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

Topic 2.2: Entity Relationship Diagram (ERD)
(Chapters 3-4)
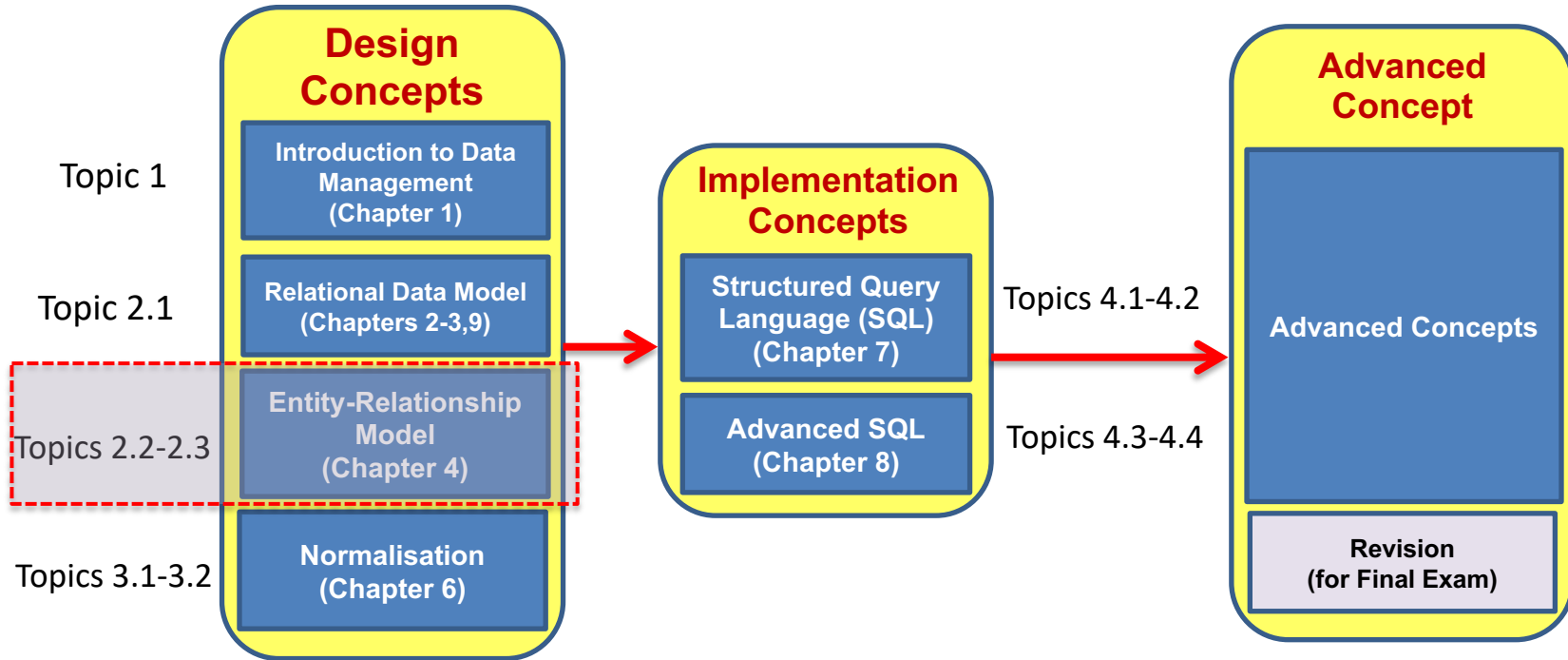
Convenor: AProf. Henry Nguyen

School of Information and Communication Technology

Course bigger picture

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

Design Concepts

Topic 1 — Introduction to Data Management (Chapter 1)

Topic 2.1 — Relational Data Model (Chapters 2-3,9)

Topics 2.2-2.3 — Entity-Relationship Model (Chapter 4)

Topics 3.1-3.2 — Normalisation (Chapter 6)

Implementation Concepts

Structured Query Language (SQL) (Chapter 7)

Advanced SQL (Chapter 8)

Topics 4.1-4.2

Topics 4.3-4.4

Advanced Concept

Advanced Concepts

Revision (for Final Exam)

Learning Outcomes

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

- More on Entity relationship Diagram (ERD)

- How to solve M:N relationship in an ERD

- How to draw ERD using www.draw.io

Content

- ▪ Continue ERD on case studies   **Outcome 1**
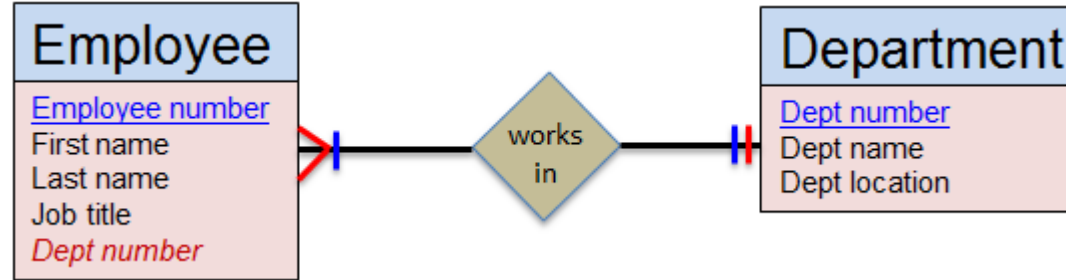- ▪ Solving M:N relationship   **Outcome 2**
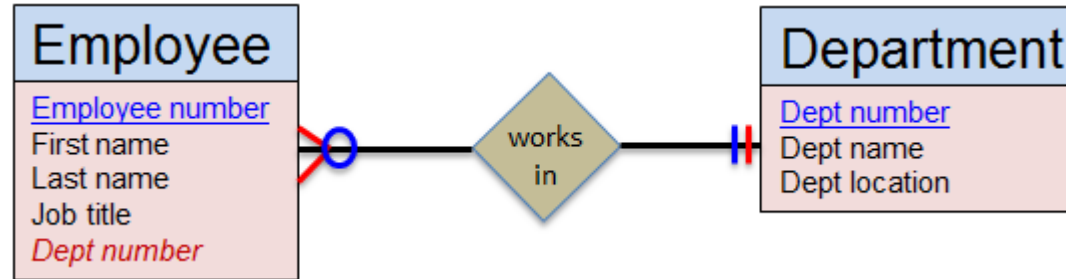- ▪ www.draw.io   **Outcome 3**

Recap from Topic 2.1

Relationship: Connectivity and Participation

- **Business rule** between Employee and Department entities?
    - An employee works in a department and a department can employ many employees.
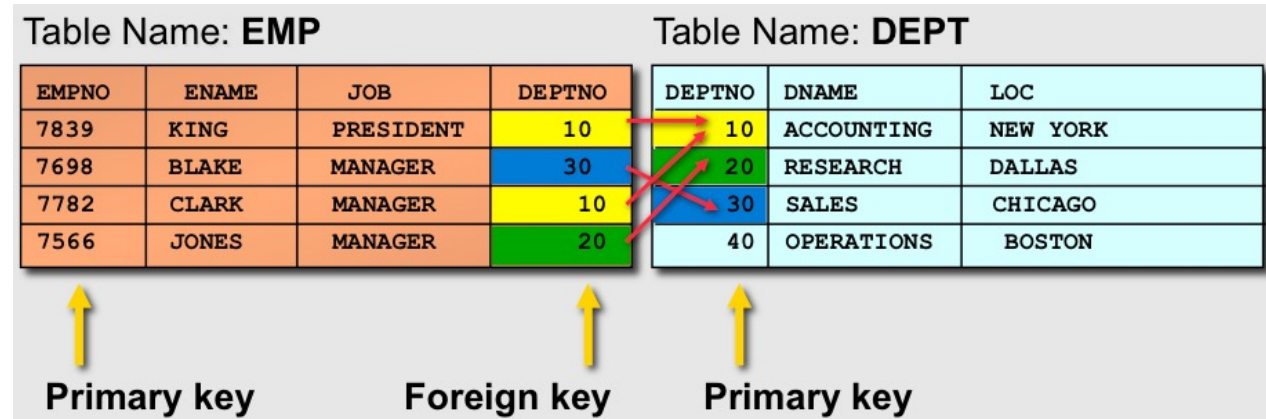- **Connectivity:** 1:M

- **Participation:** Mandatory (Employee side) and Mandatory (Department side)

- **Participation:** **Optional** (Employee side) and Mandatory (Department side)
    - Write your assumptions, if any, and assumptions should not contradict any given business rules

- **Keys:**

- **Entity Integrity** (constraint): Do both EMP & DEPT tables maintain the entity integrity constraint?

- **Referential integrity** (constraint)**:** Do both EMP & DEPT tables maintain the referential integrity constraint?

Keys & constraints

Table Name: **EMP**

EMPNO	ENAME	JOB	DEPTNO
7839	KING	PRESIDENT	10
7698	BLAKE	MANAGER	30
7782	CLARK	MANAGER	10
7566	JONES	MANAGER	20

Table Name: **DEPT**

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

Primary key **Foreign key** **Primary key**

FK usually inserted in "Many side"

Example of FK that is inserted in "1 side"

EMPNO	ENAME	JOB
7839	KING	PRESIDENT
7698	BLAKE	MANAGER
7782	CLARK	MANAGER
7566	JONES	MANAGER

Foreign Key

DEPNO	DNAME	LOC	EMPNO
10	ACCOUNTING	NEW YORK	7839,7782
20	RESEARCH	DALLAS	7566
30	SALES	CHICAGO	7698
40	OPERATIONS	BOSTON	NULL

Invalid

| DEPNO	DNAME	LOC	EMPNO
10	ACCOUNTING	NEW YORK	7839
10	ACCOUNTING	NEW YORK	7782
20	RESEARCH	DALLAS	7566
30	SALES	CHICAGO	7698
40	OPERATIONS	BOSTON	NULL

Redundant

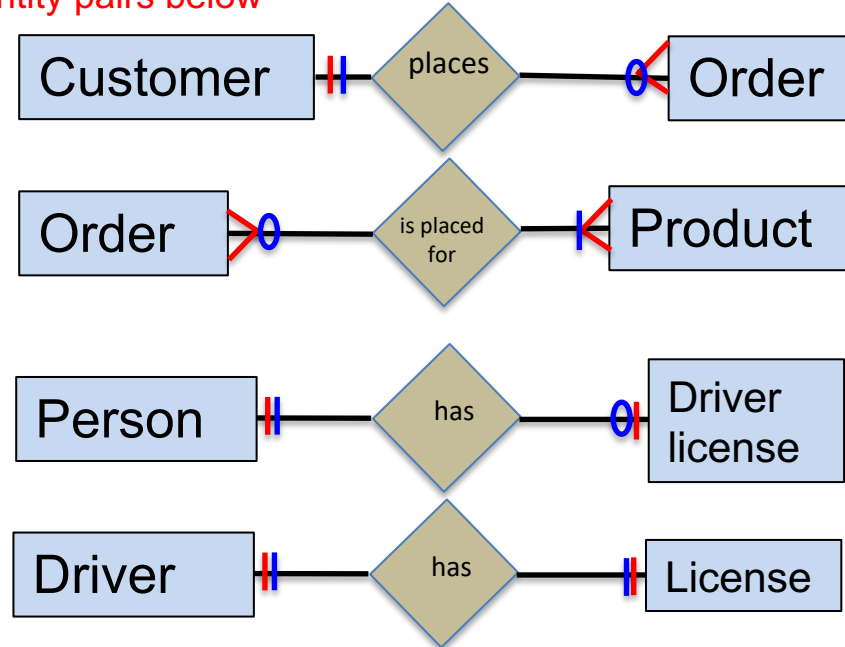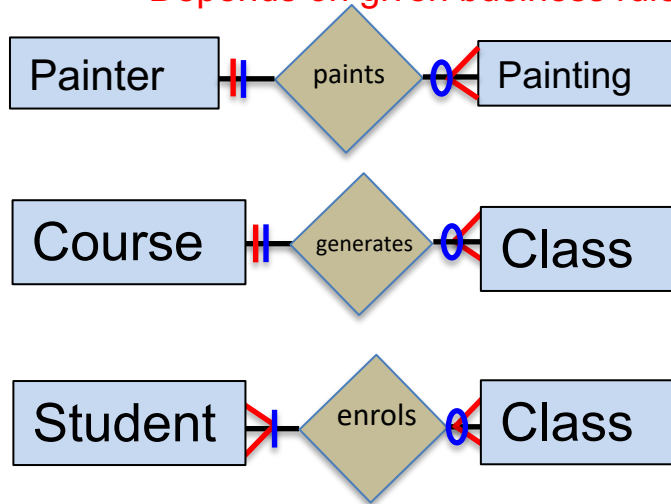# More Examples on Connectivity and Participation

Connectivity types: 1:1, 1:M, M:N

- **THREE** types of relationships exist for each relationship:
    - one-to-one or 1:1,
    - one-to-many or many-to-one (1:M),
    - many-to-many or M:N

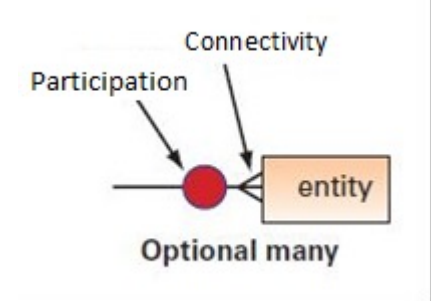- Identify a specific relationship (connectivity) between the entity pairs below
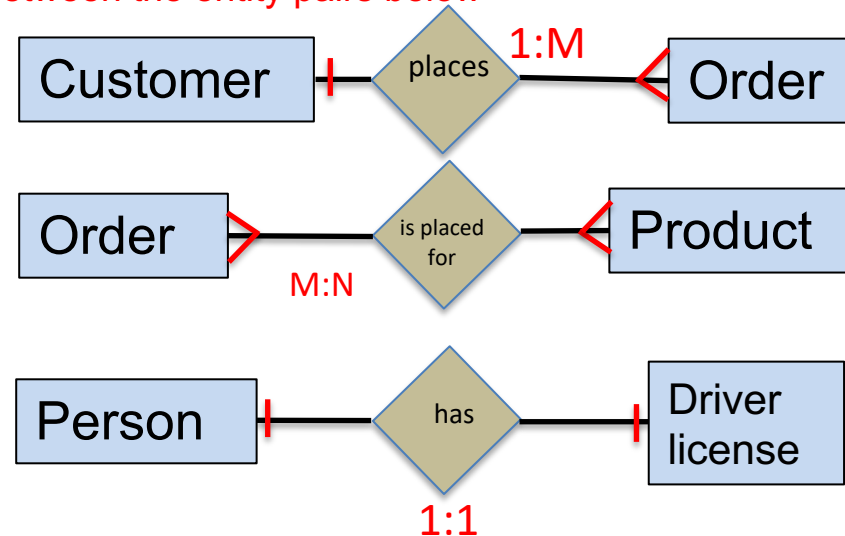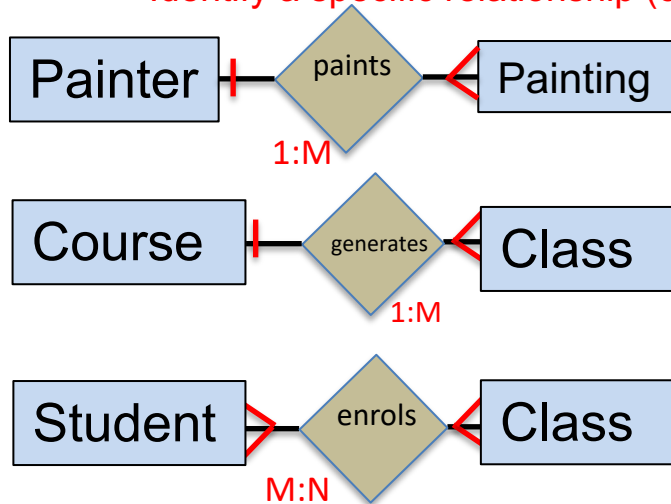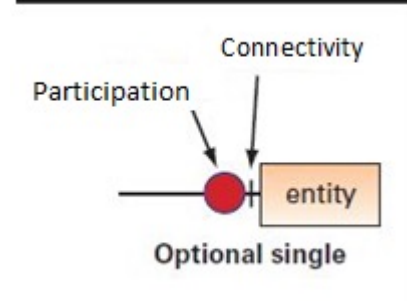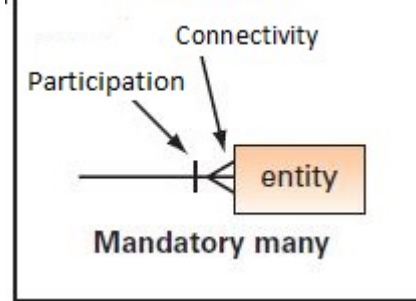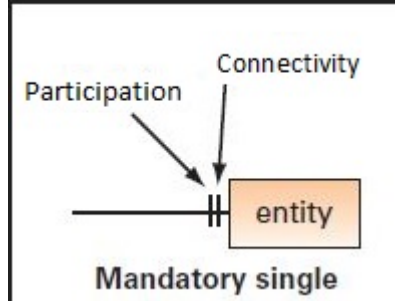
Participation types: '0' or '1'

- Total **TWO** types of participation exist for each entity:

  - Optional = 0,

  - Mandatory = 1,

- Identify a specific participation between the entity pairs below

- Depends on given business rule

Relationship (to reflect business rules)

- We *have a total of FOUR options* when connectivity and participation are combined on each entity side

Thank you