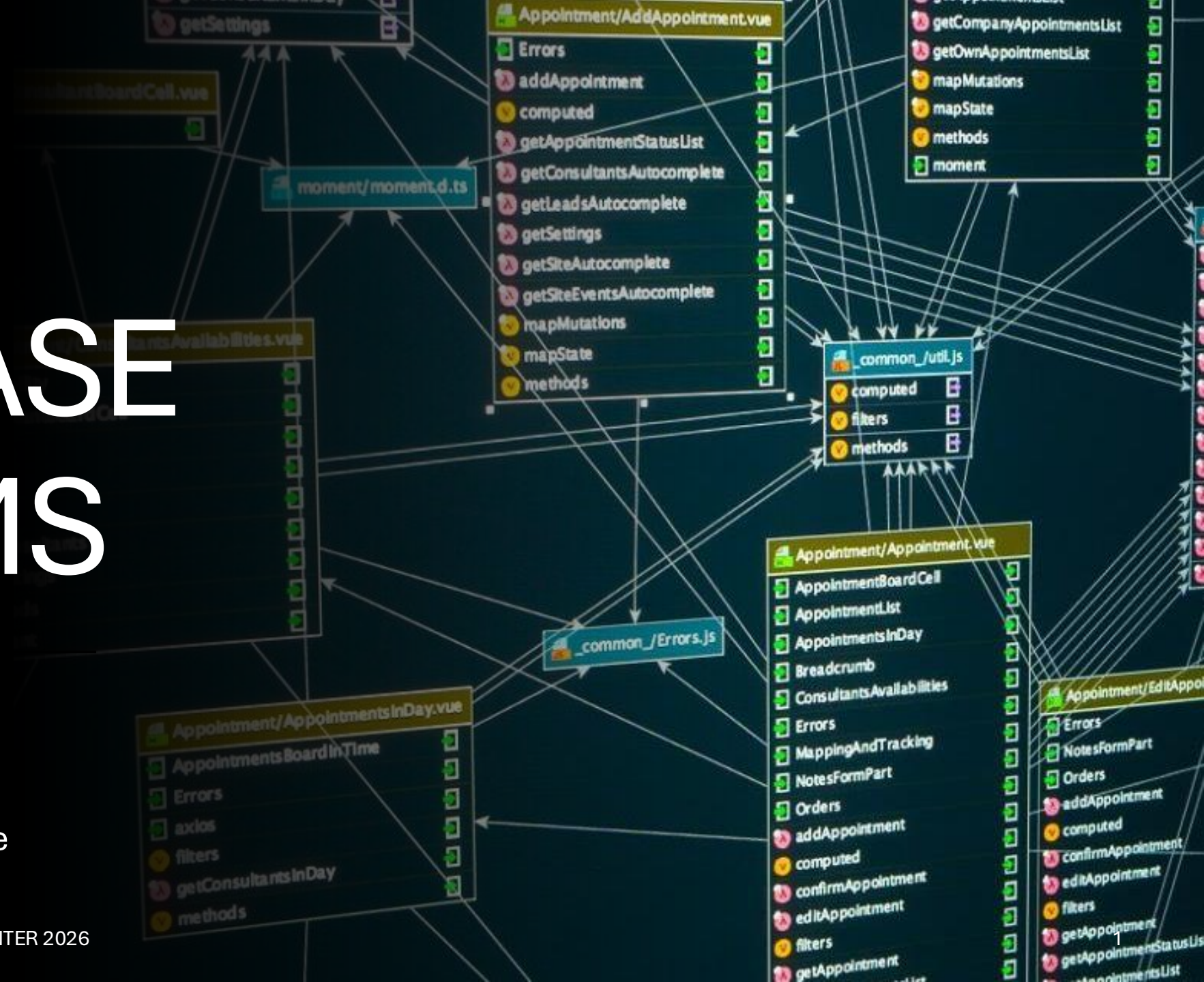


# DATABASE SYSTEMS

Shivani Tyagi

Faculty of Computing Science

COMP 3610-01 | WINTER 2026

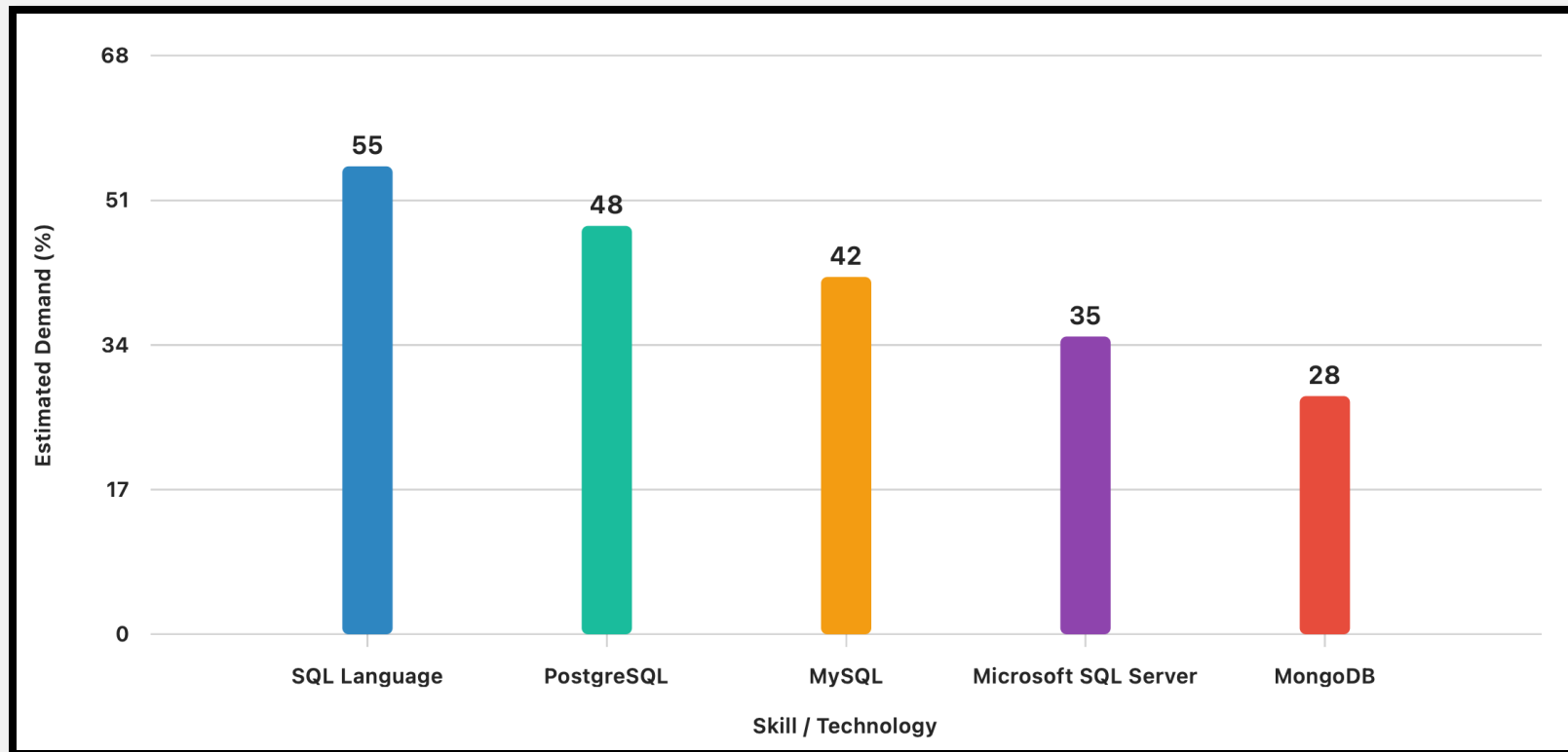


# JOBs in Market for "DATABASE SKILLS"

- **LinkedIn** lists **23,000+ SQL-related job openings** across Canada, with around 1,675 new postings—covering roles like BI analysts, data analysts, and SQL developers. [\[ca.linkedin.com\]](https://ca.linkedin.com)
- **Glassdoor** shows approximately **9,639 active SQL job listings**, alongside **1,623 SQL database developer positions**. [\[ca.indeed.com\]](https://ca.indeed.com), [\[glassdoor.ca\]](https://glassdoor.ca)
- **Job Bank (Canada)** reports a median wage of **CA \$42.36/hour** for Database Analysts, with *moderate to good* employment prospects over the next few years across major provinces. [\[jobbank.gc.ca\]](https://jobbank.gc.ca), [\[jobbank.gc.ca\]](https://jobbank.gc.ca)
- Tech skills in demand: SQL ranks among the **top 40 tech skills** in Canada for 2025, alongside Python, R, cloud, and cybersecurity. [\[thecareerators.ca\]](https://thecareerators.ca)
- A substantial **524,300 job vacancies** were recorded in Q1 2025; among those, SQL-related roles—especially in A, B, & C professions (e.g., business and natural sciences)—remain strong despite a slight overall dip. [\[immigcanada.com\]](https://immigcanada.com), [\[madeinca.ca\]](https://madeinca.ca)

# Why **MUST** we **LEARN DATABASE**?

The backbone of the most in-demand jobs in today's data-driven world **"KNOWLEDGE OF DATABASE"**



Results for **Canada** · [Choose area](#) ⋮

Jobs

Follow

Job postings

Saved jobs

Following



**Data & Integration Engineer**  
OpenHouse.ai  
Calgary, AB · via LinkedIn  

🕒 14 hours ago 📅 Full-time





**Data Engineering Specialist - Healthcare**  
Mariner Innovations  
New Brunswick · via Indeed  

🕒 3 days ago 📅 Full-time





**Data Engineer | Remote Work**  
Mercor  
Canada · via LinkedIn  

🕒 3 days ago 💵 US\$14 an hour 📅 Part-time



technologies (ERPs, CRMs, data warehouses)

- Architect generic solutions to make integrations less error prone
- Migrate and run existing clients through new parameters and models along the way
- Optimize and tune existing machine learning models
- Discover and correct data anomalies, working with data solution engineer to ensure the insights we provide are accurate

About you:

- A highly skilled software engineer with a passion for applications of technology and a love of fast paced environments
- Proficient in Python, experience with pytorch
- Experience with, or ability to understand, data integration ERP databases
- **Strong fundamental understanding of SQL** and ability to write complex queries
- Have a basic understanding of statistical distributions and can generally intuitively understand data sets when presented
- Solid foundation in collaborative coding and version control
- Experience using Jupiter notebooks or similar tools, exploring data/models is an asset
- A desire to learn or experience with machine learning
- A desire to learn or experience with how to evaluate quantitative AI models
- No minimum work experience is required

4





Canada • via LinkedIn

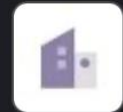
🕒 3 days ago 🌐 US\$14 an hour 📅 Part-time

**Data Engineer, Promotions & Insights; AWS**

Amazon

Vancouver, BC • via Learn4Good

🕒 3 days ago 🌐 \$80K–\$100K a year 📅 Full-time

**Senior Data Engineer - Hybrid Cloud & Data Lake Lead**

Fraser Health

Vancouver, BC (+1 other) • via Talent.com

🕒 3 days ago 📅 Full-time

**Senior Data Engineer, Data Platforms & Pipelines; AWS**

Amazon Jobs

Vancouver, BC • via Learn4Good

🕒 2 days ago 🌐 \$136K–\$226K a year 📅 Full-time

**Senior Data Engineer, ADE Science**

Amazon Development Centre Canada ULC

Vancouver, BC • via Indeed

🌐 \$136K–\$226K a year 📅 Full-time

**Data Engineer**

Jobgether

Canada Creek, NS • via Jobs Trabajo.org

🕒 2 days ago 📅 Full-time



or anomalies. Ensure data and reporting consistency across the organization

**Communication**

- Excel at communicating complex ideas to technical and non-technical audiences.
- Build relationships with product and engineering stakeholders and counterparts.
- Work with stakeholders to gather requirements, and translate business needs into data engineering solutions
- Work cross-functionally across product and engineering teams to drive adoption of data assets

**Operations**

- Drive automation and operational excellence in data infrastructure. Reduce manual intervention and improve system reliability.
- Scale existing solutions. Create new solutions as required based on team and stakeholder needs.

**BASIC QUALIFICATIONS**

- 5+ years of data engineering experience
- Experience with data modeling, warehousing and building ETL pipelines
- **Experience with SQL**
- Experience in at least one modern scripting or programming language, such as Python, Java, Scala, or NodeJS
- Experience mentoring team members on best practices
- Experience building data products incrementally and integrating and managing data sets from multiple sources

**PREFERRED QUALIFICATIONS**

- Experience with big data technologies such as: Hadoop, Hive, Spark, EMR
- Experience operating large data warehouses
- Experience communicating with users, other technical teams, and management to collect requirements, describe data modeling decisions and data engineering



Senior Data Engineer, ADE Science

Amazon Development Centre Canada ULC  
Vancouver, BC • via Indeed

💰 \$136K–\$226K a year 📅 Full-time



Data Engineer

Jobgether  
Canada Creek, NS • via Jobs Trabajo.org

🕒 2 days ago 📅 Full-time



Senior Data Engineer

Equisoft  
Abbotsford, BC • via GrabJobs

🕒 3 days ago 📅 Full-time



Lead Data Engineer - Databricks (Remote)

Lumenalta  
Calgary, AB • via LinkedIn

🕒 4 days ago 💰 \$90K–\$181K a year 📅 Full-time



Analyst, Data Engineering, Digital & Artificial Intelligence Department

Bombardier  
Dorval, Quebec • via Bombardier Careers

📅 Full-time



NEW

Job description

What We're Working On

We help global enterprises launch digital products that reach millions of users. Our work spans massive datasets, scalable pipelines, and critical business challenges across industries.

What You'll Do

- Lead technical direction for data engineering initiatives.
- Architect scalable data pipelines and systems using PySpark, AWS, and Databricks
- Guide and mentor a team of engineers, fostering best practices and code quality
- Collaborate with stakeholders across product, engineering, and data teams
- Solve enterprise-scale data challenges that impact real-world business outcomes

What We're Looking For

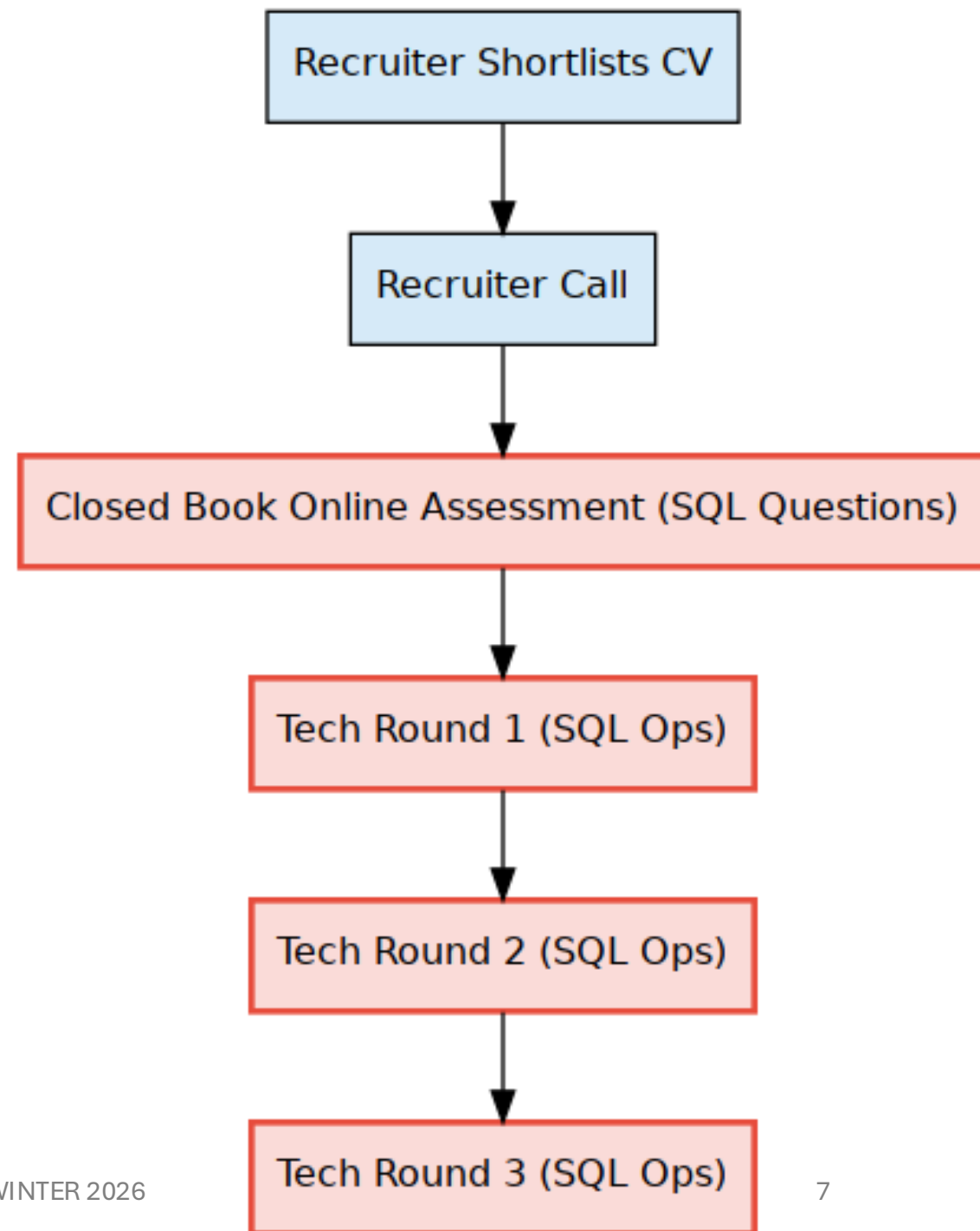
- 10+ years in data engineering or related roles
- Experience leading technical teams or projects
- Strong hands-on expertise in Python, SQL, PySpark, AWS, and Databricks
- Deep understanding of data architecture and pipeline design
- Excellent communication and leadership skills
- Fluent in English (spoken and written)

The job is 100% Remote; please ensure you have a comfortable office set at your desired work location.

Salary

Salary range: CA\$90,000 - CA\$181,000 annually, with final compensation determined by your qualifications, expertise, experience, and the role's scope

# Process of Recruitment in



# Amazon & Microsoft : SQL Question Trends

- **Amazon** often emphasizes **data analytics scenarios** (e.g., analyzing orders, shipments, and customer behavior).
- **Microsoft** includes **complex joins and window functions**, often tied to reporting or BI use cases.

The screenshot shows a SQL problem interface on the DataLemur platform. The problem is titled 'Average Review Ratings' and is categorized as 'Easy' and 'Amazon'. The description asks for a query to get the average stars for each product every month. The output should include the month in numerical value, product id, and average star rating rounded to two decimal places. The reviews table structure is provided, and an example input is shown. A large 'amazon' logo is overlaid on the right side of the interface.

**Average Review Ratings**

Easy Amazon

Given the reviews table, write a query to get the average stars for each product every month.

The output should include the month in numerical value, product id, and average star rating rounded to two decimal places. Sort the output based on month followed by the product id.

**reviews Table:**

Column Name	Type
review_id	integer
user_id	integer
submit_date	datetime
product_id	integer
stars	integer (1-5)

**reviews Example Input:**

review_id	user_id	submit_date	product_id	stars
-----------	---------	-------------	------------	-------

```
1 SELECT
2   EXTRACT(MONTH FROM submit_date) AS mth,
3   product_id,
4   ROUND(AVG(stars), 2) AS avg_stars
5 FROM reviews
6 GROUP BY EXTRACT(MONTH FROM submit_date), product_id
7 ORDER BY mth, product_id;
```

PostgreSQL 14

Run Code Submit



# Sample SQL Interview Question

*Which SQL command will return the second highest salary from Employee table?*

1. `SELECT MAX(salary) FROM Employee;`
2. `SELECT salary FROM Employee ORDER BY salary DESC LIMIT 1 OFFSET 1;`
3. `SELECT TOP 2 salary FROM Employee ORDER BY salary DESC;`
4. `SELECT salary FROM Employee WHERE RANK() OVER (ORDER BY salary DESC) = 2;`



HackerRank

Prepare > SQL > Basic Select > Weather Observation Station 5

Problem

Submissions

Leaderboard

Discussions

Query the two cities in **STATION** with the shortest and longest CITY names, as well as their respective lengths (i.e.: number of characters in the name). If there is more than one smallest or largest city, choose the one that comes first when ordered alphabetically.

The **STATION** table is described as follows:

STATION	
Field	Type
ID	NUMBER
CITY	VARCHAR2(21)
STATE	VARCHAR2(2)
LAT_N	NUMBER
LONG_W	NUMBER

where **LAT\_N** is the northern latitude and **LONG\_W** is the western longitude.

**Sample Input**

For example, **CITY** has four entries: **DEF**, **ABC**, **PQRS** and **WXY**.

**Sample Output**

```
ABC 3  
PQRS 4
```

**Explanation**

When ordered alphabetically, the **CITY** names are listed as **ABC**, **DEF**, **PQRS**, and **WXY**, with lengths 3, 3, 4, and 3. The longest name is **PQRS**,

2

/\*  
Enter your query  
Please append a s  
a single line to  
\*/  
SELECT TOP 1 CITY  
SELECT TOP 1 CITY

Upload Code as File

Wrong Answer

1/1 test case failed

X Sample Test case 0

NUMERIC

DECIMAL

## CHARACTER

### Question 2

Marks: 1

Which operator performs pattern matching?

BETWEEN operator

## LIKE operator

EXISTS operator

None of these

### Question 3

Marks: 1

Which statement is used to get all data from the student table whose name starts with p?

```
SELECT * FROM student WHERE name LIKE '%p%';
```

```
SELECT * FROM student WHERE name LIKE 'p%';
```

```
SELECT * FROM student WHERE name LIKE '_p%';
```

### Question 4

Marks: 1

What is the full form of SQL?

## Structured Query List

## Structured Query Language

## Sample Query Language

None of these.


### Question 5

Marks: 1

Evaluate the SQL statement:

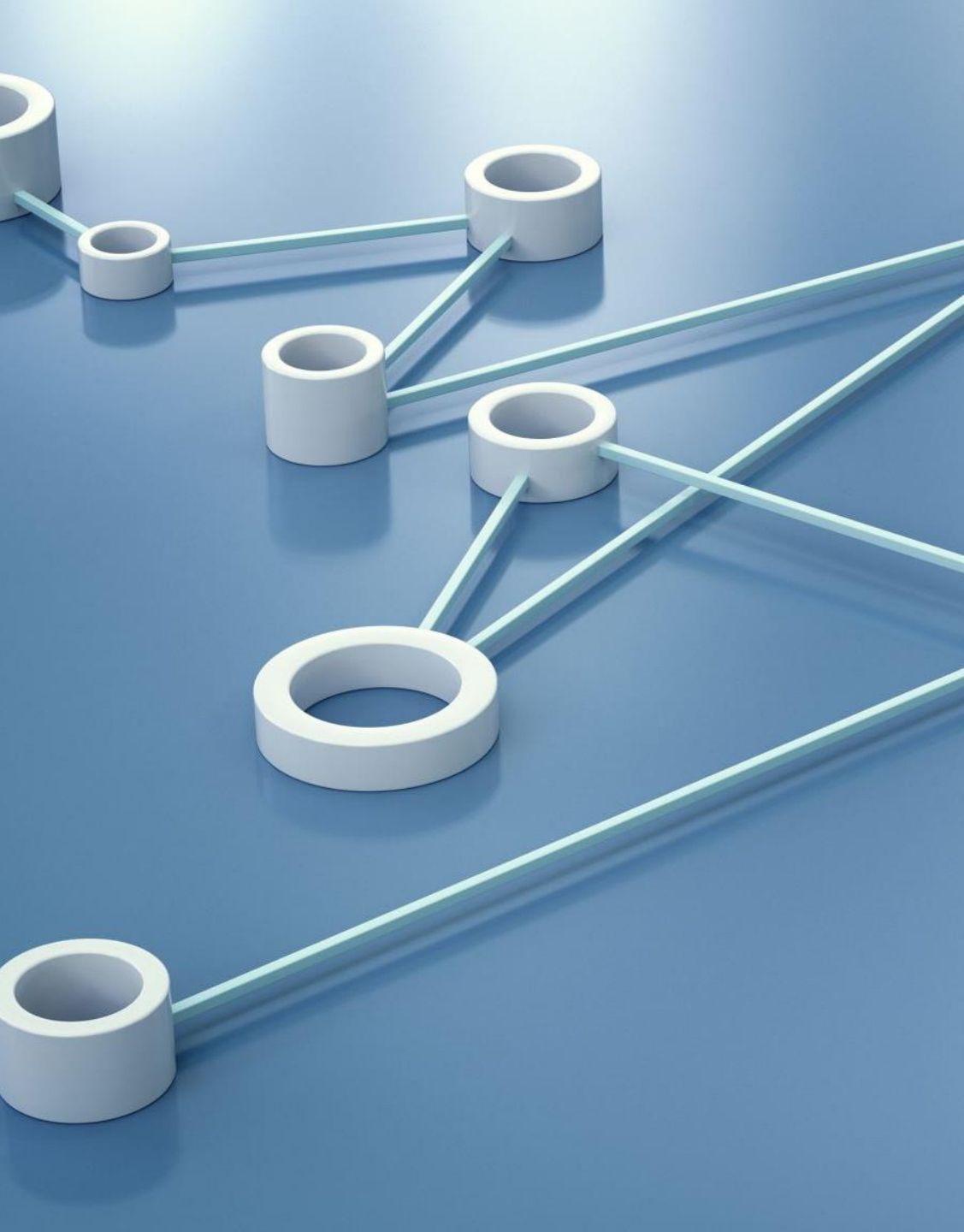
```
SELECT ROUND (TRUNCATE (MOD (1600, 10), -1), 2) FROM dual;
```

What will be displayed?



If you want to  
future-proof your  
career, start where  
the data lives—  
inside the database.





# LEARNING OBJECTIVES – WEEK 1

1. Introduction to key concepts
2. What is a Database?
3. Types of Database Systems
4. Why not File-Based System?
5. What are Database Management Systems?
6. Who are Database Administrators
7. Different Job Roles in Database



# What is DATA?

- Data is raw facts and figures.
- The unprocessed information that, when organized, becomes knowledge.



**"DATABASE SYSTEMS COMP  
3610-01 WINTER 2026"**

Raw text

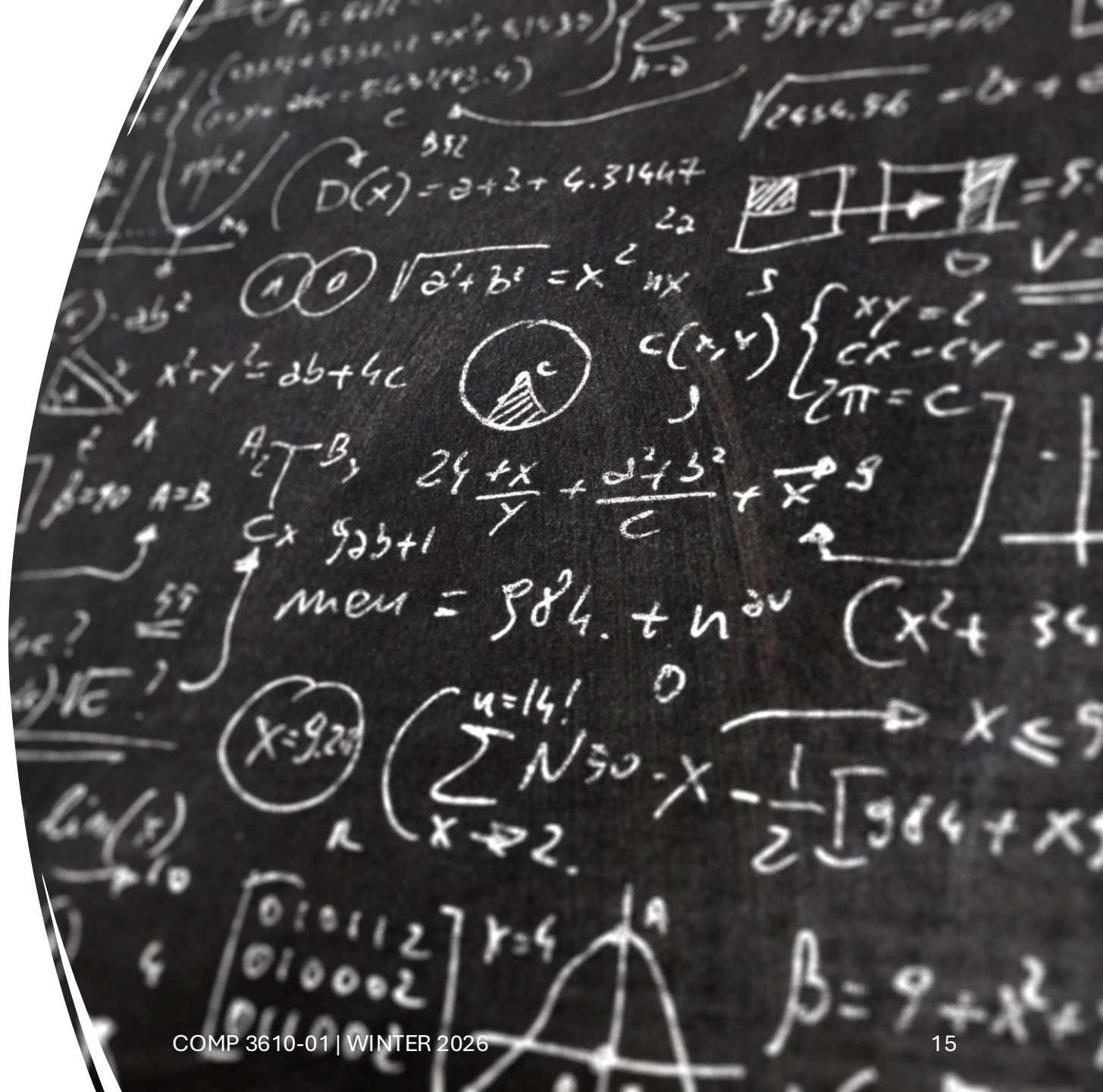
# INFORMATION

---

Data that have been processed and can be used for a decision making.

INFORMATION =  
PROCESSED(DATA) + PURPOSE

INFORMATION = DATA +  
MEANING



*Course Name:* Database  
Systems  
*Course Code:* COMP 3610-01  
*Semester:* Winter 2026

Information



# DATABASE

## Organized collection of data

- self-describing collection of processed information.

## Allows to perform data operations:

- Can be accessed
- Can be managed
- Can be updated

# Example

Course Name	Course Code	Semester
Database Systems	COMP 3610-01	WINTER 2026
Data Structures	COMP 2230-01	WINTER 2026
Data Structures	COMP 2230-02	WINTER 2026

# Example Expanded...

Course Name	Course Code	Section	Semester
Database Systems	COMP 3610	01	WINTER 2026
Data Structures	COMP 2230	01	WINTER 2026
Data Structures	COMP 2230	02	WINTER 2026

# Example Expanded More...

Course Name	Course Code	Section	Semester	Year
Database Systems	COMP 3610	01	WINTER	2026
Data Structures	COMP 2230	01	WINTER	2026
Data Structures	COMP 2230	02	WINTER	2026



# Class Activity : RAW DATA



John Smith is 25 years old and can be reached at [john.smith@email.com](mailto:john.smith@email.com). He lives in Vancouver, BC, Canada, and his phone number is 604-555-1234. John is enrolled in the Computer Science program and is taking the course COMP 3610 in the Winter 2026 semester. His grade is A.



Emily Johnson is 22 years old and her email is [emily.j@email.com](mailto:emily.j@email.com). She resides in Kamloops, BC, Canada, and her contact number is 250-555-5678. Emily is studying Data Analytics and is registered for COMP 3620 in Winter 2026. She earned a grade of B+.



Michael Brown, aged 24, can be contacted at [michael.b@email.com](mailto:michael.b@email.com). He lives in Kelowna, BC, Canada, and his phone number is 778-555-9876. Michael is pursuing Software Engineering and is enrolled in COMP 3630 for the Winter 2026 term. His grade is A-.

A blue pen with a silver tip is positioned diagonally across the upper left portion of the image. The background is a document featuring a bar chart with several blue bars of varying heights. The text 'INFORMATION from THE DATA ?' is overlaid in white, with 'from' in a smaller font size. Below the text is a solid orange horizontal bar.

# INFORMATION from THE DATA ?



John Smith is 25 years old and can be reached at [john.smith@email.com](mailto:john.smith@email.com). He lives in Vancouver, BC, Canada, and his phone number is 604-555-1234. John is enrolled in the Computer Science program and is taking the course COMP 3610 in the Winter 2026 semester. His grade is A.



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Michael Brown, aged 24, can be contacted at [michael.b@email.com](mailto:michael.b@email.com). He lives in Kelowna, BC, Canada, and his phone number is 778-555-9876. Michael is pursuing Software Engineering and is enrolled in COMP 3630 for the Winter 2026 term. His grade is A-.

**Student Name**  
**Age**  
**Email**  
**Address**  
**Phone Number**  
**Program**  
**Course Code**  
**Grade**

# INFORMATION from RAW DATA

- John Smith, 25, [john.smith@email.com](mailto:john.smith@email.com), Vancouver, BC, Canada, 604-555-1234, Computer Science, COMP 3610, Winter 2026, Grade:
- A Emily Johnson, 22, [emily.j@email.com](mailto:emily.j@email.com), Kamloops, BC, Canada, 250-555-5678, Data Analytics, COMP 3620, Winter 2026,
- Grade: B+ Michael Brown, 24, [michael.b@email.com](mailto:michael.b@email.com), Kelowna, BC, Canada, 778-555-9876, Software Engineering, COMP 3630, Winter 2026, Grade: A-






NOW what could be  
the DATABASE?

---


Student Name	Age	Email	Address	Phone Number	Program	Course Code	Grade
John Smith	25	john.smith@email.com	Vancouver, BC, Canada	604-555-1234	Computer Science	COMP 3610	A
Emily Johnson	22	emily.j@email.com	Kamloops, BC, Canada	250-555-5678	Data Analytics	COMP 3620	B+
Michael Brown	24	michael.b@email.com	Kelowna, BC, Canada	778-555-9876	Software Engineering	COMP 3630	A-

# How can we make it more simplified?





First Name	Last Name	Age	Email	Address	Phone Number	Program	Course Code	Grade
John	Smith	25	john.smith@email.com	Vancouver, BC, Canada	604-555-1234	Computer Science	COMP 3610	A
Emily	Johnson	22	emily.j@email.com	Kamloops, BC, Canada	250-555-5678	Data Analytics	COMP 3620	B+
Michael	Brown	24	michael.b@email.com	Kelowna, BC, Canada	778-555-9876	Software Engineering	COMP 3630	A-



First Name	Last Name	Age	Email	City	Province	Country	Phone Number	Program	Course Code	Grade
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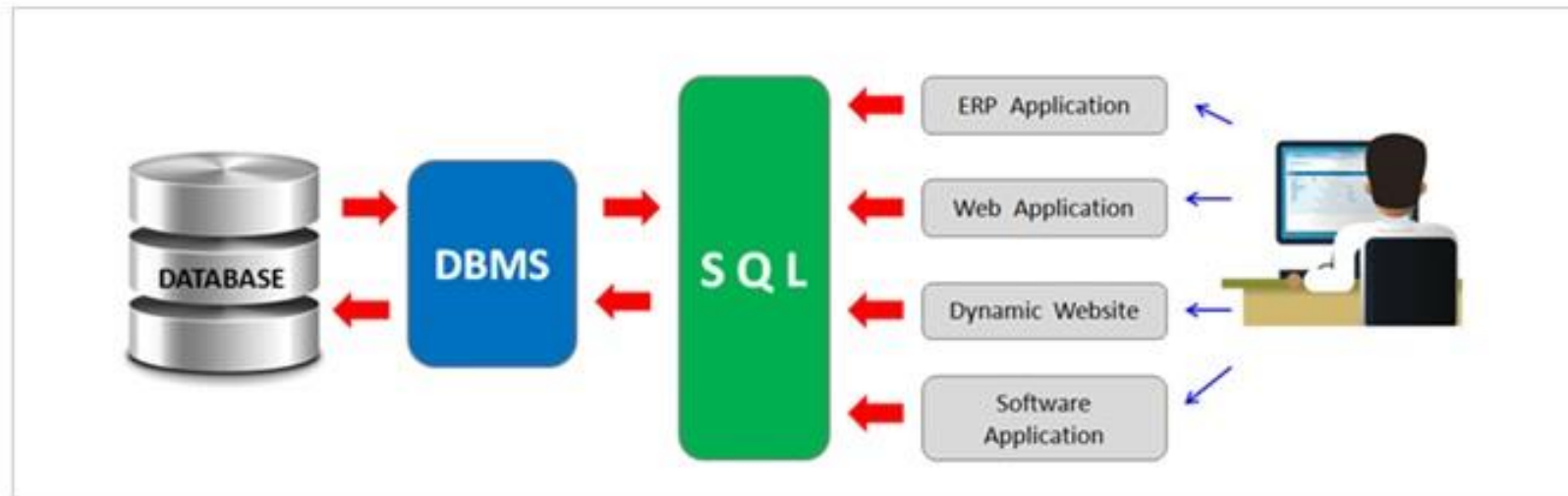
# DATA TO DATABASE

- John Smith is 25 years old and can be reached at [john.smith@email.com](mailto:john.smith@email.com). He lives in Vancouver, BC, Canada, and his phone number is 604-555-1234. John is enrolled in the Computer Science program and is taking the course COMP 3610 in the Winter 2026 semester. His grade is A.
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Michael	Brown	24	michael.b@email.com	Kelowna	BC	Canada	778-555-9876	Software Engineering	COMP 3630	A-

# DATABASE MANAGEMENT SYSTEM

Software System that helps user to define, create, maintain and control access to the database.



## DBMS COMPONENTS

**SQL** - Structured Query Language. **DBMS** - Database Management System.

**Database** - Organized Collection Of Interrelated Data.

[www.learncomputerscienceonline.com](http://www.learncomputerscienceonline.com)

# Why do we need DBMS?

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