

SESSION REPORT

Database Systems Audit

Comparing MySQL, Oracle Database, Microsoft SQL Server, and PostgreSQL, plus hands-on work in an Oracle 19c VM

PROGRAM	AEC Infrastructure Informatique et Cybersecurite
INSTITUTION	College de Bois-de-Boulogne
SCOPE	Part 1 team comparison, Part 2 individual work
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1. Introduction

A database management system (DBMS) is the software that stores, organizes, secures, and queries data. The choice of DBMS has a direct impact on cost, growth capacity, and the load an organization can support. This report compares four relational DBMSs on cost, data volume, and concurrent users, then moves to hands-on work in a provided Oracle 19c VM.

2. Comparison of four DBMSs

Criterion	MySQL	Oracle Database	SQL Server	PostgreSQL
Cost	Free (Community, open source)	Paid and costly (Enterprise); free Oracle Database Free is limited	Free editions (Express, Developer); paid Standard/Enterprise	Free and open source
Data volume	Very large, several TB	Very large, TB to PB	Very large, several TB (Express: 50 GB per database)	Very large, several TB
Concurrent users	Hundreds to thousands*	Thousands*	Hundreds to thousands*	Hundreds to thousands*
Advantages	Simple, fast, very popular for the web	Very performant, secure, reliable	Strong integration with Windows and Microsoft tooling	Free, powerful, very complete
Disadvantages	Less suited to some very complex needs	Expensive and complex to administer	Paid licenses can be costly	Administration can be more complex

* The real number of concurrent users depends on hardware (CPU, memory), server configuration, and query complexity, not only the software.

Analysis

Cost: free editions exist for all four products, but only MySQL Community and PostgreSQL are free without a size or resource cap. Oracle Database Free is limited (2 CPU threads, 2 GB RAM, 12 GB of user data) and SQL Server Express is capped at 50 GB per database.

Data volume: all four handle multi-terabyte databases without difficulty. Theoretical limits are far higher still, and Oracle stands out at very large volumes through partitioning and clustering (RAC).

Concurrent users: each DBMS sets a configurable connection limit (151 by default for MySQL, 100 for PostgreSQL, up to 32,767 for SQL Server). In practice the limit mostly comes from hardware, and a connection pool is used beyond a few hundred connections.

Synthesis

- MySQL: a good fit for web applications and small to medium businesses that want a free, simple, fast solution.
- Oracle Database: suited to large enterprises with critical needs (banking, government) where performance and reliability justify the cost.

- Microsoft SQL Server: a natural choice in a Microsoft environment (Windows Server, Active Directory, .NET, Power BI).
- PostgreSQL: the strongest free option for advanced needs, with no license cost.

3. Oracle 19c VM and the HR schema

Imported and started the Oracle VM provided for the course, then connected to the orcl database from a terminal using SQL*Plus as the system user:

```
CODE
sqlplus system/oracle@orcl
```

Queried the HR schema for the department list:

```
CODE
SELECT * FROM hr.departments;
```

The query returned 27 departments (department_id 10 to 270). Only departments 10 to 110 have a manager assigned; departments 120 to 270 have none, and most are located at location 1700. Confirmed in both SQL*Plus and Oracle SQL Developer (27 rows returned in each).

4. Conclusion

All four DBMSs studied can handle large data volumes and many users; what mainly sets them apart is cost, ecosystem, and administration complexity. The choice depends on budget, existing environment, and how critical the data is. The second part put into practice connecting to an Oracle 19c database and querying the HR schema with SQL*Plus and SQL Developer.