SQL STATEMENT:
SELECT

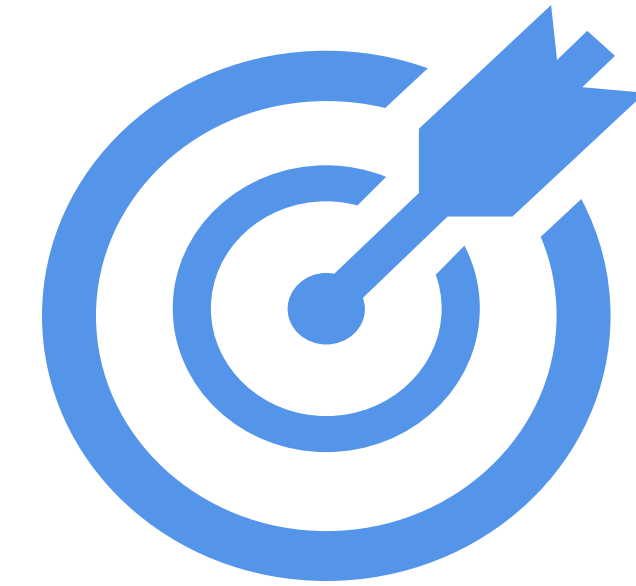Bachelor of Information Systems

INTRODUCTION TO
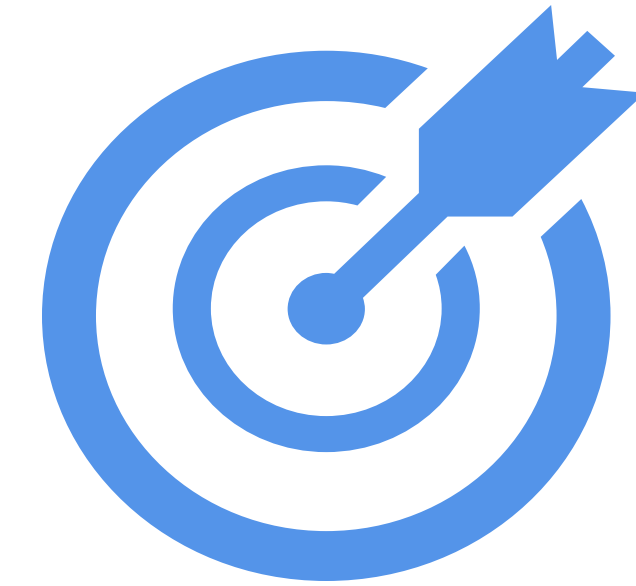**DATABASE AND INFORMATION SYSTEM**

Learning Objective(s)

This material should address the following question(s).

? How do we retrieves data from a single database table in SQL?

? How do we give a temporary name for a column in a table in SQL?

? How do we retrieves only the distinct values from a table in SQL?

? How do we extract only those records that fulfill a specified condition in SQL?

# Learning Objective(s)

This material should address the following question(s).

? How do we perform mathematical operations on the numerical values stored in the tables in SQL?

? How do we organizes data into groups by one or more column names listed in the SQL query result?

? How do we sorts query results by one or more columns in ascending or descending order the SQL query result?
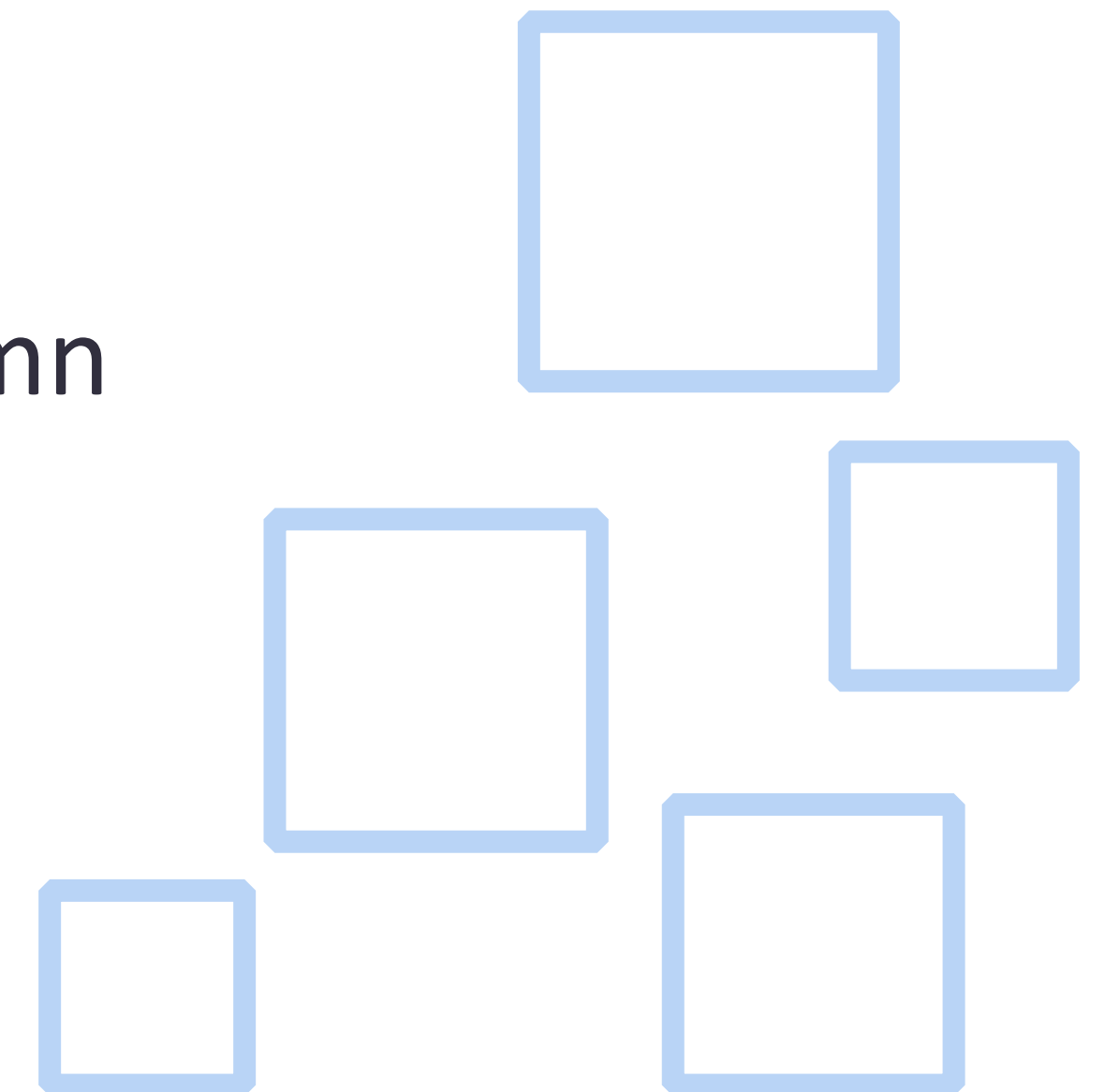
Question

How do we retrieves data from a **single database table** in SQL?

SELECT

- SELECT identifies *what* columns.

- FROM identifies *which* table.

- Syntax:
  SELECT * | column1, columnN
  FROM TableName;
  - The asterisk (*) means "everything, all columns".

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Return all the columns from the Books table

SELECT * FROM Books;

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

SELECT

- SELECT identifies *what* columns.

- FROM identifies *which* table.

- Syntax:
  ```
  SELECT * | column1, columnN
  FROM TableName;
  ```
  - The asterisk (*) means "everything, all columns".

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Selects the `title` and `publisher` columns from the Books table

```
SELECT title, publisher FROM Books;
```

title	publisher
Data Mining: Co...	Morgan Kaufmann
SQL QuickStart...	ClydeBank Media LLC
Software Engine...	McGraw-Hill
Database System...	McGraw-Hill

Question

?

How do we give a **temporary name** for a **column** in a table in SQL?

Aliases

- Aliases are used to give a column in a table, a temporary name.

- Aliases are often used to make column names more readable.

- An alias is created with the AS keyword.

- Syntax:
  SELECT column_name AS alias_name
  FROM TableName;

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Selects the publisher_year as year from Books table

```
SELECT published_year AS year
FROM Books;
```

year
2011
2019
2014
2019

INTRODUCTION TO
DATABASE AND INFORMATION SYSTEM

Question

How do we **retrieves** only the **distinct values** from a table in SQL?

SELECT DISTINCT

- SELECT DISTINCT returns only distinct (different) values in the result set.
- Syntax:
  ```
  SELECT DISTINCT * | column1, columnN
  FROM TableName;
  ```
  - The asterisk (*) means "everything, all columns".

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Select only the distinct values from the publisher column in the Books table

```
SELECT DISTINCT publisher FROM Books;
```

publisher
Morgan Kaufmann
ClydeBank Media LLC
McGraw-Hill

Question

?

How do we **extract** only those records that **fulfill** a specified **condition** in SQL?

SELECT WHERE

- WHERE clause is used to filter records.

- Syntax:
```
SELECT * | column1, columnN
FROM TableName
WHERE condition;
```
  - The asterisk (*) means "everything, all columns".
  - The WHERE clause is not only used in SELECT statements, it is also used in UPDATE, DELETE, etc.

INTRODUCTION TO
DATABASE AND INFORMATION SYSTEM

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Select all the books published by "McGraw-Hill" in the Books table

```
SELECT *
FROM Books
WHERE publisher="McGraw-Hill";
```

publisher
Morgan Kaufmann
ClydeBank Media LLC
McGraw-Hill

Comparison Operators

Operator	Description
=	Equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
<>	Not equal

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Select all the books published after or in 2015

```
SELECT *
FROM Books
WHERE published_year>=2015;
```

isbn_13	title	authors	publisher	published_year	edition
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Logical Operators

Operator	Description
ALL	TRUE if all of the subquery values meet the condition
AND	TRUE if all the conditions separated by AND is TRUE
ANY	TRUE if any of the subquery values meet the condition
BETWEEN	TRUE if the operand is within the range of comparisons
EXISTS	TRUE if the subquery returns one or more records
IN	TRUE if the operand is equal to one of a list of expressions
LIKE	TRUE if the operand matches a pattern
NOT	Displays a record if the condition(s) is NOT TRUE
OR	TRUE if any of the conditions separated by OR is TRUE
SOME	TRUE if any of the subquery values meet the condition

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Select all the books published between 2010 and 2015

```
SELECT *
FROM Books
WHERE published_year BETWEEN 2010 AND 2015;
```

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8

Wildcard Characters

- A wildcard character is used to substitute one or more characters in a string.

- Wildcard characters are used with the `LIKE` operator.

Operator	Description
%	Represents zero or more characters
_	Represents a single character

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Select all books that starts with the pattern 'da' in `title`

```
SELECT *
FROM Books
WHERE title LIKE 'da%';
```

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Select all books with `published_year` starting with two any characters, followed by '19'

```
SELECT *
FROM Books
WHERE published_year LIKE '__19';
```

isbn_13	title	authors	publisher	published_year	edition
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Question

?

How do we perform **mathematical operations** on the numerical values stored in the tables in SQL?

Arithmetic Operators

Operator	Description
+	Add
-	Subtract
*	Multiply
/	Divide
%	Modulo

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Show how many years has each McGraw-Hill book has been since publication if it is now 2023

```sql
SELECT *, 2023 - published_year
FROM Books
WHERE publisher="McGraw-Hill";
```

isbn_13	title	authors	publisher	published_year	edition	2023 - published_year
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8	9
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7	4

Question

?

How do we **organizes data into groups** by one or more column names listed in the SQL **query result**?

GROUP BY

- The GROUP BY groups rows that have the same values into summary rows.

- Often used with aggregate functions (COUNT(), MAX(), MIN(), SUM(), AVG()).

- Syntax:
  ```
  SELECT column_name(s)
  FROM TableName
  GROUP BY column_name(s);
  ```

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Groups the books based on publisher and counts the number of records in each group

```
SELECT publisher, COUNT(isbn_13)
FROM Books
GROUP BY publisher;
```

publisher	COUNT(isbn_13)
Morgan Kaufmann	1
ClydeBank Media LLC	1
McGraw-Hill	2

Question

?

How do we **sorts query results** by one or more columns in ascending or descending order the SQL query result?

ORDER BY

- The ORDER BY is used to sort the result-set in ascending or descending order.

- The ORDER BY sorts the records in ascending order by default.

- Syntax:
SELECT column_name(s)
FROM TableName
ORDER BY column_name(s) ASC|DESC;

Example:

Books

isbn_13	title	authors	publisher	published_year	edition
978-9380931913	Data Mining: Co...	Jiawei Han, Micheline Kamber	Morgan Kaufmann	2011	3
978-1945051753	SQL QuickStart...	Walter Shields	ClydeBank Media LLC	2019	1
978-0078022128	Software Engine...	Roger S. Pressman, Bruce Maxim	McGraw-Hill	2014	8
978-0078022159	Database System...	A. Silberschatz, H. F. Korth, S. Sudarshan	McGraw-Hill	2019	7

Groups the books based on publisher and counts the number of records in each group, sorted descending by the publisher column

```
SELECT publisher, COUNT(isbn_13)
FROM Books
GROUP BY publisher
ORDER BY publisher DESC;
```

| publisher	COUNT(isbn_13)
Morgan Kaufmann	1
McGraw-Hill	2
ClydeBank Media LLC	1

Conclusion
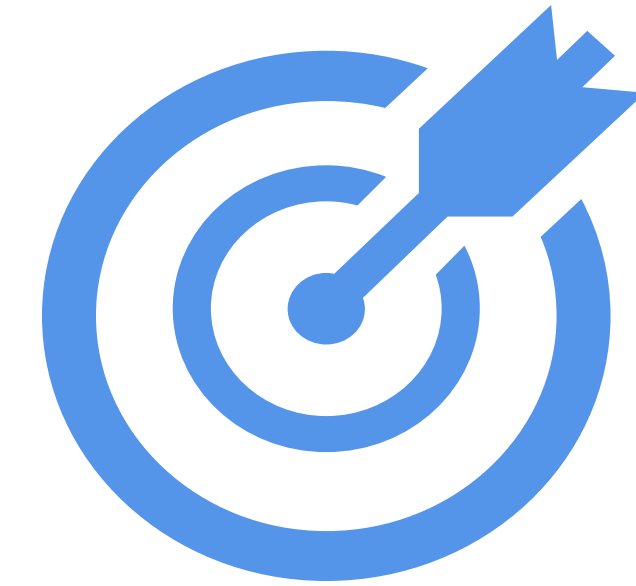
- ✅ Retrieves data from a single database table in SQL using SELECT.

- ✅ Give a temporary name for a column in a table in SQL using AS.

- ✅ Retrieves only the distinct values from a table in SQL using DISTINCT.

- ✅ Extract only those records that fulfill a specified condition in SQL using WHERE combined with value comparison operators and logical operators.
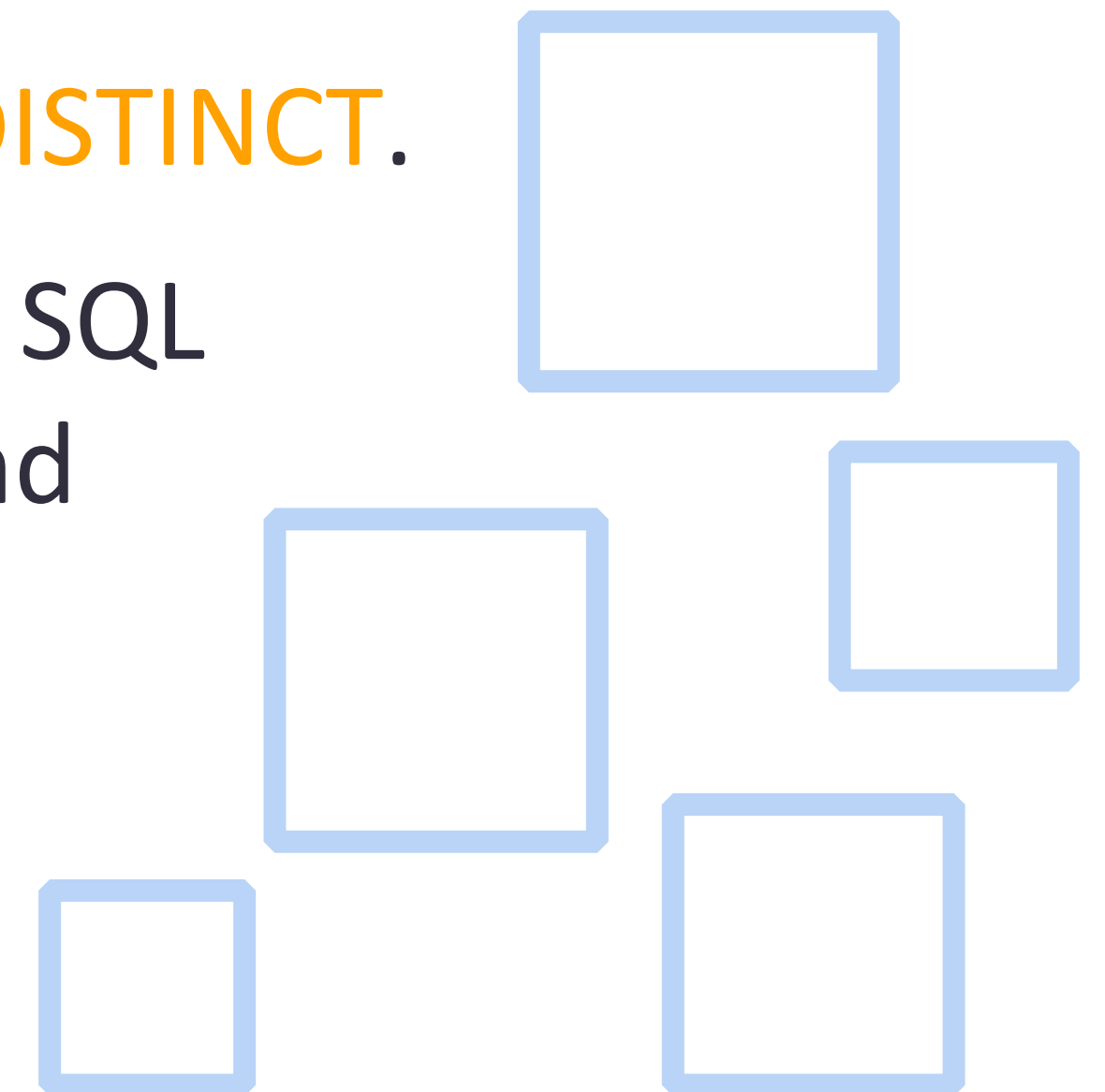
Conclusion
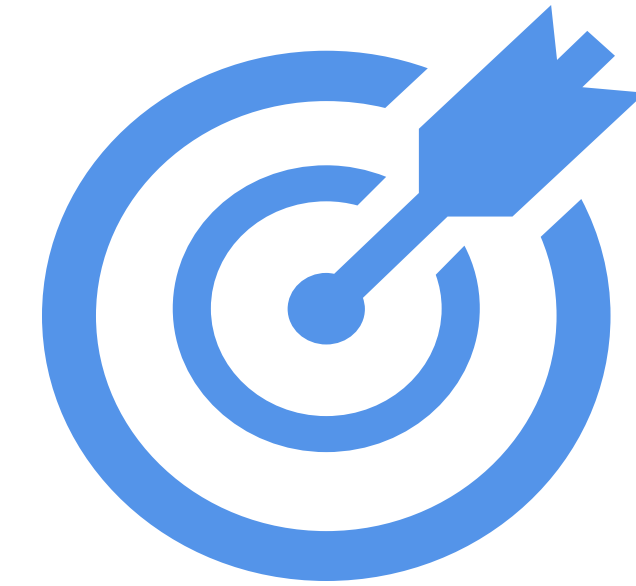
- ✓ Perform mathematical operations on the numerical values stored in the tables in SQL using arithmetic operators.

- ✓ Organizes data into groups by one or more column names listed in the SQL query result using GROUP BY.

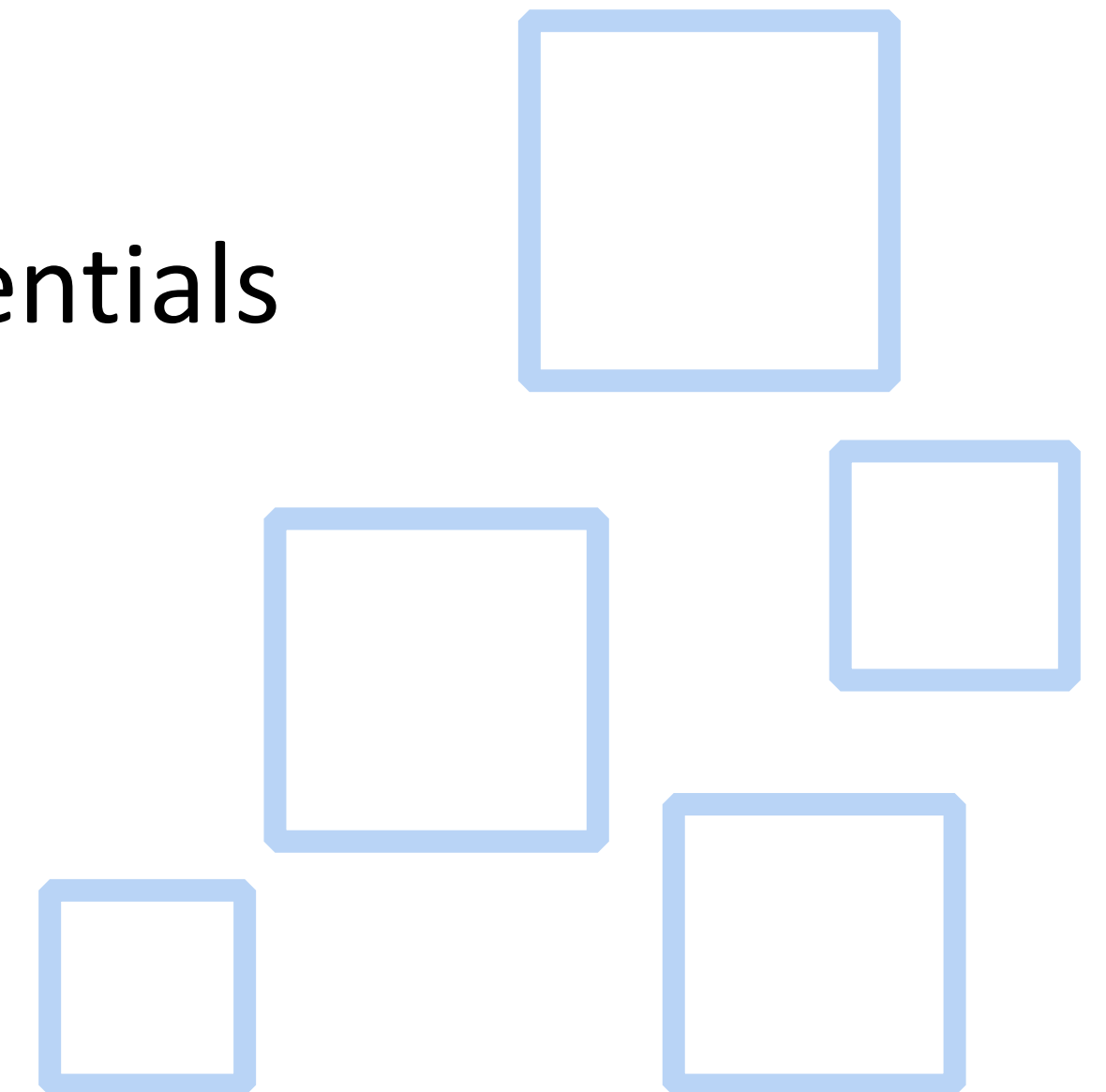- ✓ Sorts query results by one or more columns in ascending or descending order the SQL query result using ORDER BY.

References

- R, Elmasri, et. al., Fundamentals of Database Systems.
- A. Silberschatz, et. al., Database System Concepts.
- R. K. Rainer, et. al., Introduction to Information Systems.
- G. M. Marakas et. al., Introduction to Information Systems: Essentials for The e-Business Enterprise.

INTRODUCTION TO
DATABASE AND INFORMATION SYSTEM

Course

Lecturer

Mario E. S. Simaremare

Samuel I. G. Situmeang

@simaremare

@exemuel