Unit-3 Front End Technologies

Q1] What is a web framework? Give the reasons for using web framework.

→ • A Web framework is a software tool or platform that helps in building web application easily.
• It provides the pre-written codes, libraries & tools so that developers dont need to write everything from ~~begin~~ scratch.
• Web framework may be written in different languages and different methodologies. The term 'stack' is used to refer to the collection of different languages, software & framework.

Why Web framework?

1] Saves Time → The most important feature of web framework is that it saves time and energy that means the developer dont have to write the code from beggining & ~~the~~ dont need to worry about session handling it is done by Web framework.

2] Well organised app → The Web framework itself takes ~~the~~ care of managing directories & files. This make complete application well organized.

3] Flexibility & customizable: Developer can add-on things as he/she wish to. eg - adding plugins, themes, widges. This brings out a lot of flexibility in code development.

4] Code reusability : framework also promotes the reuse of code

5] Faster Development → pre written codes & Libraries leads to faster development.

6] Security • Web framework makes sure that the application uses good security measurements because framework itself takes care of it

7] Scalability → • One can add their own features acc. to need.
• Supports building small-to-large appl

Q List and explain features of popular web frameworks.

→ Various web frameworks are

1] Bootstrap → • It is Build By Twitter
- Easy to learn & looks professional
- Predefine UI components.
- Use Grid System → 12-column layout.
- Difficult to customize components.
- Customizable Theme → Easy to change colour & fonts.
- Frontend framework

2] Angular
- Build by Google
- Encourage reusability
- Code is divided into Blocks
- Improves application scalability
- Well supported
- Frontend framework

3] React
- Build by facebook.
- Bundles frontend code into components.
- Organizes code & data to make code more reusables.
- Allows writing HTML like ~~co~~ syntax in JS code.
- Frontend library

4] Express
- Uses JS
- very customizable
- very lightweight
- Less build-in features
- Help creating backend APIs for frontend apps.
- Backend web framework

5] Django
- Backend framework for python.
- Secure by Default
- Seperates UI & Data.
- Rapid development.

Q] What is MVC ? Explain MVC architecture in details

→ MVC stands for Model, View & Controller, It is a architectural framework used for developing UI.

MVC architecture.

1] Model

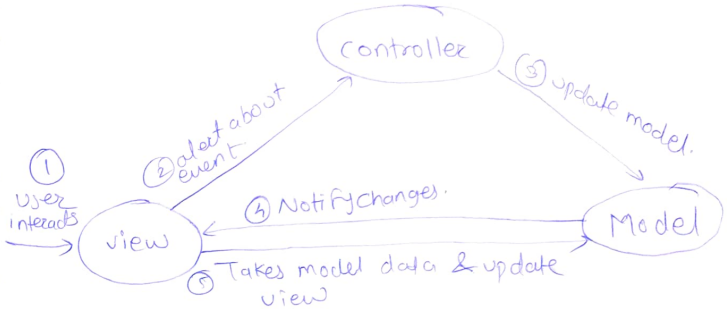
- This part of the architecture is responsible for managing the application data.
- This module responds to the request made by view. The model give instruction to controller to update when the response is made.
- It represents data, buisness logic & rules of the application
- It notifies the view whenever there is any change in data.

2] View :

- This part takes care of ~~presenting~~ presentation the data.
- It represent the user Interface of application
- It displays data taken from the model.
- It updates automatically when model data changes.

3] Controller

- Acts as a bridge between model & view
- It handles the user inputs.
- The controler takes the input from view, process it, & updates the model



- Model represents the data
- View is the user interface
- Controller is the request handler.

Advantages of MVC

- Seperates UI, data & logic
- Improves maintainability & testability
- Reusability of components.
- Easily changing UI without changing buisness logic

Q] What is typescript ? Give the advantages & disadvantages of typescript.

→ ◦ Typescript is the programming language developed & maintained by Microsoft.

◦ Typescript is superset of Javascript code. Any javascript code which is valid also becomes valid in Typescript.

◦ Typescript extends JS by adding data types, classes & other object-oriented feature with spelling check.

◦ The typescript compiles plain javascript code.

◦ Type script may be used to develop Javascript application for both client side and Server side execution.

Features of Typescript

1] Portability → Typescript is a portable because it can be executed on any browser or OS.

2] Javascript → The code written in Javascript with valid .js extension can be converted to Typescript by simply changing the extension from .js to .ts.

3] Static Type checking → Type checking at compile.

4] Libraries Support → we can use all JS libraries

5] Support of oop

6] Client & server side development → TS supports both cs & ss programming

Advantages

1] Easy error detection at runtime

2] It runs on any browser.

3] Open sourse language with continous development

4] Supports latest JS features.

5] Strong Community & Microsoft support.

Disadvantages

1) Does not support obstract classes.

2) Takes a time to compile code.

3] Web browser do not understand Typescript code. If we wan to run the typescript code on web we must first compile it. After compilation we can see the Typescript code running in Web browser.

Q] Write sample application in Typescript to demonstrate the use of modules.

→ The module is used to set code written in Typescript. The Module can be defined in a separate .ts file which can contain functions, classes & interfaces.

- You can import code from one file into another using import keyword.

Example

Step1 We will create, calculator.js is a module. which contain Classname Addition. This class is prefixed with keyword export.

Calculator.js

```
export class Addition{
    a:number;
    b:number;
    Constructor(a:number, b:number){
        this.a=a;
        this.b=b;
    }
    display(){
        console.log("Addition:"+(this.a+this.b));
    }
}
```

- The above class contain two variable a&b and one function display()

Step2 Creat JS file for importing the class created above.

syntax →

```
import {exportname} from "file path with extension";
```

app.ts

```
import {Addition} from './calculator';
let obj= new Addition(100,200);
obj.display();
```

Q] What is Angular? List & explain its feature.

→ - Angular is JS framework used to build Single page Applications (SPAs)

- Single Page Applications is type of web application that dynamically updates the current page without reloading whole page.
- It provideos users with Fast, smooth & interactive experience, similar to a desktop application.
- Angular application are built using HTML for structure & Typescript for logical.
- Angular is completely component-based, which means the entire application is made up of small, reusable parts called components.

Features of Angular

1) support for multiple platforms
2) High speed web applications.
3) Typescript support
4) component-Based Architecture.
5) Testing Support.
6) Dynamic Development
7) full stack development.

Q3] Diff^ce bet^n functional & class component

Point	functional component	Class component.
1) Definition	made using normal f^n	made using class
2) Syntax	Uses f^ or arrow f^	Uses class React.component.
3) this Keyword	Do not uses this keyword	Uses this keyword
4) State Handling	Uses React Hooks like useState()	Uses this.state().
5) Code Simplicity	Short & easy to write.	Longer & more complex code.
6) Performance	Better than class	Lower than functional.
7) render()	There is no need of render() method	There is render() method used.
8) Constructor	Constructor are not used	Constructor are used.

Q] List & explain different type of structural directives in Angular

→ • Structural directives are angular directives that change structure of the Dom i.e adding or removing element from the HTML page.
- They are prefixed with a * (asterisk)
- common structural directives are *ngIf, *ngFor, *ngSwitch.

1) *ngIf → • It is used to display or hide an element based on condition.
- If condition is true element is shown, if false element is removed from the Dom.

Syntax: `<div *ngIf="isLoggedin">Welcome, user1 </div>`
- if isLogged in true, the <div will appear>
- else will be removed completely from the page

2] *ngFor:
- It is used to loop through a list and create repeated HTML element for each item

`<li *ngFor="let item of items">{{item}}</li>`

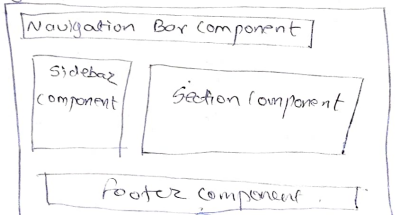
3] *ngSwitch
- used to display one element from many options.

```
<div [ngSwitch]="fruit">
  <div *ngSwitchCase="'Apple'">You chose Apple</div>
  <div *ngSwitchCase="'Banana'">You choose Banana</div>
  <div *ngSwitchDefault>Choose a fruit</div>
</div>
```

- Based on value of fruit, one of the class will be shown
- else default will be shown.

Q] Give the sample layout of the Angular application with multiple components. Explain how to create and use the components in angular.

→ • Components are basic building blocks element of Angular.
- Each component consists of
  - HTML template that define structure
  - Typescript class that define behavior
  - A css selector that define how the component is used in template.
- Angular app contains multiple components. It can be viewed as follow



eg

① 1) Header component
2) Home Component
3) Footer Component.

② Application Layout

~~<app-header>~~

Welcome to my Website ⟶ Header

This is Home page ⟶ Home

③ 2025 my website ⟶ Footer

Steps to create

① ng ~~New~~ new MyApp
cd myApp

② ng generate component header
ng generate component footer
ng generate component home.

③ Add simple html.

header.component.html:

<h1> welcome to my website </h1>

~~h~~ Home.component.html

 This is home Page

footer.component.html

@2025 my website

Step 4 Use components in App HTML

app.component.html

<app-header></app-header>
<app-home></app-home>
<app-footer></app-footer>

Step 5 final O/p

welcome to my website

This is Home page.

@2025 My website.

Q] Explain event binding & property binding in

→ • Data Binding is the connection between HTML & Typescript
• It helps to send data from component to template or from template to component & from component to template.

There are two types

1] Property Binding

• Property Binding is a binding in which we can set the properties of the element to UI page
• In this binding [] is used for data binding

Syntax :→

[element property] = "ComponentProperty"

eg

in app.component.ts

```
export class Appcomponent {
}   imageurl = 'https://example.com/logo.png';
```

In appcomponent.html

```
<img [src] = "imageurl" >
```

→ The image will be loaded using imageURL

2] Event Binding.

• Event Binding is used to handle user actions, like Click, Keypress, etc
• It uses round brackets ()

Syntax

(event name) = "methodName()"

In appcomponent.ts

```
export class Appcomponent {
    showmessage() {
    } alert("Button clicked")
}
```

In app.component.html

```
<button (click) = "showmessage()" > Clickme </button>
```

→ When button is clicked it shows an alert message

8] Explain redux architecture in detail

→ Redux is a Javascript library which can be used with react applications for state management.

- For creating UI React uses Redux.

Redux works on following core components:

1] Action

- An action is a simple JS object
- It tells Redux what happened in the app
- Action in Redux ~~use~~ represent work being done. The action can be fetching user data, loggin the user in and so on.

2] Reducer

- The Reducer determines how state should change.
- It does not modify original state.

3] Store:

- The store is a central place where the whole state of the app is stored.
- There is only one store in Redux app
- Developers can access & update the store with the help of various method.

4] Middleware

- Middleware is a function that runs between dispatching an action & the reducer
- It gives more control over action processing
- It is used to handle asynchronous code between action & reducers.

9] Explain different types of hooks in ReactJS.

→ • Hooks were added in React in Version 16.8

- Hooks allows to write clean, reusable & readable code.
- Hooks allows the function components to have access to state & other React feature hence no need of class component.

Rules of hooks

1) Only call hook at top level
2) Only call the hooks for React function.
3) Hooks can not be conditional.

Types of hooks

1] useState()

- Used to add state in functional component.

eg:

```
const [count, setCount] = useState(0);
```

2] UseEffect() hook

- The use effect hook allows to run side effects.
- The side effects can be API calls, timers, etc.
- UseEffect runs on every render (Display)

1] When there is no dependency

```
useEffect(() => {
    //Runs on every render
});
```

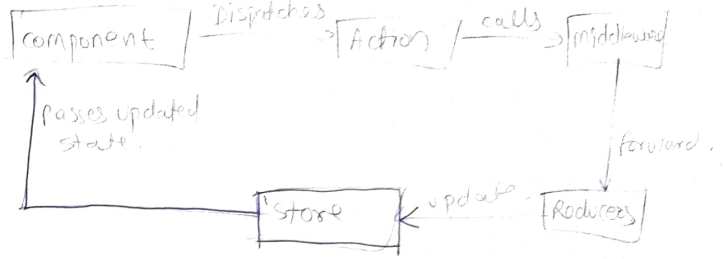
2] To run on first Render

```
useEffect(() => {
    //Runs on first render
}, []);
```

3] render with the state value.

```
useEffect(() => {
    //Runs on first render
    // value changes
}, [state]);
```

Diagram of redux architecture.



8] Typescript program for finding max min number

→

```
function findMaxMin(numbers: number[]): void {
    let max = numbers[0];
    let min = numbers[0];

    for(let i=1; i<number.length; i++){
      if(numbers[i]>max){
        max=numbers[i];
      }
      if(numbers[i]<min){
        min=numbers[i];
      }
    }

    console.log("max number is", max);
    console.log("min num is", min);
}

const myArray: number[] = [25,78,12,45,6,89,33];
findMaxMin(myArray);
```

O/P Max number is 89
min number is 6.

Unit-6 Web application Development

Q] What is cloud Computing? what are the benefits of cloud computing?

→ • Cloud Computing means storing & using data over internet instead of computer.

• One can access it from anywhere, anytime using the internet.

• Cloud computing is one of the ~~be~~ most usable services in IT services. where we can use this service for various operation.

• It makes the faster accessibility of the IT resources for the development & deployment of any kind of project.

• Users can access cloud services, usually by paying as per ~~user~~ usage.

Benefits of Cloud Computing are

1) • Cost Saving
   • Pay only for what you use

2) • Scalability

3) Performance Speed

4) Reliability

5) Security

6) Accessibility

7] Data Backup & Recovery

Q] What is AWS cloud? List different services provided by it. Explain any two in details.

→ • AWS Stands for Amazon Web services which is cloud platform offering over 200 fully-feature services.
- It is leading CC platform
- With AWS cloud we can deliver the project on cloud IT infrastructure.
- It has more functionality for storage, delivery, networking, database, software etc.
- It is more secure cloud platform on comparision with other cloud platform.
- Aws has the largest community of customers & developers for support.

AWS services

- Storage
- S3
- ~~EEC~~ EC2
- Database services
- Security services
- Analytics
- Mobile services
- IOT

Q] What is EC2 service? Explain steps to deploy website on EC2

→ • EC2 is a virtual machine ~~to~~ with an OS & hardware component that you want to use
- EC2 Stands for Elastic compute Cloud.
- It is cloud-based virtual server provided by AWS
- EC2 is used to run application or website in the cloud.
- You can choose your own OS, CPU, memory, & storage.
- EC2 allows us to build and run application faster
- You can use EC2 in AWS to lauch as many virtual servers as you need.

Steps to deploy website on EC2

Step1 → Connect server with PUTTY

Step2 → Update Ubuntu instance.

Step3 → Install Apache 2.

Step4 → Go back to your instances page & click on 'Launch-wizard-1' under security groups

Step5 → Go to Inbound & click on Edit inbound rules

Step6 : Add an HTTP rule with source as 'Anywhere —IPV4' & save the rule.

Step7 → On your browser, use your public IP address put it in the URL box & run

Step8 → You can create ~~create~~ your HTML page or upload your code with Github in ~~the~~ the /var/www/html folder.

Q] What is PuTTy? How to connect EC2 instance with PuTTy?

→
- PuTTy is free and open source network file transfer application.
- It is used to remotely connect to server like AWS EC2 instances.
- Mainly used in windows operating System
- Supports SSH, Telnet, SCP, socket connection.
- It can also connect to a serial port.

Steps to connect EC2 instance with PuTTy

Step1 → Download puttygen for creating .ppk file as putty doesn't accept .pem file generated by AWS

Step2 → Convert your .pem file to .ppk file using PuttyGen. Load your .pem file generated by AWS Then save the .ppk file.

Step3 → Open putty, Add your IP, Add User name. Add .ppk file. Click Open. Give the ip address or the host name. Then give user name for the instance for linux its generally "ec2-user"

Step4 → Click open

Q] What is elastic load balancer & explain its working,

→
- Every application needs good efficiency, performance & availability
- The network traffic & load on single server decrease the efficiency, performance & availability of an application.
- Elastic load balancer or ELB is a service provided by Aws to distribute the incomming traffic across multiple servers or clusters.
- The ELB increases the availability & fault tolerance of an application.
- Work load is distributed across multiple resources, such as virtual machine or virtual server.

Working of ELB

1) User request :
- User opens website or send request to your app

2) Load Balancer receive Request
- ELB receives this request first instead of the EC2 instance.

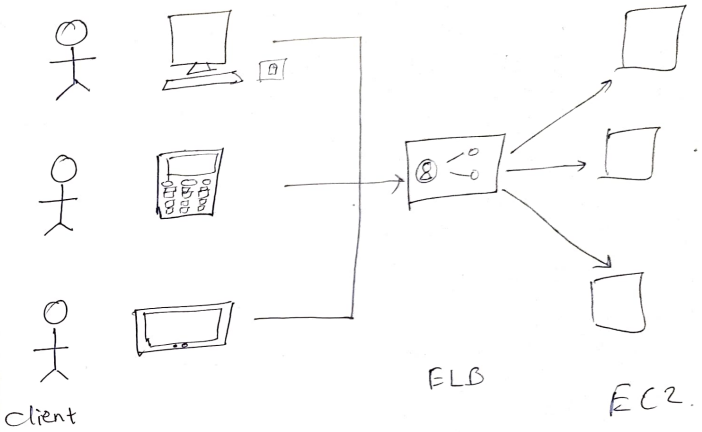
3) Health Check

ELB check which EC2 are healthy & running properly. If the request found unhealthy. then it will stop redirecting until it is declared healthy.

4). Traffic Distribution
- ELB forward the request to one of the healthy EC2 instances.

5) Response to user
- The instance process the request & send the result back to the user.

6) Automatic scaling
- ELB works well with auto scaling. If more traffic comes then new instances are added automatically & ELB manages them



Q] Explain types of elastic Load balancer.

→ 1] Classic load balancer (CLB)
- It is traditional load balancer that is used initially
- The CLB in AWS is used on EC2-classic instance.
- This is previous generation load balancer & does not supports host-based or path-based routing.
- It reduces efficiency & performance in some situations.

2] Network Load Balancer

- Network Load Balancer in AWS takes routing decision ~~in TCP/UDP~~ at transport layer (TCP/UDP)
- It is best for TCP/UDP traffic that needs high performance with low latency
- It can handle millions of request per second.
- Supports Static IP & Elastic IP.

3] Application load balancer

- An application load balancer in AWS makes routing ~~p~~decision at application layer (HTTP/HTTPS) thus the named as ALB
- ALB supports path-based & host based routing
- It can direct the traffic to different services

Q] What is AWS VPC? What are different Components of AWS VPC?

→ AWS provides security to servers with its services

- VPC stands for Virtual private cloud that provides security levels on the AWS services that you are using
- VPC gives you full control over routing ~~protocol~~ traffic
- It is virtual network inside AWS that allows you to launch resources like EC2, RDS, ~~etc~~ databases, etc..
- It gives all features of traditional network that you have for your own data center
- Resources and applications are accessed through IPV4 & IPV6 in your AWS VPC

Different Components of VPC?

- **Subnet** → • Subnet is similar part of VPC
  - It allows you to organize resources.
  - Two Types Public & private Subnet.
    - Public → access internet
    - private → Do not have direct access to internet
- **Internet Gateway** → It is connection to utilize public Internet
- **NAT Gateway** → NAT stands for: Network Access Transaction that allows private subnet to access internet.
- **Virtual private gateway** → It connects your VPC to your company's data center or private network using a VPN
  - It supports secure connection using encryption.

- Peering Connection → • It connects two different VPCs, even across AWS account.
- It dont required internet or VPN.

- VPC endpoints → • Used to connect privately for your service in AWS without using an Internet Gateway, VPN, Network Address Translation (NAT).

- Egress-only internet Gateway → ~~Used~~ It is special type ~~of no~~ of IG used only for IPV6 traffic
- It allows to send private subnet instance on internet but block incoming traffic from internet.

Q] Explain any three storage services.

→ 1] Simple Storage Service (S3).

1) It is an object storage type service that store any type of data or any size of data.
2) It is used for web application, Mobile applications, analytics & backup services.
3) With S3 we can create, rename, delete folder with the help of web-based file explorer.
4) AWS provides 99.99% durability to deliver data to end-users

- It provides three types of encryption using server-side encryption and client-side encryption

2) Amazon S3 glacier

- It is an object storage type
- It is used for long-term data storage.
- It also provides encryption on data for security.
- Stores data as object in bucket
- It allows running queries & analytics on it directly
- It provids 99% durability.

3] Elastic Block Storage (EBS)

→ • It is Block Storage type
- It is like hard drive storage
- This storage is attached to EC2 instance & used as Block storage, where we can install any OS.
- It is valid in SSD or HHD format.
- This ~~gets~~ are Network file system
- This gets automatically replicated ~~of this~~ for better availibility & durability.
- We can dynamically increase or decrease the capacity of storage.

4] Amazon EC2 instance storage

- It is block storage type
- ~~It is like hard drive storage.~~
- It is used as temporary storage for EC2 instances.
- It uses SSD for high I/O performance.
- Durability provides with replication of Storage.

5] What is elastic beanstalk and elist the advantage of using it? steps to deploy the application on the elastic benstalk

→ • Elastic Beanstalk is compute service for web application
- It is preconfigured EC2 server where environment configuration is already done.
- EC2 is infrastructure-as-a service whereas Elastic Beanstalk is platform as service.
- It makes it easier for developers to deploy & manage application on AWS.
- ~~for developer~~ :
- User just needs to ~~do~~ upload the application. The Elastic Beanstalk will
  - automatically provide services like EC2, ELB, autoscaling
  - Deploys your code
  - Monitors your application
  - Handles scaling & load balancing

Steps to ~~create~~ deploy application on the elastic beanstalk

Step1 → Login to AWS management code.
Step2 → Seach elastic beanstalk & select elastic beanstalk services
Step3 → click on create application button
Step4 → select application name.
Step5 → select application tags.
Step6 → select application platform.
Step7 → Deploy your code.
Step 8 → click on create application