

Week 4: Hardware; Software; Database Processing; Database Design

CB2500 Information Management

Smart Banking (**BI**)
Smart e-Services (**ISSN**)

Smart IS Auditing (**ISA**)
Smart Global Business (**GBSM**)

“We Don’t Have a Way to Track the Data About the Videos.”

- Falcon Security stores sequentially numbered digital video files in separated directories for each client
- Tracking down exact footage of when equipment stolen is time consuming
- Need database to track specific video files



Common questions asked by consultants

What are the data to be managed?

How would data be used?

Study Questions / Intended Learning Outcomes

Ch. 4

Q4-3: What do business professionals need to know about software? (What types of applications exist, and how do organizations obtain them? p.143-144)

Ch. 5

Q5-1: Why do you need to know about databases?

Q5-2: What is a database?

Q5-3: What is a database management system (DBMS)?

Q5-4: How do database applications make databases more useful?

CE5

QCE5-3: What are the components of the entity relationship data model?

QCE5-4: How is a data model transformed into a database design?

Q4-3: What Do Business Professionals Need To Know About Software?

What types of applications exist?

Categories:

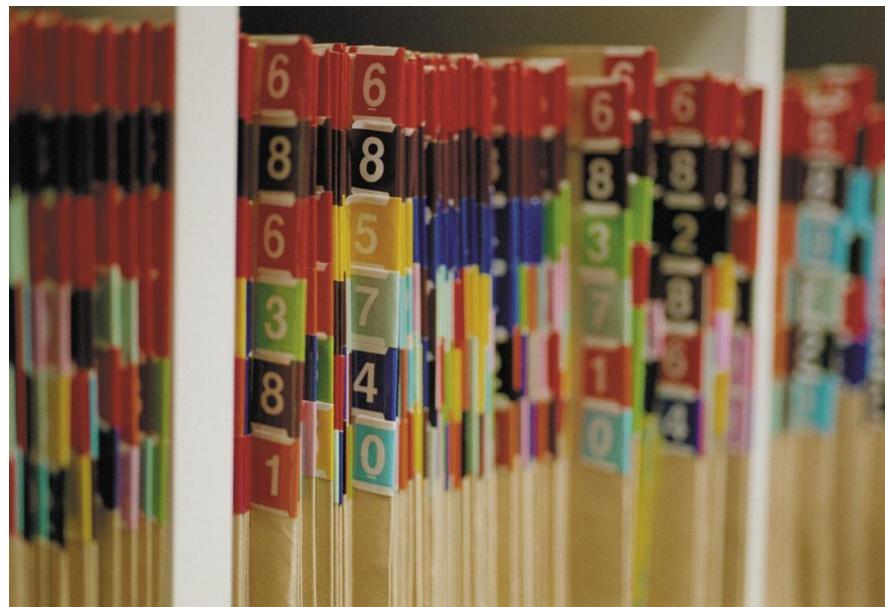
- Horizontal-market applications
 - Provide capabilities common across all organizations and industries
- Vertical-market applications
 - Serve the needs of a specific industry
- One-of-a-kind applications
 - Developed for a specific, unique need

Software Sources and Types

		Software Source		
		Off-the-shelf	Off-the-shelf and then customized	Custom-developed
Software Type	Horizontal applications	Off-the-shelf		
	Vertical applications	Off-the-shelf and then customized	Off-the-shelf and then customized	
	One-of-a-kind applications			Custom-developed

Q5-1: What Is the Purpose of a Database?

- Organize and keep track of different kinds of data, e.g.
 - e.g. customer data, sales data, HR data, accounting records, ...



Student Grades in a Spreadsheet; Student Email/Office Visits Records in a Database Application

The screenshot shows a Microsoft Excel spreadsheet titled "UMIS Chapter 5 Student Grades - Excel". The spreadsheet has two tabs: "Sheet1" and "Sheet2". The "Sheet1" tab displays student grades for Andrea Baker. The columns are labeled A through H, and the rows are numbered 1 through 11. The data includes:

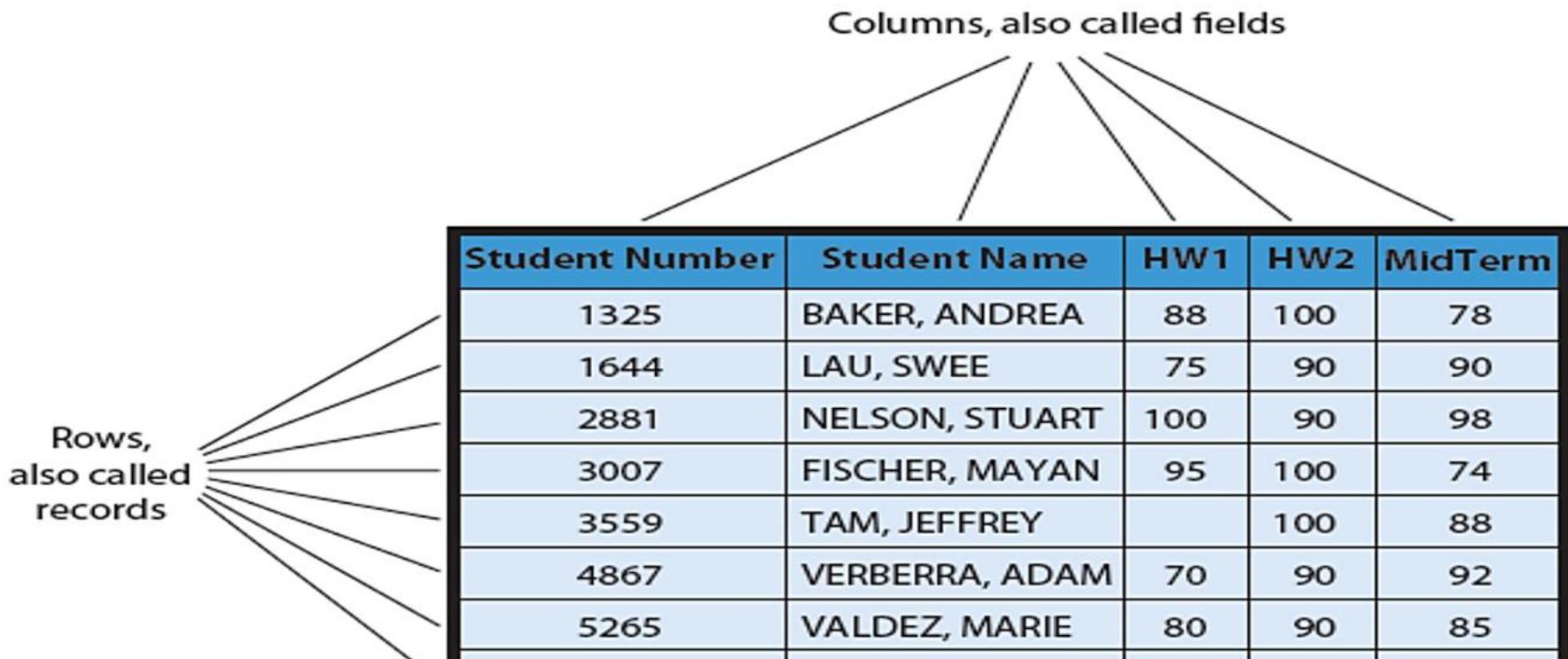
	A	B	C	D	E	F	G	H
1	Student Name	Student Number	HW1	HW2	MidTerm	HW3	HW4	Final
2								
3	BAKER, ANDREA							
4	FISCHER, MAYAN							
5	LAU, SWEET							
6	NELSON, STUART							
7	ROGERS, SHELLY							
8	TAM, JEFFREY							
9	VALDEZ, MARIE							
10	VERBERRA, ADAM							
11								

The "Sheet2" tab contains a database application window titled "STUDENT" and "EMAIL". The "STUDENT" section shows fields for Student Name (BAKER, ANDREA), Student Number (1325), HW1 (88), HW2 (100), and MidTerm (78). The "EMAIL" section shows messages from 2/1/2013 to 6/3/2013. The "OFFICE VISITS" section shows a single entry for 2/13/2013.

Record: 1 of 3 Record: 1 of 1

7

Q5-2: What Is a Database?



Hierarchy of Data Elements

Table or File

Student Number Student Name HW1
Student Number Student Name HW1 ...

Group of

Records or Rows

Student Number | Student Name | HW1 | ... , ...

Group of

Fields or Columns

Student Number | Student Name | HW1 , ...



Components of a Database

stores the data you want

makes database more meaningful,
e.g. table of customer personal data linked with table of sales transaction,
what kind of analysis you can perform?

Tables or Files
+
Relationships Among Rows in Tables
+
Metadata

=



data about data

Example of Relationships

Email Table

EmailNum	Date	Message	Student Number
1	2/1/2012	For homework 1, do you want us to provide notes on our references?	1325
2	3/15/2012	My group consists of Swee Lau and Stuart Nelson.	1325
3	3/15/2012	Could you please assign me to a group?	1644

Student Table

Student Number	Student Name	HW1	HW2	MidTerm
1325	BAKER, ANDREA	88	100	78
1644	LAU, SWEET	75	90	90
2881	NELSON, STUART	100	90	98
3007	FISCHER, MAYAN	95	100	74
3559	TAM, JEFFREY		100	88
4867	VERBERRA, ADAM	70	90	92
5265	VALDEZ, MARIE	80	90	85
8009	ROGERS, SHELLY	95	100	98

Office_Visit Table

VisitID	Date	Notes	Student Number
2	2/13/2012	Andrea had questions about using IS for raising barriers to entry.	1325
3	2/17/2012	Jeffrey is considering an IS major. Wanted to talk about career opportunities.	3559
4	2/17/2012	Will miss class Friday due to job conflict.	4867

Primary key and foreign key enable the linkage among tables

Metadata: Data that Describes Data

EMAIL

Field Name	Data Type	Description (Optional)
EmailNum	AutoNumber	Primary key -- values provided by Access
Date	Date/Time	Date and time the message is recorded
Message	Long Text	Text of the email
Student Number	Number	Foreign key to row in the Student Table

Field Properties

General **Lookup**

Format	Short Date
Input Mask	99/99/0000;0;#
Caption	
Default Value	=Now()
Validation Rule	
Validation Text	
Required	Yes
Indexed	No
IME Mode	No Control
IME Sentence Mode	None
Text Align	General
Show Date Picker	For dates

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

UReply Q1

Find out the following in a simple receipt:

- a. Different tables of data (at least 2)
- b. Potential primary key(s) of tables?
- c. Relationships among tables



Receipt ID: 9873

Staff ID: 1234

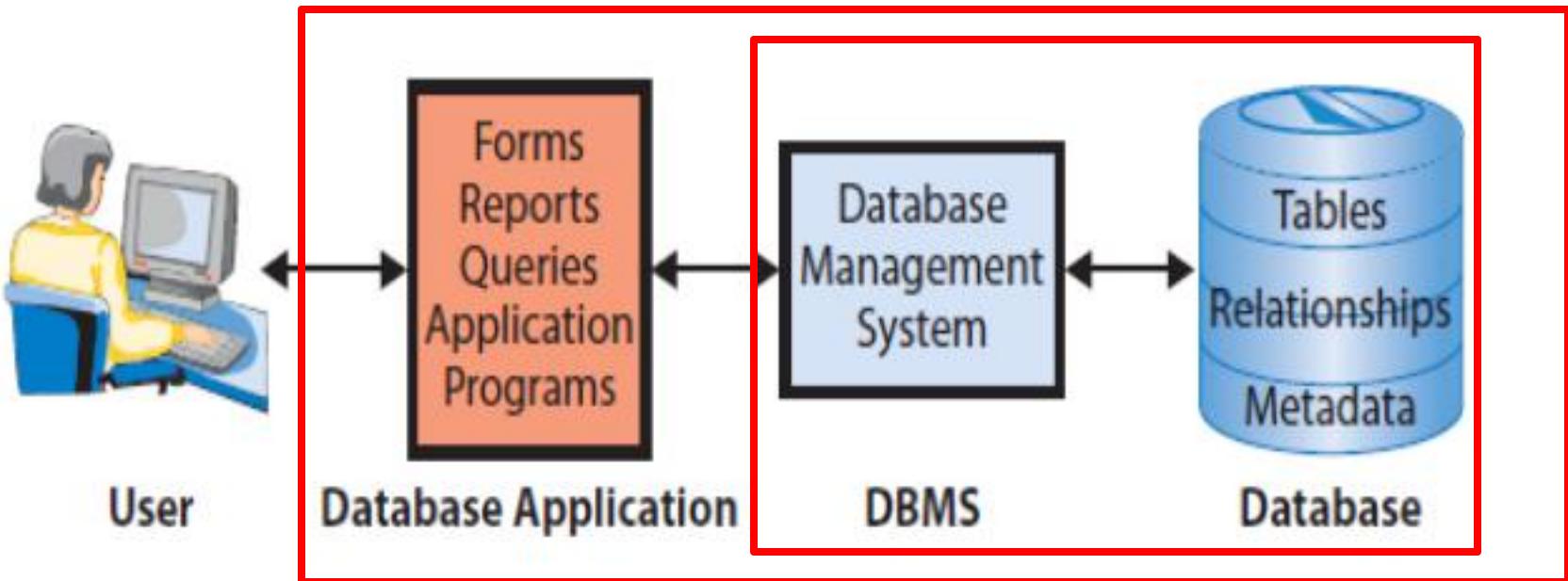
Staff Name: Chris Chan

26th September 2019
9:00am

Item	Quantity	Price	Amount
#001: Pencil	2	\$6	\$12
#003: Experiencing MIS	1	\$300	\$300
Total			\$312

Payment	
Visa	1234 xxxx xxxx 5678

Q5-3: What Is a Database Management System (DBMS)?



Database Application System Components

Usually, these components are sold in a package, customized, or tailor made.



Four DBMS operations

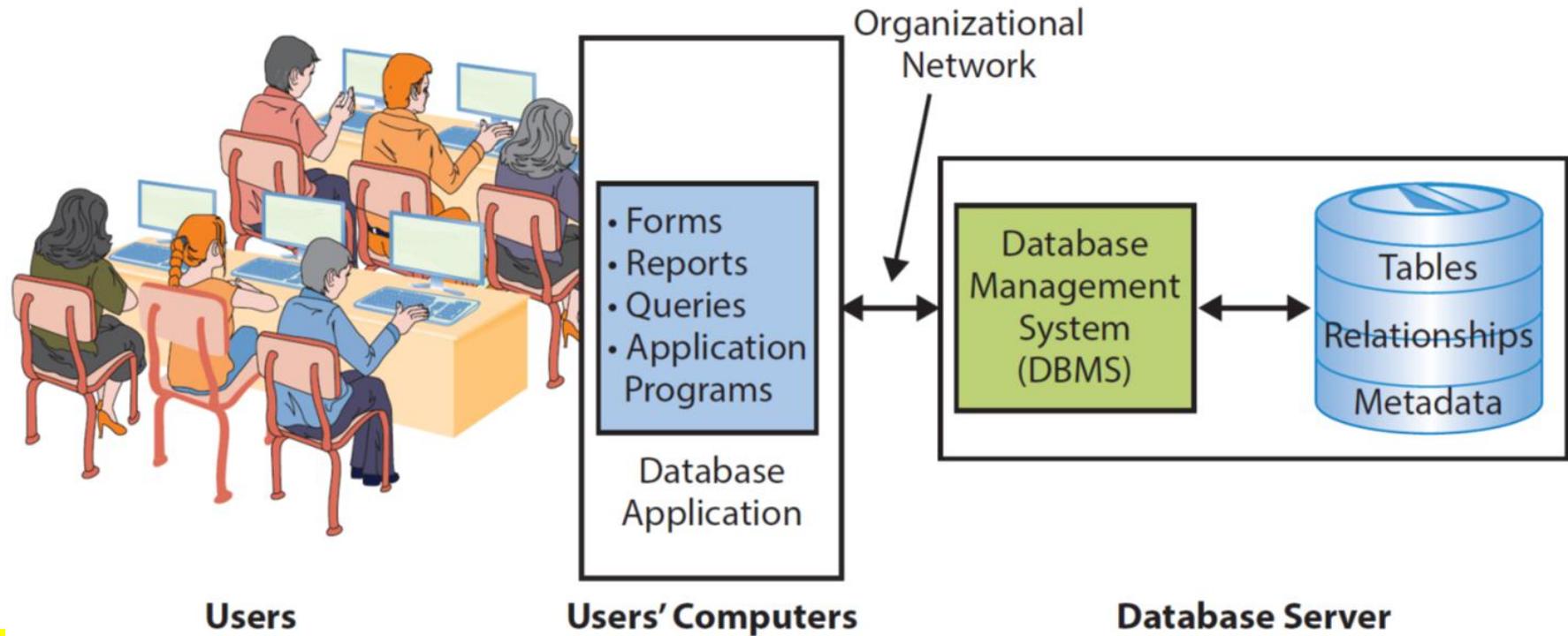
1. Read
2. Insert
3. Modify
4. Delete data

Structured Query Language (SQL)

- SQL (see-quell)
 - International standard
 - Used by most popular DBMS
 - E.g. **Select SID, Name, Score from Test**

One of the many basic info management skills;
For quick analysis of data

Q5-4: How Do Database Applications Make Databases More Useful?

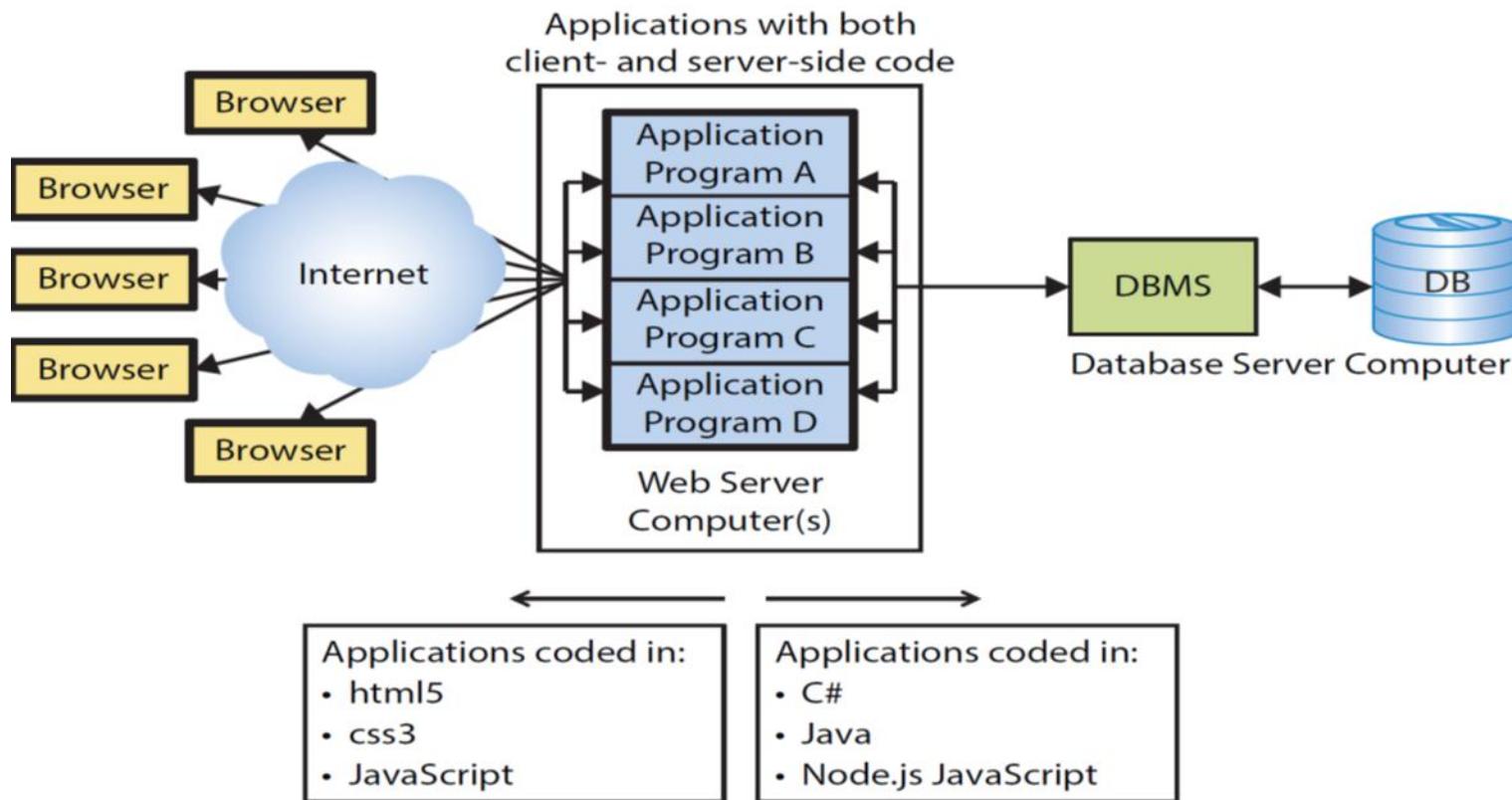


Database –

DBMS –

Database application –

Why Are Database Application Programs Needed?



Web-based version VS local version

QCE5-3: What Are the Components of the Entity-Relationship Data Model?

Entities

- Something users want to track
- Order, customer, salesperson, item, volunteer, donation

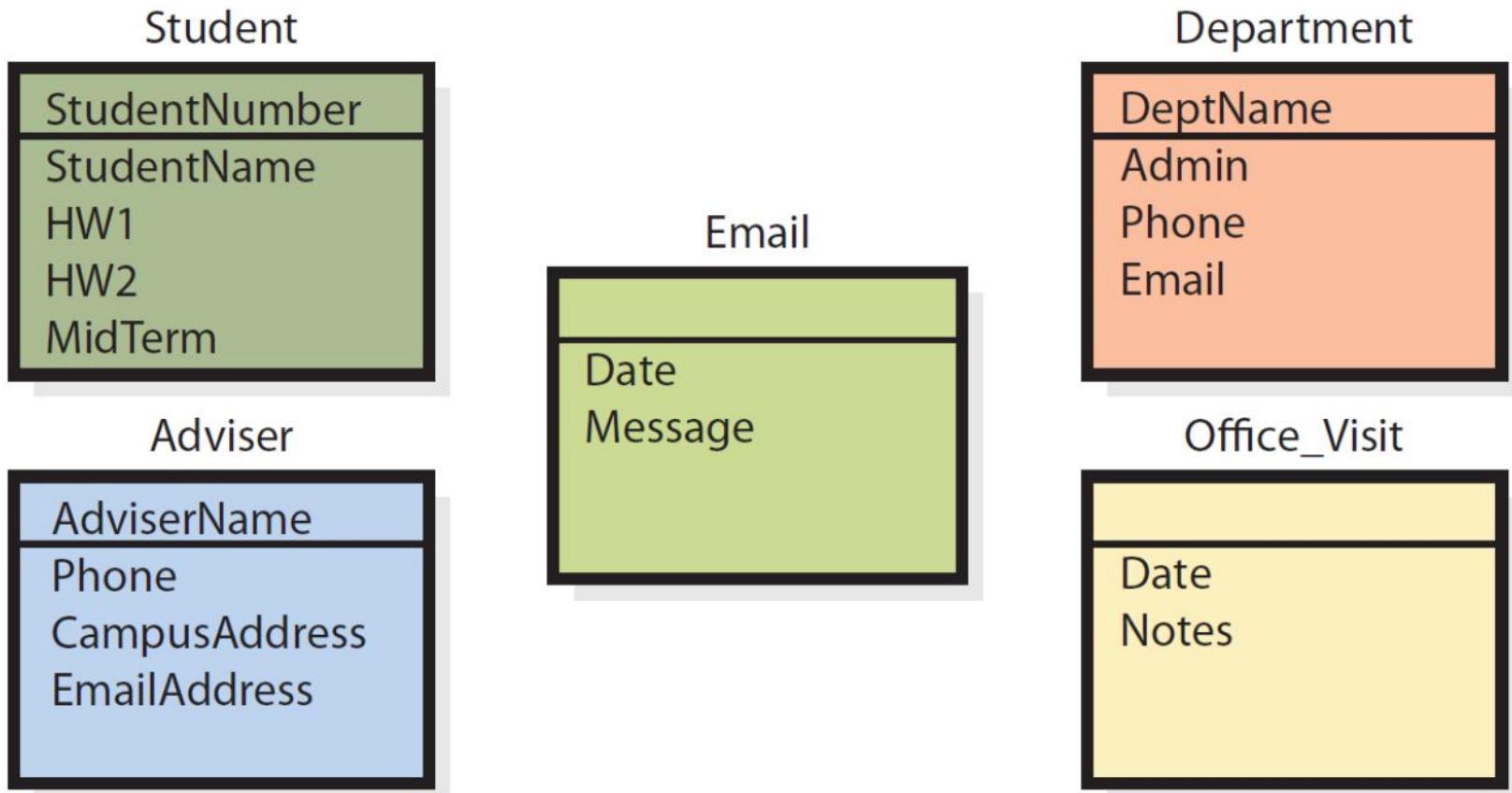
Attributes

- Describe characteristics of an entity
- OrderNumber, CustomerNumber, VolunteerName, PhoneNumber

Identifier

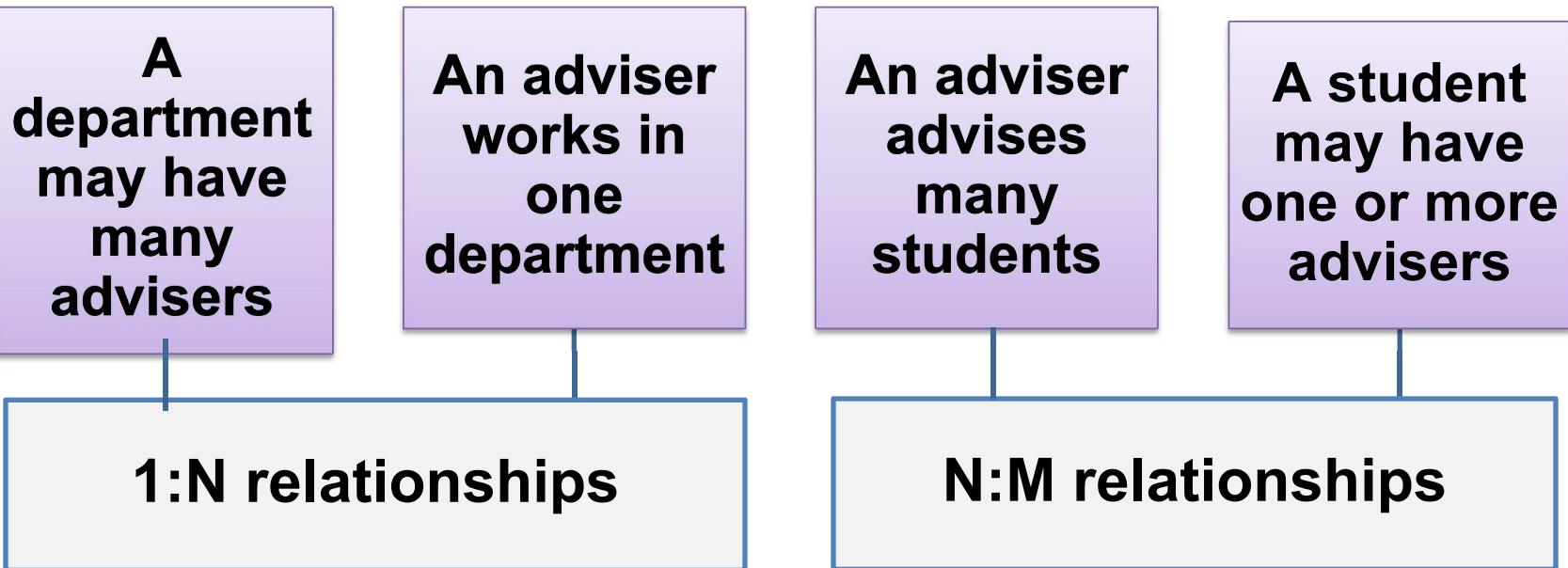
- Uniquely identifies one entity instance from other instances
- Student_ID_Number

Student Data Model Entities

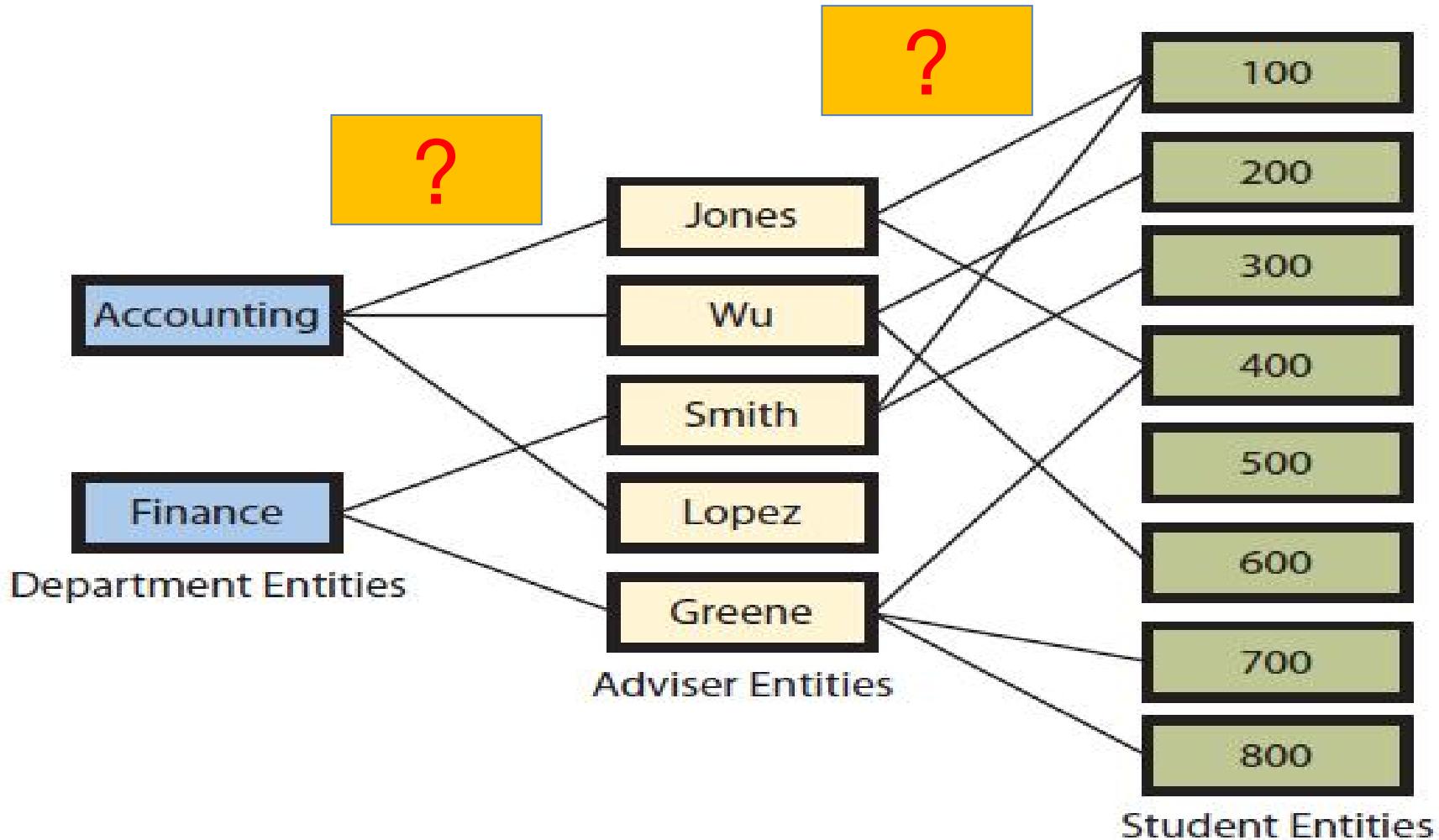


What are missing here?

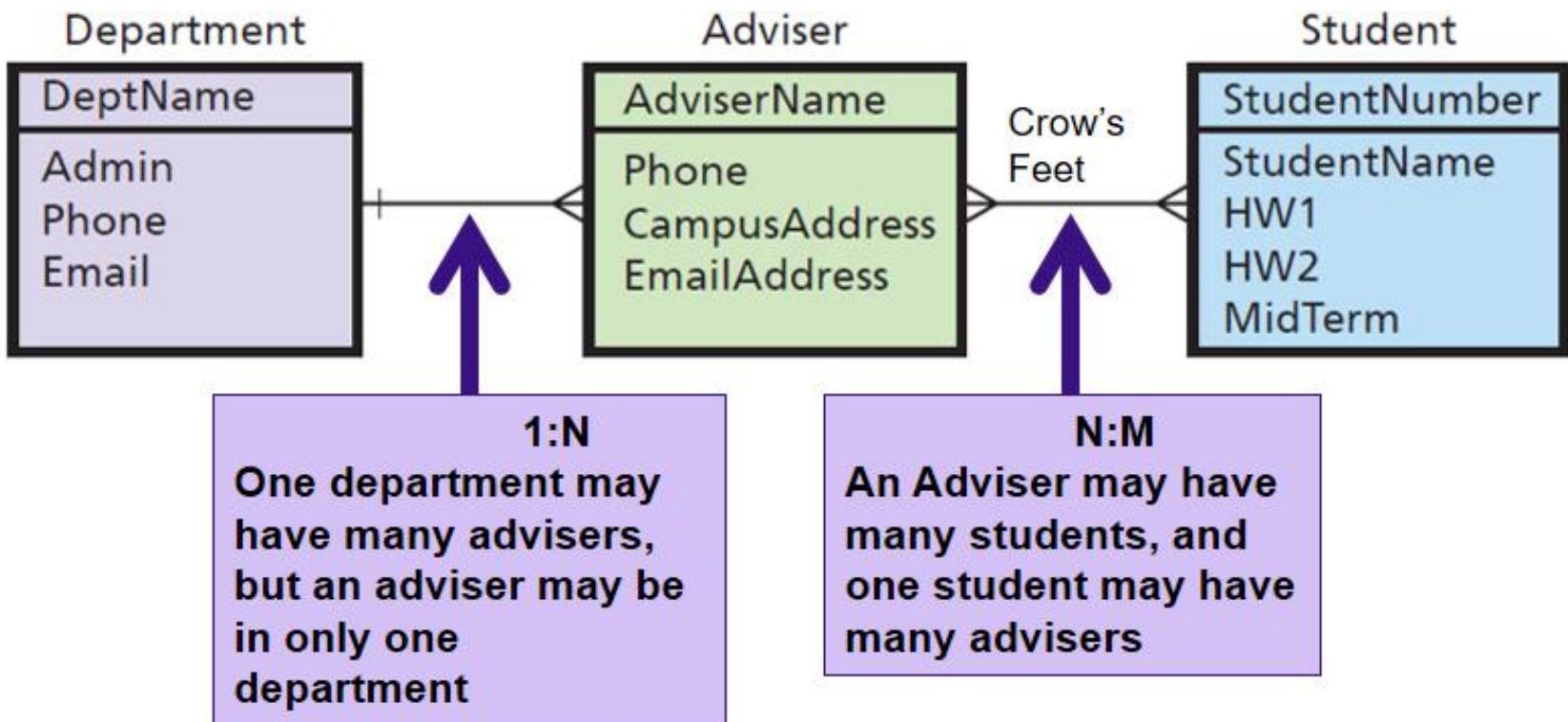
Example of Department, Adviser, and Student Entities and Relationships



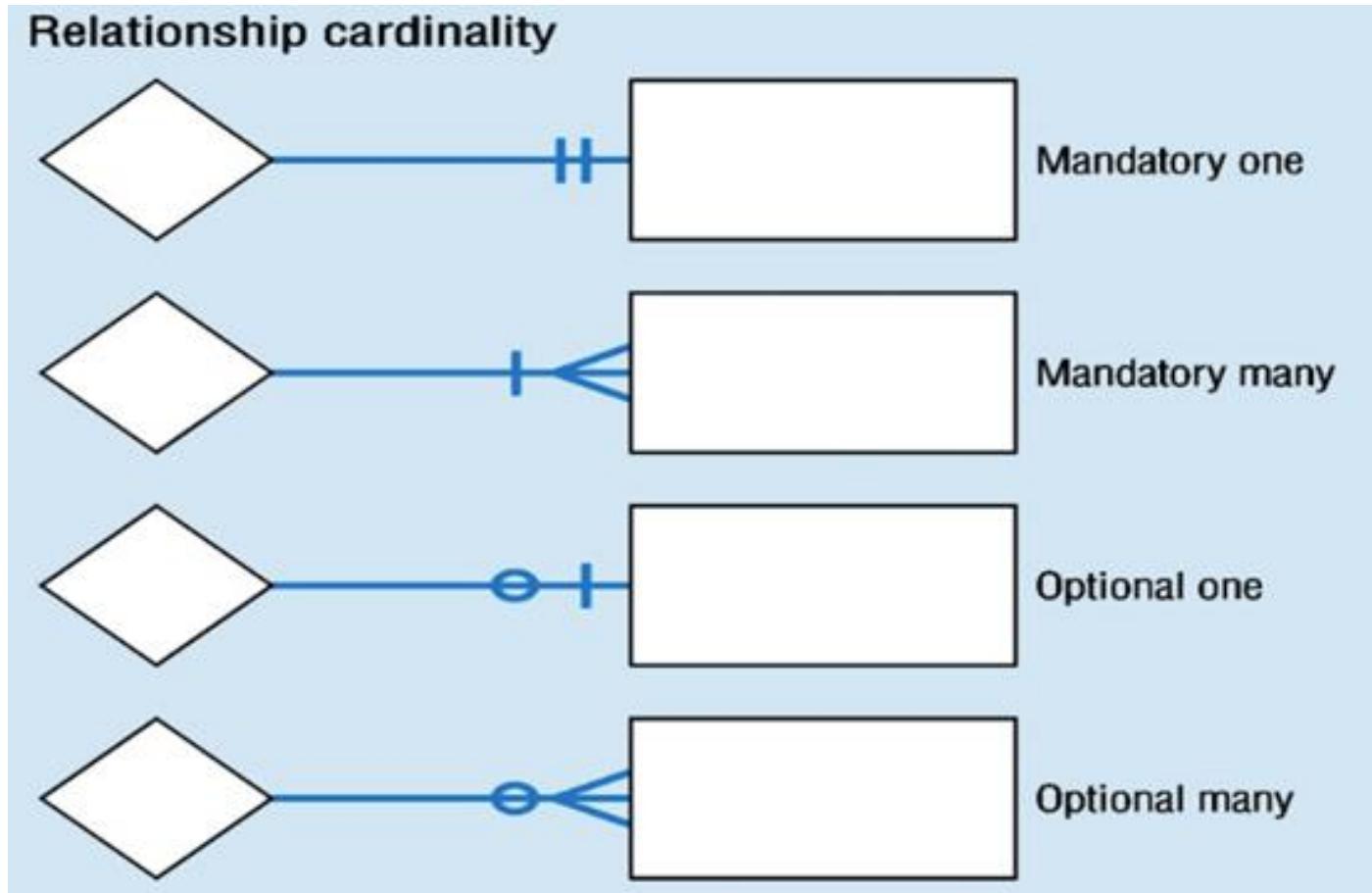
Example of Department, Adviser, and Student Entities and Relationships



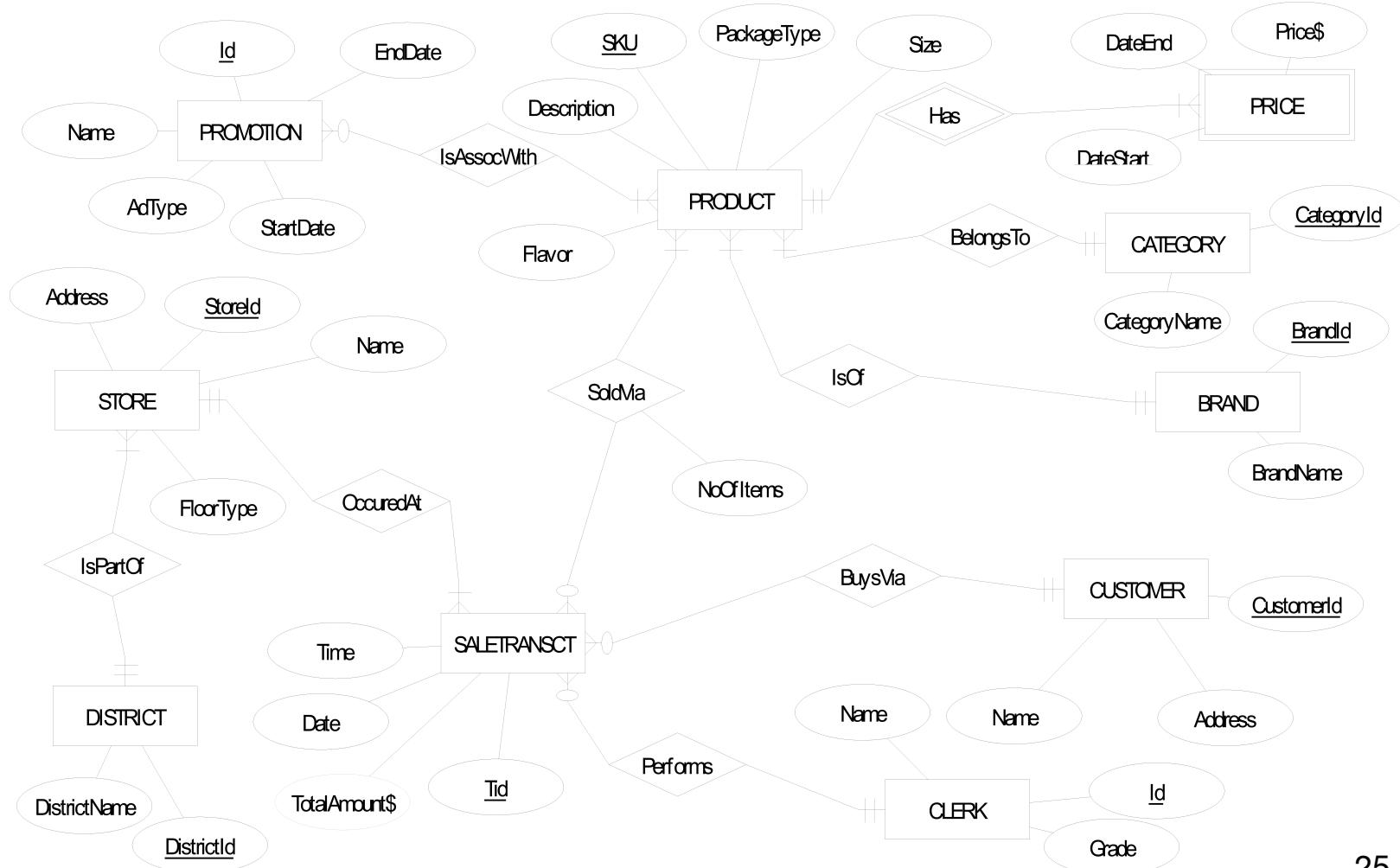
Example: Entity-Relationship (E-R) diagram



Entity-Relationship (E-R) diagram – General Notation



Entity-Relationship (E-R) diagram Example



Entity-Relationship (E-R) diagram

Example: Can you draw an ER Diagram for the potential database that generates this sample receipt

Receipt ID: 9873

Staff ID: 1234

Staff Name: Chris Chan

26th September 2019
9:00am

Item	Quantity	Price	Amount
#001: Pencil	2	\$6	\$12
#003: Experiencing MIS	1	\$300	\$300

Total \$312

Payment		
Visa	1234 xxxx xxxx 5678	\$312

The sample result will be posted before next class.

QCE5-4: How Is a Data Model Transformed into a Database Design?

- **Normalization**
 - Converting poorly structured tables into two or more well-structured tables
 - **Goal:** Construct tables with data about a single theme or entity
 - **Purpose:** To minimize data integrity problems

Data Integrity Problems

- Data integrity problems **produce incorrect and inconsistent information**, users lose confidence in information, and the system gets a poor reputation
- Can only occur if data are **duplicated**

So, we try to minimize data duplication in a database. Let's analyze an example.

Poorly Designed Employee Table Causes Data Integrity Problem

Employee

Name	HireDate	Email	DeptNo	DeptName
Jones	Feb 1, 2007	Jones@ourcompany.com	100	Accounting
Smith	Dec 3, 2004	Smith@ourcompany.com	200	Marketing
Chau	March 7, 2004	Chau@ourcompany.com	100	Accounting
Greene	July 17, 2007	Greene@ourcompany.com	100	Accounting

a.Table Before Update

Employee

Name	HireDate	Email	DeptNo	DeptName
Jones	Feb 1, 2007	Jones@ourcompany.com	100	Accounting and Finance
Smith	Dec 3, 2004	Smith@ourcompany.com	200	Marketing
Chau	March 7, 2004	Chau@ourcompany.com	100	Accounting and Finance
Greene	July 17, 2007	Greene@ourcompany.com	100	Accounting

b.Table with Incomplete Update

Two Normalized Tables

Employee

Name	HireDate	Email	DeptNo
Jones	Feb 1, 2010	Jones@ourcompany.com	100
Smith	Dec 3, 2011	Smith@ourcompany.com	200
Chau	March 7, 2007	Chau@ourcompany.com	100
Greene	July 17, 2010	Greene@ourcompany.com	100

Department

DeptNo	DeptName
100	Accounting
200	Marketing
300	Information Systems

Single Themes

Each table is now about 1 single theme only. The Employee table links to the Department table using DeptNo.

Summary of Normalization

- Normalization is just one of the criteria for evaluating database designs
- Normalized designs can be slower to process
- Designers sometimes choose to accept non-normalized tables
- The best design of a table depends on how well it meets the users' requirements

Why is this lecture valuable to you?

- This lecture shows you how to represent data in a structured database format by Entity Relationship Diagram
- You need database knowledge to communicate with database administrators and organize data in an organized manner

Week 4 Recap

Ch. 4

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References and Disclaimer

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