Internship @ Dohatec

Full stack
Software Development
using

- Angular
- Spring Boot
- Spring security

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SPA

↳ Single Page Application

SPA → load all the data/code and then never refresh again

→ বার বার refresh না হওয়ায়, application অনেক বেশি fast হয়

Info:

- need to install Node for angular
- MVC Architecture
- Angular js and Angular are different

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Angular Component Life-Cycle Hook :

that will automatically call when our pages are loaded

Phase

1. Creation
2. Change Detection
3. ~~Detection~~
4. Rendering
5. Destruction

Creation → constructor → runs when Angular instantiates the component.

Change
→ ngOnInit → Runs once, after Angular has initialized all the components' inputs.

Destruction :
→ ngOnDestroy → Runs once before the component is destroyed.

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Rendering:

- afterRender → runs every time all components have been rendered to the DOM.
- afterNextRender → runs once the next time that all components have been rendered to the DOM.

Change Detection:

- ngOnChanges → runs everytime the components inputs have changed.

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Services in Angular

What are services?

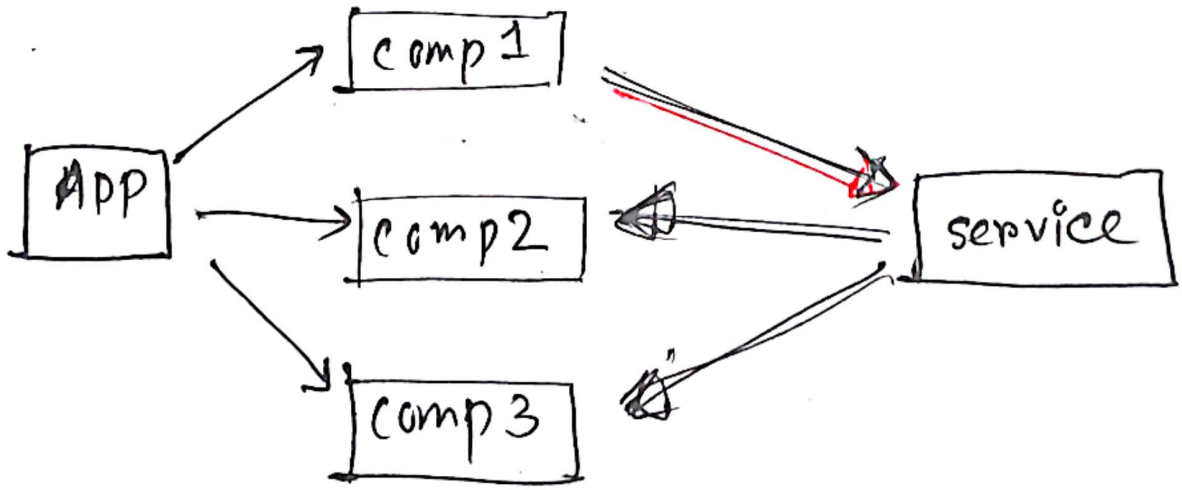
Angular services provide a way for you to separate Angular app data and functions that can be used by multiple components in your app.

separate → app data and functions

↓

can be used by

multiple components



↓

almost same functionality

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creating a service

```
ng g s service-name
ng g s services/service-name
```

Ex:

```
ng g s services/product
```

first:

product.ts

```
import {Injectable} from '@angular/core';

@Injectable({
    providedIn: 'root',
})

export class Product{
    constructor(){
        console.log("product-service called");
    }
}
```

```
getProductData(){
return [
{name: 'Samsung',
 category: 'phone',
 price: 110000},
{name: 'Asus',
 category: 'Laptop',
 price: 740000,
]}}
```

If we want to keep some data then we should not keep this data in the constructor only.
Because in constructor we can't return ~~anything~~ anything,

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then

2nd to call the services in the App Component

App.ts

when we don't want this to use outside this class

```
export class App {

    constructor(private product: Product) {}

    productData : {
        name: string;
        category: string;
        price : number;
    } [] | undefined

    ~~constr~~

    getData(){
        this.productData = this.product.getProductData();
    }
}
```

service Name

function in the service

then

3rd

App.html

function written in app.ts

```
<h1> services in Angular </h1>
<button (click) = "getData()" >
        Load Product Data
</button>

@for (item of productData; track item){
  <h2>{{item.name}}, {{item.category}},
        {{item.price}} </h2>
}
```

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Call API with the Services in Angular:

API:

API : Application Programming Interface

→ We can not connect database with Angular or JS

→ So we make API in any backend programming Language

→ API integrate with angular or react or any

→ Same API can connect in any technology.

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Example.

product.ts

```
export class products{
    constructor(private http: HttpClient){}
}

productList() {
    const url = "https://dummyjson.com/products";
    return this.http.get(url);
}
}
```

app.ts

```
export class App {
    constructor (private product : Products){}
    ngOnInit() {
        this.product.productlist().subscribe(
        (data) => {
        }}
    }
}
```

life-cycle hook

service name

this service is inject through the constructor

function/method in the service

without it, the HTTP request will never run

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subscrib():

In Angular, HTTP calls return an observable.

↳ a container that can give you data now, later or many times in the future

To actually get the data, you must call .subscribe().

Without .subscribe, the HTTP request will never run.

subscrib() ⟶ tells Angular to execute the API call and give you the result.

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Install JSON server and Make API :-

JSON Server :-

JSON server is basically a tool that help us to make fake APIs

json server typicode

npm install json-server

1. Install JSON server
2. Make db.json file
3. Make Users API
4. Test API with postman / thunder client

GET → get the data from database
POST → store the data in database
PUT → update entire resource on server
PATCH → update partial resource on server
DELETE → delete the data from db

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Define Data type for API result :-

Interface:

Interfaces are a feature of TypeScript that allows us to define the structure or datatype.

Post API in Angular :-

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Route Lazy Loading :-

With the help of lazy loading, we can only load the required code in our Angular application whenever we are using that Angular application.

In app.routes.ts :-

the component we want to be as Lazy

path of the component

```
export const routes: Routes = [
  { path: 'admin', loadComponent: () =>
      import('./admin/admin').
      then(c => c.Admin)
  }
];
```

component

component

Component Name

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Route Guards:-

In Angular, Route Guards are special features that let you control access to specific routes in your application.

They decide whether a user is allowed to navigate to a route, leave a route, load a module or fetch route data.

Types of Route Guards in Angular:

(i) CanActivate → checks if an user can navigate to a route

(ii) CanDeactivate → checks if an user can leave a route (useful for unsaved changes)

(iii) CanActivateChild → checks if a user can access child routes

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(iv) CanMatch → Allows or blocks ~~navigation~~ navigation before route is matched

(v) CanLoad → Prevents lazy-loaded modules from loading

Resolve → This performs route data retrival before any activation of the route.

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Auth Guards :

An Auth Guard in Angular is a Route Guard used specifically to protect routes from unauthorised access. canActivate guard.

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Spring Boot

Java Framework

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Spring Boot

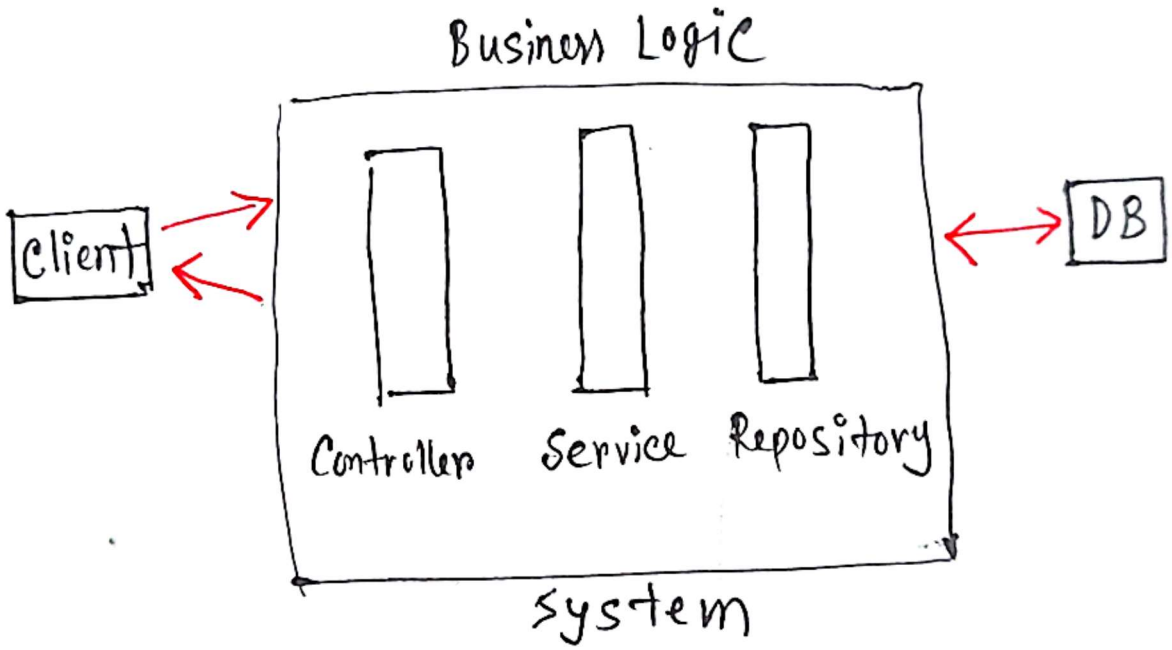
IoC:

↳ Inversion of Control

IoC means:

→ You do not create objects manually

→ The framework (Spring) creates and manages objects for you.



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DI (Dependency Injection):

DI means:

→ You do not create objects manually

→ Spring creates and gives (injects) the required objects to your class automatically.

Your class simply "receives" its required dependencies instead of "creating" them.

Dependency Injection is the actual implementation of IoC.

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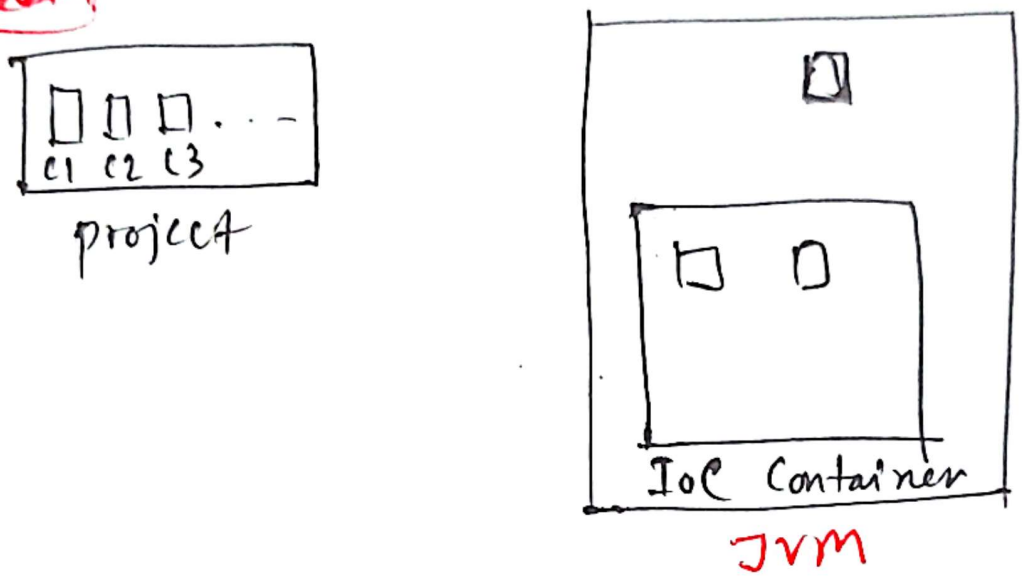
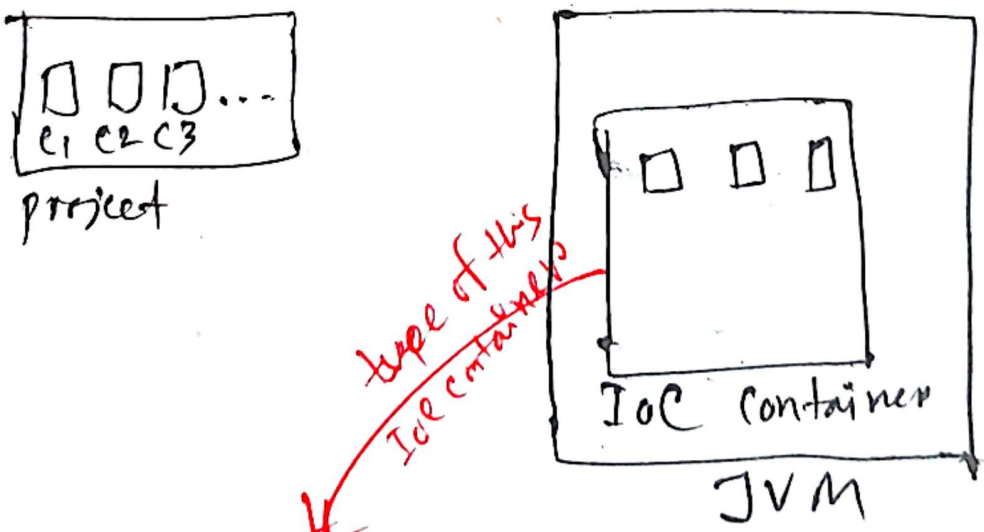
Spring Boot :

Dependency Injection Using Spring Boot

exam → new class is outside the container :



Lets assume the newly created class is already in the IoC container



type of this IoC container

Application context

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Example:

Dev.java

```
package com.tasrik.App2;

import ——— .Component;

***
@Component

public class Dev{

    sout("Working on a
        spring project");

}
```

main → java → com → App2

App2ApplicationJava

```
package . . . . . ;
import . . . . . ;

@SpringBootApplication
public class
  ~~Spring~~App2Application{

    public static void
      main(String[] args){

        ApplicationContext
          context = ~~SpringApplic~~
            SpringApplication.run();

        ***
        Dev obj =
          context.getBean(Dev.class);

        obj.build();
    }
}
```

DI → Injects the Dependency.

Autowire :-

@Autowired is a Spring annotation that tells Spring :

→ please create the object for me and inject it here.

- Field Injection (@Autowired)
- Constructor Injection (Default)
- Setter Injection (@Autowired)

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Laptop.java

```
package .....;
import .....;
@Component
public class Laptop {
    public void compile(){
        sout ("Compiling with 404 bugs");
    }
}
```

Laptop.java & Dev.java connect हुए by type

connect

Laptop.java	Dev.java
public class Laptop {	private Laptop laptop;
}	

Constructor Injection

Dev.java

```
import . . . . ;

@Component
public class Dev {
    private Laptop laptop;

    public Dev(Laptop laptop){
        this.laptop = laptop;
    }

    public void build(){
        laptop.compile();
        sout("working on
            awsome project");
    }
}
```

Field Injection

Dev.java

```
import . . . . Autowired;
import . . . . Component;

@Component
public class Dev {
    @Autowired
    private Laptop laptop;

    public void build(){
        laptop.compile();
        sout("    ");
    }
```

Setter injection

```
private Laptop laptop;
@Autowired
public void setLaptop(Laptop laptop){
    this.laptop = laptop;
}
```

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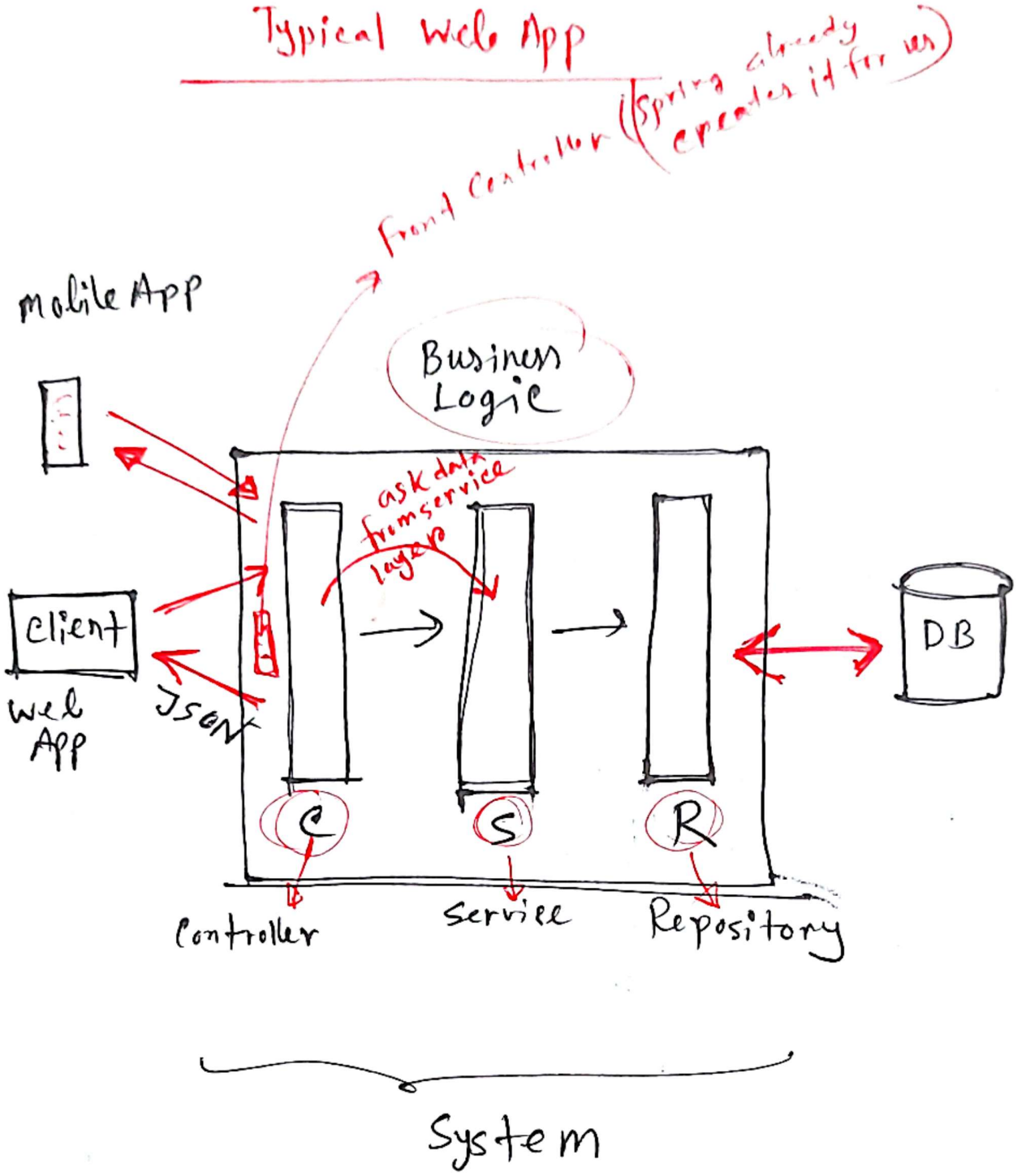
Typical Web App



Controller → just for req and res
not any business logic

Service → all the business logic

Model → data of the project

Repository → connect with database

What is the particular thing who can handle the request → Controller

27/11/2025

Controller:

A controller is a Java class that:

→ Receives requests from the client (web browser/Mobile App)

→ Process the request

→ sends a response back (JSON, text, data ... etc)

Controller → API entry point

its like a receptionist in an office:

who:

→ Accepts requests

→ Redirects to the correct Department

→ sends the result back.

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lombok dependency

MVC

(Model View Controller)

Controller ⟶ req, res

View ⟶ pages (UI)

Model ⟶ Data

Service ⟶ All the business Logic

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REST

→ HTTP methods

→ GET → fetch data

→ POST → add new data

CRUD

→ PUT → update the data

→ DELETE → delete the data

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Spring Data JPA :

ORM

→ object Relational mapping

object → Data + behavior

prodID,
prodName,
price

connect

Object ↔ Relations

Object → Data

Relations → Table Name

Data

prodID, prodName, Price

[
{
},
{
},
{
]

prodID,	prodName	Price

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ORM tools

Hibernate → full floged
Eclipse link
My Batis

object		Relations
ClassName	→	Table Name
variables (each)	→	column name (each)
each object	→	each row

JPA
↳ Java Persistence API

with the help of spring JPA we can store the data which we are doing in the service layer in the DB.

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package → Repository

Repository → Interface

An Interface in Java is a collection of abstract methods and constants.

methods without a body

→ Any class that implements an interface must provide the method definitions.

Example:

Interface

```
interface Animal {
    void sound();
    void eat();
}
```

class implementing the interface

```
class Dog implements Animal {
    public void sound() {
        sout("Dog barks");
    }
    public void eat() {
        sout("Dog eats bones");
    }
}
```

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using the class

```
public class Main{
    psvm(String[] args){
        Animal a = new Dog();
        a.sound();
        a.eat();
    }
}
```

Using JPA Repository Step 1

Reprsitory Package → Interface → ProductRepo.java

```
imports . . . . . ;

@Repository
public interface ProductRepo extends
    JpaRepository<Product, Integer>{

}
```

the class we will work with

primary key type

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Step 2 → ProductService.java

```
imports . . — . ;

@Service
public class ProductService {

    @Autowired
    ProductRepo repo;
```

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Project

(R)

int id

sn

Product:

id → primary Key

name → string

description → "

brand → "

price → int

category → string

release Date → Date

available → boolean

quantity → Int

? Img →

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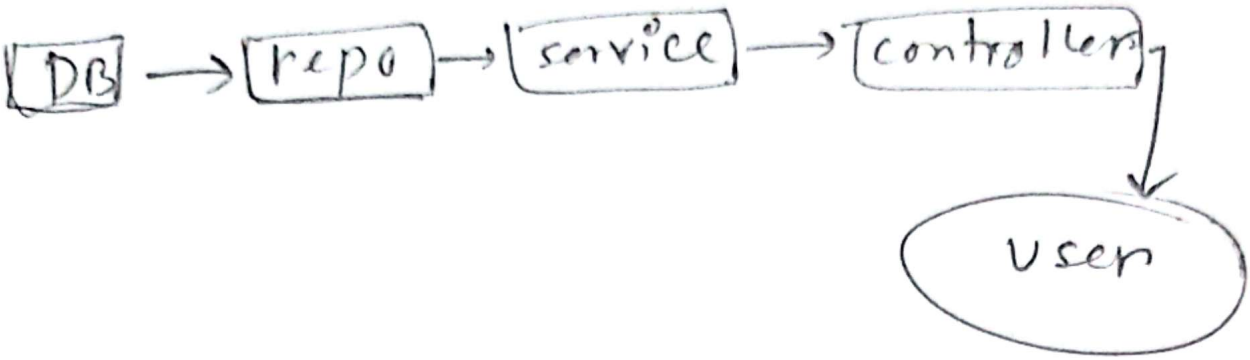
when data fatching what happens



CORS Error is Spring Boot g

→ Cross-Origin Resource Sharing

It is a browser security system that prevents a website from calling APIs on another domain unless allowed.

→ For the security reasons.
it is not allowed to send a request with some another address.

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Spring security

1/12/2025

Spring security can support the following right out of the box :-

1. Username/Password authentication (from login)
2. JWT (JSON Web Token)
3. OAuth2 and Open ID Connect (OIDC) integration 3rd-party auth
4. Social login (Google, GitHub, Facebook etc)
5. LDAP authentication
6. Remember-me authentication
7. Role-based access control (RBAC)
8. Fine-grained permission expressions using SpEL

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9. Concurrent session control (limit login sessions)

10. session timeout and invalidation

11. Built in CSRF token generation and validation

12. Cross-Origin Resource sharing (CORS) header

13. X-Frame-Options for clickjacking protection

14. Custom authentication providers

15. Custom fiters and filter chain.

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1) Add Spring Security Dependency

↓

Dependency add করার সাথে সাথে project এ spring security এর কিছু default behavior add হয়ে যাবে → EX:

i) route → protected Route
Authenticated Route

ii) to access a route → login first

iii) to login → generated spring security password use করতে হবে

iv) user → by default user নামে একটা users create করে দিয়ে সাথে login page এ

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v) login করার পর refresh করলে ও page/state change হয় না → spring security নিজেই একটা session create করে

update the default user name and password :

Bra → main → resources → application.properties

```
# security config
spring.security.user.name = anuj
spring.security.user.password = pass
```

→ But session will not work

2) Security filter chain → Middleware chain

Filter chain → design pattern

⇒ Filter chain এর through তে আমরা multiple independent filters বানাতে পারি এবং একটা chain এ রাখতে পারি

⇒ so that, যেই request টা আসুক, যেন-

- আমরা সেটাকে modify করতে পারি;
- আমরা সেটাকে check করতে পারি
- আমরা সেটাকে change করতে পারি

on the basis of different different filters.

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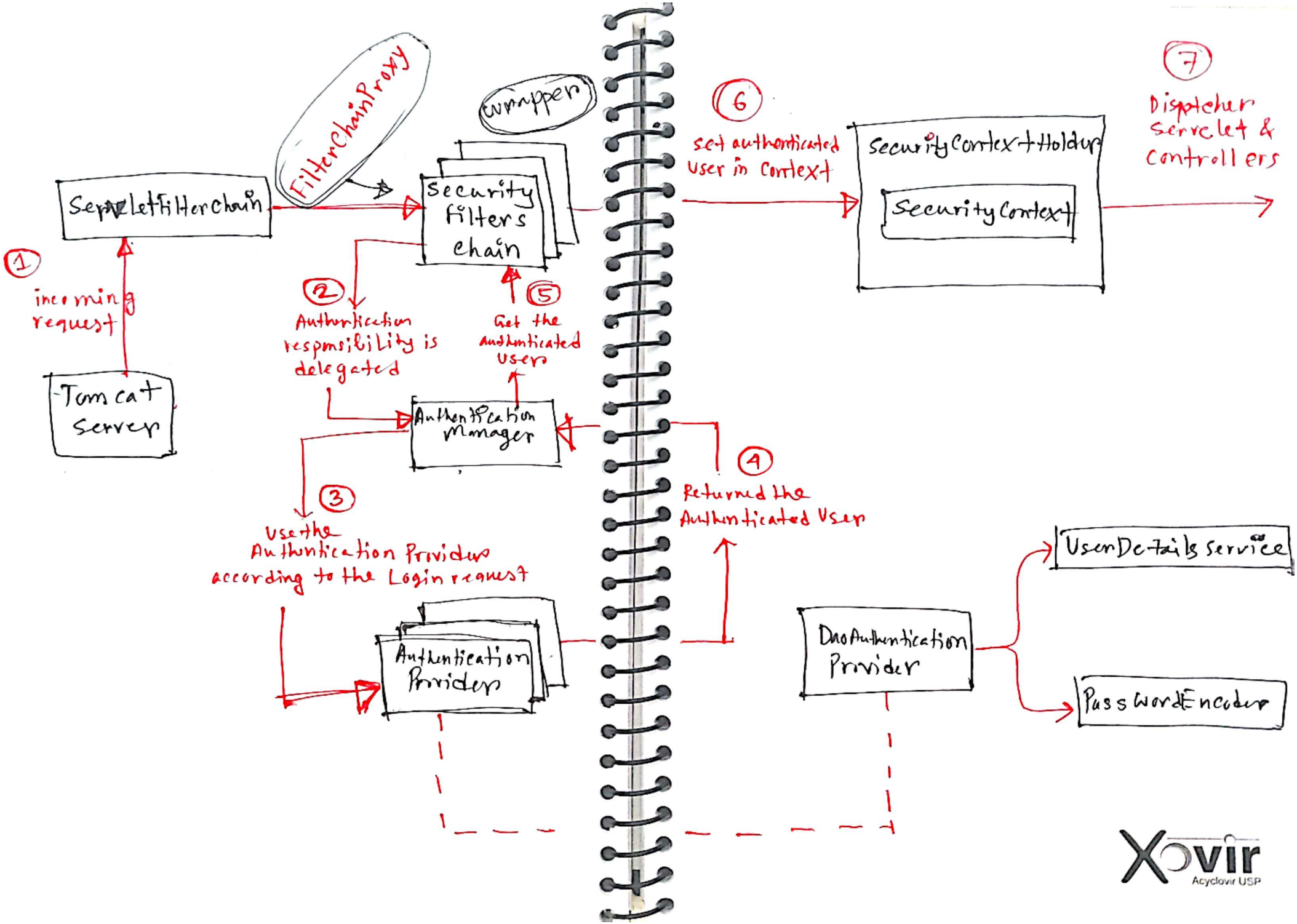

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Path:

src/main/java/security/webSecurityConfig :-

WebSecurityConfig.java

@Bean
It tells Spring :
Create this object and put it into the Application Context, so it can be injected elsewhere

```
import . . . . ;

@Configuration
public class WebSecurityConfig {

    @Bean
    public securityFilterChain
        securityFilterChain(
    HttpSecurity http Security) throws
        Exception {
          http Security
          :

}
```

Bean always have to be public

Spring Security 6

JWT Authentication

↳ can use in ~~any~~ with backend

JWT → Widely used mechanism to secure our authentication

JWT → JSON Web Token

Token

part 1 . part 2 . part 3

Header

```
{
  "alg": "HS256",
  "typ": "JWT"
}
```

Payload

```
{
  "sub": "1234567890",
  "name": "John Doe",
  "iat": 1516239022
}
```

Signature

secret

HMACSHA256(
BASE64URL(header)
BASE64URL(payload),
secret)

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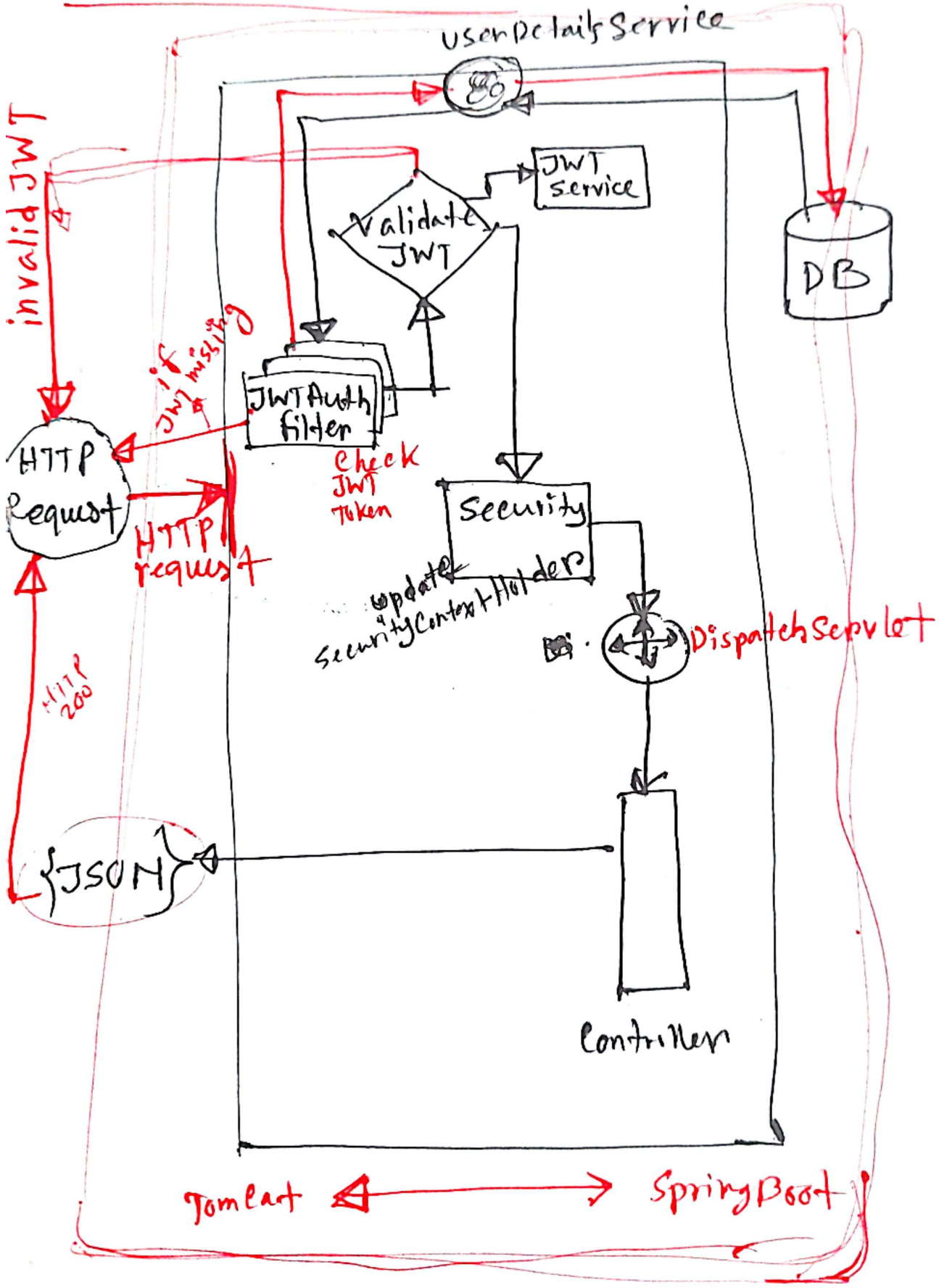
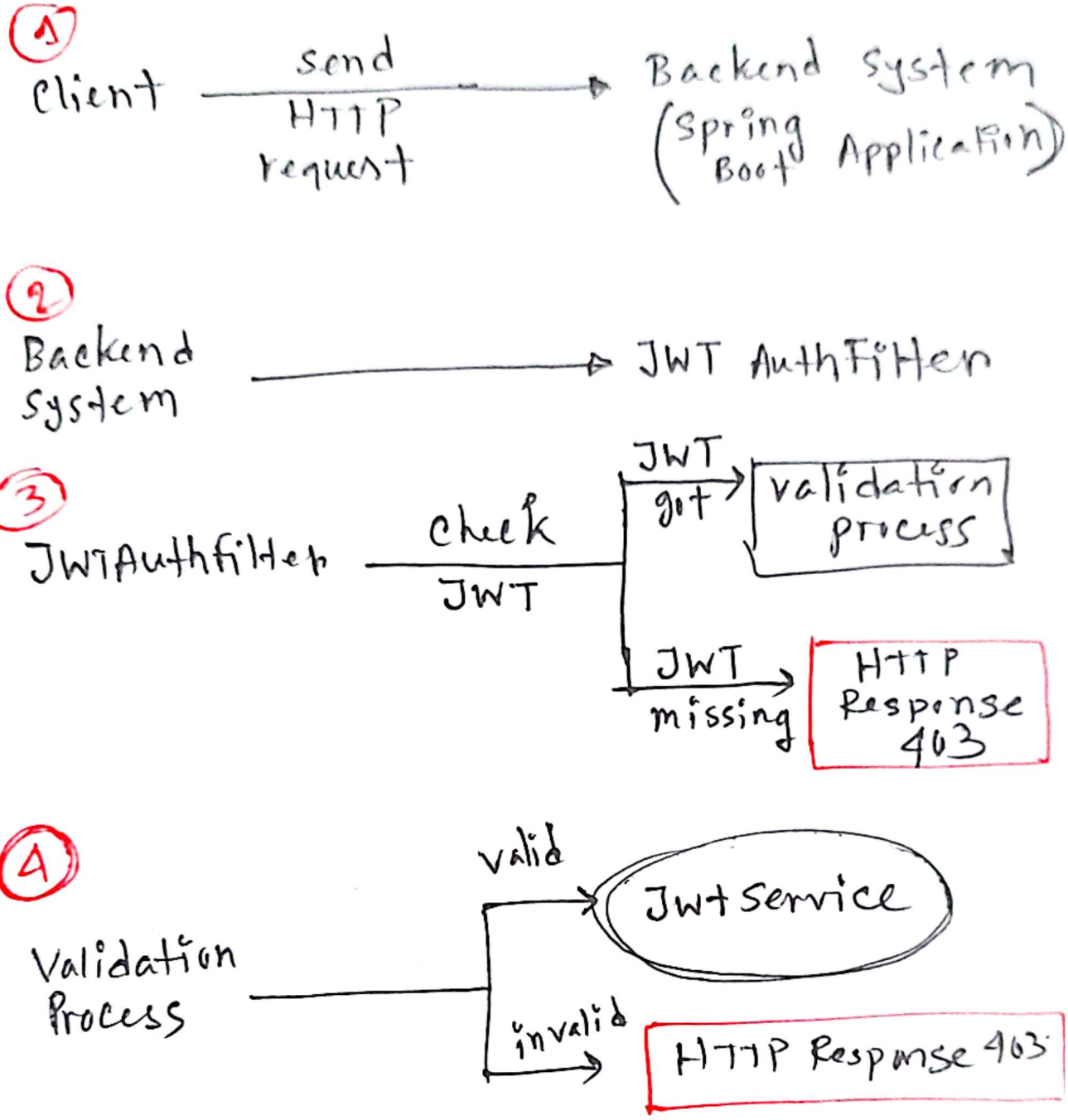
Spring Boot 3 + Spring Security 6 with JWT Authentication and Authorization &





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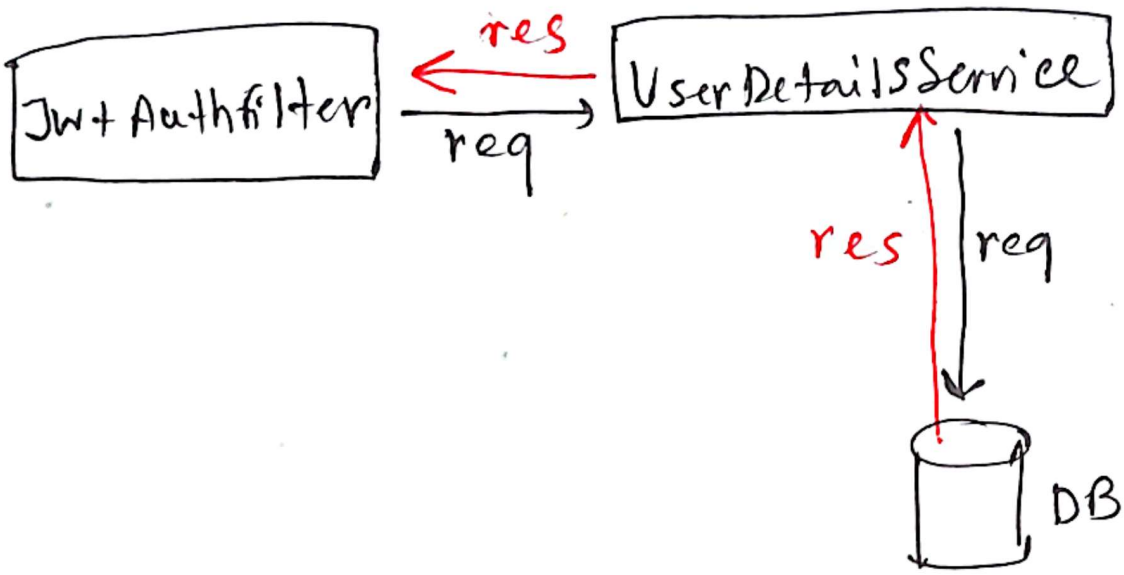
Validation Process:

JWTAuthFilter ⟶ make the call (1st)



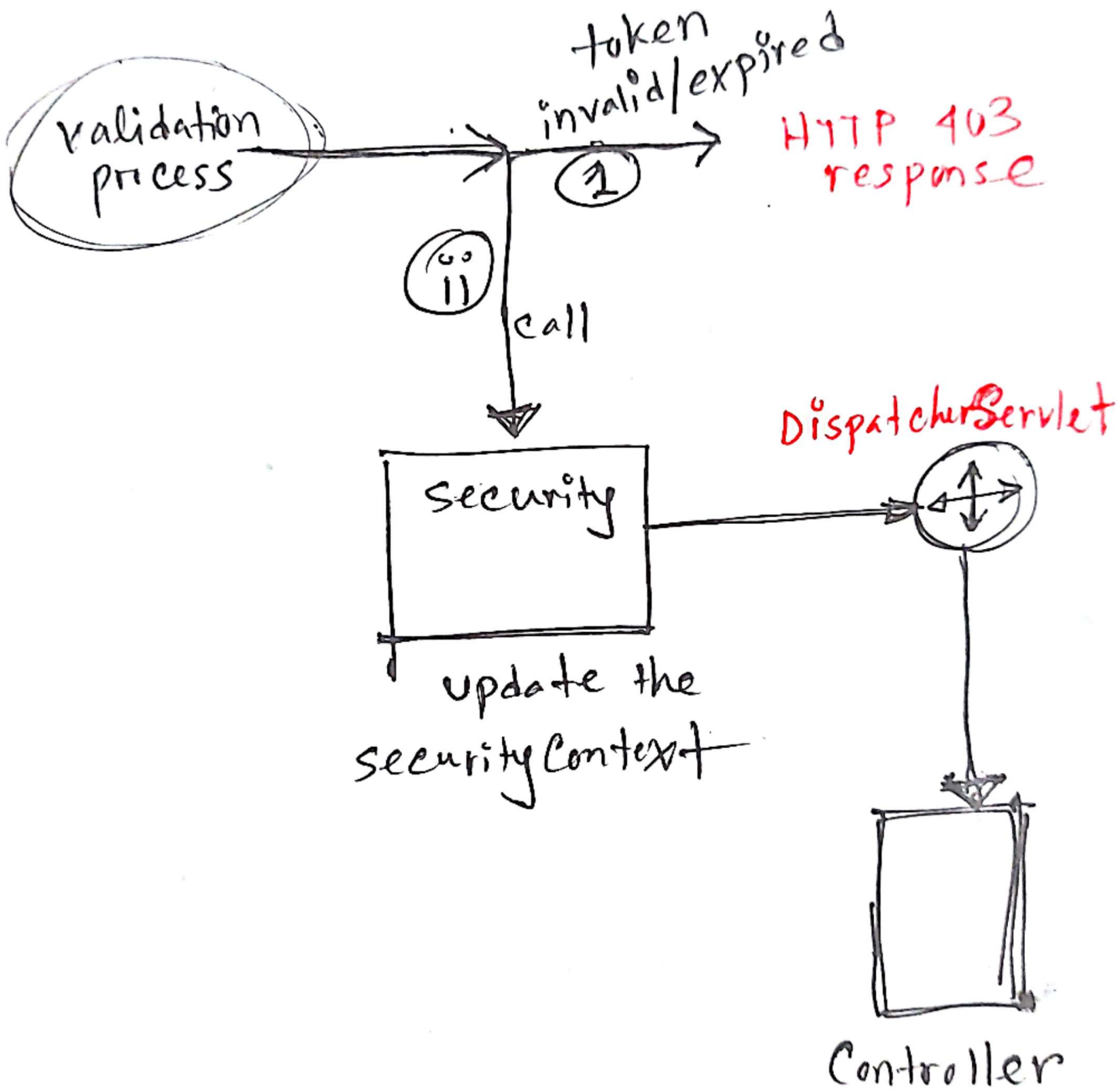
5 After validation Process

(i) The token is not valid/expired

(ii) Update the security Context and set this connected user

⟶ as a result that user will be considered as

Authenticated User



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⑥ Check Users Authentication

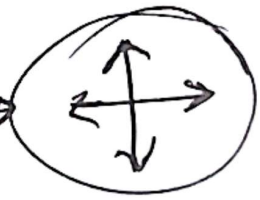
If the User is Authenticated, and we will update the Authentication manager.

→ Everytime we check if this user is authenticated for this (request), the answer will be [(Yes) Authenciated]

[Once]

(Security Context) will be updated

DispatcherServlet



it will automatically dispatch the (req) and it will send (req) to the [Dispatcher Servlet]

Apply JWT security :

1. Create Spring Boot Project
   Open it in Intellij Idea

2. PgAdmain → postgreSQL 17
   ↓
   Database
   ↓
   create
   ↓
   JWT-Security
   database name

3. Intellij Idea →
   src → main → resource → application.properties

4. application.properties :

```
spring:
    datasource:
        url: jdbc:postgresql://localhost:5432/database name
```

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4. configuration and Connection project with dB

application.properties:

spring.application.name = JWT-WebSecurity

~~spring.~~

spring.datasource.url = jdbc:postgresql://
localhost:port-no/
database name

spring.datasource.driver-class-name =
org.postgresql.Driver

spring.datasource.username = postgresql
spring.datasource.password = real-password

spring.jpa.hibernate.~~ddl~~ ddl-auto = create-drop
spring.jpa.show-sql = true
spring.jpa.properties.hibernate.format_sql = true
spring.jpa.database-platform = org.hibernate.dialect.
PostgreSQLDialect

(5) Now, start writing Backend codes

(i) Models

(ii) Repository

} packages of a

JWT filters:

(i) new package → config

(ii) config → JwtAuthenticationFilter.java

class

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