</h1>
        <ul>
            <h3>Sailors: id name rank</h3>
            <li>64 Horatio 7</li>
            <li>74 Horatio 9</li>
            <li>22 Dustin 1</li>
            <li>31 Lubber 8</li>
        </ul>
        <ul>
            <h3>Boats: id name color</h3>
            <li>102 Interlake red</li>
            <li>103 Clipper green</li>
            <li>104 Marine red</li>
        </ul>
    </body>
</html>
Let’s make a webpage to advertise sailors and boats

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</body>
</html>

It would be nice if we could use our sailors database to do this.
The Web Application Stack

- Persistent Data Storage
- Web Server
- Operating System
- Network
- Server
- You
- Web Browser
- Operating System
The Web Application Stack

Application
Persistent Data Storage
Web Server
Operating System

Server
Network
You

Web Browser
Operating System
The Web Application Stack

- Application
- Persistent Data Storage
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Network

- Server
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PHP
Postgres
PHP

- **PHP Hypertext Preprocessor**
- Syntax is similar to C
- Object Oriented Extensions
- Scripting language
  - Interpreted, not compiled
  - Executed on the webserver
- Script written inside `<?php ?>` tags
PHP continued

• Variables
  – Prefixed by a $
  – Do not have to be declared with a data type
  – Can change type
PHP continued

- Functions

function myfunction($param) { }

- Useful built-in
  - print_r, var_dump(), var_export()
  - print, echo, printf
PHP continued

- Operators
  - =, +=, -=, /=, *=, %=, ++, --
  - +, -, /, *, %
  - .=
  - .
  - ==, !=, <>, <, <=, >=, >
  - === true if arguments are equal and the same data type
  - !== true if arguments are not equal or they are not of the same data type
Arrays

- Can be any size and any/mixed type
- Are not defined with their size

```php
$array = array(1, 2, 3);
$array[0] = "foo";
$array[] = 12;
```

- May be multidimensional

```php
$md_array[0] = $array;
$md_array[1] = array(1, "foo", 34);
```
PHP continued

- Arrays continued
  - PHP arrays are associative
    - Instead of using numbered indexes we can have named keys
      ```
      $array[‘fname’] = “alice”;
      $array[‘lname’] = “smith”;
      $array[‘age’] = 48;
      $array = array (
          $key => $value,
      );
      $array = array (            ‘fname’ => ‘alice’,
          ‘lname’ => ‘smith’,
          ‘age’   => 48,
      );
      ```
PHP continued

• Control Structures
  – if/elseif/else if, else
  – switch
  – while, do{}while, for
  – foreach

    foreach ($array as $value) {}
    foreach ($array as $key => $value) {}
PHP continued

• Connecting to a database
  – Can do low-level like embedded sql in C
    • Drivers for
      – Mysql
      – Postgres
      – Mssql
      – Odbc
      – Sqlite
      – ...
    – Or we can use an abstraction layer
      • A consistent interface across multiple databases
      • Abstracts away many of the details
      • A couple of different choices
        – DBA
        – dbx
        – ODBC
        – PDO
PDO

- Compare PDO and embedded C

- A little bit about password security
  - Permissions
  - CGI
    - CGI example
      » http://web.cecs.pdx.edu/~britell/cs386/boats.html.cgi

- A little bit about errors

On MCECS systems look at /www/log/users-error.log
PDO

• Now lets make our sailors and boats page dynamic
PDO

- Now let's make a reservation system
  - HTML forms
  - Global arrays
    - $_GET
    - $_POST
  - http://web.cecs.pdx.edu/~britell/cs386/reserves.php
  - http://web.cecs.pdx.edu/~britell/cs386/reservations.php
The Web Application Stack

Application

Persistent Data Storage

Web Server

Operating System

Server

Php, perl, python

Mysql

Apache

Linux

LAMP
The Web Application Stack

Application

Persistent Data Storage

Web Server

Operating System

Asp

Sql Server

IIS

Windows

WISA

Server
The Web Application Stack

Application

Java

* Tomcat

* Persistent Data Storage

Web Server

Operating System

Server
The Web Application Stack

- **Application**: java, php, perl, python, ruby, erlang, haskell, ...
- **Persistent Data Storage**: Mysql, sql server, postgres, oracle, sqlite, NoSQL, ...
- **Web Server**: Apache, IIS, lighttpd, tomcat, rails, nodejs, ...
- **Operating System**: Linux, windows, solaris, freebsd, apple, ...

Server