

1814ict/2814ict/7003ict/1011ICT: Data Management/ Database Design/ Applied Computing

Topic 4.3: SELECT with GROUP BY & more tables

(Chapter 7)

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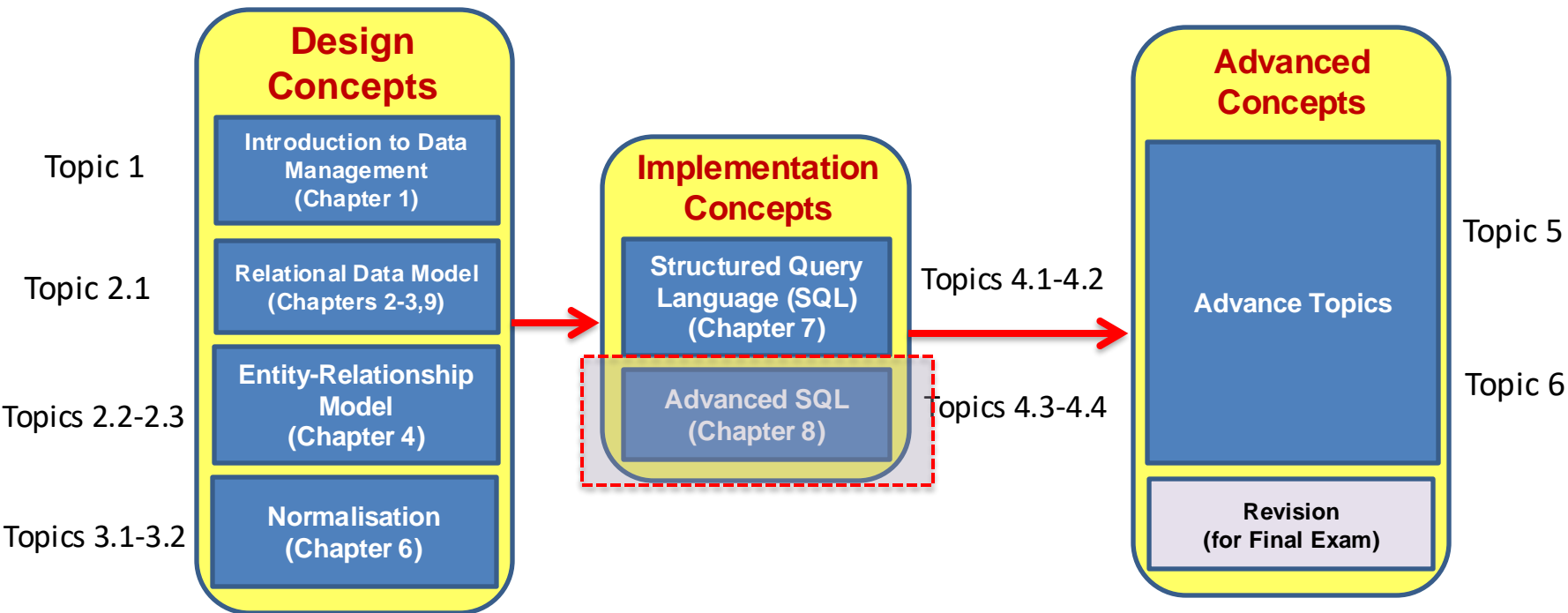
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Course bigger picture

- Chapter references are to textbook *Database Systems: Design, Implementation, & Management* - By Carlos Coronel and Steven Morris



Learning Outcomes

At the end of this lecture students will be able to know:

- How to retrieve data using **SQL functions**
- How to retrieve data using **GROUP BY** and group functions
- How to retrieve data from **more tables**

Content

- SQL functions
- GROUP BY clause
 - HAVING conditions
- JOIN data from 2 or more tables
- Complex queries

Outcomes 1 to 3

Recap from Topic 4.2

Select Statement

- General Syntax

SELECT [ALL | DISTINCT | DISTINCTROW] select_expr [, select_expr ...]

FROM table_references

[**WHERE** where_condition]

[**GROUP BY** {col_name | expr | position}]

[**HAVING** where_condition]

This topic

[**ORDER BY** {col_name | expr | position} [ASC | DESC], ...]

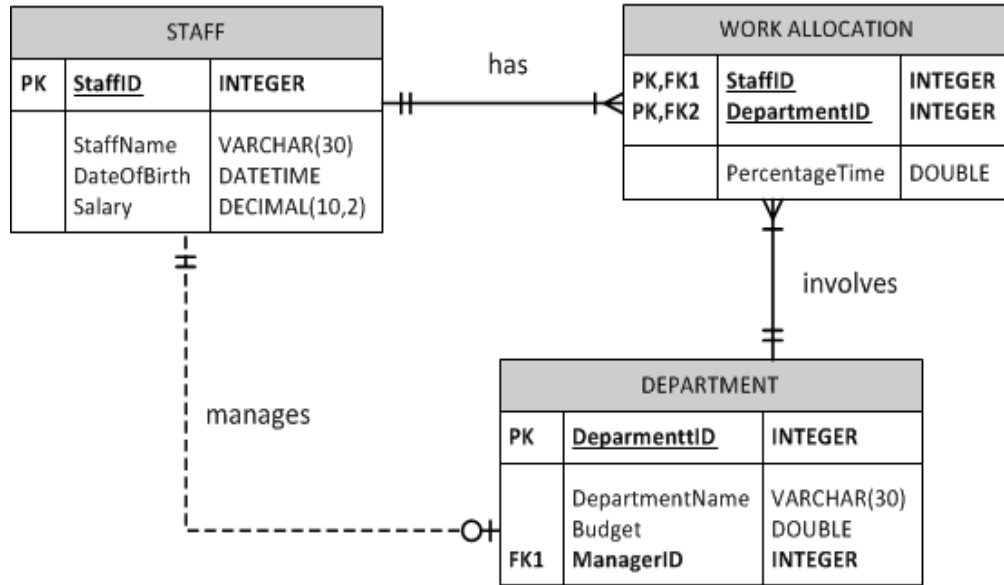
[**LIMIT** {[offset,] row_count | row_count OFFSET offset}]

Select Statement

- SELECT *
- SELECT Specific columns
- SELECT DISTINCT rows
- SELECT ... (alias for table & output columns)
- SELECT ... ORDER BY
- SELECT ... LIMIT rows
- SELECT ... WHERE clause (IN, NOT IN, BETWEEN, AND, OR, NOT, ...)
- SELECT ... CONCAT
- SELECT ... LIKE for string matching

SELECT statement

ERD (Physical model) and Relation Schema



Business rule:

- An employee may work in several departments, with the percentage of time spent in each department being recorded in the **WORK ALLOCATION** table

STAFF(StaffID, StaffName, DateOfBirth, Salary)

DEPARTMENT(DepartmentID, DepartmentName, Budget, ManagerID)

WORK ALLOCATION(StaffID, DepartmentID, PercentageTime)

Topic 4.2 database

- From [Topic 4.1](#), updated with more data

Staff table

| StaffID | StaffName | DateOfBirth | Salary |
|---------|--------------------|-------------|----------|
| 1 | Buffy Winters | 1987-09-15 | 27000.00 |
| 2 | Teddy Bear | 1983-12-03 | 87125.02 |
| 3 | John Smith | 1972-09-20 | 25000.00 |
| 4 | Jane Doe | 1969-01-25 | 55000.00 |
| 5 | Jacek Jones | 1984-10-19 | 35000.00 |
| 6 | Mohammad Awrangjeb | 1977-11-21 | 35000.00 |
| 7 | Rupam Deb | 1980-10-21 | 55000.00 |
| 8 | Md Polash | 1981-11-25 | 38000.00 |
| 9 | Teddy Bear | 1983-12-03 | 87125.02 |
| 10 | Fred Smith | 1956-06-30 | 25125.02 |

Department table

| DepartmentID | DepartmentName | Budget | ManagerID |
|--------------|----------------|---------|-----------|
| 1 | Sales | 5005000 | 2 |
| 2 | Marketing | 509000 | 1 |
| 3 | Finance | 650000 | 5 |
| 4 | Accounting | 360000 | 3 |
| 5 | Human Resource | 550000 | 7 |

WorkAllocation table

| StaffID | DepartmentID | PercentageTime |
|---------|--------------|----------------|
| 1 | 2 | 0.7 |
| 1 | 5 | 0.3 |
| 2 | 1 | 1 |
| 3 | 2 | 0.3 |
| 3 | 3 | 0.2 |
| 3 | 4 | 0.5 |
| 4 | 4 | 0.3 |
| 4 | 5 | 0.7 |
| 5 | 3 | 0.7 |
| 5 | 4 | 0.3 |
| 6 | 3 | 0.4 |
| 6 | 4 | 0.3 |
| 6 | 5 | 0.3 |
| 7 | 5 | 1 |
| 8 | 2 | 0.4 |
| 8 | 3 | 0.6 |
| 9 | 4 | 0.5 |
| 9 | 5 | 0.5 |
| 10 | 1 | 0.4 |
| 10 | 3 | 0.2 |
| 10 | 4 | 0.2 |
| 10 | 5 | 0.1 |

WHERE CLAUSE (from Topic 4.2 lecture)

WHERE clause

- Find departments which have managers.

```
SELECT DepartmentName, ManagerID  
FROM DEPARTMENT  
Where ManagerID IS NOT NULL;
```

| DepartmentName | ManagerID |
|----------------|-----------|
| Sales | 2 |
| Marketing | 1 |
| Finance | 5 |
| Accounting | 3 |
| Human Resource | 7 |

- Find the staff who were born **between 1975 to 1985**.

```
SELECT *  
FROM Staff  
Where DateOfBirth >= '1975-01-01' AND DateOfBirth <= '1985-12-31';
```

| StaffID | StaffName | DateOfBirth | Salary |
|---------|--------------------|-------------|----------|
| 2 | Teddy Bear | 1983-12-03 | 87125.02 |
| 5 | Jacek Jones | 1984-10-19 | 35000.00 |
| 6 | Mohammad Awrangjeb | 1977-11-21 | 35000.00 |
| 7 | Rupam Deb | 1980-10-21 | 55000.00 |
| 8 | Md Polash | 1981-11-25 | 38000.00 |
| 9 | Teddy Bear | 1983-12-03 | 87125.02 |

- Find the staff who were not born **between 1975 to 1985**.

```
SELECT *  
FROM Staff  
Where DateOfBirth < '1975-01-01' OR DateOfBirth > '1985-12-31';
```

| StaffID | StaffName | DateOfBirth | Salary |
|---------|---------------|-------------|----------|
| 1 | Buffy Winters | 1987-09-15 | 27000.00 |
| 3 | John Smith | 1972-09-20 | 25000.00 |
| 4 | Jane Doe | 1969-01-25 | 55000.00 |
| 10 | Fred Smith | 1956-06-30 | 25125.02 |

BETWEEN, NOT BETWEEN

- Find the staff who were born **between 1975 to 1985**.

```
SELECT *  
FROM Staff  
Where DateOfBirth BETWEEN '1975-01-01' AND '1985-12-31';
```

| StaffID | StaffName | DateOfBirth | Salary |
|---------|--------------------|-------------|----------|
| 2 | Teddy Bear | 1983-12-03 | 87125.02 |
| 5 | Jacek Jones | 1984-10-19 | 35000.00 |
| 6 | Mohammad Awrangjeb | 1977-11-21 | 35000.00 |
| 7 | Rupam Deb | 1980-10-21 | 55000.00 |
| 8 | Md Polash | 1981-11-25 | 38000.00 |
| 9 | Teddy Bear | 1983-12-03 | 87125.02 |

- Find the staff who were not born **between 1975 to 1985**.

```
SELECT *  
FROM Staff  
Where DateOfBirth NOT BETWEEN '1975-01-01' AND '1985-12-31';
```

| StaffID | StaffName | DateOfBirth | Salary |
|---------|---------------|-------------|----------|
| 1 | Buffy Winters | 1987-09-15 | 27000.00 |
| 3 | John Smith | 1972-09-20 | 25000.00 |
| 4 | Jane Doe | 1969-01-25 | 55000.00 |
| 10 | Fred Smith | 1956-06-30 | 25125.02 |

Thank you