



1420-7001

By

Dr. Abdul Majeed (조교수)

1st Semester, 2025

웹 프로그래밍

Web Programming



IT융합대학 컴퓨터공학부(컴퓨터공학전공)



Welcome to Web Programming Course

Course Title	Web Programming (웹 프로그래밍)
Course code	1420-7001
Who can participate?	Any person, preferably Computer Engineering students
What are the minimum requirements?	Basic programming & web development
Why it is necessary to learn WP?	To be aware about latest web developments
Will this course be hard?	Not really if continuous learning + Coding is performed

Practicing codes

+

Continuous learning is the minimum requirement for success in any field.



Class Schedule: Friday from 13:00 ~ 15:50 @ AI Engineering Building-408 (AI관-408)

Who am I? (My Introduction)



Abdul Majeed, Ph.D.

- Information Privacy
- Robotics (UAVs)
- Social Networks

Languages

English
Urdu

Education

2021



Ph.D. in Computer Information
Systems and Networks
Korea Aerospace University, Korea

2016



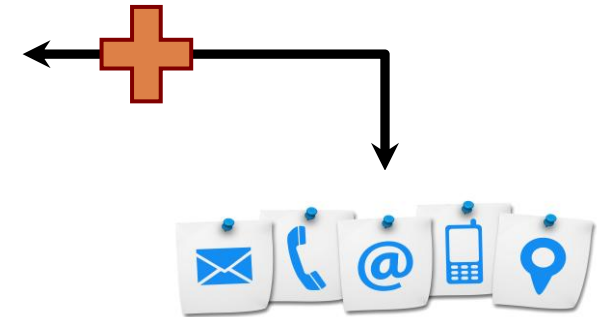
MS in Information Security
COMSATS University, Islamabad, Pakistan

2013



BS in Information Technology
Arid University, Rawalpindi, Pakistan

Bronze
medal



Name: Abdul Majeed < 교수 압돌 >

Email: ab09@gachon.ac.kr (Primary contact)

Cell #: +82-10-9503-9597 (Secondary Contact)

Class Place: AI-building, Room #: 408

My Research area (s): Robotics, Privacy, Social Networks, Artificial Intelligence, **Web Developments**, Algorithms, Data Structure, Machine Learning, and COVID-19.



**TOP 2%
SCIENTISTS**
LEADING MINDS IN SCIENCE

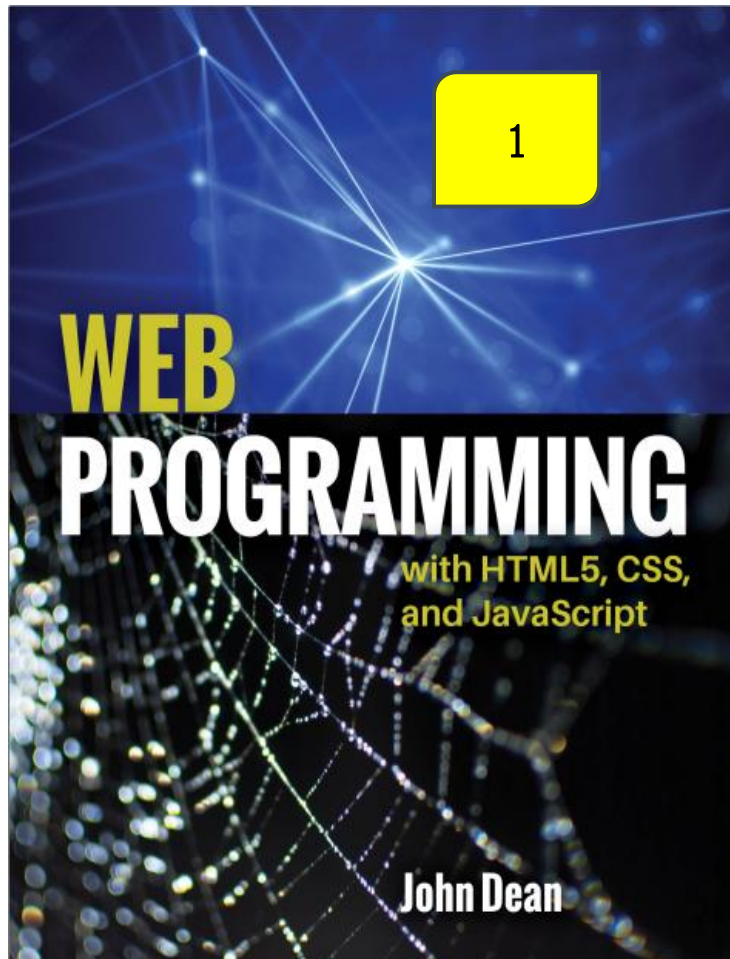
[2023-2024]

{ Assistant Professor @ Gachon University since 2021 }

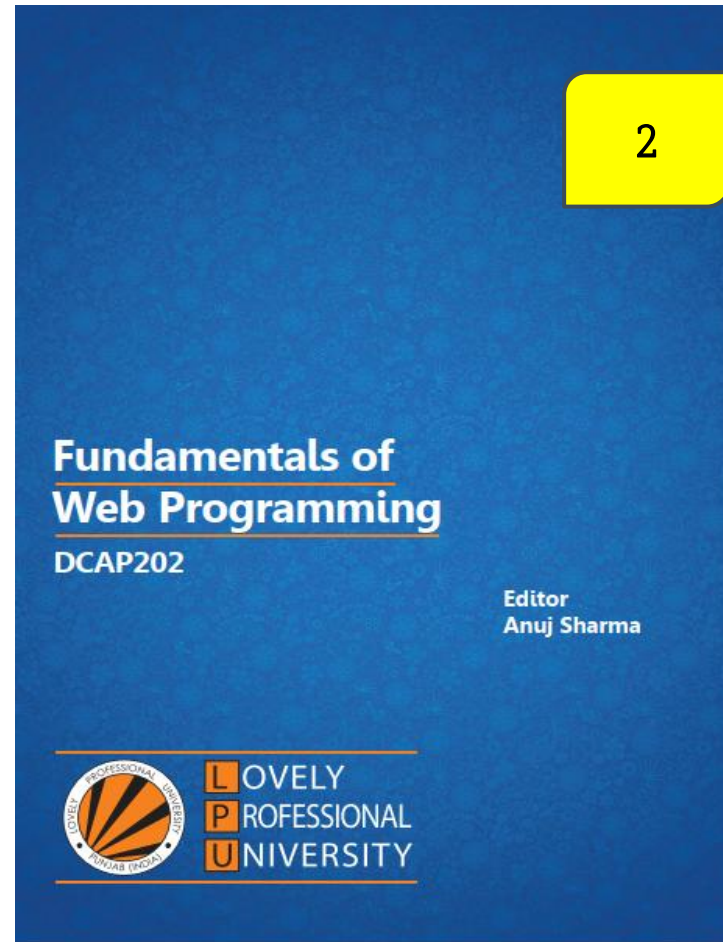
Course Contents



Candidate Books for Web Programming



Recommended book, can be downloaded from Internet.

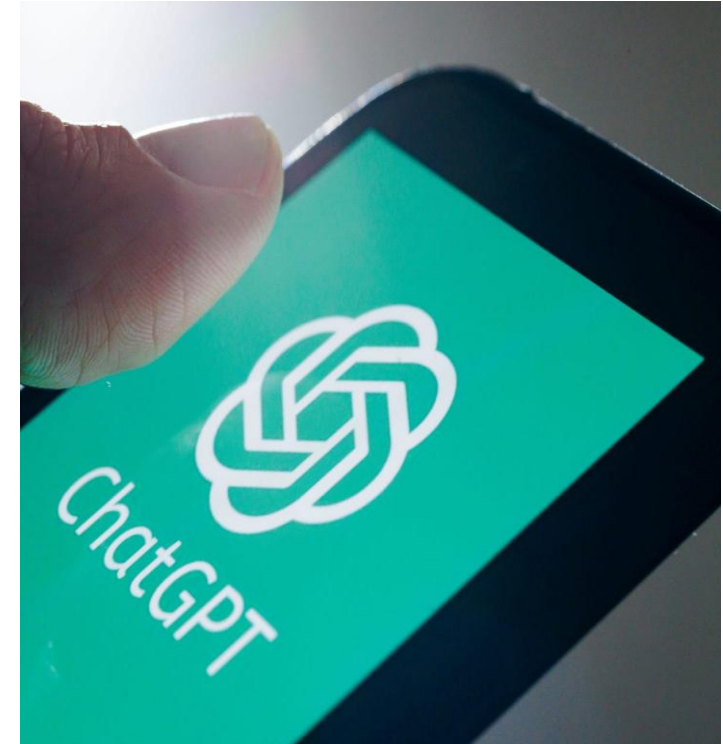


Available on internet at <https://mml-book.github.io/book/mml-book.pdf>



Available on internet [https://northell.design/wp-content/uploads/2021/11/A Complete Web Development Guide For Non Technical Startup Founder.pdf](https://northell.design/wp-content/uploads/2021/11/A_Complete_Web_Development_Guide_For_Non_Technical_Startup_Founder.pdf)

Candidate Source for Web Programming

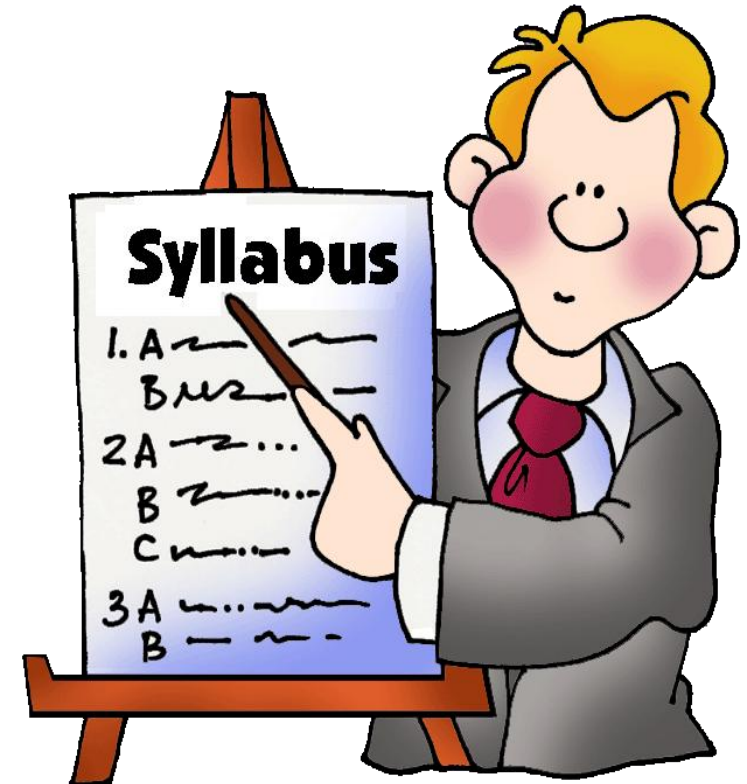


1. Web coding
2. Code debugging
3. Concepts understanding

Gemini

Course Outline- Web Programming [Before Mid Exam]

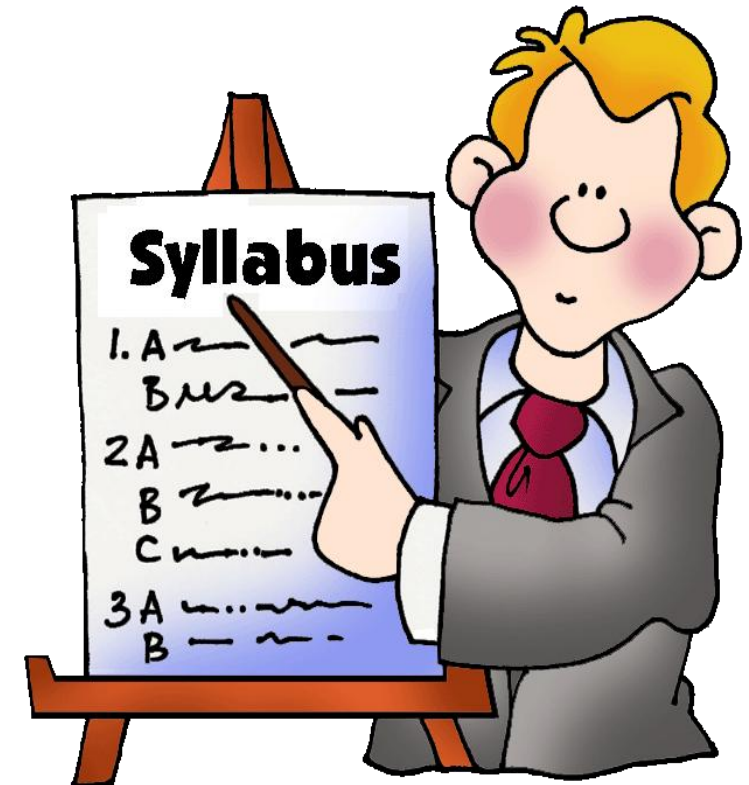
- **Introduction to Web Programming**
 - Goals/learning outcomes
 - Assumed Background
 - Basic concepts and definitions
 - Why study Web Programming
 - A brief overview of the Web applications
 - Examples of designing basic HTML code,
 - Setting up the development environment (Editors & Libraries)
- **Front-end development**
 - Basic HTML tags/attributes,
 - [Inline, Internal, and External] CSS use in web applications
 - Tables and lists with custom data
 - Headings
 - Date formatting
 - Linking multiple web pages, etc.
- **Front-end development**
 - Static and dynamic forms development
 - action listeners in PHP
 - bootstrap applications to web elements
 - JavaScript basics (functions, variables, operators, dates),
 - AngularJS introduction and examples



phillipmartin.info

Course Outline- Web Programming [Before Mid Exam]

- **Front end development**
 - ▣ Creating visuals in web application using chart.js and High-Charts libraries
 - ▣ understanding of div and data management in web pages
 - ▣ API use,
 - ▣ Data customization in different forms
- **JS Basics**
 - ▣ Introduction of JavaScript
 - ▣ JS placement in HTML Codes
 - ▣ variables, constants
 - ▣ JS functions and objects
 - ▣ JS Arrays
 - ▣ Array searching, array sorting, action listeners, etc.
- **JS Advanced**
 - jQuery functions, dates formatting, Set & Get Methods,
 - Mathematical functions, decision making, switches,
 - classes, sets, visualization data preparation, etc.



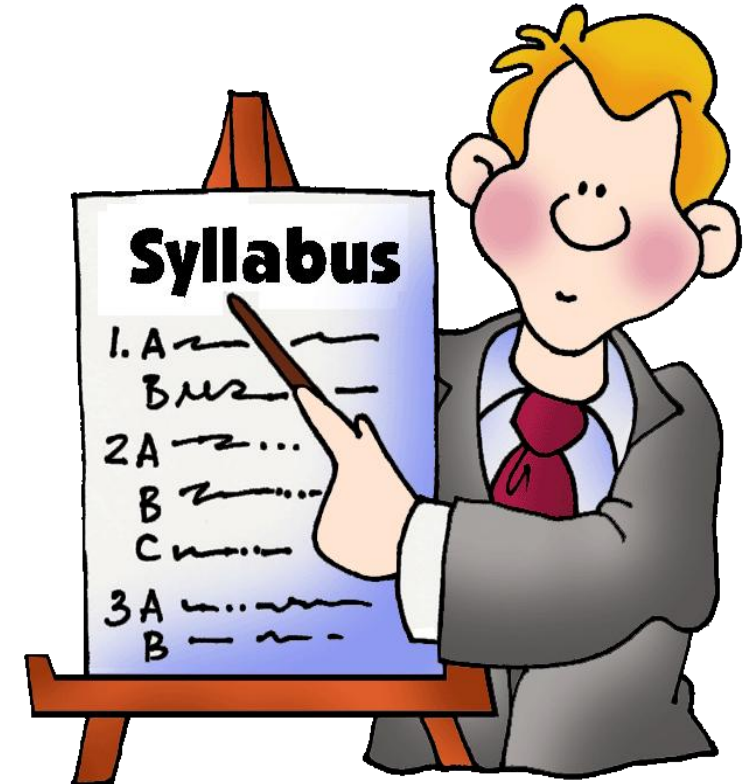
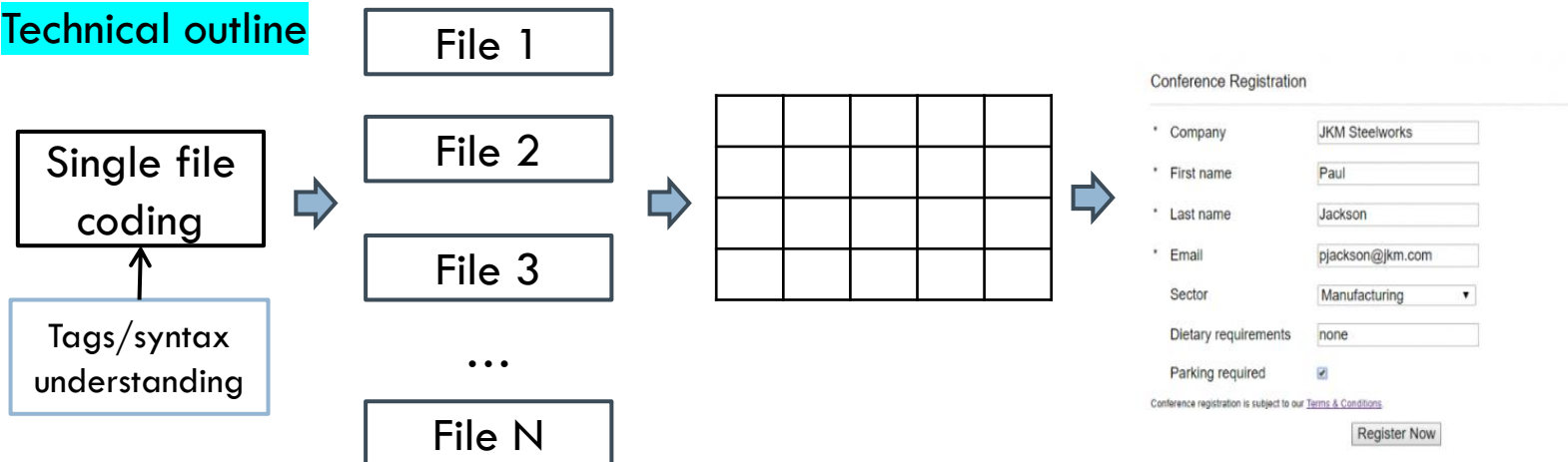
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Course Outline- Web Programming [Before Mid Exam]

□ Basics of php Programming

- Syntax of the php program
- Variables
- Echo statements
- Data types, Int, Strings, characters, etc,
- Castings, Math Operations, Conditions, Operators,
- Switch, Loops, Functions, Regular Expressions, etc.
- Some CSS

Technical outline



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Tools & Technologies- Web Programming [In a nutshell]

HTML

JS

CSS

[Before Mid Exam]

Php

SQL

Database

Design
patterns [MVC]

Data and
control flows

[After Mid Exam]



Course Evaluation Criteria



Course Evaluation Criteria

평가요소	성적 평가방법	비율
출석	Attendance records	10
중간고사	Question paper and Answer Sheet's grading ✓	25
기말고사	Question paper and Answer Sheet's grading ✓	35
레포트	Problem solving through code and critical report submission ✓	20
그룹 프로젝트	Development project and presentations	10
기타		0
기타2		0
합 계		100

We may change as the class progresses!!!. Students' opinion about grading will also be considered.

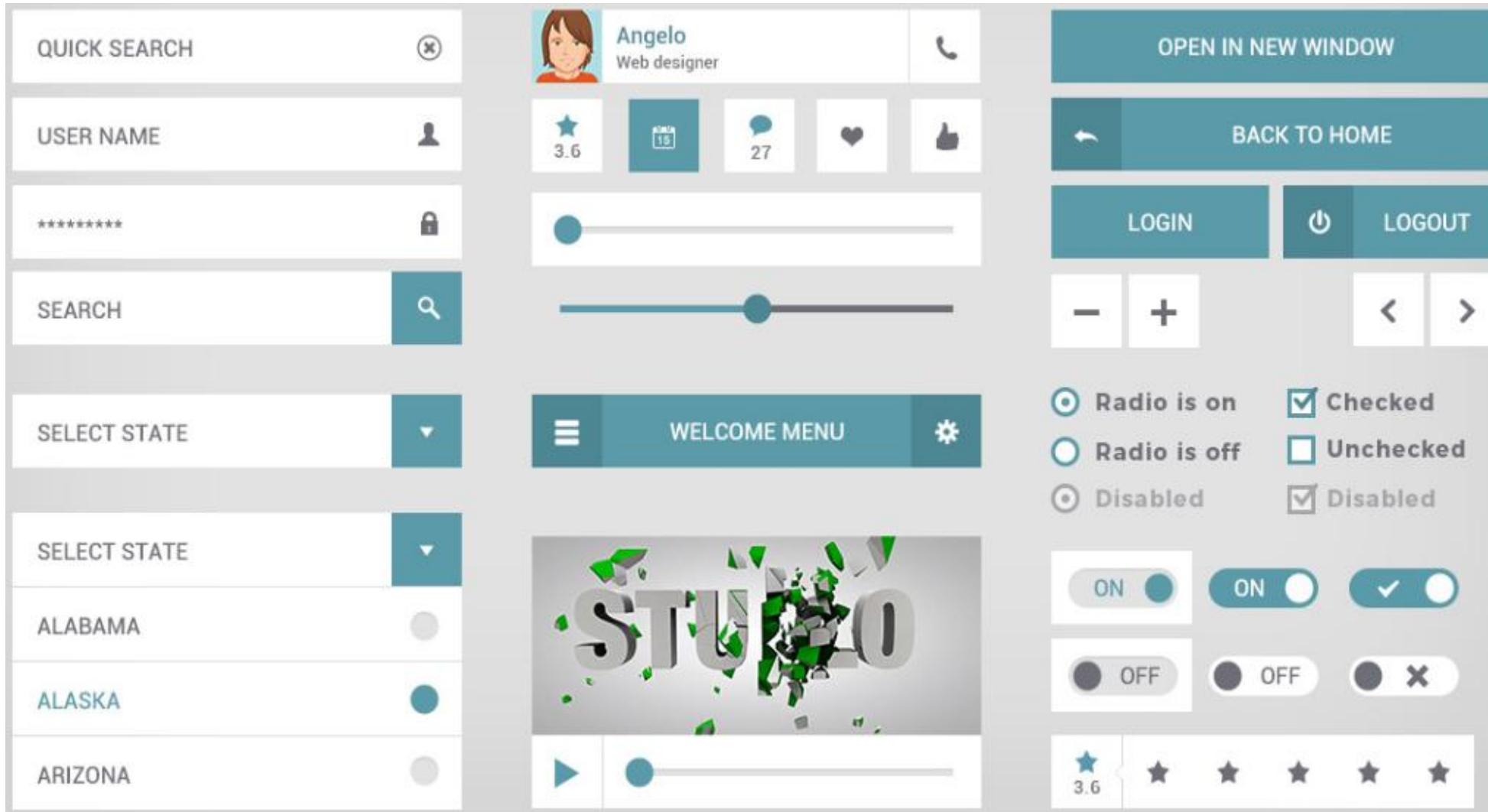
Exams have higher weightage in the final grades.

Class participation has some score.

Goals & Learning Outcomes



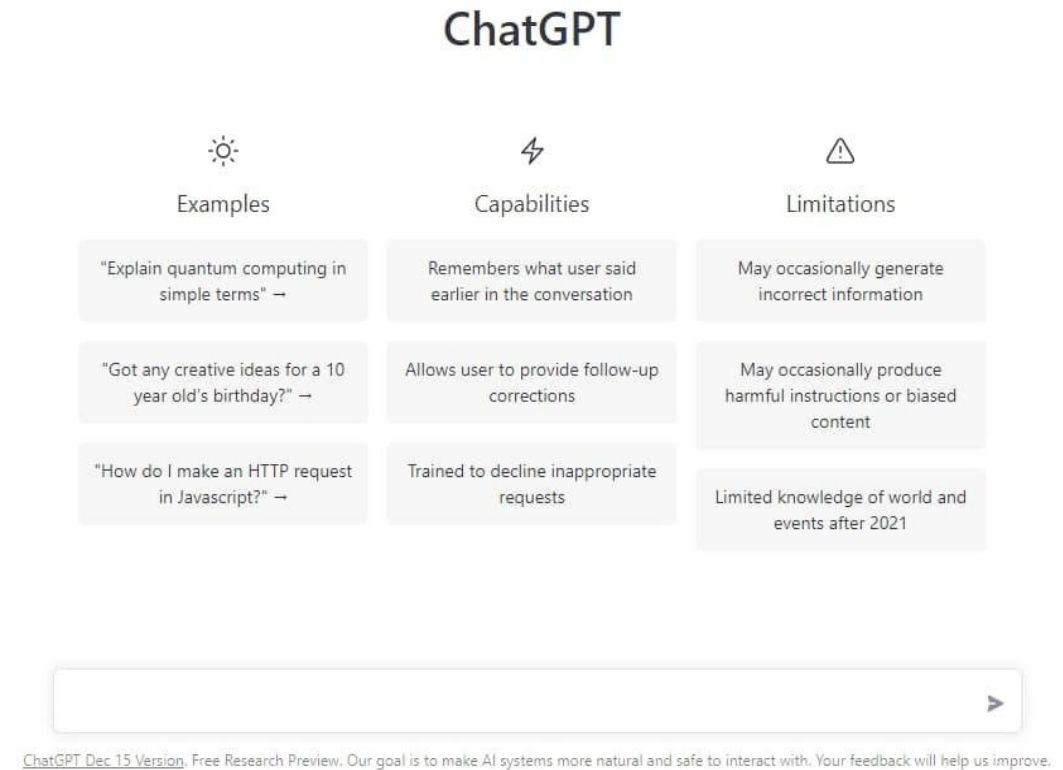
Important Goals of this Course- Understand Web Things



Important Goals of this Course- Understand Web Things



ChatGPT first screen- End Users



Web interface in mobiles

Important Goals of this Course

- Deeply understand the Fundamental concept/logic of Web Programming
 - Understand the **fundamentals of web development**. [Working, code, and implementation]
 - Rigorously **analyse** the design model used in web development and their internal structure (**data flow & control flow!**).
 - Learn how to design a website and related Concepts
 - More thorough and rigorous take on topics related to the modern web.
 - Students should understand how to integrate the database with the web application.
 - The mix of “**theory**” and “**engineering**” at the core of computer science
 - Think about the actual utilization of **web-based systems** in diverse fields (e.g., **healthcare**).



Learning Outcomes of this Course

□ On successful completion of this course, students will be able to:

- To distinguish between a front end, backend, control flow, and data flow in web applications.
- Understand and implement web applications in n-tier architecture.
- Design and implement accessible and user-friendly graphical user interfaces (GUI).
- Design and implement accessible and user-friendly graphical user interfaces.
- Manipulate data from databases and web applications.
- Interpret online web programming documentation (e.g., APIs).
- Exposure to different tools and design patterns (MVC) that are used to develop web applications.



Assumed Background of the Participating Students

- Prerequisite is Basic programming and web concepts

- Topics you should have a basic understanding of:

Basic HTML pages development, web program writing and execution, code organization, error and bugs fixation by taking help from the internet (stack overflow, Github, etc.), front-end and back-end developments, and similar things for better understanding of this course).

- Familiarity with the scripting language (JavaScript, php, CSS, and JSP) is a plus.
- We can fill in gaps as needed, but if topics are new, plan on some extra studying and practice.
- Understanding of the basic terms and knowledge from the online sources.
- **Discussion with friends is highly recommended to understand the concepts well.**



Course Startup



We are surrounded by millions of websites.
Every bank, every university, every
company, every person, every restaurant,
every hotel, every school,

AB

You

welcome message for web programming course



ChatGPT

Welcome to our Web Programming Course!

🌐 Get ready to embark on an exciting journey into the world of web development! Whether you're a beginner or looking to enhance your skills, this course is designed to empower you with the knowledge and tools needed to create dynamic and engaging websites.

🚀 Throughout this course, you'll dive into the fundamentals of web programming, mastering key languages like HTML, CSS, and JavaScript. From building the structure of your web pages to styling them with beautiful designs and adding interactive functionalities, you'll gain a comprehensive understanding of the entire web development process.

🔧 Our hands-on approach ensures that you not only grasp theoretical concepts but also apply them in real-world scenarios. You'll work on practical exercises, projects, and collaborate with your peers, fostering a dynamic and supportive learning environment.

🎓 Whether you dream of becoming a full-stack developer, creating your own web applications, or simply understanding the magic behind the websites you visit every day, this course is your gateway to success.

📚 Get ready to code, create, and innovate! Let's build the web together. Welcome to the Web Programming Course – where your journey to web development excellence begins!

Happy coding! 🚀🌟



Is this conversation helpful so far?



Message ChatGPT...



Introduction to the Web Programming

- ❑ **Web programming** refers to the development of **web applications** and **websites** that are accessed over the **Internet**.
- ❑ Web programming involves creating web pages, web applications, and other online content that can be displayed in a web browser.
- ❑ Web programming is **accomplished** using a variety of programming languages, including **HTML, CSS, JavaScript, PHP, Python, Ruby, and Java**.

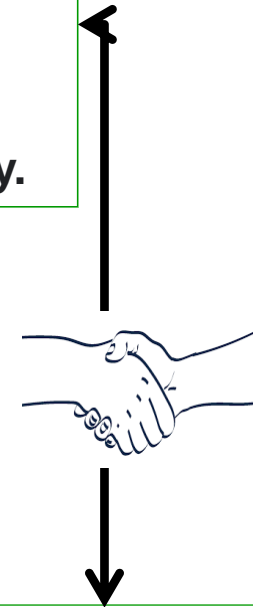


Nowadays it's almost impossible to imagine the world without the internet and websites.

Can you list some Web systems/applications that we are using every day?

Web Applications/Websites-We use almost every day

- ⌘ A **web application** is **software** that runs in your **web browser** or has its own GUI.
- ⌘ Businesses must exchange information and deliver services remotely.
- ⌘ **Web applications are used to connect with customers conveniently and securely.**



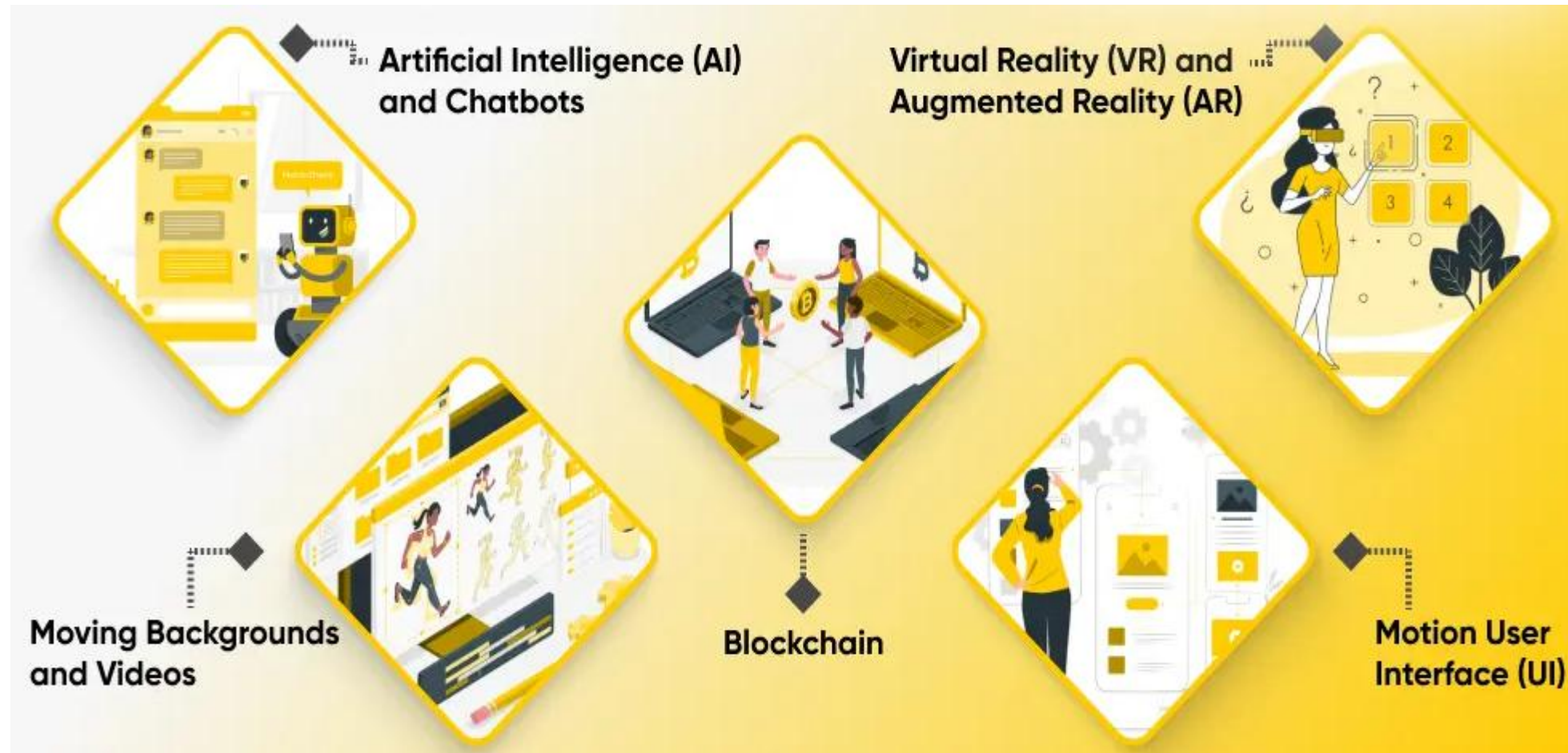
Web applications are delivered on the World Wide Web to users with an active network connection.

Web Applications

“Web applications have several benefits, with almost all major enterprises utilizing them as part of their user offerings” — AWS Amazon, 2023

<https://www.vocso.com/blog/future-of-web-application-development/>

Why is web programming so **challenging** nowadays?



Source: <https://www.techcedence.com/blog/modern-web-application-development/>

Why is web programming so challenging nowadays?

Google Cloud Home FAQ

Generative AI: The next frontier for developers

DUET AI: CHAT

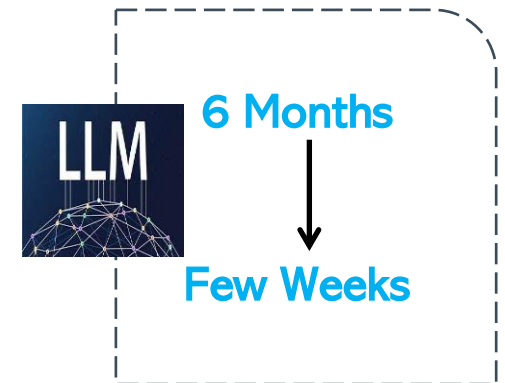
There are several services to deploy containers in Google Cloud, including:

- **Google Kubernetes Engine (GKE)** is a managed Kubernetes service that makes it easy to deploy, manage, and scale containerized applications. GKE provides a production-ready environment for running containerized applications, and it includes features such as automatic scaling, load balancing, and security.
- **Cloud Run** is a serverless compute platform that allows you to run stateless containers that are invocable via HTTP requests. Cloud Run is ideal for applications that need to be highly scalable and cost-effective.
- **App Engine** is a fully managed platform for building and running web applications in a scalable and reliable way. App Engine supports both Java and Python, and it includes features such as automatic scaling, load balancing, and security.

How do I deploy an app to cloud run from cloud-c

```
sample_data.py > ...
41 from google.cloud import firestore
42
43 # Create a Firestore client.
44 db = firestore.Client()
45
46 # Get the current working directory.
47 cwd = os.getcwd()
48
49 # Read the product data from the samp
50 with open(f"{cwd}/sample_data.py", "r
51     product_info = json.load(f)
52
53 # Create a collection in the database
54 products_collection = db.collection("
55
56 # Add each product to the collection.
57 for product in product_info:
58     products_collection.document(prod
59
60 # Print a message to the console to i
61 print("Data uploaded successfully.")
62
```

Google Cloud
Next '24



Generative AI: The next frontier for developers

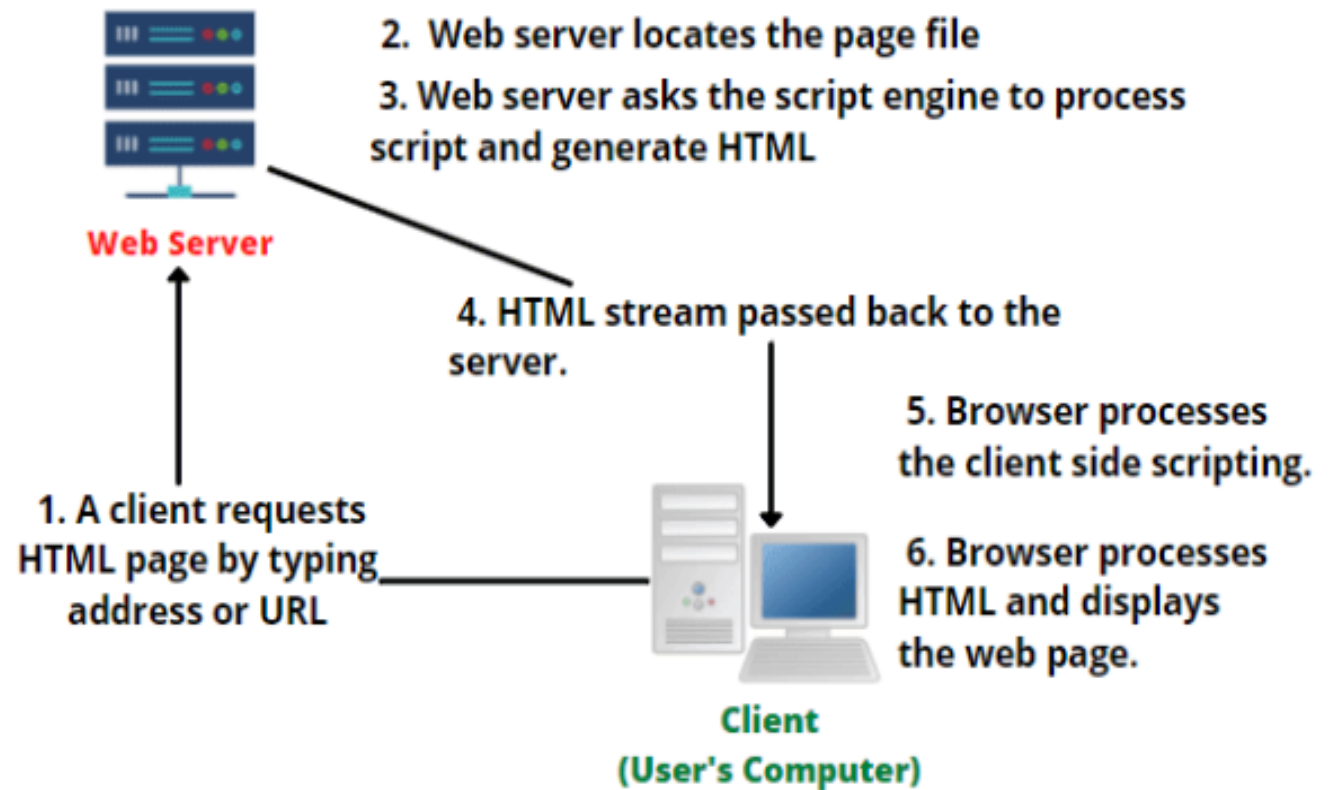
65 Minutes Thomas Kurian, Eli Collins, Amin Vahdat, Gabe Monroy, Priyanka Vergadia, Nenshad Bardoliwalla

Developing web application in a **five minutes** or **less than** that time.

What is Web Programming?

❑ Web programming involves creating dynamic websites that are interactive and user-friendly.

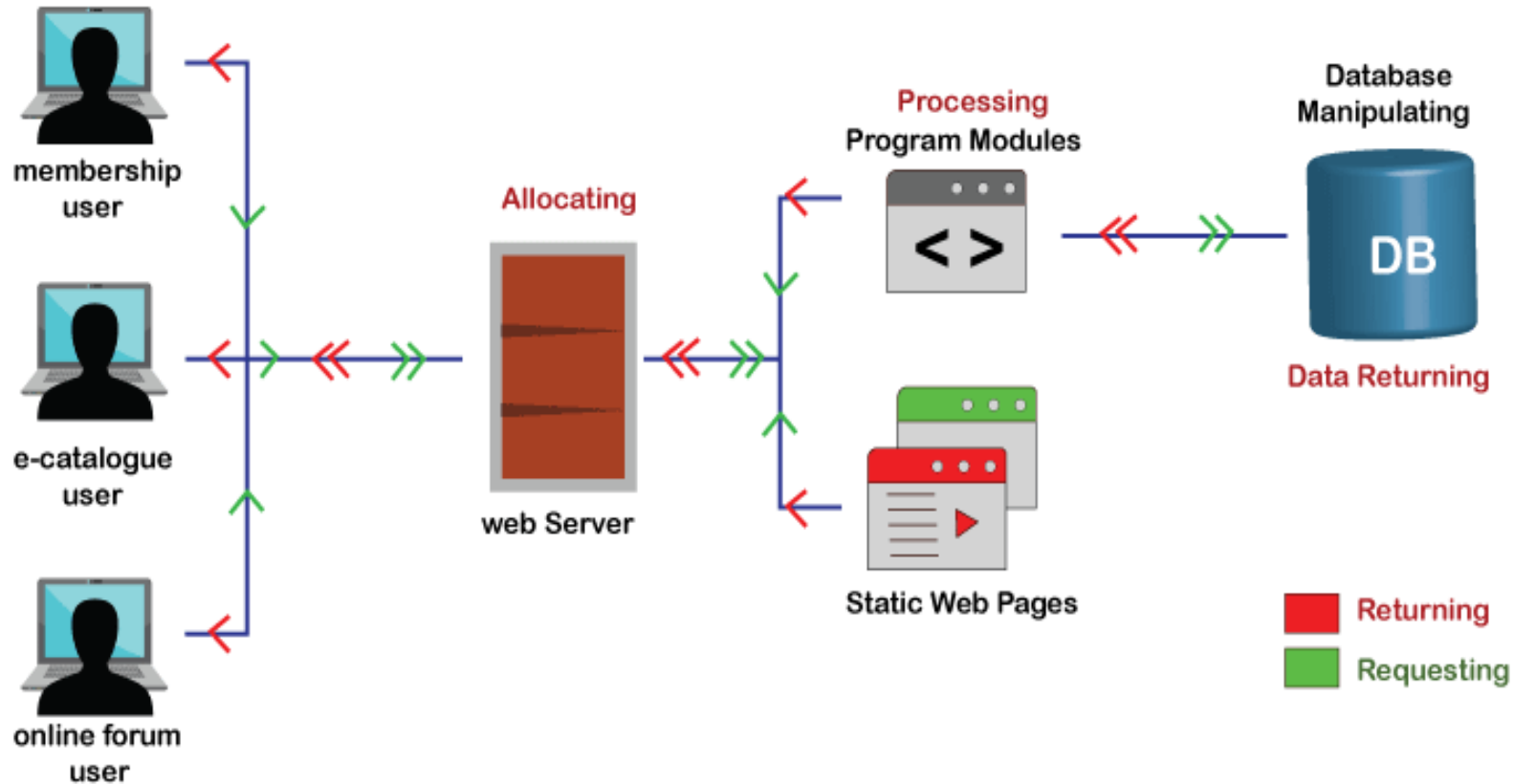
- 3 aspects of WP
- ① Client-side scripting
 - ② Server-side scripting
 - ③ Databases



What to do?

process data, display content, and interact with users.

Overview of Web Application Working



Three tier applications are a base for development of modern-day dynamic websites. It all started by having on premises servers hosting server-side scripts running on a database engine.

Architecture of Web Applications-**Frontend**

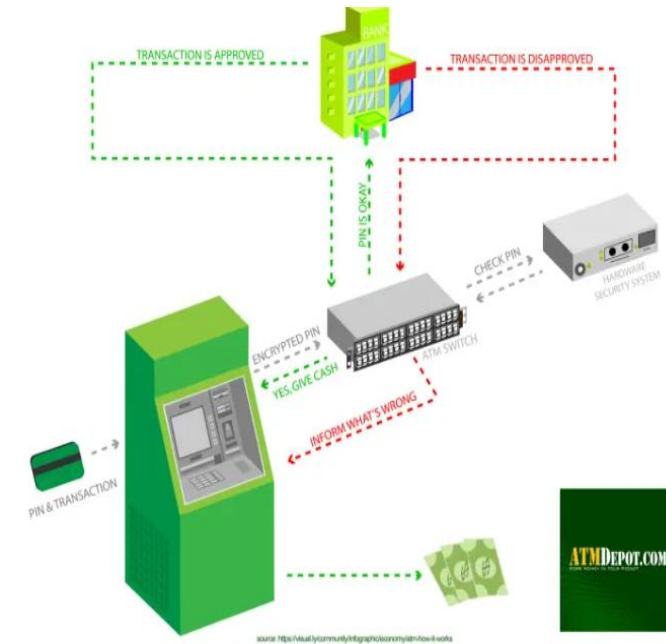
- ⌘ The frontend is the part of the website **that users can interact with**. This is where the entire customer experience takes place and where the most detailed programming takes place.
- ⌘ It's also the part that is referred to as **the interface and client side**. Multimedia files, action buttons, colours and typography are some of the aspects that can be found on this side of the web.
- ⌘ It's important that the programmer knows your needs and requirements. This way, the structure of the website and the project in general will have the right specifications and will offer the user **a more fluid and pleasant interface**.



Maybe you have heard about front-end, back-end, and full stack developer in IT job advertisements..

Architecture of Web Applications-Backend

- ❑ As a complement to the front end, the back end is the non-visible part of the website. This is the server **where the data of our portal is hosted**, so it's of utmost importance that the programmer does a good job.
- ❑ The backend is where all our data is stored, and it's the part of the site that users do not interact with directly. However, without this aspect of the page, the frontend would not be possible, so it plays **an important role in the programming of the site**.
- ❑ Both parts depend on each other to **give an optimal and complete result**, so it's important that both are well programmed. For the site to work properly, both must be in tune with each other.
- ❑ The backend is where the programming language that the programmer has chosen for your website comes into play. It's also **what hosts the code of the website** and what allows the browser to correctly read the information on the site.



Architecture of Web Applications-Database

- ❑ Holds **data** for the website.
- ❑ Can be in **structured** and **unstructured** form.
- ❑ Different **databases** in our life.
 - ❑ **Healthcare** database
 - ❑ **Crime** database
 - ❑ **University** database
 - ❑ **Disaster** database
 - ❑ **Immigration** database
 - ❑

Transaction_Details

ID	Transaction_Header_ID	Gross_Amount
5434125	4526622	-300.00
5420422	4513202	279.72
5415415	4508216	300.00
5413258	4506059	279.72
5434502	4526964	-279.72
5415438	4508239	279.72

Transaction_Headers

ID	Payment_Type_Id	GL_Date
4526622	26	2013-10-10 00:00:00.000
4513202	8	2013-10-05 00:00:00.000
4508216	1	2013-12-01 00:00:00.000
4506059	1	2013-01-01 00:00:00.000
4526964	26	2014-12-09 00:00:00.000
4508239	1	2014-12-09 00:00:00.000

Bill_Mapping

ID	Trans_ID_Dr	Trans_ID_Cr	Amount
2865991	5420422	5434125	279.72
2865992	5415415	5434125	20.28
2866486	5415438	5434502	279.72

Majors Web Applications in our Real-Life

In conclusion, web applications or website are almost everywhere.

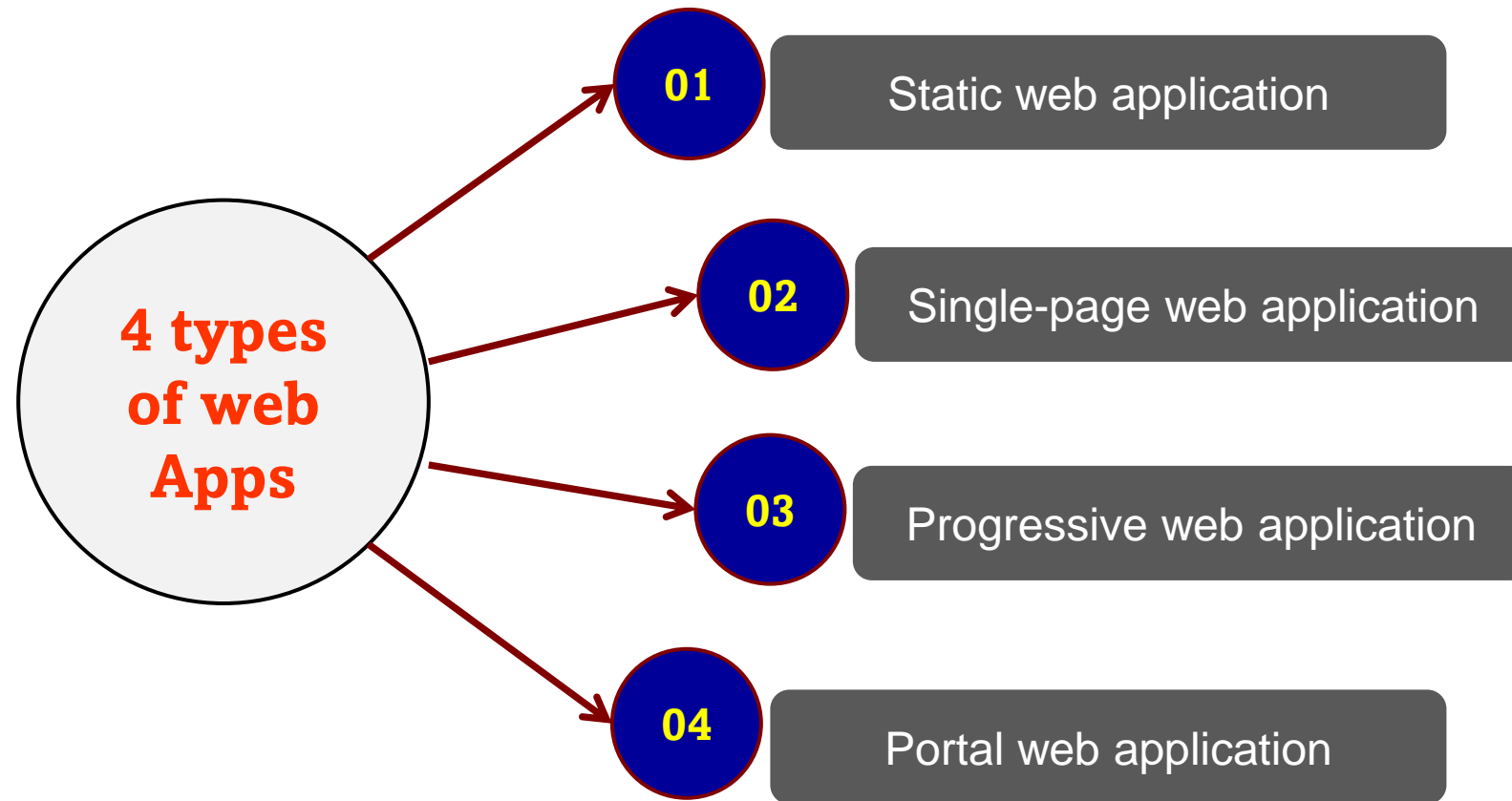
Can you name one of the best web application of modern times?



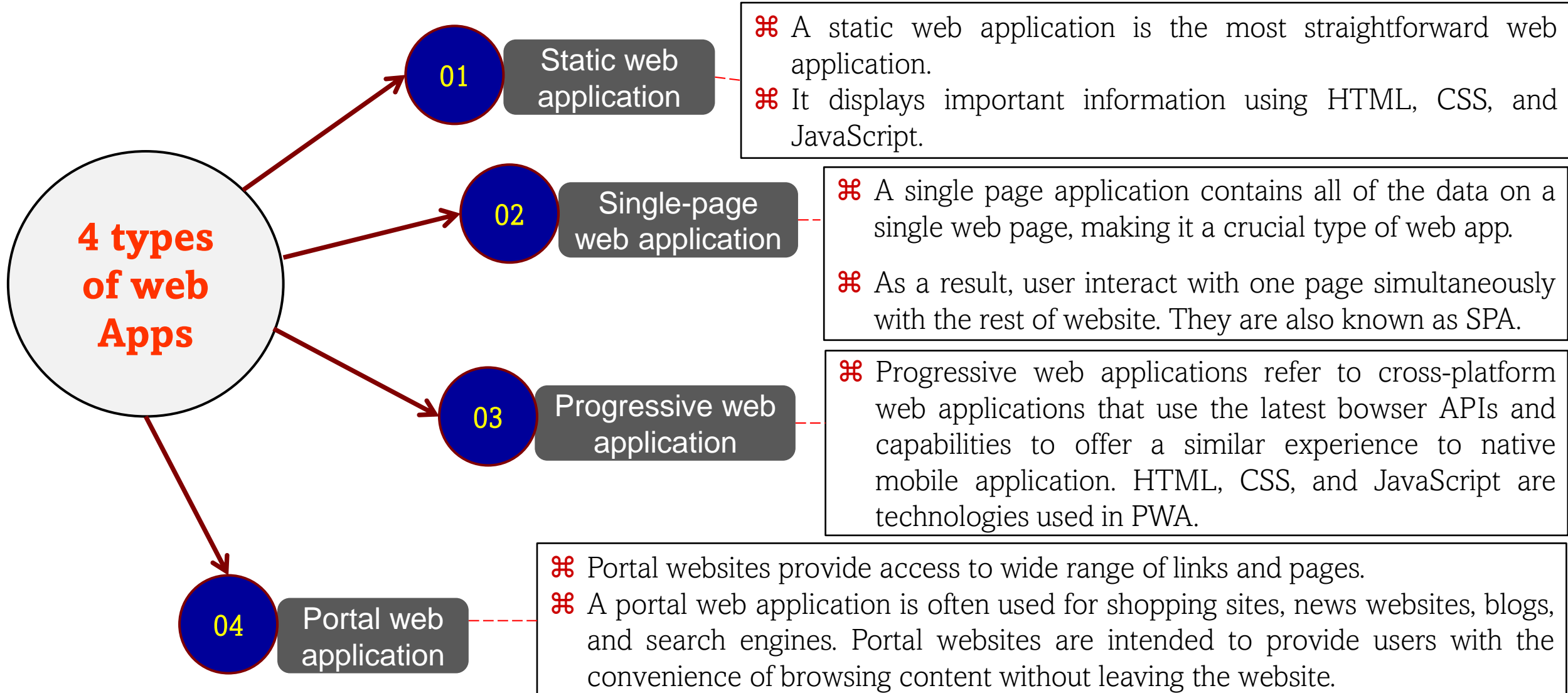
Almost each business have their website, otherwise, NO PROFIT!!!!.

✓ You must move services rather than attracting customers only.

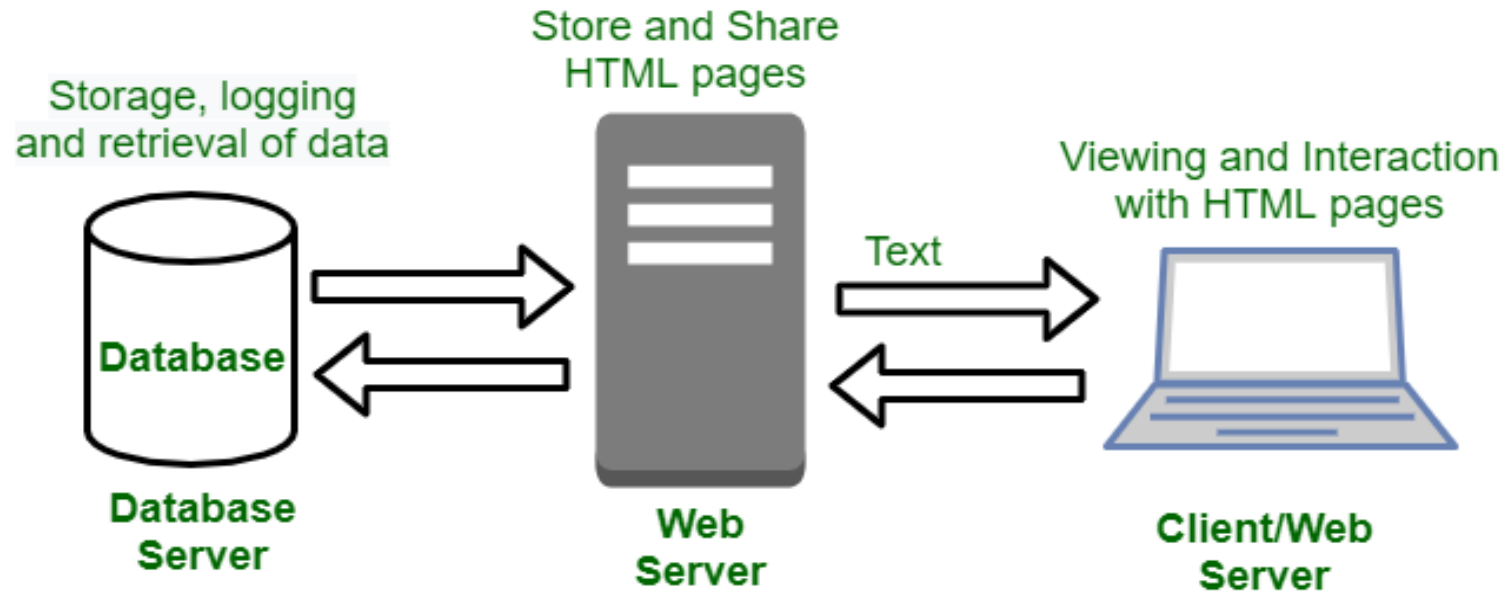
Famous Types of Web Applications



Static and Single Page- Web Applications



Web Application/Website- In Action



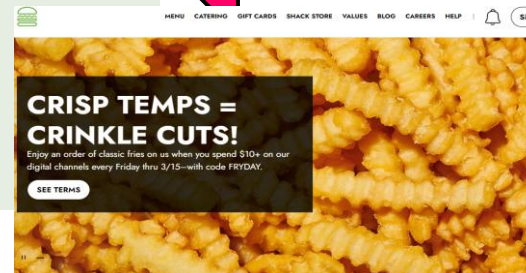
How many main components are given in the above figure?



Why to Study Web Programming?

Why Study Web Programming? (Big Picture)

In the modern era, web-based systems are almost everywhere?



Why Study Web Programming? (Reason # 1)

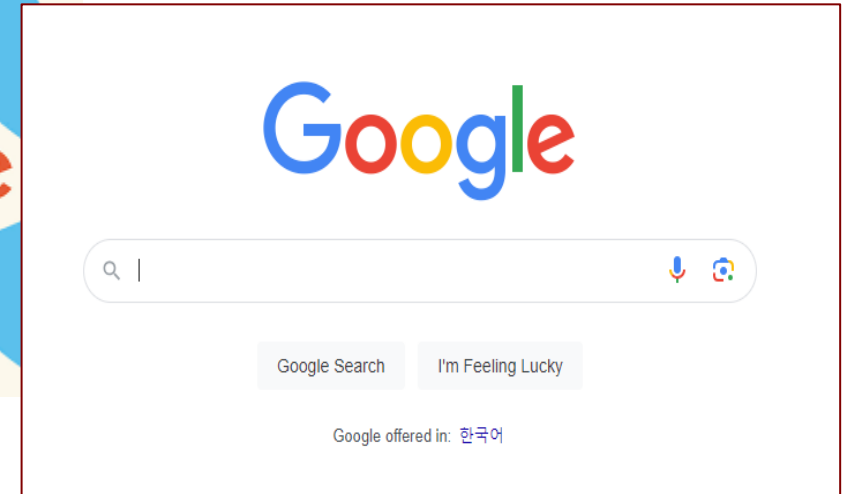


**“Google search was important
– one of the most important
applications ever on the Web.**

**People accessed everything
through a browser, and for us
it was important for making
sure we had an option there.”**

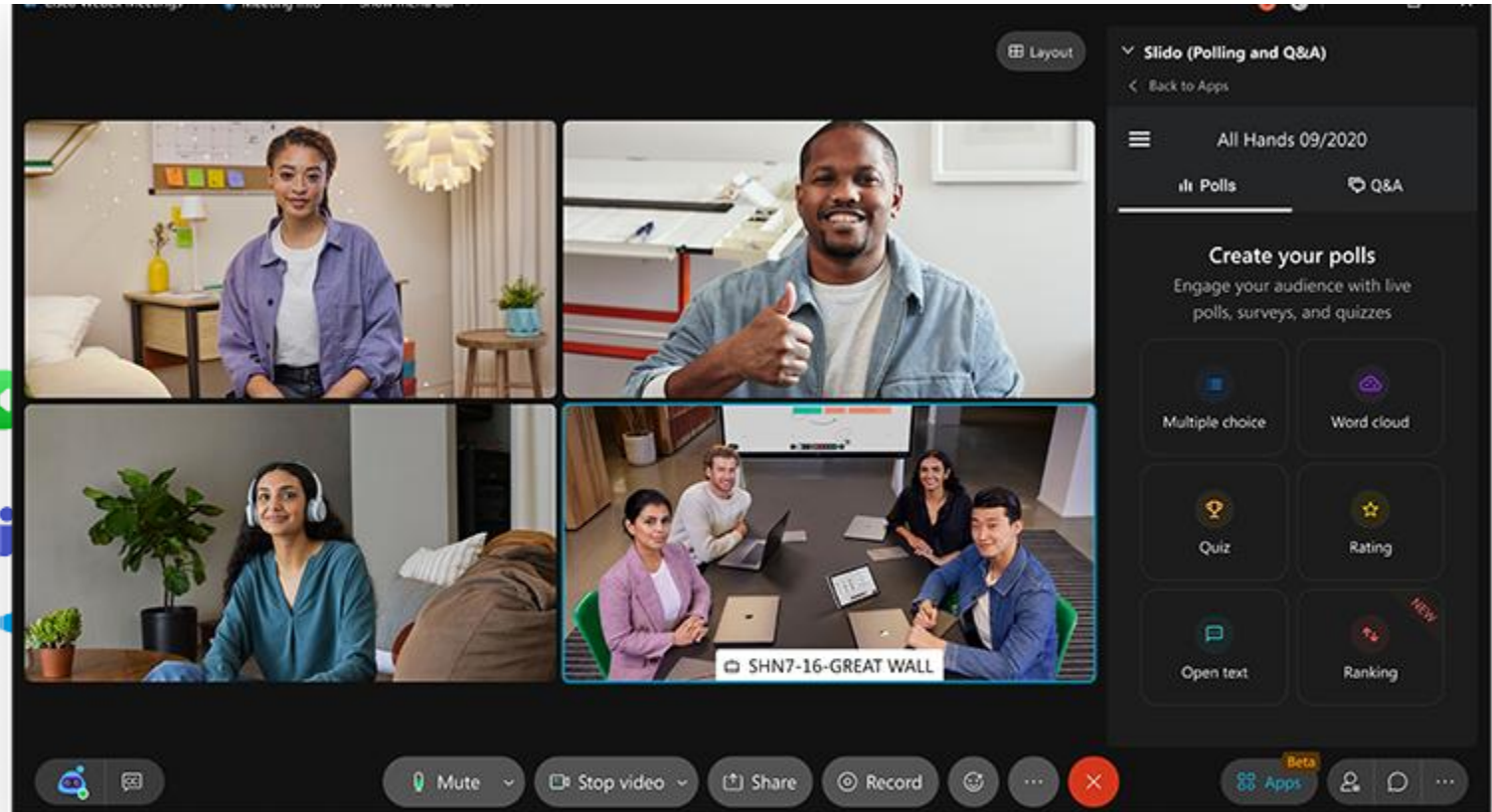
Sundar Pichai

① ㄹ One of the important thing for humanity.



Why Study Web Programming? (Reason # 2)

2 🌀 Remote Work and Mobility



Why Study Web Programming? (Reason # 3)

3 卐 E-commerce and Online Services

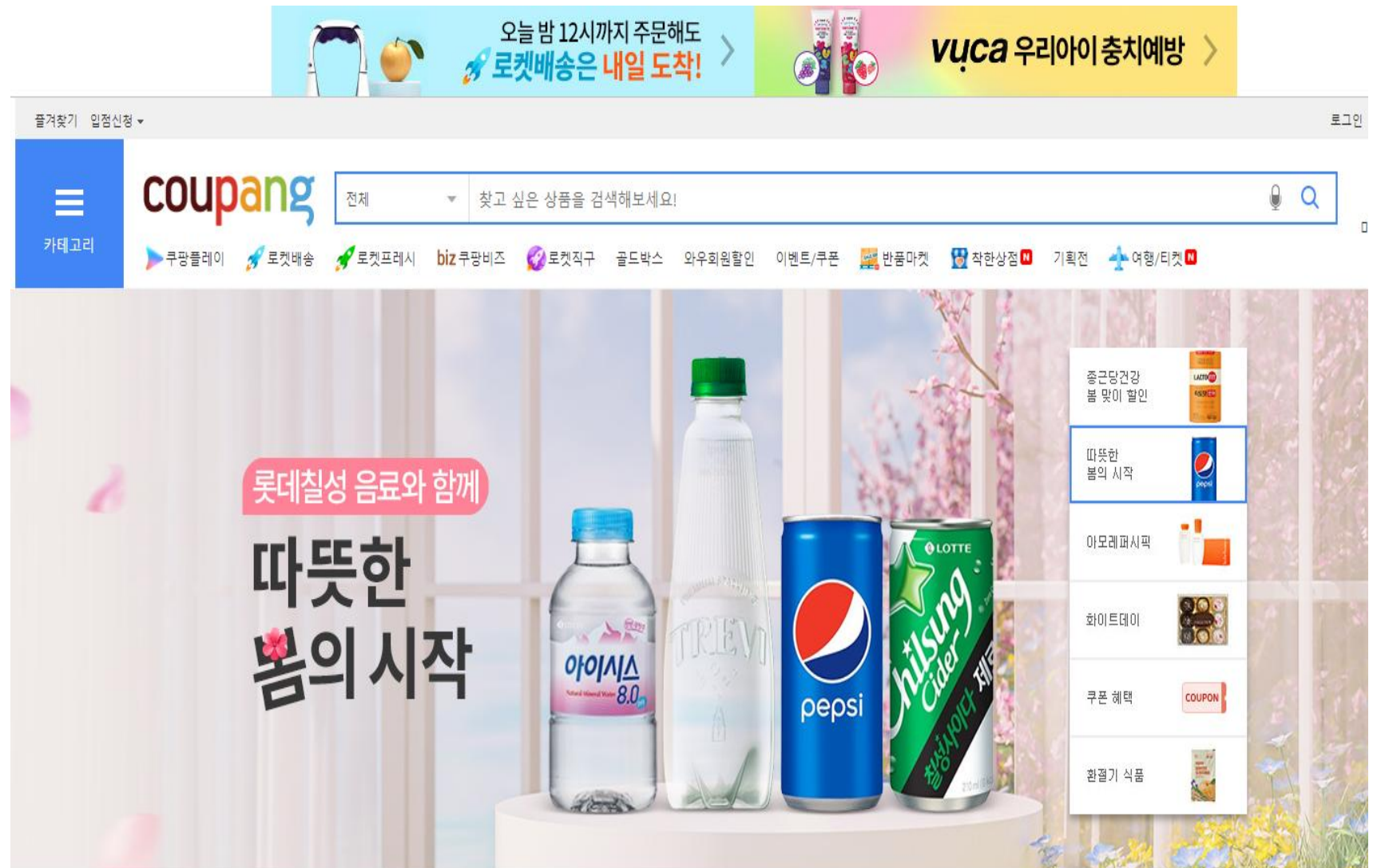


- ☐ E-Commerce helps in expanding the diameter or the reach ability of an enterprise.
- ☐ Getting a web design helps an enterprise to give a boost to its online sales.
- ☐ Gradually E-Commerce is becoming a necessity more than an additional tool for business.

Why Study Web Programming? (Reason # 4)

4

⌘ To make our life better
& Convenient!!!



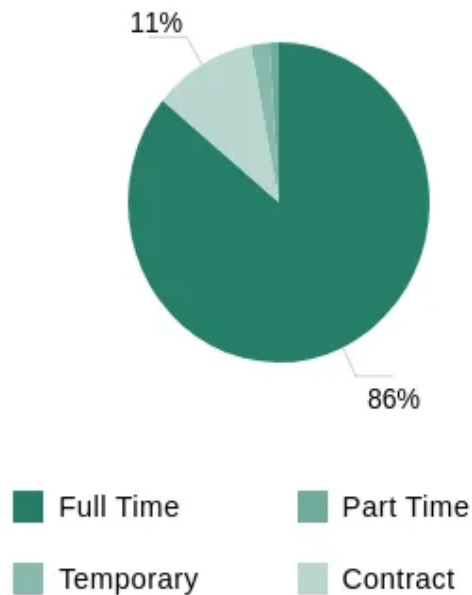
Why Study Web Programming? (Reason # 5)

5 ✂ To get a better job!!!.

✂ Market demand!!!.

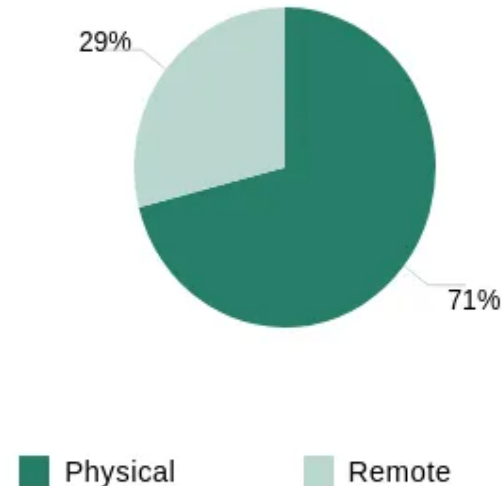
As of January 2024, there are **9,704 Backend Web Developer Job Openings** in the United States

Employment type



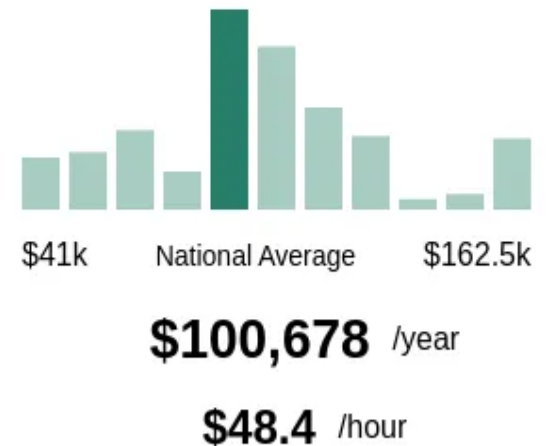
86% of Backend Web Developer Job Openings in the United States are Full Time positions.

Remote vs. In-Person



71% of Backend Web Developer Job Openings in the United States are Physical positions.

Average salary



The average yearly salary for Backend Web Developer Jobs in the United States is **\$100,678 a year**.

<https://www.ziprecruiter.com/Jobs/Backend-WEB-Developer>

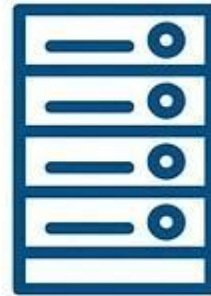
Why Study Web Programming? (Reason # 6)

- 6 ✂ Exposure to critical components and techniques of modern web development.



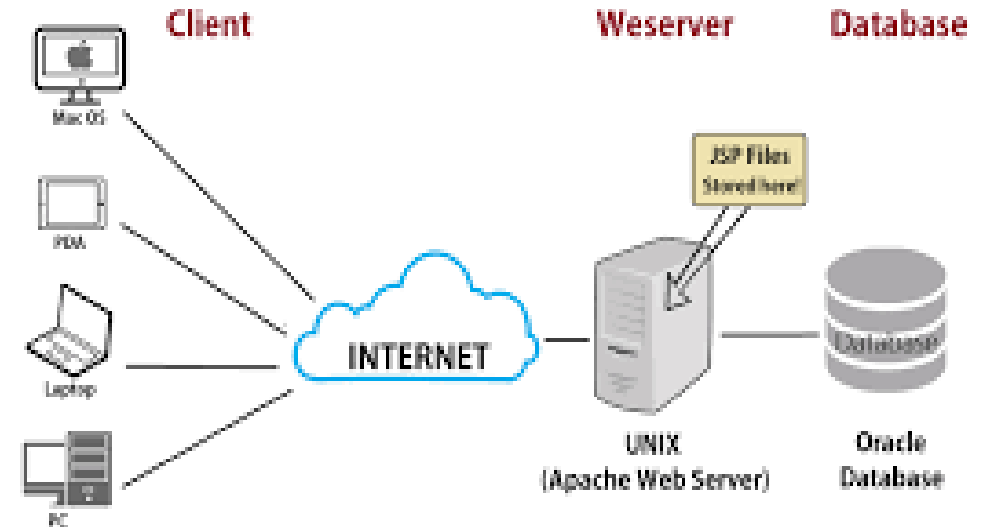
Front End

- Markup and web languages such as HTML, CSS and Javascript
- Asynchronous requests and Ajax
- Specialized web editing software
- Image editing
- Accessibility
- Cross-browser issues
- Search engine optimisation



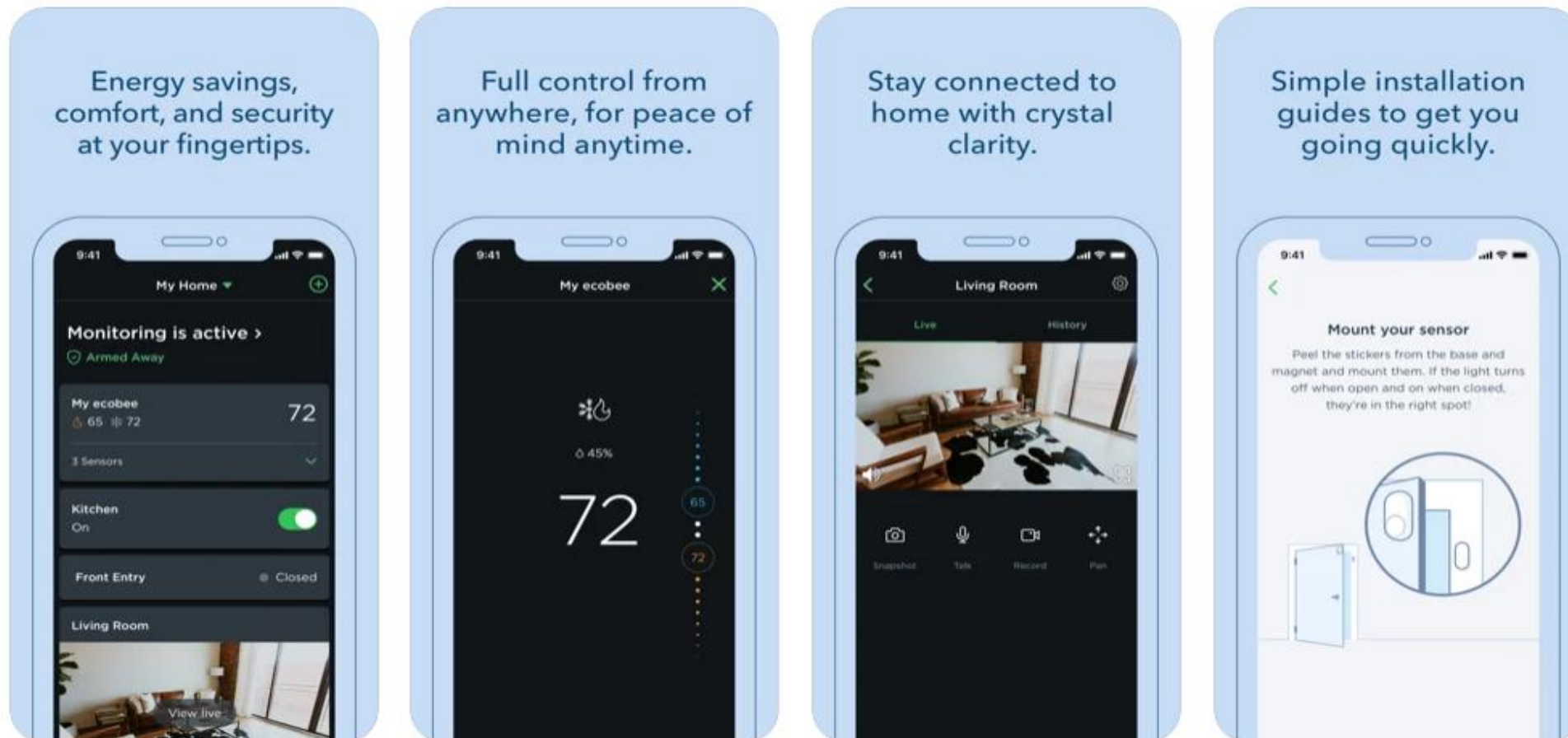
Back End

- Programming and scripting such as Python, Ruby and/or Perl
- Server architecture
- Database administration
- Scalability
- Security
- Data transformation
- Backup

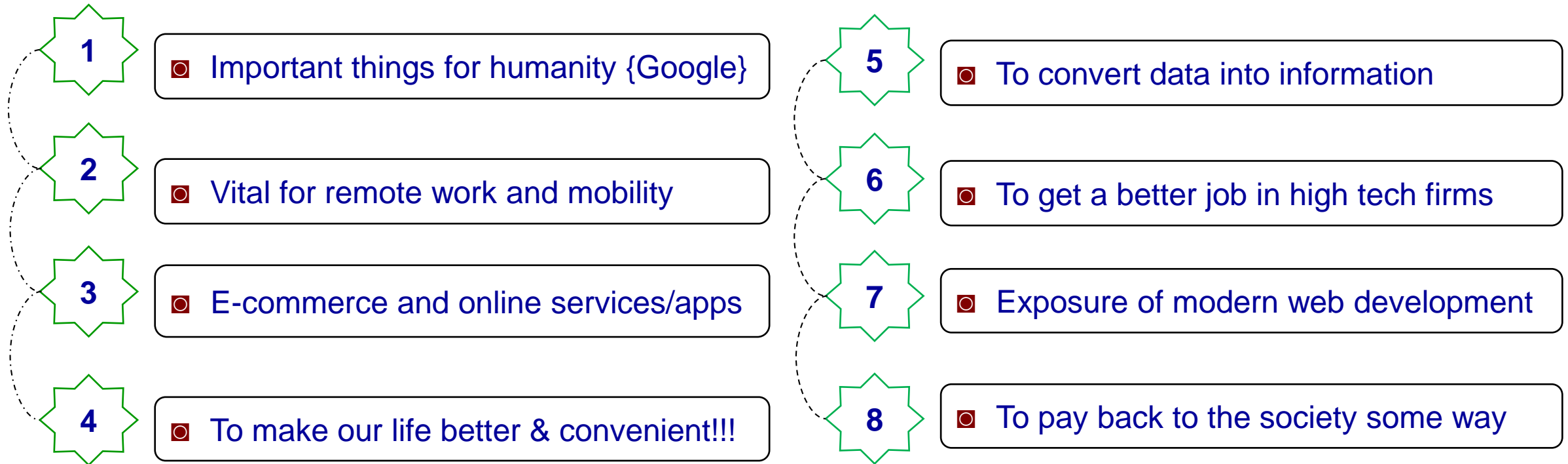


Why Study Web Programming? (Reason # 7)

7 ✂ Play some role in making web applications more accessible and usable.



Why Study Web Programming? (Summary)



In the modern era, web-based systems are almost everywhere?



Development tools for this course



Software needed for Web Database Programming

1



Notepad ++

Required software, please
install it.

2



CSS libraries, can be
downloaded latter.

3



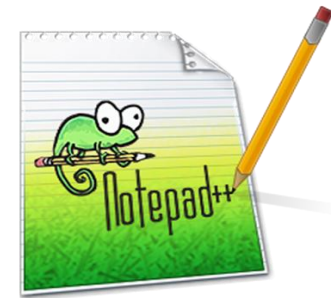
XAMP & Mongo DB,
and many others

Notepad ++ Installation

- Simple notepad can also be used.
- I recommend using notepad ++
- Download from below link
 - ▣ <https://notepad-plus-plus.org/downloads/>
- Install as you do for other software.
- It has colours so easy for coding.



Notepad++ vs Windows Notepad



```
abc.html.txt
1  <!DOCTYPE html>
2  <html>
3  <body>
4
5      <h1>Heading 1</h1>
6      <h2>Heading 2</h2>
7      <h3>Heading 3</h3>
8      <h4>Heading 4</h4>
9      <h5>Heading 5</h5>
10     <h6>Heading 6</h6>
11
12     </body>
13     </html>
```

VS

```
File Edit Format View Help
<!DOCTYPE html>
<html>
<body>

<h1>Heading 1</h1>
<h2>Heading 2</h2>
<h3>Heading 3</h3>
<h4>Heading 4</h4>
<h5>Heading 5</h5>
<h6>Heading 6</h6>

</body>
</html>
```

XAMPP installation



XAMPP is an abbreviation for **cross-platform, Apache, MySQL, PHP and Perl**, and it allows you to build WordPress site offline, on a local web server on your computer. This simple and lightweight solution works on Windows, Linux, and Mac – hence the “cross-platform”.

What is XAMP? And How to Install it?

- XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.

1- Go to the following website.

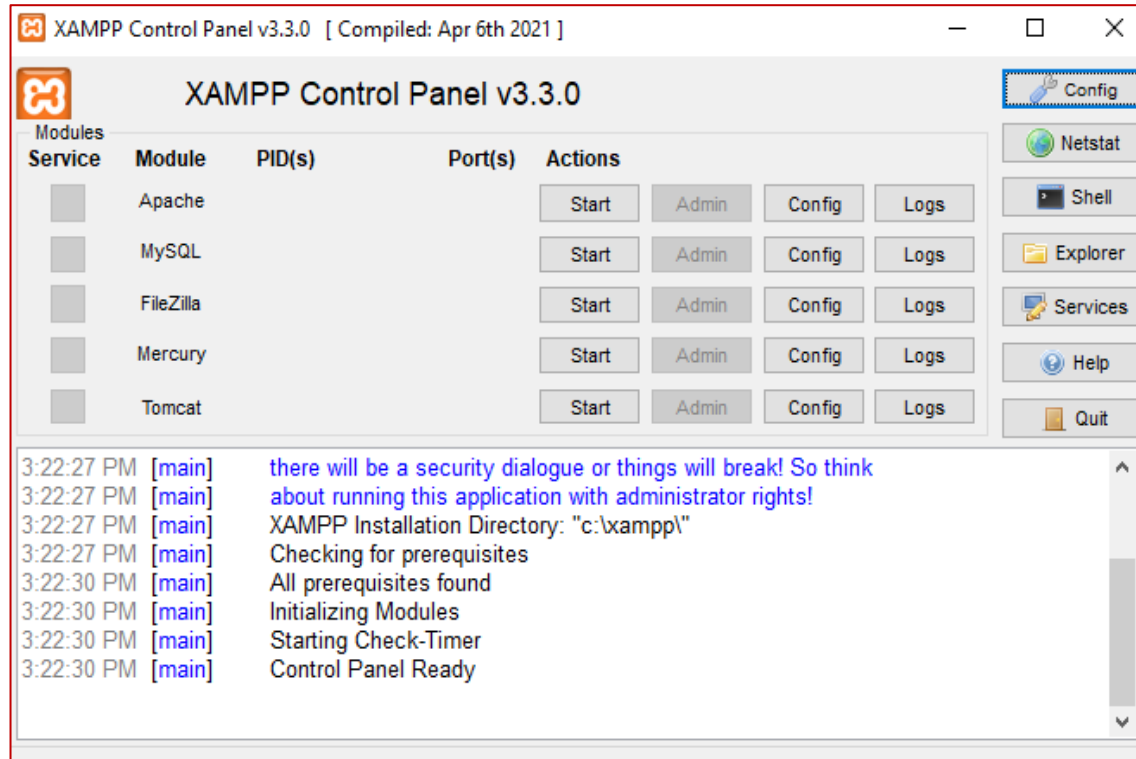
<https://www.apachefriends.org/index.html>

2- Download XAMP & Install it by double click.

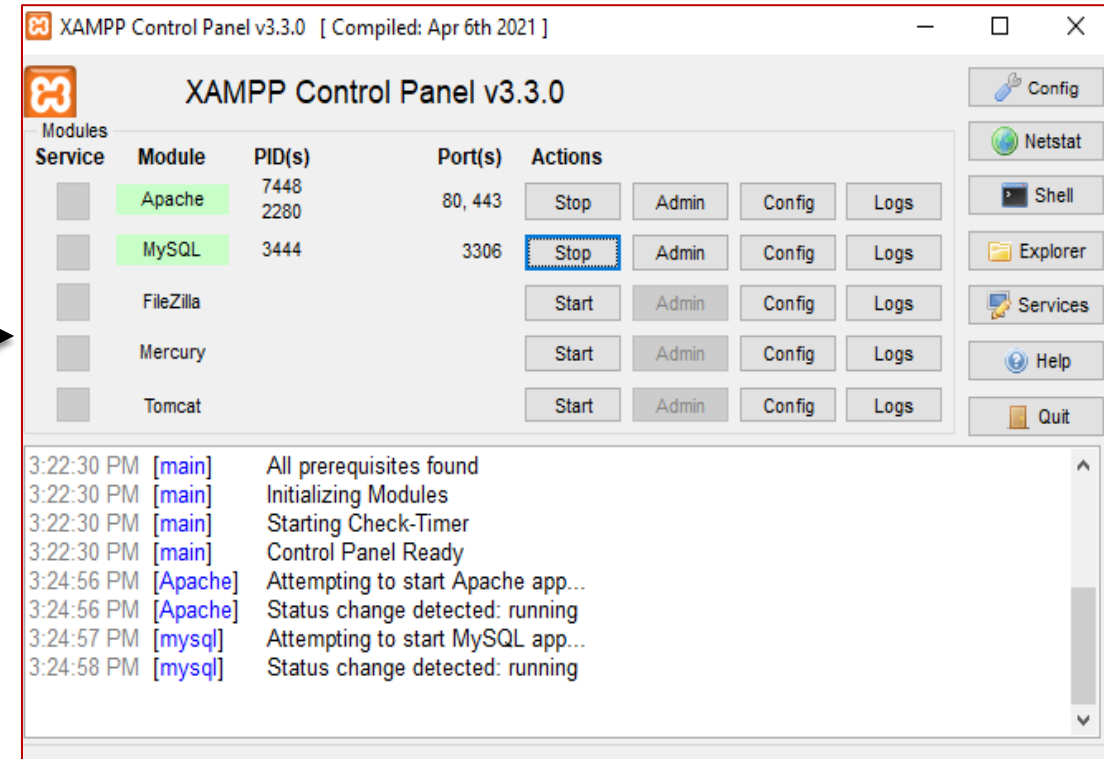
— If you set some username & password, then please remember it.

3- Open it just like any other application.

Database Overview-Click on service which you want to start.



First interface of XAMPP Software



In the above example, I started Apache & MySQL.

Homework! First week

Homework 1. Get **Notepad++** and **XAMP** on your computer.
Spend some time perusing the course lecture notes.
Look at course information, resources, links, etc.

Week # 1 Lectures Summary

- Part I: Introduction to Web programming course

- Course Contents & Evaluation criteria of this course
- Goals/learning-outcomes of this course
- Assumed Background

- Part II: Basic concepts and definitions

- Basic Definition
- Types of Web applications
- Architecture of Web Programming
- Promising Applications

- Part III: Why study Web Programming?

- Web-based systems are everywhere
- To satisfy humanity needs
- To understanding working of web-based systems
- To get a better job.
- To get to know about advanced programming concepts used in web development
- Etc

- Part IV: Software Installation for Web Programming Course

- Notepad++
- XAMP



Ways to succeed in this course!!!.

Here are a few tips to help you succeed and manage the difficulty:

1. **Start with the Basics:** Ensure you have a solid understanding of the foundational languages like HTML, CSS, and JavaScript. These are the building blocks of web development.
2. **Practice Regularly:** Programming is a skill that improves with practice. Work on coding exercises, projects, and challenges regularly to reinforce your learning.
3. **Ask for Help:** Don't hesitate to seek help when you encounter difficulties. Utilize forums, online communities, and any support resources provided by the course.
4. **Break it Down:** Break down complex problems into smaller, more manageable tasks. Tackling one step at a time can make the overall process less overwhelming.
5. **Collaborate:** If possible, collaborate with peers. Learning from others, sharing ideas, and working on group projects can enhance your understanding and make the learning experience more enjoyable.
6. **Stay Persistent:** It's normal to face challenges, but persistence is key. Keep a positive mindset, and don't be discouraged by initial difficulties.



- Be curious about engineering and theory behind website development.
- Know the working of code, not memorize it.
- Get code, understand code, execute code, modify codes, and assemble code for new applications
- Solve assignments by yourself; if you take it from other sources, understand it