

Lab 01: Database Ecosystems & Modern Development Environment

Course: Database Systems Lab (Data Science Program)

Student Name: [Your Full Name]

Roll Number: [Your Roll Number]

Date: [Date of Submission]

Section 1: Environment Setup Evidence (20 points)

1.1 Linux Terminal Setup

What was done: Used the native Linux (Ubuntu) terminal for the lab.

Command run	Purpose
uname -a	Shows Linux kernel and system info
whoami	Shows current username

[INSERT SCREENSHOT HERE]

Terminal with uname -a and whoami output

1.2 PostgreSQL Downloaded and Installed

Commands used:

```
sudo apt update  
sudo apt install -y postgresql postgresql-contrib
```

Command run	Purpose

<code>psql --version</code>	Shows installed PostgreSQL client version
<code>sudo systemctl status postgresql</code>	Shows PostgreSQL service is active (running)

[INSERT SCREENSHOT HERE]

Terminal with `psql --version` and service status

1.3 DBeaver Downloaded and Installed

Downloaded .deb from dbeaver.io and installed with `sudo dpkg -i dbeaver-ce_*_amd64.deb`.

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DBeaver application open or Help → About

1.4 Database and User Created (muhammad-asif-khan)

Created user `muhammad-asif-khan` and database `lab1_db` via `create_user_and_db.sql`.

Command / action	Purpose
<code>psql -U muhammad-asif-khan -d lab1_db</code>	Connect to <code>lab1_db</code>
<code>SELECT version();</code> and <code>\l</code>	Show version and list databases

[INSERT SCREENSHOT HERE]

`psql` showing version and `\l` with `lab1_db`

1.5 DBeaver Connection to PostgreSQL

Connection: Host localhost, Port 5432, Database lab1_db, Username muhammad-asif-khan.

[INSERT SCREENSHOT HERE]

DBeaver Navigator with lab1_db connection and Databases expanded

1.6 Table Created and Data Inserted

books_read table created and 5 sample books inserted via `lab1/create_books_table.sql`.

[INSERT SCREENSHOT HERE]

DBeaver showing books_read table and/or `SELECT * FROM books_read` result

1.7 Git Configuration

Command run	Purpose
<code>git --version</code>	Verify Git is installed
<code>git config --list</code>	Show user.name and user.email

[INSERT SCREENSHOT HERE]

Terminal with `git --version` and `git config --list`

Section 2: Database Work (30 points)

2.1 Table Structure (books_read)

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books_read table structure in DBeaver (columns, types, constraints)

2.2 Sample Data (at least 5 books)

Query: SELECT * FROM books_read ORDER BY date_finished;

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Query result with 5 rows

2.3 Analytical Queries (5 required types)

Query 1: Filtering with WHERE

```
SELECT title, author, rating, category  
FROM books_read  
WHERE rating >= 4.5  
ORDER BY rating DESC;
```

Explanation: Returns books with rating ≥ 4.5 , sorted by rating descending.

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Query 1 result

Query 2: Aggregation with GROUP BY

```
SELECT category, AVG(pages) AS avg_pages, COUNT(*) AS book_count
FROM books_read
GROUP BY category
ORDER BY avg_pages DESC;
```

Explanation: Average pages and book count per category.

[INSERT SCREENSHOT HERE]

Query 2 result

Query 3: Sorting with ORDER BY

```
SELECT * FROM books_read ORDER BY date_finished DESC;
```

Explanation: All books, most recently finished first.

[INSERT SCREENSHOT HERE]

Query 3 result

Query 4: Date manipulation function

```
SELECT TO_CHAR(date_finished, 'YYYY-MM') AS month,
       COUNT(*) AS books_finished, SUM(pages) AS pages_read
FROM books_read
GROUP BY TO_CHAR(date_finished, 'YYYY-MM')
ORDER BY month;
```

Explanation: Reading progress by month.

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Query 4 result

Query 5: Multi-condition (AND/OR)

```
SELECT title, author, category, rating, pages
FROM books_read
WHERE (category = 'Machine Learning' OR category = 'Data Science')
    AND rating > 4.0
ORDER BY rating DESC;
```

Explanation: ML or Data Science books with rating > 4.0.

[INSERT SCREENSHOT HERE]

Query 5 result

2.4 Schema Export

Command: pg_dump -U muhammad-asif-khan -d lab1_db -s > lab1_schema.sql

[INSERT SCREENSHOT OR PASTE FIRST 20 LINES HERE]

head -20 lab1_schema.sql

Section 3: AI Learning Log (25 points)

Minimum 5 high-quality AI interactions. Fill each entry below.

AI INTERACTION #1

Date: AI Tool: Claude / ChatGPT / Other

Task:**Prompt used:****Response quality:** ★★★★★**Key learnings:****How I verified:****What I modified:**

AI INTERACTION #2

[Same structure as above]

AI INTERACTION #3

[Same structure as above]

AI INTERACTION #4

[Same structure as above]

AI INTERACTION #5

[Same structure as above]

Section 4: Version Control (15 points)

4.1 GitHub Repository

Repository URL: [https://github.com/\[YOUR_USERNAME\]/database-labs](https://github.com/[YOUR_USERNAME]/database-labs)

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GitHub repo page with folder structure and commits

4.2 Commit History

Command: `git log --oneline --graph --all`

[INSERT SCREENSHOT HERE]

Terminal with commit history

4.3 File Organization

```
database-labs/  
├── README.md  
└── lab1/  
    ├── create_books_table.sql  
    ├── queries.sql  
    └── NOTES.md
```

[INSERT SCREENSHOT HERE]

Terminal or explorer showing repo structure

Submit as PDF: Lab01_FirstNameLastName_RollNumber.pdf to Google Classroom.