

# Notes

- Reference dates for case study
  - By Week 10 (4/2), post on Piazza case study folder on your choice for the topic
  - By Week 12 (4/16), post on Piazza case study folder on your choice for your paper/project. You need my approval before actually work on it
  - Present as a team on week 15 (5/7): every member needs to present
  - More at <https://piazza.com/class/kjy8thbsiiih4?cid=69>

# Discussion #6

- What are the commonalities and differences between caching and replication?

	Caching	Replication
Difference 1	Mostly copy at another site	Copy at the same site, most at server side
Difference 2	Copy partial info	Full copy
Difference 3	Copy when there is a request	Copy in advance
Difference 4	Copied data will be used or discarded	Copied data could be partially updated
Difference 5	Doesn't have consistency problem	Have consistency challenge
Difference 6	Temporal copy	Permanent copy
Commonality 1	Both improve performance and reduce latency	
Commonality 2	Both have data copy	

# IS 651: Distributed Systems

## Chapter 9: Web Frameworks

Jianwu Wang

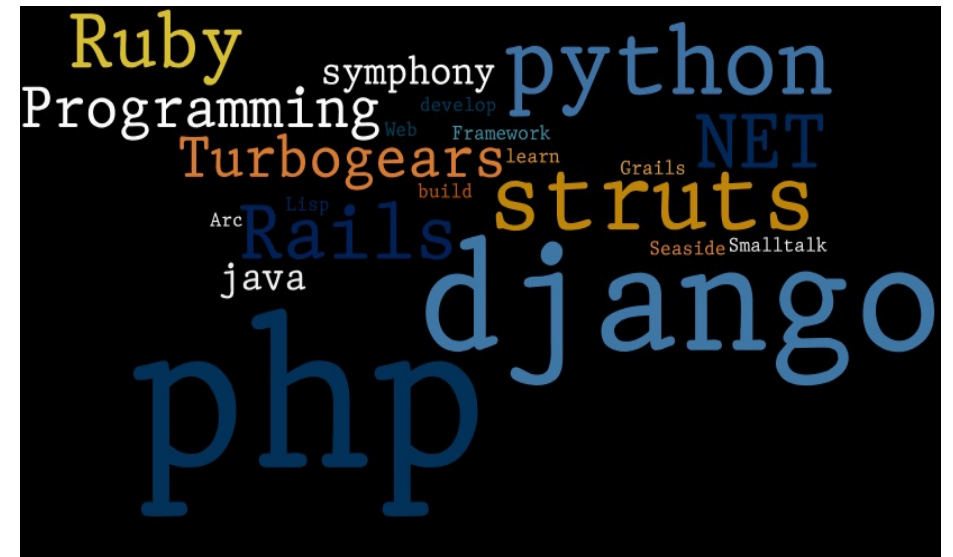
Spring 2021

# Learning Outcomes

- After learning this chapter, you should be able to
  - Know the MVC design pattern
  - Know how to follow a Web framework to build your own Web application. Differentiate reusable parts from the framework and your own implementation

# Web Frameworks

- Software frameworks are generic, **partially** written applications for a specific application architecture that make creating new applications quicker and easier
- They offer a large collection of libraries that take care of all the **routine** programming tasks
  - e.g.: scalability, caching, security
- They leave the programmer to implement **custom** functions that are required for the new application
  - e.g.: representation, business logic



# Productivity

- Web Frameworks make programmers much more productive, but removes flexibility



# The Four Tier Web Architecture

- Presentation in the web browser
- Web servers to deliver content
- Application server technology
- Databases for maintaining state

Presentation Tier (Web Browsers)  
HTML, JS, CSS, etc.

Communication Tier (Web Servers)  
PHP, JSP, Rails, etc.

Logic Tier (Application Servers)  
PHP, Java EE, etc.

Data Tier (Storage Servers)  
MySQL, FileSystem, S3, etc.

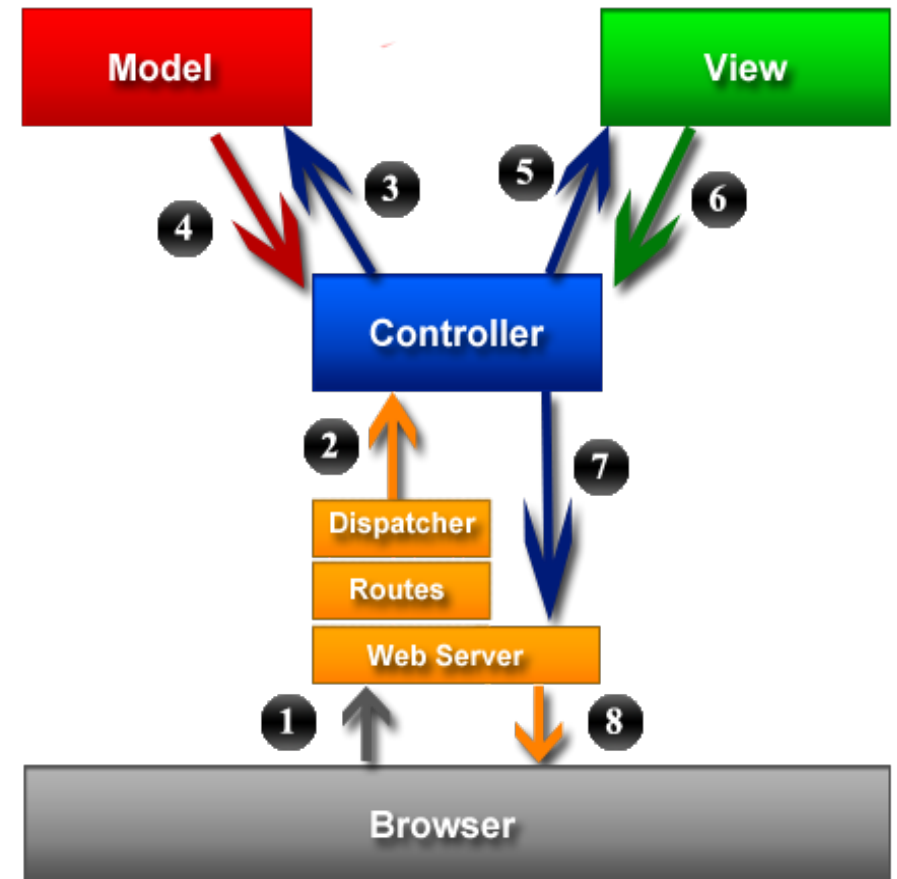
# Design Patterns

- Design patterns
  - Represent reusable solutions to a commonly occurring programming and software design problems
  - It is not code but a description of the pattern. Programmers use code to implement the design pattern
  - A classic book: "Design Patterns: Elements of Reusable Object-Oriented Software" by the so-called "Gang of Four" (Gamma et al.), 1994, which defined 23 classic software design patterns
- A very common design pattern used in web frameworks is the **model, view, controller (MVC)** pattern
  - It separates interface/representation (V), logic (C), and data models (M) so that code developed with this pattern is more easily maintained, tested, and developed



# Model, View, Controller (MVC) Pattern

1. The browser sends a request to the web server
2. The web server processes the request, determines which route it belongs to and dispatches that request to the corresponding controller method
3. The controller then asks the model layer for all the necessary information in order to be able to complete the request
4. The model layer collects all the information and returns it to the controller
5. The controller gives the appropriate information to the view, and asks it to render
6. The view renders itself and gives the rendered html to the controller
7. The controller assembles the total page's html and gives it to the web server
8. The web server returns the page to the browser

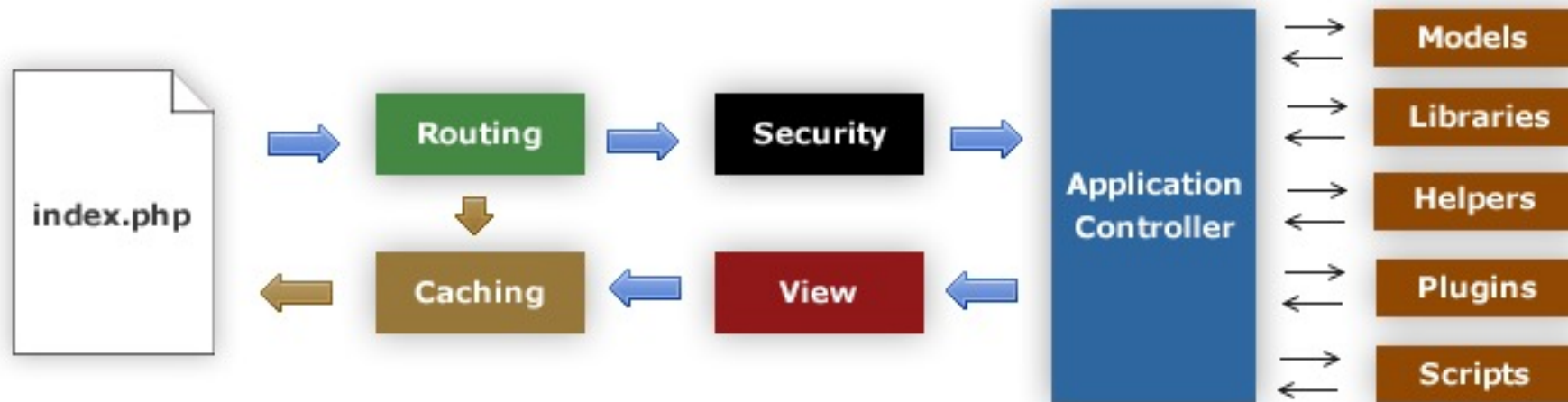


# Quick Question

- For a weather forecast web application. What should be its MVC components?
  - Model
  - View
  - Controller

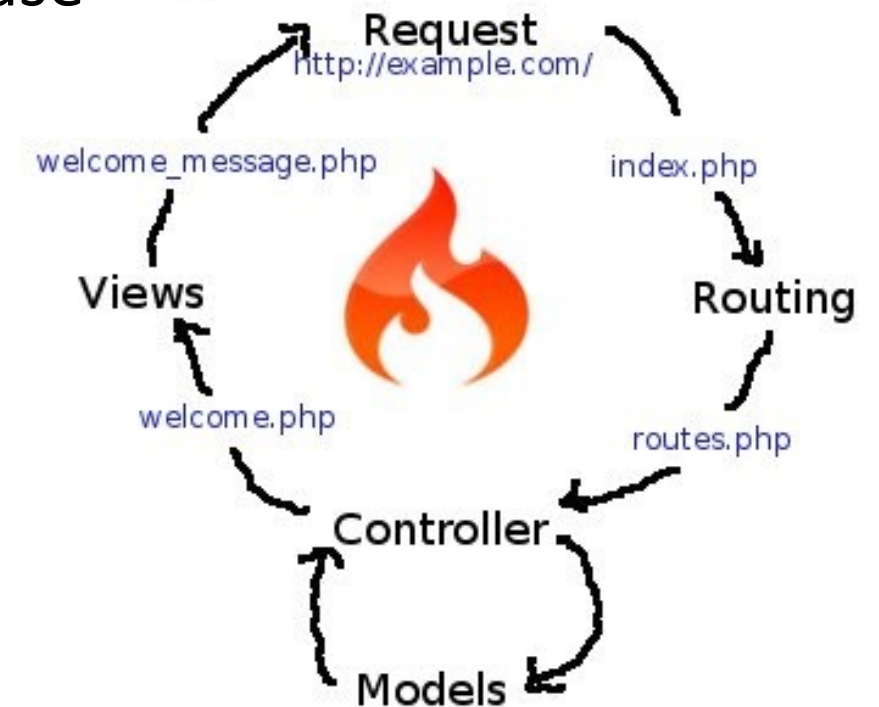
# CodeIgniter

- We will look at the open-source PHP framework CodeIgniter (<http://codeigniter.com/>) since we have PHP on gl
  - It is a simple framework inspired by Ruby on Rails (ROR)
  - It follows MVC pattern



# CodeIgniter on gl

- Configure your password for the mysql database
- Download codeigniter - version 1.7
  - You can try this or newer versions
  - Here is a [transcript](#) of how to do it
- Configure codeigniter



# Video Tutorial

- First 'Hello World' CodeIgniter Video
  - My resume demo 1:  
<https://userpages.umbc.edu/~jianwu/is651/programs/ch9/ci/index.php?/resume>
  - My resume demo 2:  
<https://userpages.umbc.edu/~jianwu/is651/programs/ch9/ci/index.php?/resume/phone/123>
  - Transcript for resume

# Video Tutorial (2)

- Second 'Create a Blog in 20 Minutes' CodeIgniter Video
  - My blog demo:  
<https://userpages.umbc.edu/~jianwu/is651/programs/ch9/ci/index.php?/blog>

# Configure MySQL Password

- MySQL url: <https://mysql-admin.umbc.edu/>
  - You need [VPN](#) to access the website
  - Choose studentdb-maria.gl.umbc.edu
  - Your account should have been setup. Contact <https://my.umbc.edu/help> or DoIT Technology Support Center Phone (410-455-3838) if you cannot login.
  - More information: <https://wiki.umbc.edu/pages/viewpage.action?pageId=63800481>
- Your password is the same as your gl username
  - Change your password!
- You has only one database whose name is your account
  - You can have multiple tables within the database
- You can access the database from gl
  - Demo: `mysql -u your_umbc_username -h studentdb-maria.gl -p`

# Configure Codeigniter

- Edit the system/application/config/config.php file
  - `$config['base_url'] = "https://swe.umbc.edu/~username/ci/";`
    - based on the location of your ci folder
  - `$config['index_page'] = "index.php?";`
- Since we are using a previous version of CI, there is a minor change from the second video
  - The system/application/config/autoload.php entry is named `$autoload['libraries']` (not `$autoload['core']`):  
`$autoload['libraries'] = array('database');`
- Database setting
  - Update system/application/config/database.php to set your database info including hostname (studentdb-maria.gl), username (your umbc account), password, database (your umbc account) and dbdriver (mysql)



# Scalable Vector Graphics (SVG)

- Two main types of graphs
  - Vector Graphics use vectors to describe graphs, which do NOT lose any quality if they are zoomed or resized
    - File types: SVG
  - Raster graphics use dot matrix data structure, which has info for every pixel
    - File types: PNG, GIF, JPEG
- SVG is a language for describing two-dimensional vector graphics in XML
  - Another XML vocabulary with its own schema
  - Tutorial: [https://www.w3schools.com/graphics/svg\\_intro.asp](https://www.w3schools.com/graphics/svg_intro.asp)
  - Demo:
    - [Tryit -> Circle](#) and <https://userpages.umbc.edu/~jianwu/is651/programs/ch9/>