

- web hosting :
- 1) Shared hosting
  - 2) VPS virtual private service
  - 3) dedicated hosting
  - 4) cloud hosting

http request response protocol

GET = Retrieve

POST = Send

PUT = Update

Delete = Remove

Patch = partially update

(interim response ex: 100 continue)

information

100-199 (interim response ex: 100 continue)

200-299 (4 operation done ex: 200 OK)

Successful

300-399 (moved ex: 301 moved permanently)

Redirection

400-499 (400 - bad data, 401 - user login 403 - web server body  
404 - not found)

client error

500-599 (500 - Internal Server Error).

Server error

https : Encryption used (Secret code).

Dynamic host Configuration

Protocol - assign your computer an IP address,

DNS → check DNS server with the domain name & then return the correct IP address.

IMAP, SMTP, POP, FTP  
(Internet message Access protocol)

- ↓ Send mail
- ↓ receive mail
- ↓ mail box
- ↓ simple mail Transfer protocol
- ↓ Post office protocol

local device to send files to server (file transfer protocol)

SSH / Secure Shell Protocol  
→ It is used to interact with the computer (server) remotely with security

SFTP (secure file Transfer protocol)  
→ Security is added using SSH

web application - interactive

website - informative

libraries - re-usable

framework - structure developer build with.

API - advanced functionality with simple code

API

Browser API

REST (Representation State Transfer)

Sensor Based API

API

→ set of principles

→ IoT based

→ Adding service

Used to build highly efficient APIs

→ DOM API

(HTML document)  
converts to tree of nodes

→ Send & receiving data from db.

→ Geo location API

IDE : Integrated development Env.

→ Fetch API

→ Canvas API

→ history API

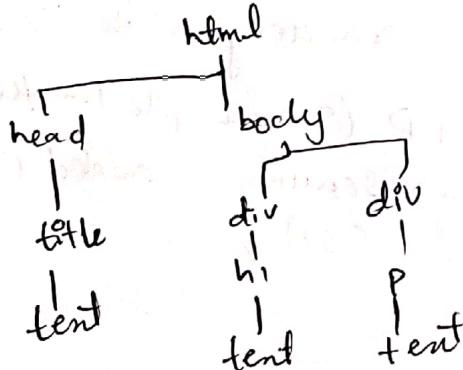
→ web storage API

→ DOM : (update & delete element)  
whenever click radio  
& press delete

<!DOCTYPE html>  
<html>  
<head> <title>li</title>  
</head>  
<body>  
</body>  
</html>.

Document object module / model

→ like, comment functionality

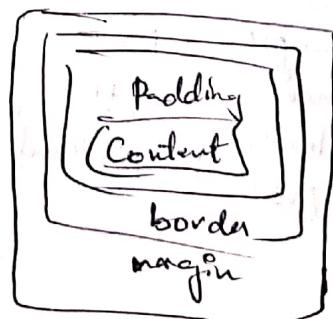


DOM & (javascript can be change DOM)

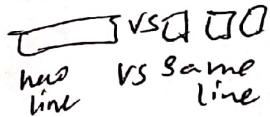
ARIA :

Accessible Rich Internet Application

Box Model :



## Block vs Inline

 vs  
has line vs same line

bootstrap library:

link tag.

bootstrap also provide js library:

package manager

→ download dependencies

because some use old version of html, css, js libraries so that package manager is used.

→ it take care of dependency tree

→ Ex: Node Package Manager (NPM).

→ bundle up (Bundling tools)

→ brulp

→ webpack

→ gather all your dependencies and combine into a single file

Modifiers: change the visual style

of component

Primary

Secondary

Success

Info

Warning

Danger

Light

Dark

## Responsive Design

- content change acc to device

→ CSS media queries

→ fluid images

→ fixed & fluid grid.

Bootstrap is often described as a way to "build fast, responsive sites". feature-packed, powerful and extensible frontend toolkit. (prefix)

breakpoint: how layout changes

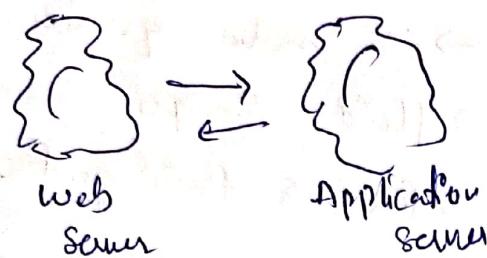
breakpoint	class	dimension
extra small	inf	< 326px
small	sm	> 326px
medium	md	> 768px
large	lg	> 992px
extra large	xl	> 1200px
extra extra large	xxl	> 1400px

inf

bootstrap component

Static vs dynamic :-

dynamic is made when http request made.



### Application Server

- Run application logic
- Communicate with DBs.
- Check permissions.

### Single page Application :-

- feel faster
- Bundling
- lazy loading.

React : library

less code

React Component :

A small piece of a User Interface.

- isolated development
- Testing
- Reusing Template

MVC - JavaScript model view controller.

render - method.

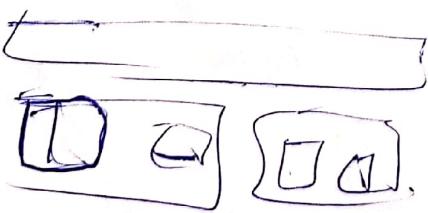
→ It returns lightweight description of what the DOM should look like.

Virtual DOM      browser DOM

update →

Component

Hierarchy :-





## Python

```
print(" ")
input("name:")
print(f"Hello {name}") - formatted string.
```

```
if:
    print()
```

```
elif:
    print()
```

```
else:
    print()
```

## Loops

```
for i in [0,1,2,3,4,5]: range(6)
    print(i),
```

## Dictionaries

```
hours = {"Harry": 4, "Herry": 9, "Tom": 7}
print(hours["Harry"])
```

```
fn:
def square(n):
    return n*n
```

```
from functions import Square
File name
method name
in that file.
```

## Decorators (Functional Programming)

```
def announce(f):
```

```
    def wrapper():
        print("About to run the fn")
        f()
        print("Done with the fn")
    return wrapper.
```

## Sequences

```
name = "Harry"
print(name[0]).
```

```
list (mutable)
names = ["a", "b", "c"]
```

tuples. 3 values together

→ coordinate = (10.0, 20.0)  
(non-mutable values)

set - collection of unique values

dict - collection of key-value pair

list:

append(" ")

sort()

Sets: (no repetition)

s = set()

s.add()

s.remove()

len(s),

## OOP's In Python

```
class Point():
    pass
```

```
def __init__(self, x, y):
    self.x = x
    self.y = y
```

P = Point(2,8)

print(P.x)

print(P.y)

@ announce

def hello():

print("Hello")

hello()



lambda.py

```
people = [ {  
    "name": "Harry", "house": "Gryffindor"},  
    { "name": "Cho", "house": "Ravenclaw"},  
    { "name": "Draco", "house": "Slytherin"} ]
```

```
people.sort(key=f)  
print(people)
```

```
def f(person):  
    return person["name"]
```

```
    house
```

Exceptions: handling

```
import sys
```

```
try:
```

```
    result = x/y
```

```
except ZeroDivisionError:
```

```
    print("Error: Cannot divide by 0")
```

```
    sys.exit(1)
```

```
print(f'{x}/{y} = {result}')
```

```
try:
```

```
    x = int()
```

```
    y = int()
```

```
except ValueError:
```

```
    print("Error: Invalid input")
```

```
    sys.exit(1)
```



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Django: python web framework :- dynamic html pages.

Get / http/1.1

Host: www.example.com

### Response

http/1.1 200 ok

Content-Type: text/html

Pip - Python install manager.

Pip3 install Django

Django-admin Startproject PROJECT-NAME

python manage.py startapp App-Name

view.py → Setting.py → Installed app → App-Name

from django.http import HttpResponse

def index(request):

return HttpResponse("Hello World")

→ In APP folder

urls.py

from django.urls import path

from . import views

url patterns = [

path ("^\$", views.index, name="index")

### Routes

Views to Update

Urls update.

### Generic

views.py

def greet(request, name):

return HttpResponse(f"Hello, {name}").

url.py  
path ("", views.greet, name="greet"),

{ } } } } → To insert name

{ " } } } } → To insert logic.

→ { % } % } }

<h1>

{ % } . cde % }

<h1>

{ % } . endif % }

→ dink

→ { % } . for task in tasks % }

<li> {{ task }} </li>

{ % } endfor % }

Virtual env

→ Python3 -m venv venv

→ Source venv/bin/activate

(venv)

Templates = html pages

12/12/2023

```
def index(request):
    return render(request, "hello/index.html")
template/hello/index.html.
```

load static :: styles.css

{% load static %}

<link href="{% static 'newyear/style.css' %}" rel="stylesheet".

tasks.

for loop.

forms: (Inheritance).

```
<html>
<head>
</head>
<body>
    {% block body %}
    {% endblock %}
</body>
</html>.
```

=> {% extends "tasks/layout.html" %}.

{% body %}

{% endblock %},

(a href="{% url 'add' %}") > Add a New Task <a>

Switch between pages -

<form action="{% url 'tasks:add' %}" method="post">

{% csrf\_token %}

tasks:add



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403

CSRF

cross site Request Forgery  
Verification failed.

tokens :-

inbuild form in Django :-  
class NewTaskForm(forms.Form):

task = forms.CharField(label="New Task")

def add

return render(request,

"tasks/add.html", {"form":

: NewTaskForm()})

priority = forms.IntegerField(label="Priority", min\_value=1, max\_value=10)

## Lessons

Suppose you are making task manager then both too user will see the same page because of global variable now session will store information about you.

```
def index():
    if "task" not in request.session:
        request.session["tasks"] = []
    return render(request, "tasks/index.html",
                  {"tasks": request.session["tasks"]})
```

End: python manage.py migrate

SQL :- (RDBMS) languages to interact with the db.

model: python class & object

migration: technique to update db & Underline model.

~~DB~~: → MySQL

→ PostgreSQL

→ SQLite

SQLite Types:-

→ Text

→ Numeric

→ Integer

→ Real

→ Blob. - binary large data.

MySQL types:

- CHAR(size)

- VARCHAR(size)

- SMALLINT

- INT

- BIGINT

- FLOAT

- DOUBLE

Step 1

Create TABLE flights(

id INTEGER PRIMARY KEY

AUTOINCREMENT,

origin TEXT NOT NULL,

destination TEXT NOT NULL,

duration INTEGER NOT NULL

) ;

Constraints:-  
→ Check (range) rating

→ Default

→ NOT NULL

→ Primary Key

→ Unique.

Step 2  
Insert into flights

(origin, destination, duration)

VALUES ("New York", "London", 415);

Step 3

Select \* FROM flights;

Select origin, destination

FROM flights;

Select \* FROM flights

WHERE id = 3;

Select \* " " " " Origin = "New York";

touch flight.sql : file name : (SQLite)

.tables - Show all tables.

→ SQLite3 flight.sql

→ Select \* FROM flights WHERE duration > 500;

→ Select \* FROM flights WHERE a " " AND destination  
= "PARIS";

→ " " " " " " Origin IN ("New York", "Lima");

→ " " " " " " ORIGIN LIKE "%a%";

functions :

→ Average

→ Count

→ MAX

→ MIN

→ SUM

UPDATE flights

SET duration = 430

WHERE origin = "New York"

AND destination = "London";

DELETE

DELETE FROM flights WHERE destination = "Tokyo";

Other clauses :

→ LIMIT → ORDER BY → GROUP BY → HAVING.



Foreign key: (normalization it is used).

→ airport data store separate rather than involving in the main table flights.

JOIN:

Select first, origin, destination FROM flights JOIN passengers ON passengers.flight\_id = flights.id;

→ JOIN / Inner Join

→ left outer join

→ right outer join

→ full outer join

CREATE INDEX:

Create Index name\_index On passengers (last);

SQL Injection attack: - this will ignore rest of the part of the line

Select \* from users

where username = "hacker" -- AND password = " ";

→ Don't directly interact with the SQL, use interface.

→ Regular steps in Django

then

models.py

cmd: python manage.py make migrations.

"migrate

shell.

models.py:

class Airport(models.Model):

code = models.CharField(max\_length=3)

city = models.CharField(max\_length=64)

def \_\_str\_\_(self):

return f'{self.city} ({self.code})'



class Flight(models.Model):  
    origin = models.ForeignKey(Airport, on\_delete=models.CASCADE,  
        related\_name="departures").  
    destination = " " " (Airport, " " ",  
        " " " = "arrivals")  
    duration = models.IntegerField()  
    def \_\_str\_\_(self):  
        return f"{{self.id}}: {{self.origin}} to {{self.destination}}"

cmd: repeat cmd: ③ Step

cmd  
from flights.models import \*  
jfk = Airport(code="JFK", city="New York") } 4 Airport.  
jfk.save() . . - - -  
f = Flight(origin=jfk, destination=lhr, duration=415)  
→ f.save().  
→ f → f.origin.code  
→ f.origin → lhr.arrivals.all().

### index.html

{% extends "flights/layout.html" %}

{% block body %}

<h1> Flights </h1>

<ul>

{% for flight in flights %}

<li> Flight {{flight.id}}: {{flight.origin}} to  
{{flight.destination}} </li>

{% endfor %}

</ul>

{% endblock %},

## shell

Airport-objects.filter(city = "New York").first()  
.get()

To do which task to do again & again use shell to update  
thinks that why use admin-django.

cmd:

Python manage.py createsuperuser.

→ Username

→ email

→ password: OP .....

Instead of Using Shell, admin provide GUI Interface  
to update the details.

→ Admin.

→ Create User login page Using in build authentication

System



- Java Script :-
- Client - side - code (inside the client computer) no need for server processing
  - can manipulate DOM directly.

```
<Script> alert('Hello, world!');  
</Script>
```

Events : anything user does on the html page

- like user click, User scroll, User select dropdown list etc.

```
function hello()  
{  
    alert("Hello")  
}
```

Variable :

i) let

Query Selector : select the element from the html & manipulate it.

```
Ex: function hello()  
{  
    let heading = document.querySelector('h1')  
    heading.innerHTML = 'goodbye';  
}
```

ii) Const - if value is not changing.

DOM manipulation:

```
- backtick - instead of f" " in JS.  
if (counter % 10 == 0) {  
    alert(`Count is now ${counter}`);  
}
```

```
document.addEventListener('DOMContentLoaded', function() {
```

```
}); } Anonymous fn.
```

## Query Selector

- document.querySelector('tag')
  - document.querySelector('#id')
  - document.querySelector('.class')
- data-color attribute
- document.querySelectorAll('button').forEach(button => {  
 button.onclick = function() {  
 document.querySelector('#hello').style.color = button.dataset.color;  
 }  
});
- document.querySelector('select').onchange = function() {  
 document.querySelector('#hello').style.color = this.value;  
};

## Events:

- onclick
- onmouseover
- onkeydown
- onkeyup
- onunload
- onblur

## Intervals & time

Set Interval (count, 1000)

### local storage:

→ localstorage.getItem(key)

→ localstorage.setItem(key, value)

if (!localStorage.getItem('counter')) {

localStorage.setItem('counter', 0);

} (not null, 'localstorage') was found then, terminal

• if (empty) { :{

# APIs (Application Programming Interfaces)

- well defined Services can communicate with each other.
- interact with map, amazon, weather.
- JSON . (JS Object Notation)

```
{ "origin": "New York", }  
"destination": "London", }  
"duration": 415  
} JSON representation.
```

3.

```
<script>  
  <Downloader>
```

```
  fetch('https://').then(response => {  
    return response.json()  
  })
```

```
  }  
  { "rates": {  
    "EUR": 0.907,  
    "JPY": 109.716,  
    "GBP": 0.766,  
    "AUD": 1.479  
  }  
  "base": "USD"  
}
```

```
fetch('https://').then(response => response.json())  
.then(data => {  
  const currency = document.querySelector('#currency').value.toUpperCase();  
  const rate = data.rates[currency];  
  if(rate === undefined) {  
    document.getElementById('result').innerHTML = 'Invalid'  
  } else document.getElementById('result').innerHTML = rate  
})  
.catch(error => {  
  console.log('error', error);  
});  
return false;  
};
```

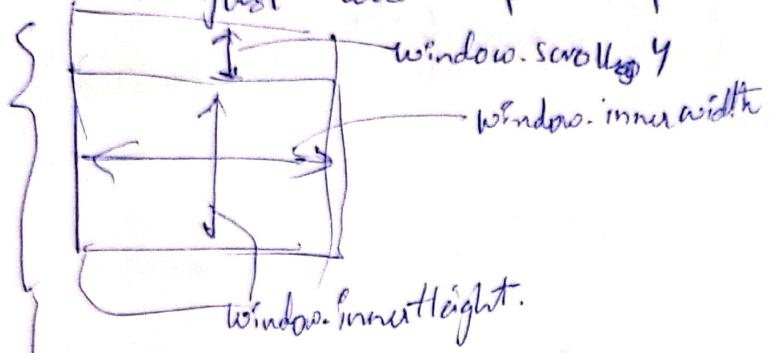
User Interfaces :-

→ Single-page Application

Django uses routes to change the home page.

→ JS changes the DOM with which is single page

just load part of the page



→ to store history of the page  
js is used.

→ changing content of the page without URL is changing  
js is used.

document.body.offsetHeight

window.onscroll = () => {

var onscroll = () => {  
 if (e.target.scrollTop + window.scrollY >= document.body.offsetHeight)

```
{  
document.querySelector('body').style.backgroundColor = 'green';
```

3. It is used for input scroll. (Ex: new app).

→ Animation - ability to move things around.

- To change size of something

@keyframes grow {

from {  
font-size: 20px;  
}

to {  
font-size: 100px;  
}

h1 {

    animation-name: grow; / mono position: relative  
    animation-duration: 2s;  
    animation-fill-mode: forwards;  
}

(a) Keyframe movement

0% {  
    left: 0%;

50% {  
    left: 50%;

100% {  
    left: 100%;

    opacity:

    animation: padding 0 → 50 → 75 → 100.  
        margin

as Web pages lot of code of JS.

→ more interactive & dynamic so use JS for.

React: JavaScript library (framework).

→ Design UI which is very interactive.

Declarative Programming

View Specification  
`<h1>0</h1>`

It is Impellative

Programming

log: c

```
let num = parseInt(document.querySelector('h1').innerHTML);
num += 1
document.querySelector('h1').innerHTML = num;
```

Too much code for simple update.

declarative programming:

View:

<h1> {num}</h1>

logic

num+=1;

} with the help  
of react.

react divides our application into whole bundle of

Component

→ Component based on the underline state. Can be manipulate the state.

→ Package js for react:

- 1) React (define component & how they behave)
- 2) ReactDOM (take react Component & insert into DOM)
- 3) Babel: (translate code into one language to another). JSX → JS file for browser

JSX (extension of JavaScript to write react).

Script:

src = "http://unpkg.com/react@17.0.2/umd/react.production.min.js"  
 src = "http://unpkg.com/react-dom@17.0.2/umd/react-dom.production.min.js" (scr)  
 <script src = " " />

<script src = " " />

<body>  
 <div id = "app"> </div>  
 <script type = "text/babel">  
 function APP() {  
 return <div>Hello! </div>  
 } ; }

React DOM. render (<APP>), document.querySelector("#app").  
</script>  
</body>

React. useState() → React hook.

Counter.js

```
<div id="app"> </div>
```

```
<script type="text/javascript">
```

```
function App() {
```

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

```
    function updateCount() {
```

```
        setCount(count + 1);
```

```
}
```

```
    return (
```

```
        <div>
```

```
            <div>{count}</div>
```

```
            <button onClick={updateCount}>Count</button>
```

```
</div>
```

```
    );
```

React DOM. render (, mounting at the end of the page)

Just to know. When we click on button, it starts rendering  
the code after the button click. So basically, it's rendering  
the code sequentially. So basically, it's rendering sequentially.



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Testing :-

~~for~~ for Python's assert command : Something should be true.

Assertion Error will be occurs. (Square fn is example)

→ Script is used to check the test cases

(8h) Shell script .sh file is made

test.sh

```
test.sh  
python3 -c "from test0 import test_prime; test_prime(1, False)  
" "  
" "  
" "  
" "
```

Compile

Sh filename.sh

## Unit

Test :

import      United

```
import prime import is_prime  
from class Tests(unittest.TestCase):
```

```
def test_1(self):
```

9111 check that 1 is not prime.

Self-assert false (is-prime(1)) .121e11, 125/28

if <-name-- = "main";

Unit test . main () .

your test should be good covered of test.

Django testing: flight to avoid valid of origin; destination should be different; duration should be greater than zero.

→ Django provide `test.py` } does not affect the actual  
to check database.

And: `python manage.py test.`

→ browser testing

Unit Test mean, what is we VS, what should be

→ Selenium is used to test browser.

```
from tests import *
```

```
uri = file-uri("counter.html")
```

```
driver.get(uri)
```

```
driver.title
```

```
driver.find_element_by_id("increase")
```

```
increase =
```

```
c) increase.click()
```

```
→ for i in range(25):
```

```
    increase.click()
```

```
decrease =
```

```
-
```

```
-
```

```
-
```

## Unit test methods:

→ assertEqual

→ assertNotEqual

→ assertTrue

→ assertFalse

→ assertIn

→ assertNotIn

CI/CD: Continuous Integration & Continuous Delivery

→ Continuous Integration

1) frequent merges to main branch

2) Automated Unit testing

→ Continuous Delivery

↳ short release schedules.

Git Action: Create workflow

→ To automate the test

YAML: language is used. (Yml file extension).

Key1: Value1

Key2: Value2

Key3:

- Item1

- Item2

- Item3

yaml

name: Testy

on: push

jobs:

test-project:

runs-on: ubuntu-latest

steps:

- uses: actions/checkout@v2

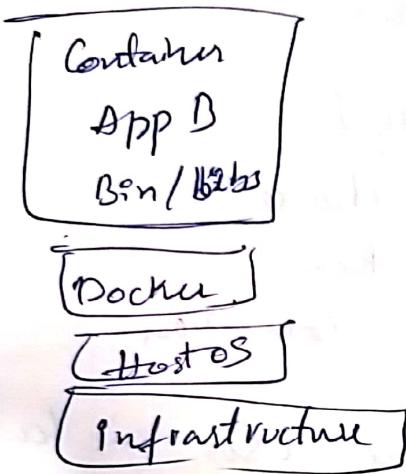
- name: Run Django unit tests

run: pip3 install --use-django  
python3 manage.py test



## Docker:

- difference b/w your machine to server.
- To solve this issue docker is
- It works on my machine problem.
- run In an container.



Dockerfile: (no extension) ~~name is~~ imp.

```

FROM python:3
COPY . /usr/src/app
WORKDIR /usr/src/app
RUN pip install -r requirements.txt
CMD ["python3", "manage.py", "runserver", "0.0.0.0:8000"]
  
```

## docker-compose.yml

version: '3' // docker version

services:

db:
   
image: postgres

web:

build: .

volumes:

- .:/usr/src/app

ports:

- "8000:8000"
   
host Container

## docker-compose up

Servers:

- On cloud
- On-premise

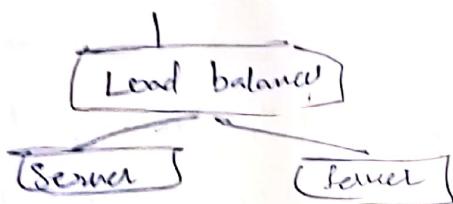
→ Benchmarking.

tools: Apache bench.

3 check how many user can handle at a particular time.

1) Vertical scaling.  $\boxed{S} \rightarrow \boxed{\text{Server}}$

2) Horizontal scaling  $\rightarrow \boxed{S} \rightarrow \boxed{S}$



Session-Aware Load Balancer

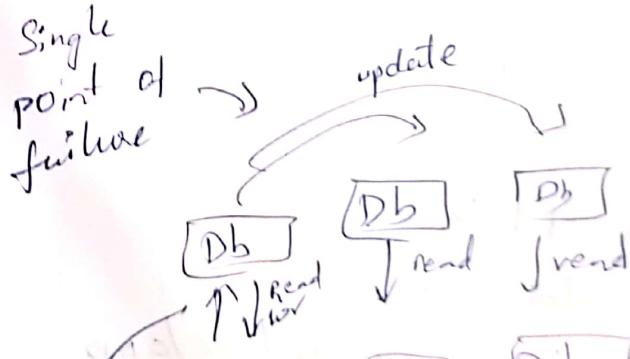
- 1) Sticking sessions.
- 2) Session in Database
- 3) Client-side Sessions

Scaling Database:

1) Database partitioning.

flights

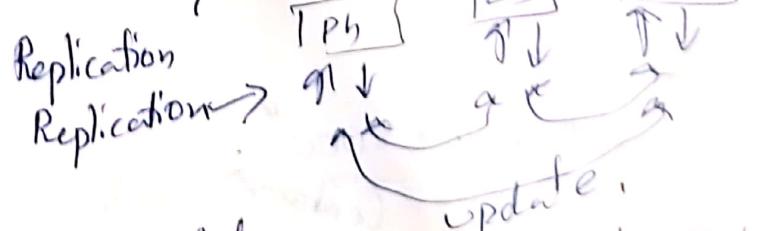
flights-domestic  
flights-international



2) Database Replication

- 1) Single - Primary
- 2) Multi - Primary

Replication  
Replication



Caching

Some info.  
Storing save version of continuous request  
from server.  
no need of

Conflict happen.

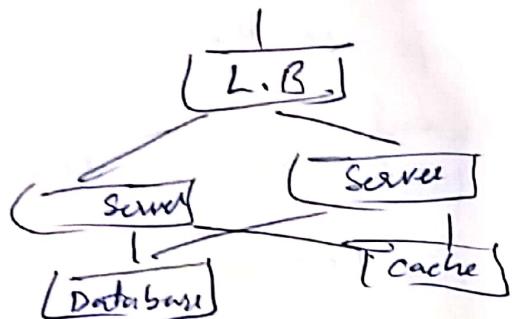
## Client - Side Caching :-

Cache-Control : max-age = 86400

Etag : "48axxxxtxx" — resource

→ load new version of resource  
→ change according to the update.

## Server - Side Caching :-



## Django Cache Framework :-

- 1) Per-view Caching
- 2) Template fragment caching
- 3) low-level Cache API

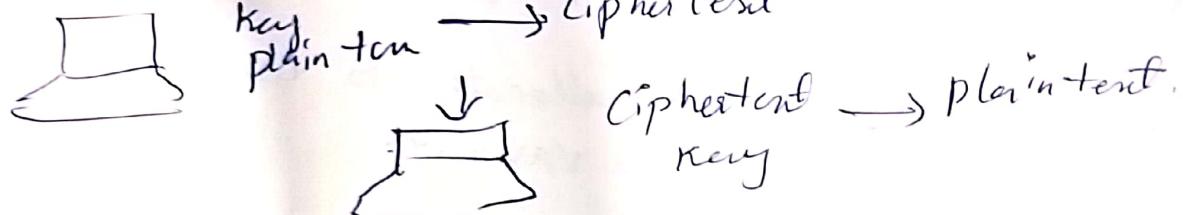
## Security :-

Git - Open Source Software. → If credential was exposed  
→ It can be backtraced tract.

html → Phishing attack → www.google.com → take your phising website.

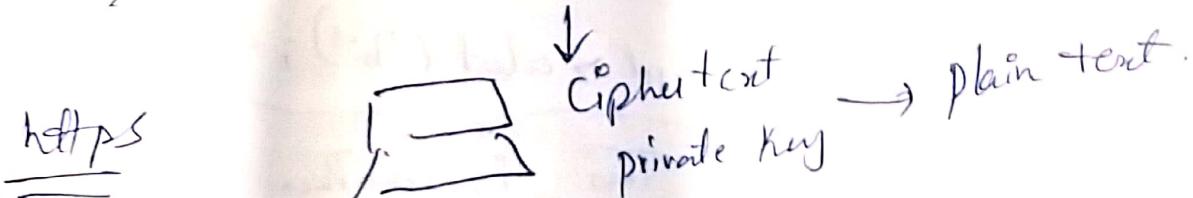
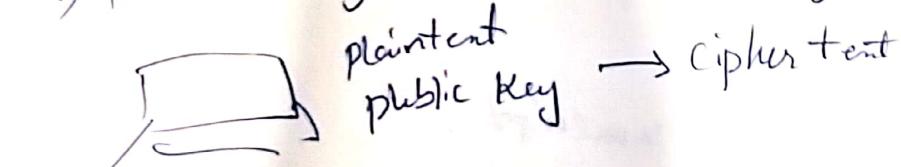
http - information can be extract from the middle like b/w router

## Secret - key Cryptography :-



## Public - key Cryptography :-

- 1) public key
- 2) private key



## SQL Security :

User table :  
 id | Username | Password. } this info should be  
 { hide.  
 # hash function → use to hide password  
 ↗ 486284(F) - info. of the user.

That's why bank doesn't know your password because of which they will say that change your password. There only know about hash function (update table is easy). To say.

## Email to reset password :

Leaking information of User have account (or) not.

## SQL Injection :

Username "hacker" -- " } ignore rest of the password & login.

API Keys : no user can request so many request can lead to crash.

Rate limiting — API keys allocated to user.

Route Authentication — API keys used as env variable.

## Cross Site Scripting :

→ JavaScript vulnerability  
 → on your web app javascript of another person code will run.

→ someone else can change javascript.

→ ex: 123.0.0.1:8000 /<script>alert('hi!');</script>.

→ lead to DDoS, API request [This is another person wrote the js.]

## Cross Site Request Forgery :-

fake a request to a website.

for href = "https://yourbank.com/transfer?to=brian&amt=2000"

click it?

me

through img :-

img : src = "http://yourbank.com/transfer?to=brian&amt=2000"

through Post request :-

<form action = "https://yourbank.com/transfer" method = "post">

<input type = "hidden" name = "to" value = "brian" >

<input type = "hidden" name = "amt" value = "2000" >

<input type = "submit" value = "Click me" >

</form> starting

<body> onload = "document.forms[0].submit()" > of close

{1. csrf-token } is use to safe guard.

## Other frameworks web :

Server Side

Express - js

Ruby on Rails

Client - Side

Angular JS

React

Vue.js

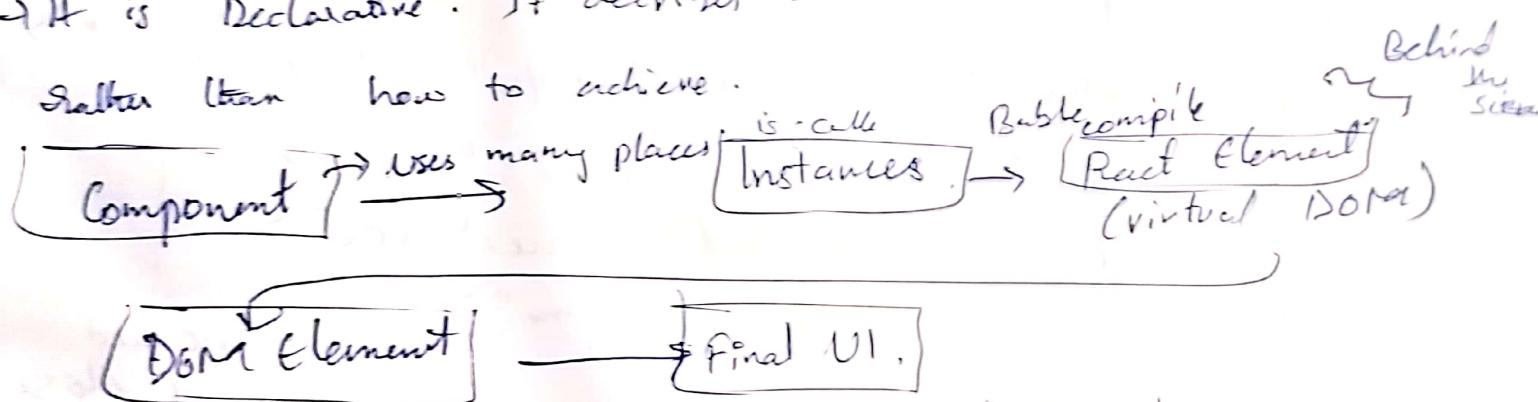
React - 3 project. Library for awesome frontent.  
(UI).

React is all about Component.

→ Don't repeat your self.

→ It's all about making common code  
nav bar is common for all page  
nav links, header, and card.

→ It's Declarative. It describes what the UI should look like  
rather than how to achieve.



npm → yarn → pnpm → bun (latest) fastest,  
(no one use).

### Project Structure :-

- node\\_structure: It contain all necessary libraries & dependencies by React.  
→ ignore folder.
- public: It contain all static files like Images, video, font etc.
- src: It contain all source file (component, js file, css)
  - APP.js is main Component.
  - main.js is an entry point
  - eslint.cjs It make sure code is preferred or not.
  - we always ignore node\\_structure → `gitignore`
- index.html → React App is loaded serving the entry point for web browser.

→ package.json : It contains all detail of configuration of the project.

### Naming Convention:

Camel Case: Variables, function, properties inside obj, file names etc

Pascal Case: Component names, class names, types etc.

Snake Case: In python, Separated by '-'

Kebab Case: file name, css class id, separated by '-'.

Component (.jsx): html code which return jsx file.

Two ways: 1) class based Components

2) functional Components (✓) Imp.

Hot Module Replacement (HMR) help to save changes live

React Fragment (Component can return multiple element without a wrapper div) prob solved.

→ Array of Elements with keys.

import { Fragment } from "react"; <>/</>  
return <fragment> // </Fragment>

### Dynamic Values in jsx:

{ } → Insert the values. (To write js in HTML).

Conditionals in jsx when <p> {age >= 18 ? "Adult" : "Minor" } </p> .

→ Ternary Operator is used

Portfolio    website !

1rem = 16 pixel

Q rem = 32 pixel