

# DATABASE SYSTEMS

Shivani Tyagi

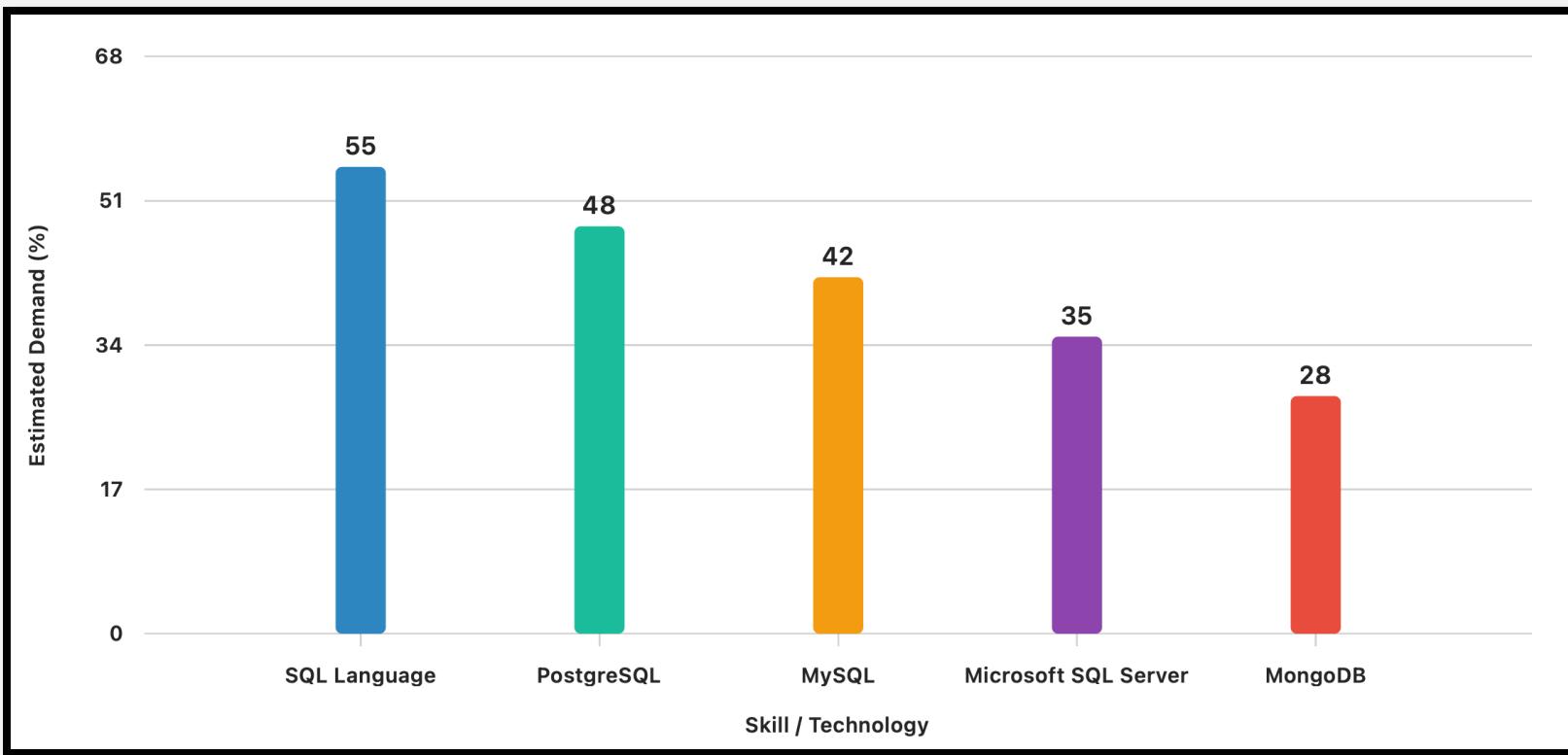
Faculty of Computing Science

# 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. [\[thecareeradvisors.ca\]](https://thecareeradvisors.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"**



Date posted ▾

Job type ▾

Job type ▾

Date posted ▾

Results for **Canada** · Choose area ⋮

## Jobs

Follow

Job postings

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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



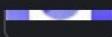
Part-time



technologies (ERPs, CRMs, data warehouses)  
• Architect generic solutions to make integrati  
error prone  
• Migrate and run existing clients through new  
parameters and models along the way  
• Optimize and tune existing machine learning  
• Discover and correct data anomalies, workin  
solution engineer to ensure the insights we pr

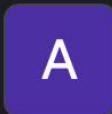
#### About you:

- A highly skilled software engineer with a pas  
applications of technology and a love of fast i
- Proficient in Python, experience with pytorch
- Experience with, or ability to understand, da  
ERP databases
- **Strong fundamental understanding of SQL a**
- Have a basic understanding of statistical dis  
generally intuitively understand data sets whe
- Solid foundation in collaborative coding and
- Experience using Jupiter notebooks or simil  
explore data/models is an asset
- A desire to learn or experience with machine
- A desire to learn or experience with how to e  
quantitative AI models
- No minimum work experience is required



Canada • via LinkedIn

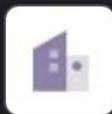
(⌚ 3 days ago) ⚡ US\$14 an hour 🗂️ Part-time

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

Amazon

Vancouver, BC • via Learn4Good

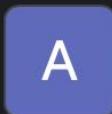
(⌚ 3 days ago) ⚡ \$80K-\$100K a year 🗂️ Full-time

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

Fraser Health

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

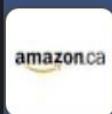
(⌚ 3 days ago) 🗂️ Full-time

**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



COMP 3610-01 | WINTER 2026

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



NEW

**Analyst, Data Engineering, Digital & Artificial Intelligence Department**

Bombardier

Dorval, Quebec • via Bombardier Careers

Full-time

**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)

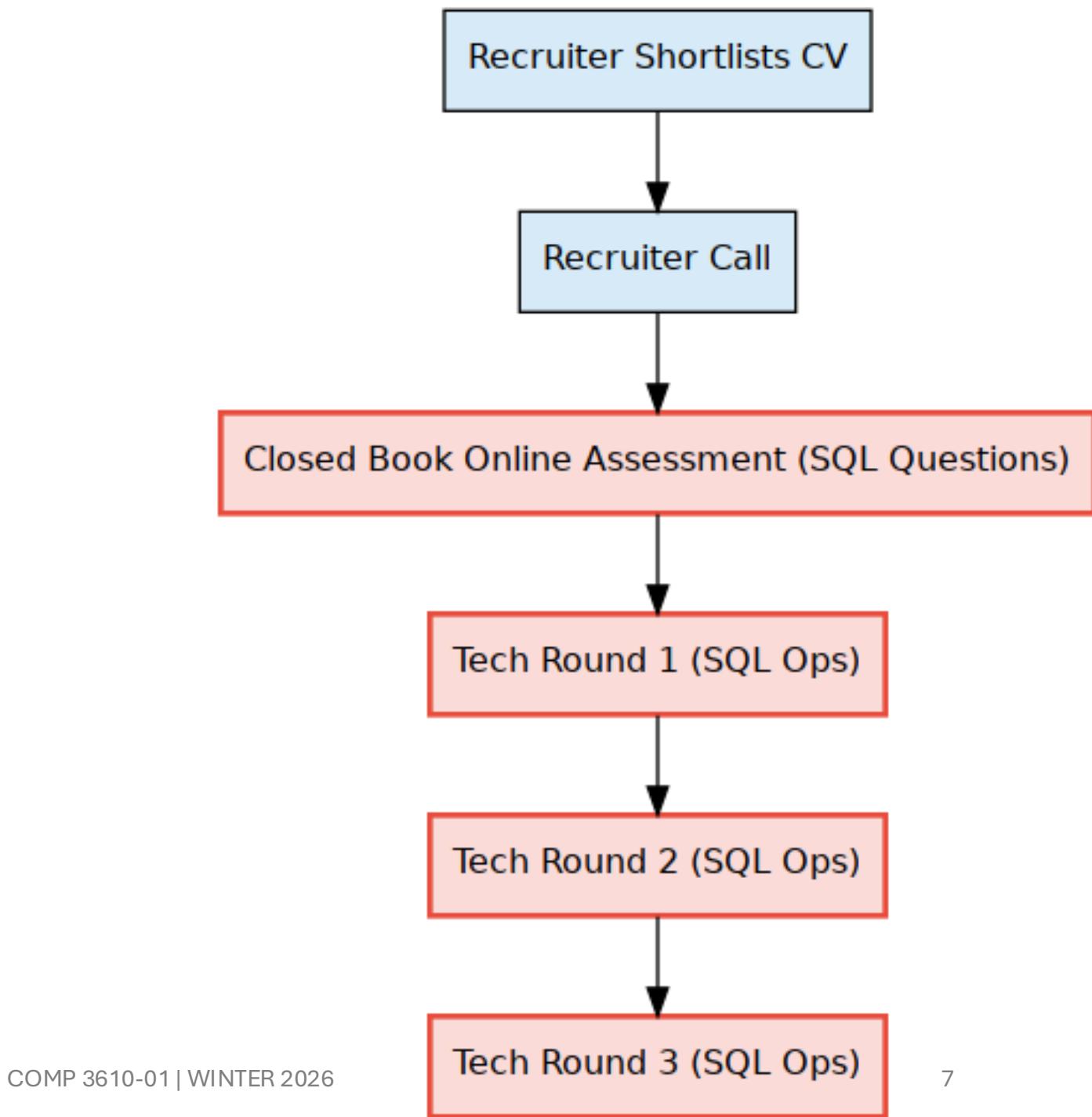
The job is 100% Remote; please ensure you have a comfortable office set up at your desired work location.

**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.

 DataLemur admin\_jason A

## Average Review Ratings

Description Solution Discussion Submissions

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
-----------	---------	-------------	------------	-------

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;



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 /*
3 Enter your query t
4 Please append a se
5 a single line to a
6 */
7 SELECT TOP 1 CITY,
8 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

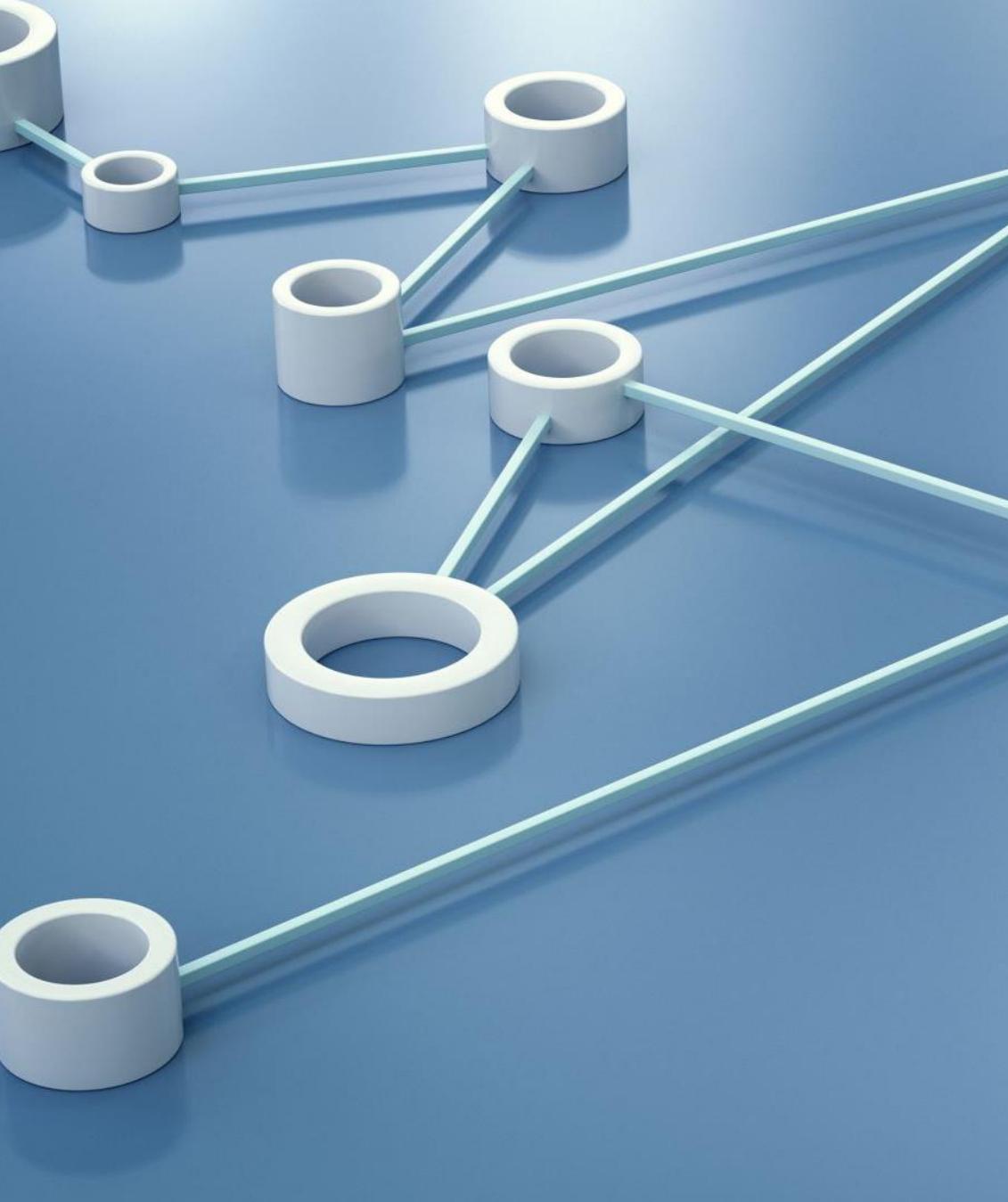
Evaluate the SQL statement:

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

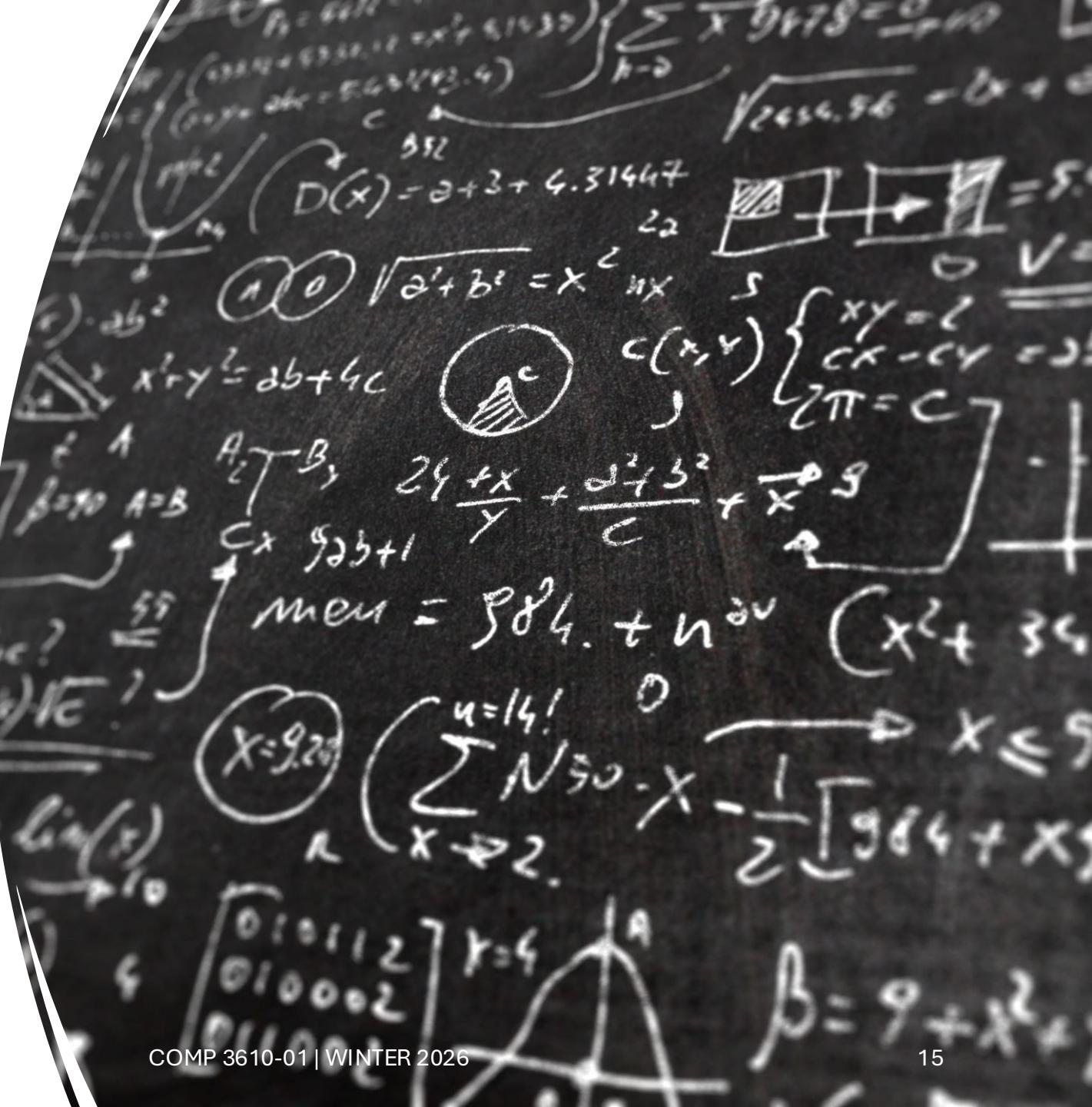
# INFORMATION

---

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

<b>Course Name</b>	<b>Course Code</b>	<b>Semester</b>
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 close-up photograph of a blue and white striped folder or document cover. A silver and blue pen lies diagonally across the folder. The background is dark, making the blue and white stripes stand out.

# INFORMATION from THE DATA ?



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# 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?

---

<b>First Name</b>	<b>Last Name</b>	<b>Age</b>	<b>Email</b>	<b>Address</b>	<b>Phone Number</b>	<b>Program</b>	<b>Course Code</b>	<b>Grade</b>
John	Smith	25	john.smith@email.com	Vancouver, BC, Canada	604-555-1234	Computer Science	COMP 3610	A
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Michael	Brown	24	michael.b@email.com	Kelowna, BC, Canada	778-555-9876	Software Engineering	COMP 3630	A-

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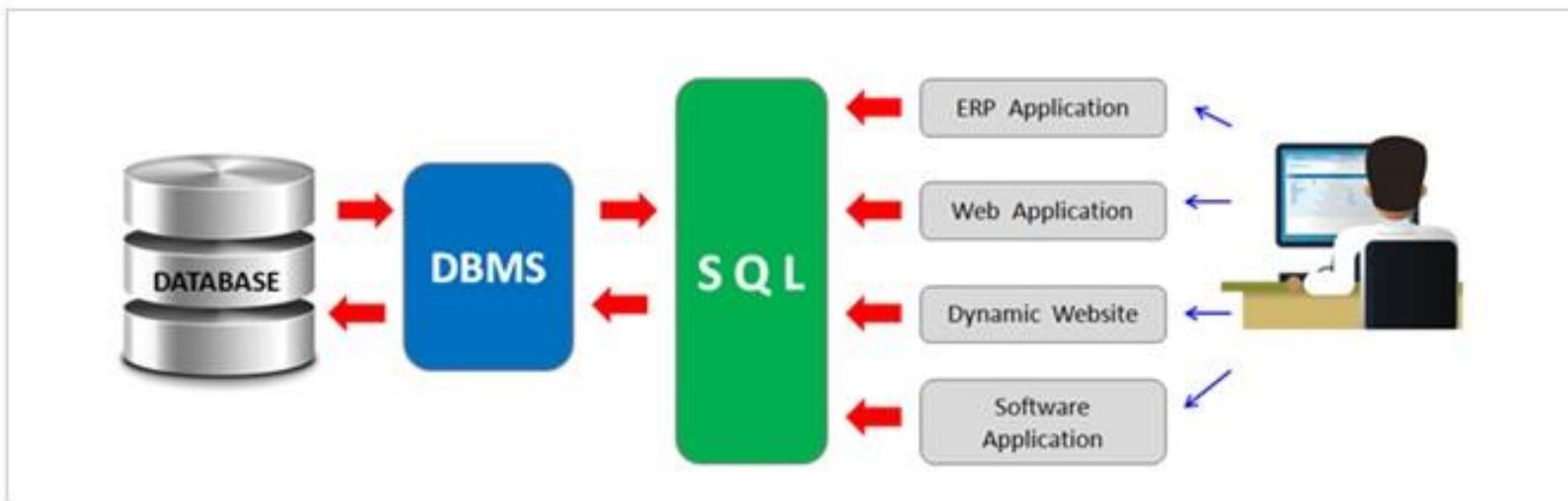
# DATA TO DATABASE

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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.

# Why do we need DBMS?

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When dealing with huge amount of data, there are two things that requires optimization:

Storage of data

Retrieval of data

Managing data all at one place