Module 4
Basic Query Formulation with SQL

Lesson 5: GROUP BY Clause

Lesson Objectives

- Write SELECT statements containing the GROUP BY clause

- Write SELECT statements with WHERE and HAVING clauses

- Write natural language explanations about SELECT statements containing the GROUP BY clause

Row Summaries

- Important for decision-making tasks

- Row summary details
  - Result contains statistical (aggregate) functions
  - Conditions involve statistical functions

- SQL keywords
  - Aggregate functions in the result list such as AVG and SUM
  - GROUP BY: summary columns
  - HAVING: summary conditions

Individual Rows versus Row Summaries
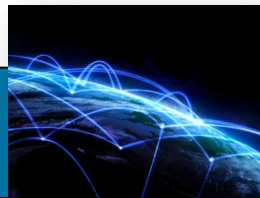
Example 1: Sort faculty by rank

```
SELECT FacNo, FacRank, FacSalary
FROM Faculty
ORDER BY FacRank;
```

```
FACNO         FACRANK  FACSALARY
-----------   -------  ----------
654-32-1098   ASSC         70000
987-65-4321   ASSC         75000
876-54-3210   ASST         40000
098-76-5432   ASST         35000
765-43-2109   PROF         65000
543-21-0987   PROF        120000
```

Example 2: Compute average salary for each faculty rank

```
SELECT FacRank,
       AVG(FacSalary) AS AvgSalary
  FROM Faculty
  GROUP BY FacRank
  ORDER BY FacRank;
```

```
FACRANK  AVGSALARY
-------  ----------
ASSC         72500
ASST         37500
PROF         92500
```

Filtering Rows and Groups

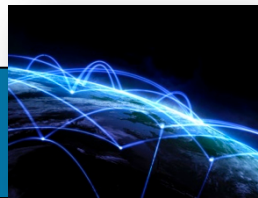Example 3: List average GPA by major for upper class students

```
SELECT StdMajor, AVG(StdGPA) AS AvgGpa
 FROM Student
 WHERE StdClass IN ('JR', 'SR')
 GROUP BY StdMajor;
```

```
STDMAJOR      AVGGPA
--------  ----------
ACCT             3.5
FIN              2.8
IS              3.15
```
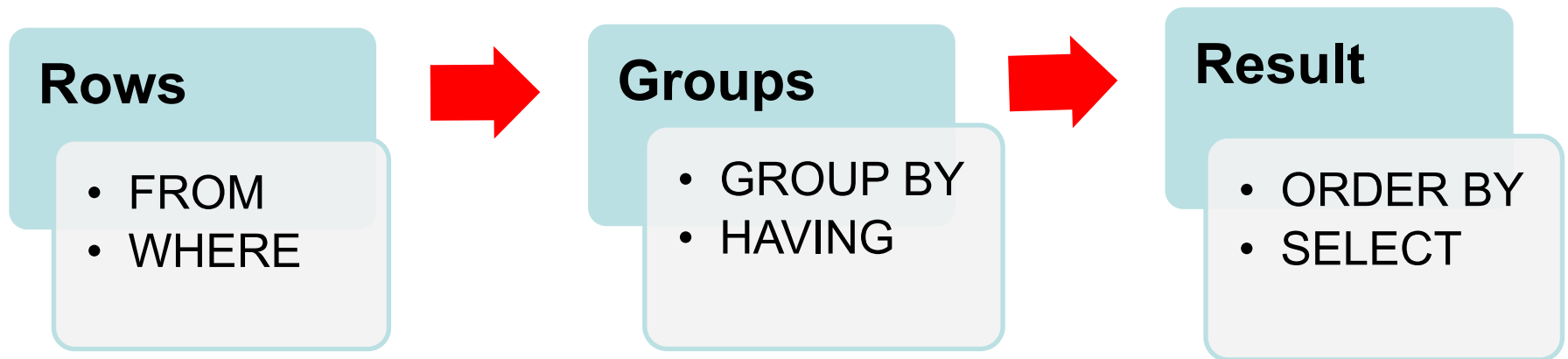
Example 4: List average GPA by major for upper class students
in which average GPA is greater than 3.1.

```
SELECT StdMajor, AVG(StdGPA) AS AvgGpa
 FROM Student
 WHERE StdClass IN ('JR', 'SR')
 GROUP BY StdMajor
 HAVING AVG(StdGPA) > 3.1;
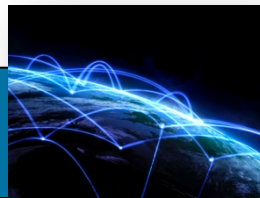```

```
STDMAJOR      AVGGPA
--------  ----------
ACCT             3.5
IS              3.15
```

Query Clause Evaluation Order

Rows
- FROM
- WHERE

→

Groups
- GROUP BY
- HAVING

→

Result
- ORDER BY
- SELECT

Evaluation Order Lessons

- Row operations before group operations
  - FROM and WHERE before GROUP BY and HAVING
  - Check row operations first
- Grouping occurs only one time
- Use small sample tables

Summary

- Summarization queries common for business intelligence

- GROUP BY clause to calculate summary data for decision making

- Grouping after joins and row conditions

- Extensions to GROUP BY operator business intelligence queries