

# LAPORAN PRAKTIKUM 14 – KONEKTIVITAS BASIS DATA (3-TIER)

Nama : Cania Nabilatul Adawah

NIM : 2403102

Kelas : D3TI 2C

Mata Kuliah : Pemrograman Berbasis Objek

## 1. Ringkasan Materi Modul 14 — Konektivitas Basis Data (3-tier)

### 1.1 Tujuan Pembelajaran

Berdasarkan modul halaman 2, tujuan pembelajaran adalah agar mahasiswa mampu:

- Mengimplementasikan konektivitas basis data menggunakan arsitektur 3-tier, yaitu pola pengembangan aplikasi yang memisahkan aplikasi ke dalam tiga lapisan utama.

Tujuan ini mengarahkan mahasiswa agar dapat membangun aplikasi yang skalabel, rapi, dan profesional.

### 1.2 Pengertian Arsitektur 3-Tier

Arsitektur 3-tier terdiri dari:

#### A. Client-tier (Java Swing)

Lapisan ini berfungsi sebagai antarmuka pengguna (UI) menggunakan pola:

- MVC (Model–View–Controller) Pattern

Client-tier hanya bertugas menerima input, mengirim permintaan ke application-tier, dan menampilkan hasil.

#### B. Application-tier (PHP Native – REST API)

Lapisan tengah yang berperan sebagai “otak” aplikasi.

Menggunakan:

- Service Layer Pattern → mengimplementasikan aturan bisnis
- DAO (Data Access Object) Pattern → menangani akses database via PDO

Application-tier menerima request dari Java Swing, memprosesnya sebagai REST API, dan mengembalikan response dalam format JSON.

#### C. Data-tier (MySQL DBMS)

Lapisan penyimpanan data.

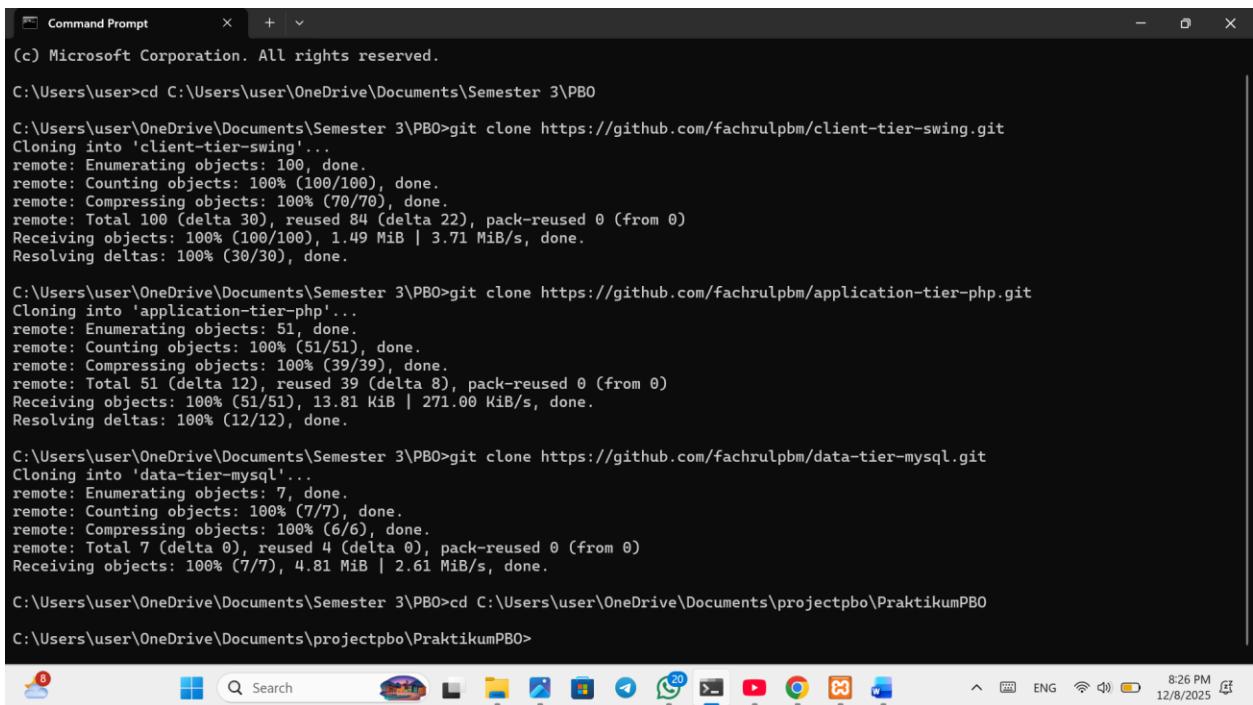
Application-tier mengaksesnya melalui PDO dan query SQL.

### 1.3 Pemetaan Konsep Arsitektur 3-Tier

- Client-tier (Java Swing) mengirim HTTP Request ke Application-tier.
- Application-tier (PHP REST API) memproses request dan mengakses Database MySQL menggunakan PDO.
- Database memberikan data kembali ke Application-tier.
- Application-tier mengirimkan HTTP Response berupa JSON kepada Client-tier.

Diagram tersebut memperlihatkan aliran request-response yang terpisah dan rapi antar layer.

## 2. Penyelesaian Tugas Praktikum



```
Command Prompt
(c) Microsoft Corporation. All rights reserved.

C:\Users\user>cd C:\Users\user\OneDrive\Documents\Semester 3\PBO

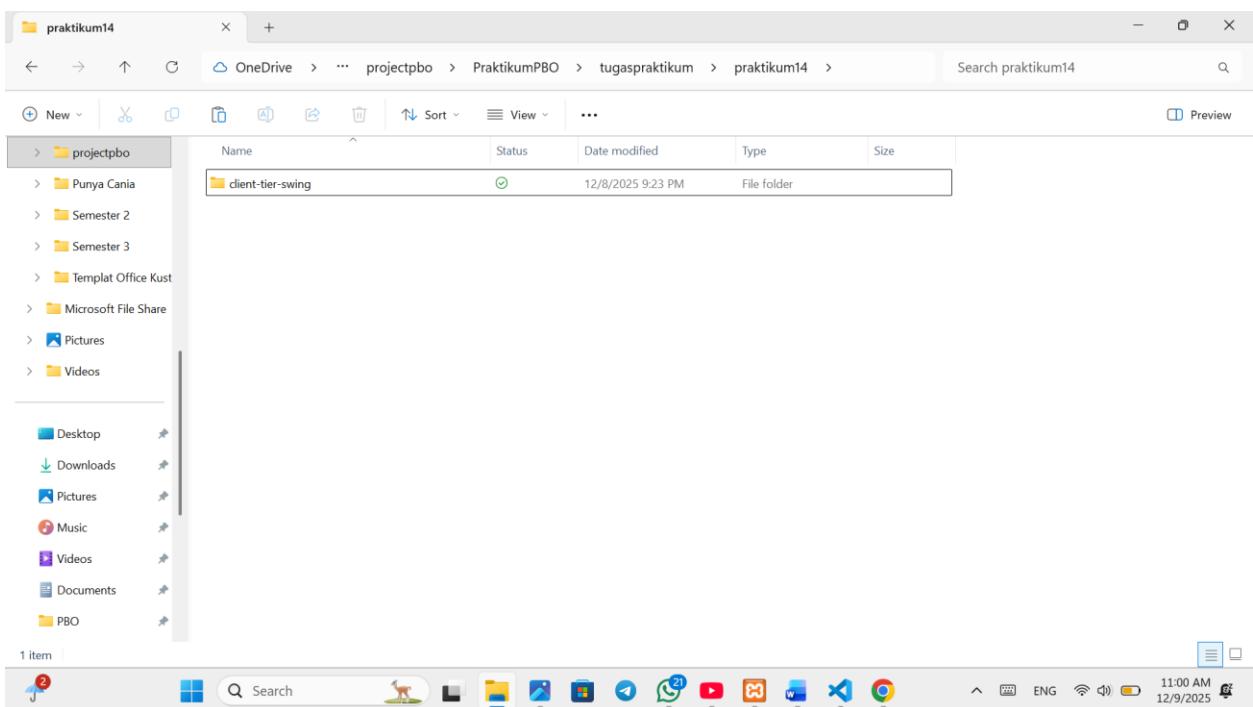
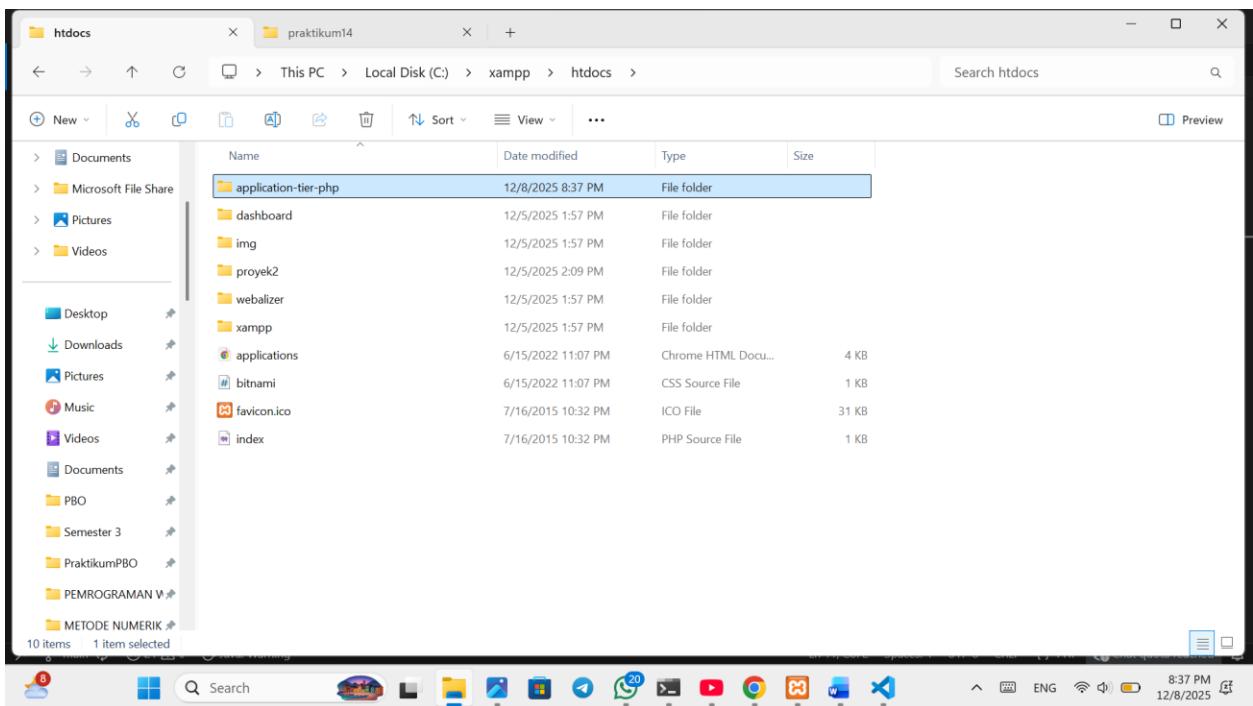
C:\Users\user\OneDrive\Documents\Semester 3\PBO>git clone https://github.com/fachrulpbm/client-tier-swing.git
Cloning into 'client-tier-swing'...
remote: Enumerating objects: 100, done.
remote: Counting objects: 100% (100/100), done.
remote: Compressing objects: 100% (70/70), done.
remote: Total 100 (delta 30), reused 84 (delta 22), pack-reused 0 (from 0)
Receiving objects: 100% (100/100), 1.49 MiB | 3.71 MiB/s, done.
Resolving deltas: 100% (30/30), done.

C:\Users\user\OneDrive\Documents\Semester 3\PBO>git clone https://github.com/fachrulpbm/application-tier-php.git
Cloning into 'application-tier-php'...
remote: Enumerating objects: 51, done.
remote: Counting objects: 100% (51/51), done.
remote: Compressing objects: 100% (39/39), done.
remote: Total 51 (delta 12), reused 39 (delta 8), pack-reused 0 (from 0)
Receiving objects: 100% (51/51), 13.81 KiB | 271.00 KiB/s, done.
Resolving deltas: 100% (12/12), done.

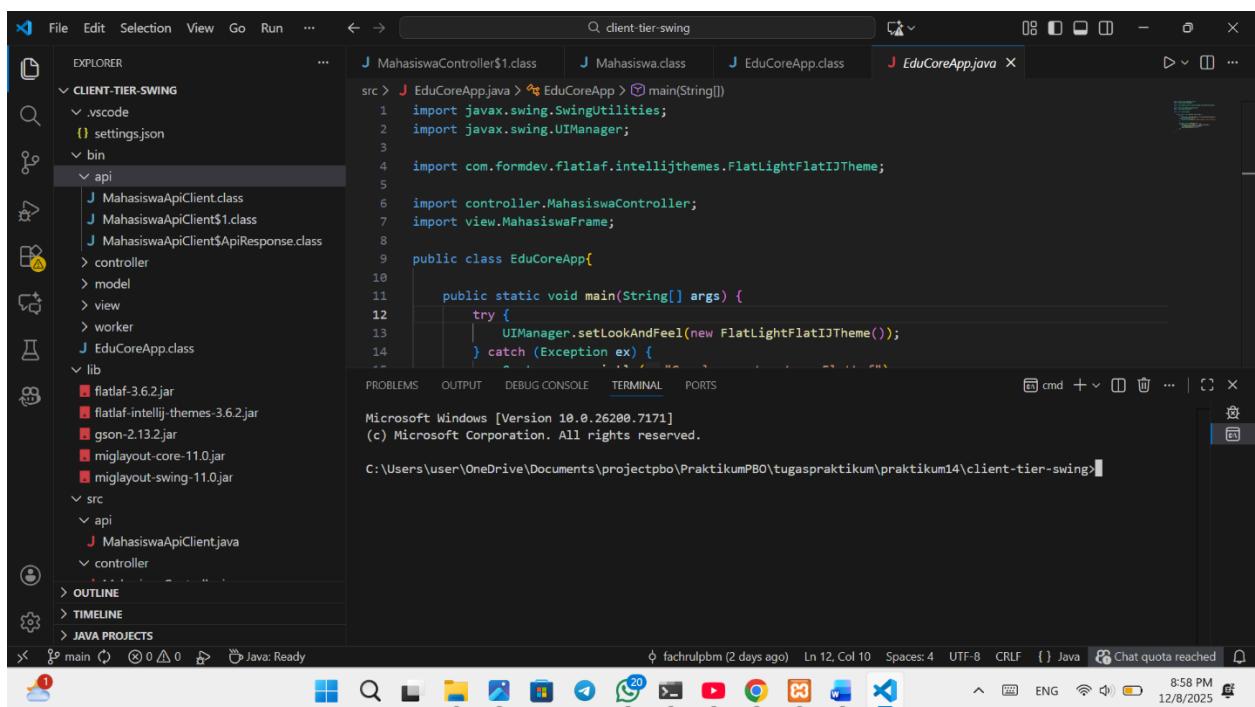
C:\Users\user\OneDrive\Documents\Semester 3\PBO>git clone https://github.com/fachrulpbm/data-tier-mysql.git
Cloning into 'data-tier-mysql'...
remote: Enumerating objects: 7, done.
remote: Counting objects: 100% (7/7), done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 7 (delta 0), reused 4 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (7/7), 4.81 MiB | 2.61 MiB/s, done.

C:\Users\user\OneDrive\Documents\Semester 3\PBO>cd C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO

C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO>
```



```
localhost/application-tier-php/ +  
localhost/application-tier-php/public/mahasiswa  
Pretty-print □  
{  
    "success": true,  
    "message": "Data mahasiswa berhasil diambil",  
    "data": [  
        {  
            "id": 1,  
            "nim": "202401000001",  
            "nama": "Begas Wibisono",  
            "jurusan": "Manajemen"  
        },  
        {  
            "id": 2,  
            "nim": "202401000002",  
            "nama": "Nurjan Safitri",  
            "jurusan": "Arsitektur"  
        },  
        {  
            "id": 3,  
            "nim": "202401000003",  
            "nama": "Dodo Fujiati",  
            "jurusan": "Psikologi"  
        },  
        {  
            "id": 4,  
            "nim": "202401000004",  
            "nama": "Carub Mulyani",  
            "jurusan": "Desain Komunikasi Visual"  
        },  
        {  
            "id": 5,  
            "nim": "202401000005",  
            "nama": "Kerisah Tamara",  
            "jurusan": "Animasi"  
        },  
        {  
            "id": 6,  
            "nim": "202401000006",  
            "nama": "Mutatake Saragih",  
            "jurusan": "Desain Komunikasi Visual"  
        },  
        {  
            "id": 7,  
            "nim": "202401000007",  
            "nama": "Hendrayda Mulyeni",  
            "jurusan": "Teknik Informatika"  
        },  
        {  
            "id": 8,  
            "nim": "202401000008",  
            "nama": "Itka Iswahyudi",  
            "jurusan": "Pendidikan Vokasi"  
        }  
    ]  
}  
25°  
Search  
            
8:42 PM 12/8/2025
```



The screenshot shows a Java IDE interface with two tabs open: 'EXPLORER' and 'MANIFEST.MF'. The 'EXPLORER' tab displays a project structure for 'CLIENT-TIER-SWING' with packages 'api', 'controller', 'model', 'view', and 'worker\masiswa'. The 'MANIFEST.MF' tab shows the manifest file content:

```
Manifest-Version: 1.0
Main-Class: EduCoreApp
Class-Path: lib/flatlaf-3.6.2.jar lib/flatlaf-intellij-themes-3.6.2.jar lib/gson-2.13.2.jar lib/miglayout-core-11.0.jar lib/miglayout-swing-11.0.jar
```

The terminal tab shows the command being run and its output:

```
C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>dir
Volume in drive C has no label.
Volume Serial Number is 90E2-CCSD

Directory of C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing

12/08/2025  08:22 PM    <DIR>        .
12/08/2025  08:44 PM    <DIR>        ..
12/08/2025  08:22 PM    <DIR>        .vscode
12/08/2025  09:22 PM    <DIR>        .
12/08/2025  09:22 PM    <DIR>        ..
12/08/2025  08:44 PM    <DIR>        ..
12/08/2025  08:22 PM    <DIR>        .vscode
12/08/2025  09:22 PM    <DIR>        bin
12/08/2025  08:22 PM    <DIR>        lib
12/08/2025  09:10 PM    199 MANIFEST.MF
12/08/2025  08:18 PM    1,445 README.md
12/08/2025  09:22 PM    <DIR>        src
          2 File(s)      1,644 bytes
          6 Dir(s)   263,288,700,928 bytes free
```

The command run was: `C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>jar cfm EduCoreApp.jar MANIFEST.MF -C bin .`

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C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>jar cfm EduCoreApp.jar MANIFEST.MF -C bin .
12/08/2025  09:22 PM    <DIR>        .
12/08/2025  08:44 PM    <DIR>        ..
12/08/2025  08:22 PM    <DIR>        .vscode
12/08/2025  09:22 PM    <DIR>        bin
12/08/2025  08:22 PM    <DIR>        lib
12/08/2025  09:10 PM    199 MANIFEST.MF
12/08/2025  08:18 PM    1,445 README.md
12/08/2025  09:22 PM    <DIR>        src
          2 File(s)      1,644 bytes
          6 Dir(s)   263,288,700,928 bytes free
```

The command run was: `C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>jar cfm EduCoreApp.jar MANIFEST.MF`

**File Edit Selection View Go Run ...**

**EXPLORER**

- CLIENT-TIER-SWING
  - lib
  - src
    - api
    - controller
    - model
    - view
      - tablemodel
      - MahasiswaDialog.java
      - MahasiswaFrame.java
    - worker\mahasiswa
      - DeleteMahasiswaWorker.java
      - LoadMahasiswaWorker.java
      - SaveMahasiswaWorker.java
      - UpdateMahasiswaWorker.java
- EduCoreApp.java
- EduCoreApp.jar
- MANIFEST.MF
- README.md

**PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS**

```

12/08/2025 09:22 PM <DIR> bin
12/08/2025 09:22 PM <DIR> .
12/08/2025 08:44 PM <DIR> ..
12/08/2025 08:22 PM <DIR> .vscode
12/08/2025 09:22 PM <DIR> .
12/08/2025 08:44 PM <DIR> ..
12/08/2025 09:22 PM <DIR> .
12/08/2025 08:44 PM <DIR> ..
12/08/2025 08:22 PM <DIR> .vscode
12/08/2025 09:22 PM <DIR> bin
12/08/2025 08:22 PM <DIR> lib
12/08/2025 09:10 PM 199 MANIFEST.MF
12/08/2025 08:18 PM 1,445 README.md
12/08/2025 09:22 PM <DIR> src
2 File(s) 1,644 bytes
6 Dir(s) 263,288,700,928 bytes free

```

C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>jar cfm EduCoreApp.jar MANIFEST.MF -c bin .

C:\Users\user\OneDrive\Documents\projectpbo\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>java -jar EduCoreApp.jar

**Ln 1, Col 1 Spaces: 4 UTF-8 CRLF Plain Text Chat quota reached**

Java: Ready

**File Edit Selection View Go Run ...**

**EXPLORER**

- CLIENT-TIER-SWING
  - lib
  - src
    - api
    - controller
    - model
    - view
      - tablemodel
      - Mahasiswa
      - Mahasiswa
    - worker\mahasiswa
      - DeleteMahasiswaWorker.java
      - LoadMahasiswaWorker.java
      - SaveMahasiswaWorker.java
      - UpdateMahasiswaWorker.java
- EduCoreApp.java
- EduCoreApp.jar
- MANIFEST.MF
- README.md

**OUTLINE TIMELINE JAVA PROJECTS**

**List Mahasiswa**

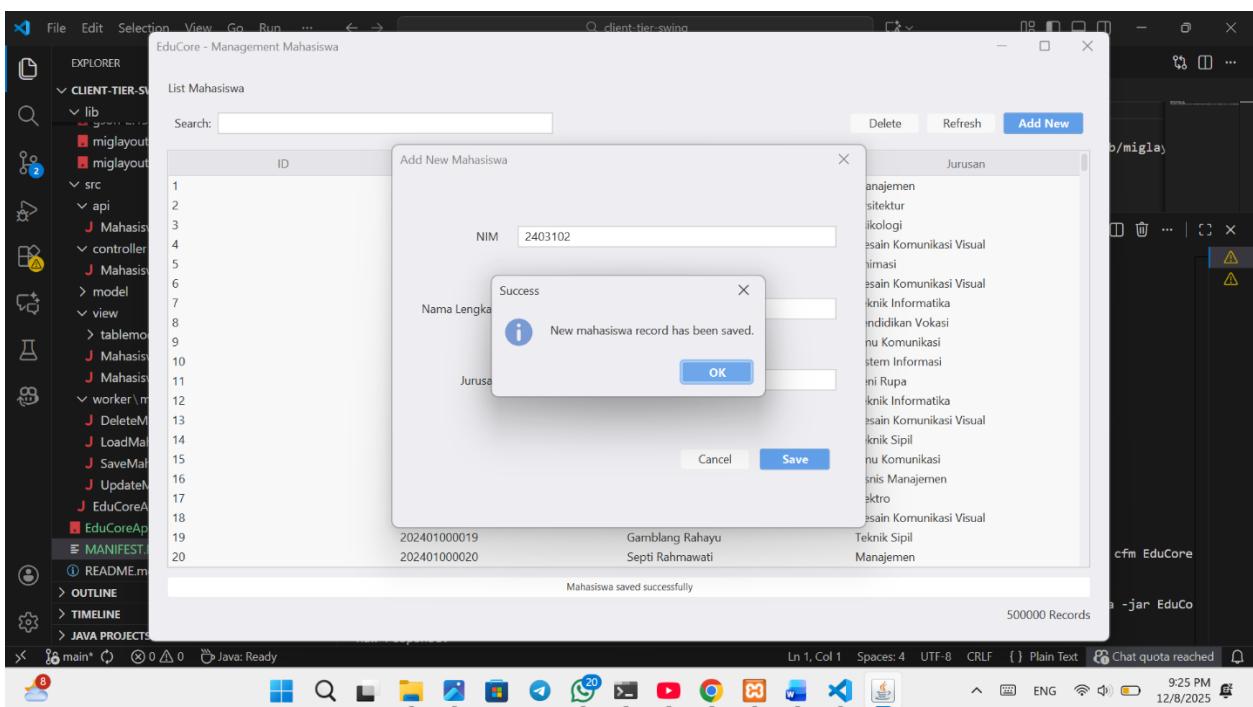
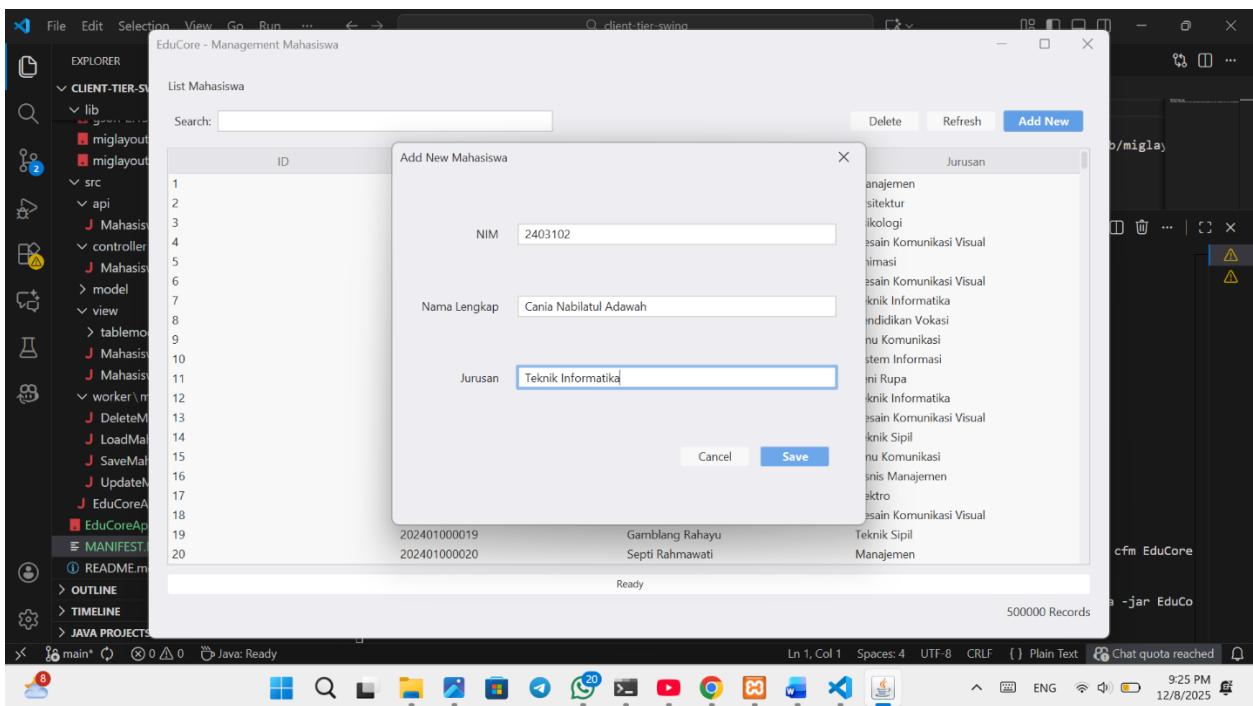
ID	NIM	Nama	Jurusan
1	20240100001	Bagas Wibisono	Manajemen
2	20240100002	Najam Safitri	Arsitektur
3	20240100003	Dodo Fujati	Psikologi
4	20240100004	Carub Mulyani	Desain Komunikasi Visual
5	20240100005	Karimah Tamba	Animasi
6	20240100006	Martaka Saragih	Desain Komunikasi Visual
7	20240100007	Wardaya Mulyani	Teknik Informatika
8	20240100008	Ika Iswahyudi	Pendidikan Vokasi
9	20240100009	Luis Aryani	Ilmu Komunikasi
10	20240100010	Vicky Usada	Sistem Informasi
11	20240100011	Cahyono Wibisono	Seni Rupa
12	20240100012	Ridwan Laksita	Teknik Informatika
13	20240100013	Ceccep Ardianto	Desain Komunikasi Visual
14	20240100014	Yani Mangunsong	Teknik Sipil
15	20240100015	Danang Sinaga	Ilmu Komunikasi
16	20240100016	Cahyanto Hidayanto	Bisnis Manajemen
17	20240100017	Adiarja Pangestu	Elektro
18	20240100018	Cakrabirawa Puspita	Desain Komunikasi Visual
19	20240100019	Gamblang Rahayu	Teknik Sipil
20	20240100020	Septi Rahmawati	Manajemen

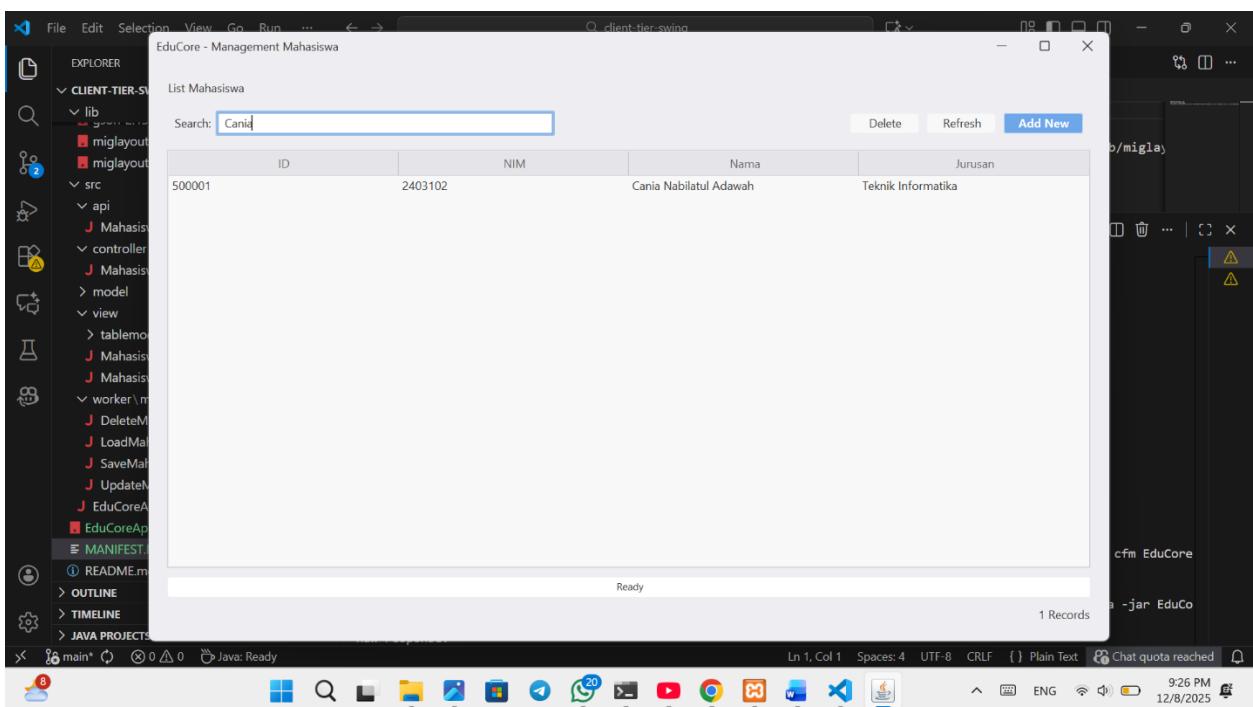
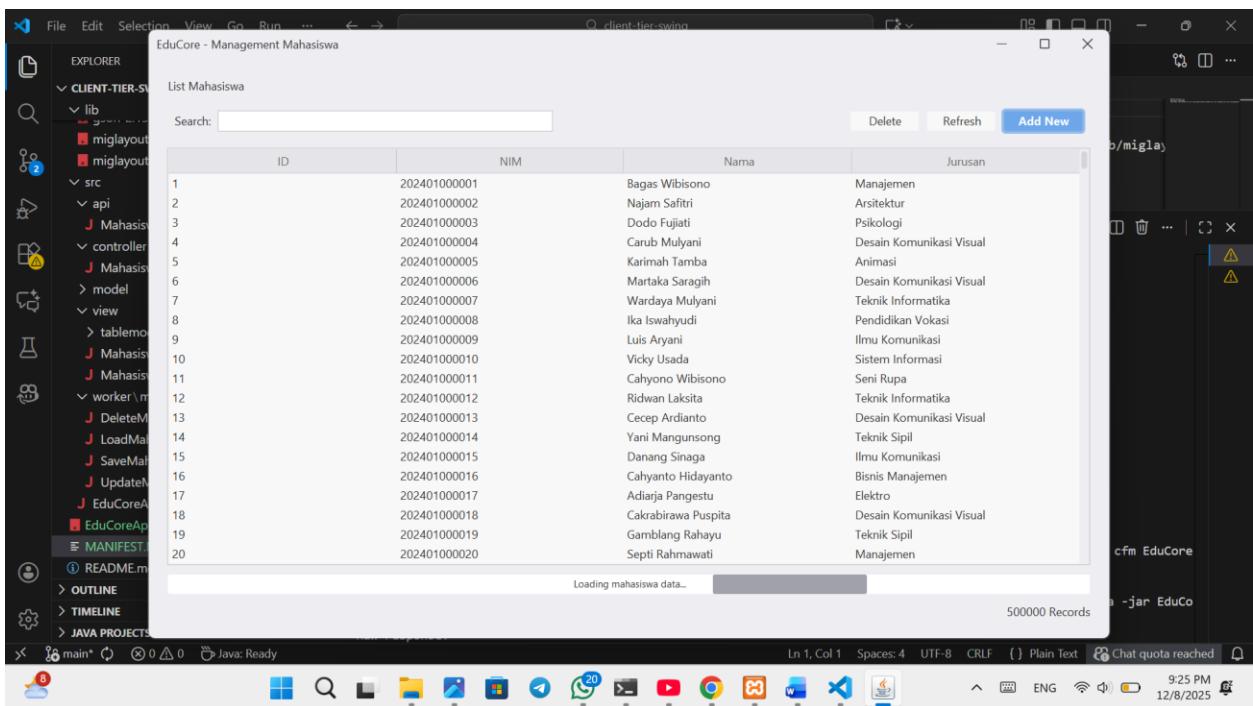
Ready

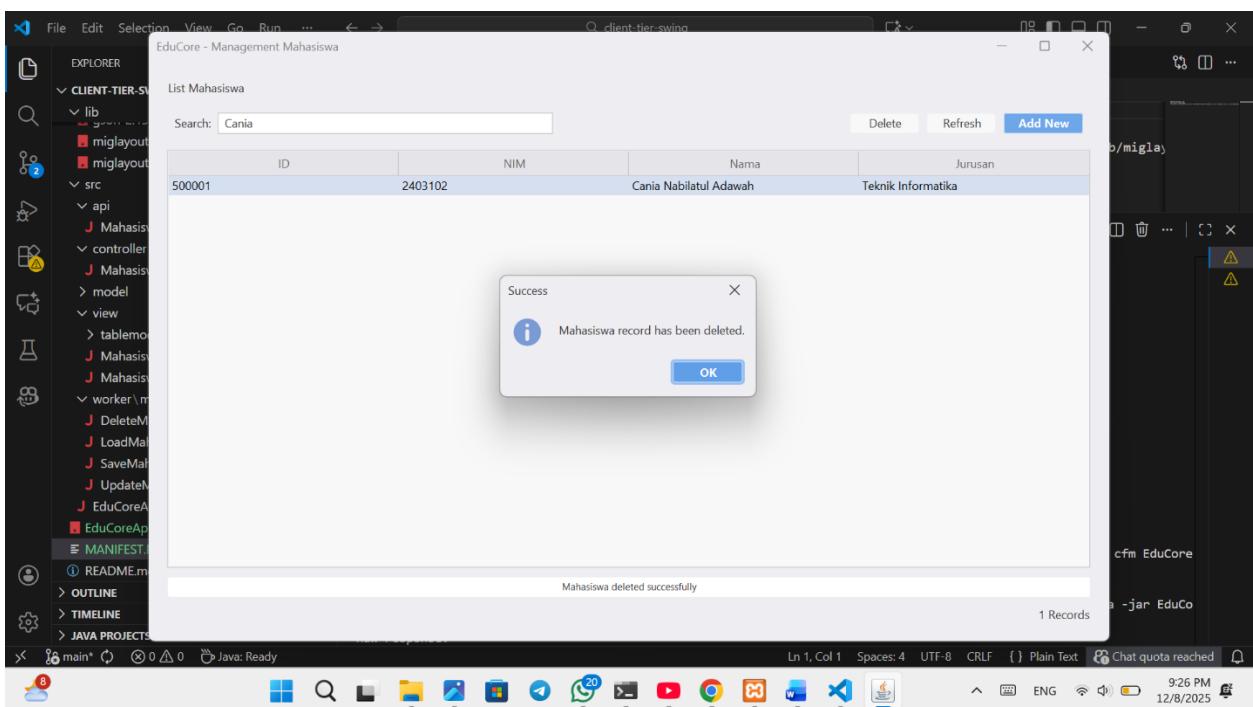
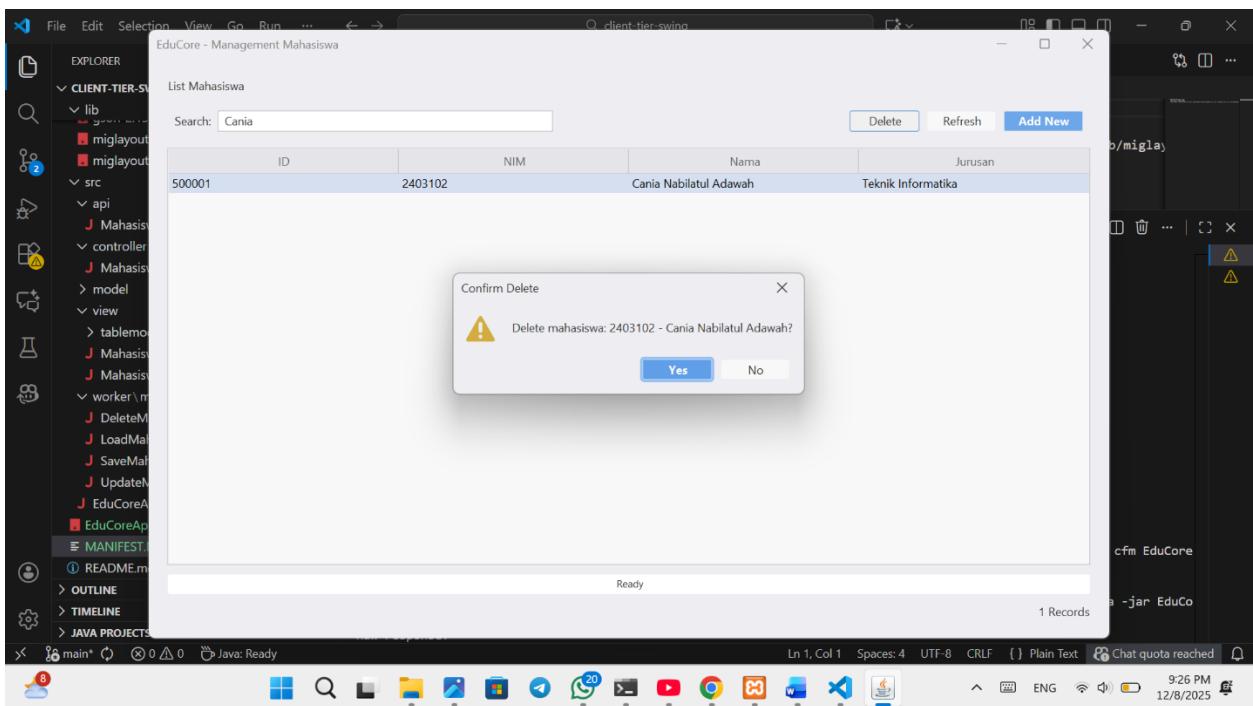
500000 Records

**Ln 1, Col 1 Spaces: 4 UTF-8 CRLF Plain Text Chat quota reached**

Java: Ready







```

File Edit Selection View Go Run ...
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
12/08/2025 08:22 PM <DIR> lib
12/08/2025 09:10 PM 199 MANIFEST.MF
12/08/2025 08:18 PM 1,445 README.md
12/08/2025 09:22 PM <DIR> src
2 File(s) 1,644 bytes
6 Dir(s) 263,288,700,928 bytes free

C:\Users\user\OneDrive\Documents\projectpb0\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>jar cfm EduCore
App.jar MANIFEST.MF -c bin .

C:\Users\user\OneDrive\Documents\projectpb0\PraktikumPBO\tugaspraktikum\praktikum14\client-tier-swing>java -jar EduCoreApp.jar
Raw response:
{
    "success": true,
    "message": "Mahasiswa berhasil ditambahkan",
    "data": {
        "id": "500001",
        "nim": "2403102",
        "nama": "Cania Nabilatul Adawah",
        "jurusan": "Teknik Informatika"
    }
}
Raw response:
{
    "success": true,
    "message": "Mahasiswa berhasil dihapus"
}

```

Ln 1, Col 1 Spaces: 4 UTF-8 CRLF {} Plain Text Chat quota reached

EduCore - Management Mahasiswa

List Mahasiswa

ID	NIM	Nama	Jurusan
1	20240100001	Bagas Wibisono	Manajemen
2	20240100002	Najam Safitri	Arsitektur
3	20240100003	Dodo Fujati	Psikologi
4	20240100004	Carub Mulyani	Desain Komunikasi Visual
5	20240100005	Karimah Tamba	Animasi
6	20240100006	Martaka Saragih	Desain Komunikasi Visual
7	20240100007	Wardaya Mulyani	Teknik Informatika
8	20240100008	Ika Iswahyudi	Pendidikan Vokasi
9	20240100009	Luis Aryani	Ilmu Komunikasi
10	20240100010	Vicky Usada	Sistem Informasi
11	20240100011	Cahyono Wibisono	Seni Rupa
12	20240100012	Ridwan Laksita	Teknik Informatika
13	20240100013	Ceccep Ardianto	Desain Komunikasi Visual
14	20240100014	Yani Mangunsong	Teknik Sipil
15	20240100015	Danang Sinaga	Ilmu Komunikasi
16	20240100016	Cahyanto Hidayanto	Bisnis Manajemen
17	20240100017	Adiarja Pangestu	Elektro
18	20240100018	Cakrabirawa Puspita	Desain Komunikasi Visual
19	20240100019	Gamblang Rahayu	Teknik Sipil
20	20240100020	Septi Rahmawati	Manajemen

Ready 500000 Records

### 3. Pengalaman Pembelajaran (Refleksi Pribadi)

Selama mempelajari materi Konektivitas Basis Data (3-tier), saya mendapatkan pengalaman baru yang berbeda dari praktikum sebelumnya. Jika pada 2-tier aplikasi Java

langsung terhubung ke MySQL, pada 3-tier saya belajar bahwa prosesnya jauh lebih terstruktur dan profesional.

Saya memahami bahwa pemisahan layer antara client, application, dan database memberikan banyak kelebihan, seperti keamanan yang lebih baik, fleksibilitas, serta kemudahan dalam melakukan perubahan tanpa mengganggu keseluruhan sistem. Proses membangun REST API menggunakan PHP Native juga memperluas wawasan saya tentang bagaimana sebuah server bekerja dalam menerima request, memproses logic bisnis, dan memberikan response berupa JSON.

Saat mencoba menghubungkan Java Swing dengan REST API, saya menghadapi tantangan seperti kesalahan BASE\_URL, error format JSON, serta kendala saat melakukan build file .jar. Namun, melalui proses tersebut, saya semakin memahami pentingnya struktur project, konfigurasi MANIFEST, serta peran library pihak ketiga seperti Gson dan FlatLaf.

Bagian yang paling menantang sekaligus berkesan adalah ketika berhasil menjalankan aplikasi dalam bentuk .jar dan tetap bisa melakukan CRUD melalui REST API. Hal ini memberi saya pengalaman nyata tentang bagaimana aplikasi desktop modern berkomunikasi dengan backend.

Secara keseluruhan, praktikum ini sangat membantu saya memahami arsitektur aplikasi yang lebih kompleks dan memberikan dasar yang kuat untuk pengembangan aplikasi client-server di masa depan.

Link Github: <https://github.com/caniaye/PraktikumPBO>