

# Lecture 5- Databases

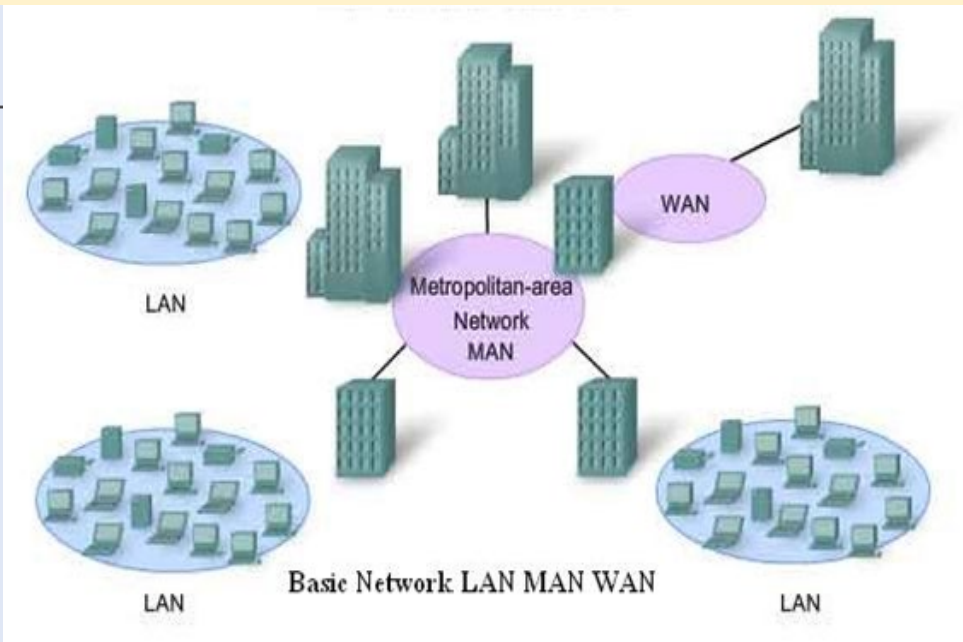


# Recap-Networking

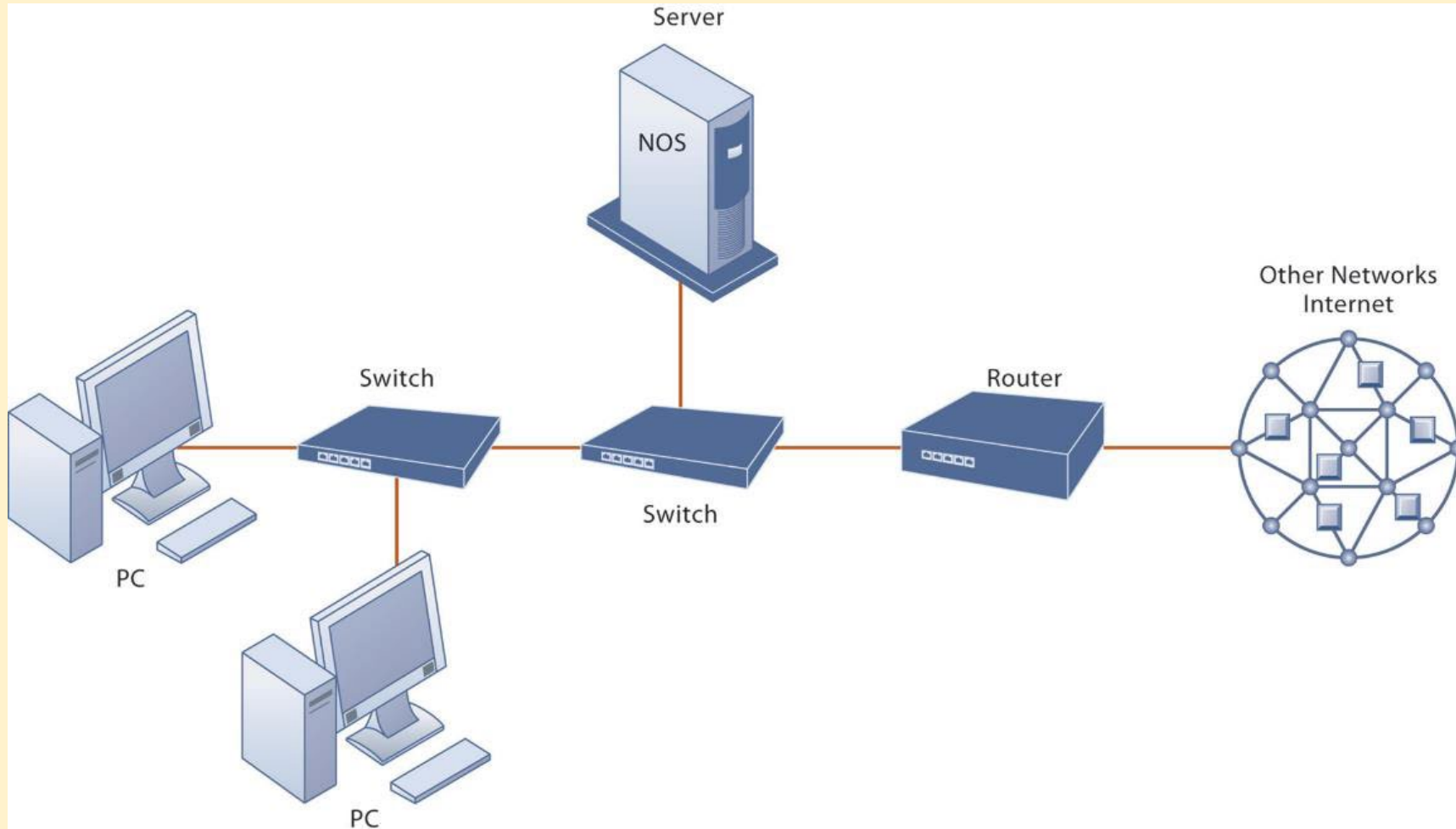
# Computer Networks

- Two or more connected computers
- Types of Networks:

Type	Area
Local area network (LAN)	Up to 500 meters (half a mile); an office or floor of a building
Campus area network (CAN)	Up to 1,000 meters (a mile); a college campus or corporate facility
Metropolitan area network (MAN)	A city or metropolitan area
Wide area network (WAN)	A transcontinental or global area



# Components of a Simple Computer Network- LAN



Laudon and Laudon (2013)

# Networks in Large Companies

- Large numbers of local area networks (LANs) linked to firm-wide corporate network
- Various powerful servers
  - Website, corporate intranet, extranet
  - Backend systems
- Mobile wireless LANs (Wi-Fi networks)
- Videoconferencing system
- Telephone network, wireless cell phones



# Network Security

- Network security is **any activity designed to protect** the usability and integrity of your network and data.
- It includes both **hardware and software technologies**
- It **targets a variety of threats**
- It stops them from entering or spreading on your network
- Effective network security manages access to the network

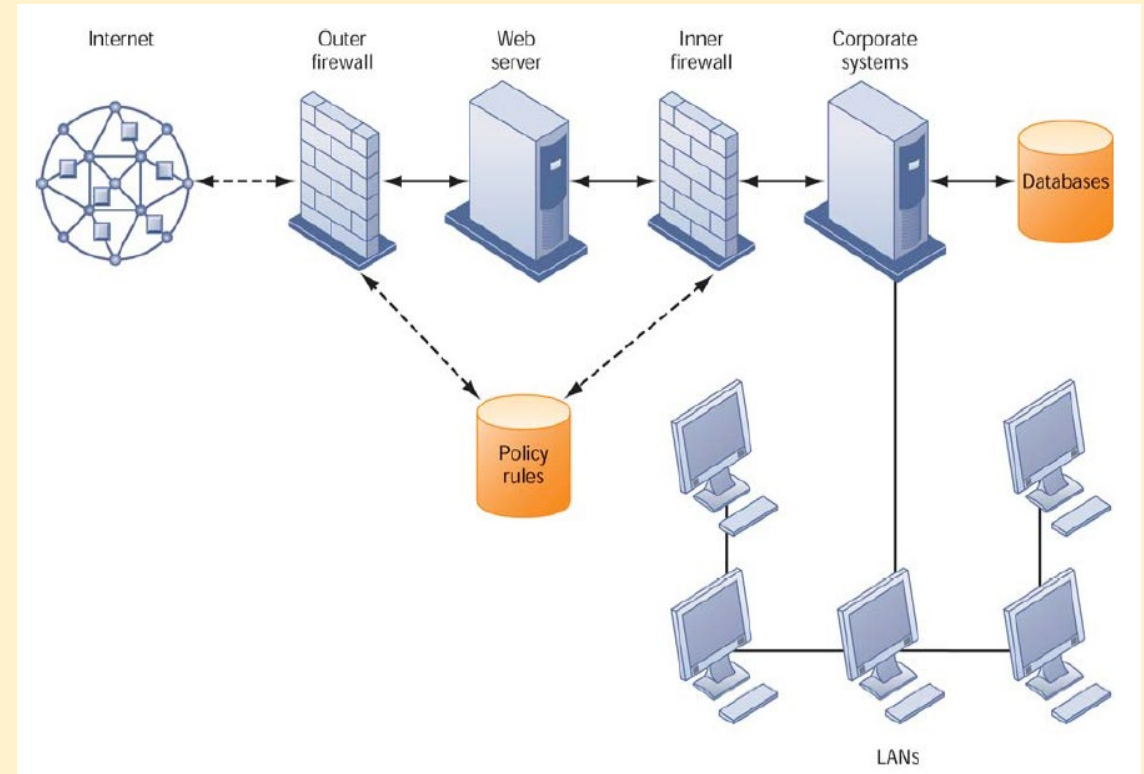
# How does network security work?

- Network security **combines multiple layers of defenses** at the edge and in the network.
- Each network security layer implements policies and controls.
- Authorized users gain access to network resources, but malicious actors are blocked from carrying out exploits and threats.

# Types of network security

- **Firewalls:**

- Firewalls put up a barrier between your trusted internal network and untrusted outside networks, such as the Internet.
- They use a set of defined rules to allow or block traffic.
- A firewall can be hardware, software, or both.



Laudon and Laudon (2013)



- **Anti-virus and anti-malware software**

- "Malware," short for "malicious software," includes viruses, worms, Trojans, ransomware, and spyware.
- Sometimes malware will infect a network but lie dormant for days or even weeks
- Antivirus software prevents, detects, and removes these threats



- **Access control**

- Not every user should have access to your network.
- To keep out potential attackers, you need to recognize each user and each device through **User Authentication**
- Then you can enforce your **Security Policies**.



## • Intrusion Prevention Systems

- An IPS scans network traffic to actively block attacks.
- It feature full-time monitoring tools placed at “hot spots” of corporate networks to detect and deter intruders continually.
- The system generates an alarm and blocks a suspicious activity



## • Physically secure your network hardware

- Network hardware such as switches and routers should not be in the open where anybody can access it.
- Store hardware in a controlled room or building
- An extra precaution would be to monitor the hardware using a manned security camera system.



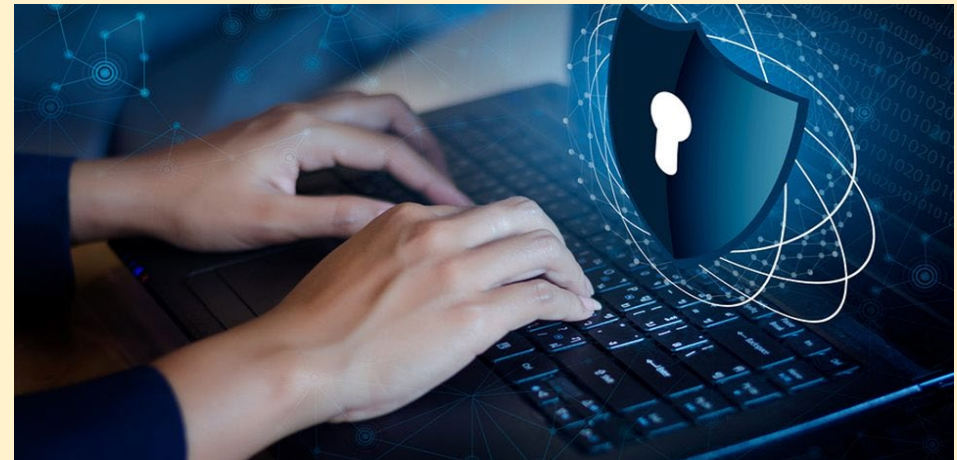
## • Wireless security

- Wireless networks are not as secure as wired ones.
- Should use:
  - A **virtual private network (VPN)** which encrypts the connection from an endpoint to a network, often over the Internet to access internal corporate data.
  - **WPA2 encryption** which ensures that only authorized users access the network. Since passwords are encrypted, longer, stronger and harder to crack



## • Web security

- A web security solution will control your staff's web use, block web-based threats, and deny access to malicious websites.
- It will protect your web gateway on site or in the cloud.
- "Web security" also refers to the steps you take to protect your own website



# Database Design

# What is a Database?

- Database:
  - Collection of related files containing records on people, places, or things
- Entity:
  - Generalized category representing person, place, thing
  - E.g., SUPPLIER, PART
- Attributes:
  - Specific characteristics of each entity:
    - SUPPLIER name, address
    - PART description, unit price, supplier

# Relational Databases

- Organize data into two-dimensional tables (relations) with columns and rows
- One table for each entity:
  - E.g., (CUSTOMER, SUPPLIER, PART, SALES)
  - Fields (columns) store data representing an attribute
  - Rows store data for separate records, or tuples
- Key field: uniquely identifies each record
- Primary key

# Supplier Table

**SUPPLIER**

Columns (Attributes, Fields)

Supplier_Number	Supplier_Name	Supplier_Street	Supplier_City	Supplier_State	Supplier_Zip
8259	CBM Inc.	74 5 <sup>th</sup> Avenue	Dayton	OH	45220
8261	B. R. Molds	1277 Gandolly Street	Cleveland	OH	49345
8263	Jackson Composites	8233 Micklin Street	Lexington	KY	56723
8444	Bryant Corporation	4315 Mill Drive	Rochester	NY	11344

Key Field  
(Primary Key)

Rows  
(Records,  
Tuples)

Laudon and Laudon (2013)

# PART Table

## PART

Part_Number	Part_Name	Unit_Price	Supplier_Number
137	Door latch	22.00	8259
145	Side mirror	12.00	8444
150	Door molding	6.00	8263
152	Door lock	31.00	8259
155	Compressor	54.00	8261
178	Door handle	10.00	8259

**Primary Key**

**Foreign Key**

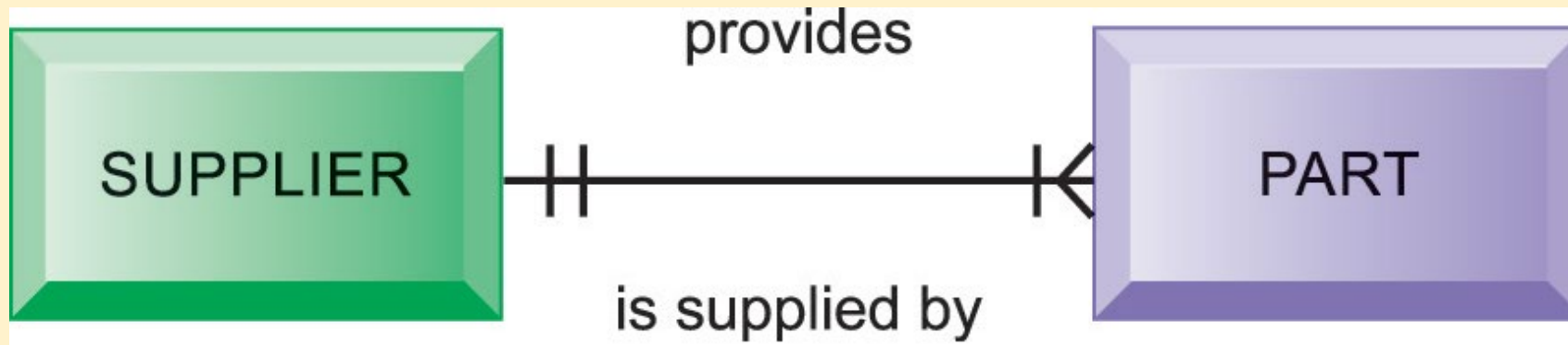


# Establishing Relationships

- **One-to-one relationship-** A record in one table is matched with only one record in another table.
  - E.g. one product code – appears once on the product table & once on the product features table
- **One-to-many relationship-** A record in one table is matched with many records in a second table, but each record in the second table can only be matched with one in the first
  - E.g. you will have one customer number per customer – but they may place many orders
- **Many-to-many relationship-** this type of relationship must be decompose into 2 one-to-many relationships. So it requires “join table” or intersection relation that links the two tables to join information

# A Simple Entity-Relationship Diagram

- Used to clarify table relationships in a relational database



Laudon and Laudon (2013)

# The Final Database Design with Sample Records

**PART**

Part_Number	Part_Name	Unit_Price	Supplier_Number
137	Door latch	22.00	8259
145	Side mirror	12.00	8444
150	Door molding	6.00	8263
152	Door lock	31.00	8259
155	Compressor	54.00	8261
178	Door handle	10.00	8259

**LINE\_ITEM**

Order_Number	Part_Number	Part_Quantity
3502	137	10
3502	152	20
3502	178	5

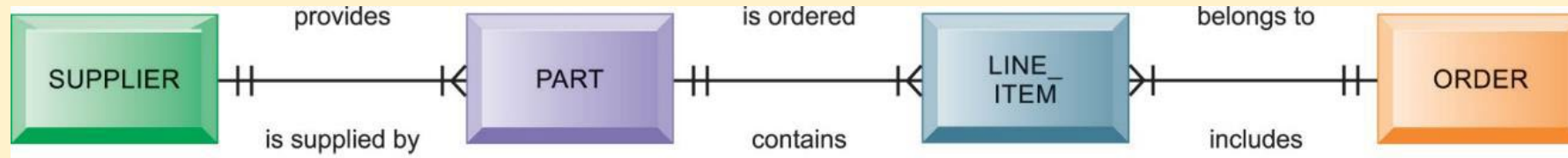
**ORDER**

Order_Number	Order_Date
3502	1/15/2018
3503	1/16/2018
3504	1/17/2018

**SUPPLIER**

Supplier_Number	Supplier_Name	Supplier_Street	Supplier_City	Supplier_State	Supplier_Zip
8259	CBM Inc.	74 5 <sup>th</sup> Avenue	Dayton	OH	45220
8261	B. R. Molds	1277 Gandolly Street	Cleveland	OH	49345
8263	Jackson Components	8233 Micklin Street	Lexington	KY	56723
8444	Bryant Corporation	4315 Mill Drive	Rochester	NY	11344

# Entity-Relationship Diagram for the Database with Four Tables



Laudon and Laudon (2013)

# Sample Order Report

Order Number: 3502  
Order Date: 1/15/2018

Supplier Number: 8259  
Supplier Name: CBM Inc.  
Supplier Address: 74 5th Avenue, Dayton, OH 45220

Order_Number	Part_Number	Part_Quantity	Part_Name	Unit_Price	Extended Price
3502	137	10	Door latch	22.00	\$220.00
3502	152	20	Door lock	31.00	620.00
3502	178	5	Door handle	10.00	50.00
Order Total:					\$890.00

# Database Management Systems (DBMS)

- Software for creating, storing, organizing, and accessing data from a database
- Separates the logical and physical views of the data
  - Logical view: how end users view data
  - Physical view: how data are actually structured and organized
- Examples: **Microsoft Access**, DB2, Oracle Database, Microsoft SQL Server, MySQL

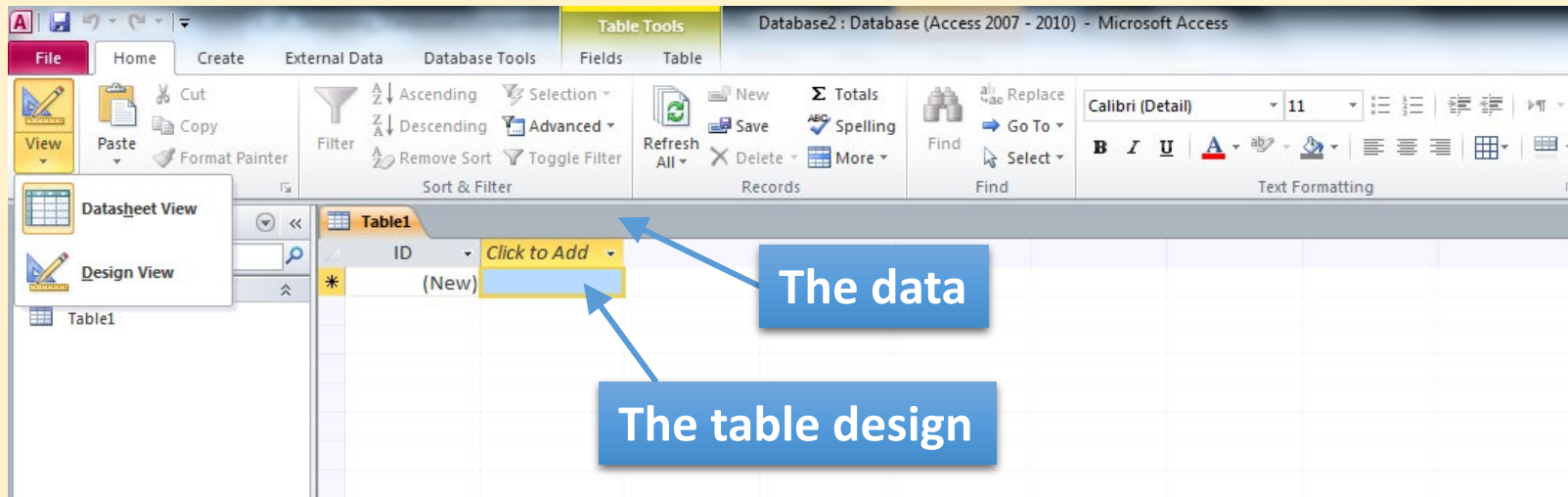
# Capabilities of Database Management Systems

- **Data definition capabilities:**
  - Specify structure of content of database
- **Data dictionary:**
  - Automated or manual file storing definitions of data elements and their characteristics
- **Querying and reporting:**
  - Data manipulation language
  - Structured query language (SQL)
  - Microsoft Access query-building tools
  - Report generation, e.g., Crystal Reports

Using MS Access



# Creating databases in MS Access




- You can create a new table in different ways
  - Datasheet View – Insert/edit data directly
  - Design View – Create/edit the structure
  - External Data – Import data from Excel or another data source

# Suppliers in DATASHEET VIEW

- Each entity is organised into a table with columns (fields) and rows (records)

Supplier_Number	Supplier_Name	Supplier_Street	Supplier_City	Supplier_State	Supplier_Zip
8259	CBM Inc.	74 5th Avenue	Dayton	OH	45220
8261	B.R. Molds	1277 Gandolly Street	Cleveland	OH	49345
8263	Jackson Composites	8233 Micklin Street	Lexington	KY	56723
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Design View



Primary Key

Field Name	Data Type
Supplier_Number	Number
Supplier_Name	Text
Supplier_Street	Text
Supplier_City	Text
Supplier_State	Text
Supplier_Zip	Number

Data Types

AB 12   Date & Time  
Text Number Currency  Yes/No  
 More Fields ▾

# Data Dictionary

The screenshot shows the Microsoft Access interface with the 'Table Tools' ribbon selected. The ribbon includes tabs for 'File', 'Home', 'Create', 'External Data', 'Database Tools', and 'Design'. The 'Design' tab is active, showing various tools for table design such as 'View', 'Primary Key', 'Builder', 'Test Validation Rules', 'Insert Rows', 'Delete Rows', 'Modify Lookups', 'Property Sheet', 'Indexes', 'Create Data Macros', 'Rename/Delete Macro', 'Relationships', and 'Object Dependencies'.

The main area displays a table named 'Parts' in design view. The table has the following fields:

Field Name	Data Type	Description
Part_Number	Number	Identification number of each part
Part_Name	Text	Brief definition of each part
Unit_Price	Currency	Cost per unit in UK £
Supplier_Number	Number	The number of the supplier who sells the part

Below the table is the 'Field Properties' pane, which is currently showing the 'General' tab for the selected 'Unit\_Price' field. The properties are as follows:

Property	Value
Format	Currency
Decimal Places	Auto
Input Mask	
Caption	
Default Value	0
Validation Rule	
Validation Text	
Required	No
Indexed	No
Smart Tags	
Text Align	General

The 'Field Properties' pane also includes a 'Lookup' tab and a large text area with the following text: 'The display layout for the field. Select a pre-defined format or enter a custom format. Press F1 for help on formats.'

At the bottom of the window, the status bar indicates 'Design view. F6 = Switch panes. F1 = Help.' and includes a 'Num Lock' indicator and several utility icons.

# Parts; Orders and Line Item Tables

- Each entity has its own table – avoid data duplication

Part_Number	Part_Name	Unit_Price	Supplier_Number
137	Door latch	£22.00	8259
145	Side mirror	£12.00	8444
150	Door molding	£6.00	8263
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155	Compressor	£54.00	8261
178	Door handle	£10.00	8259

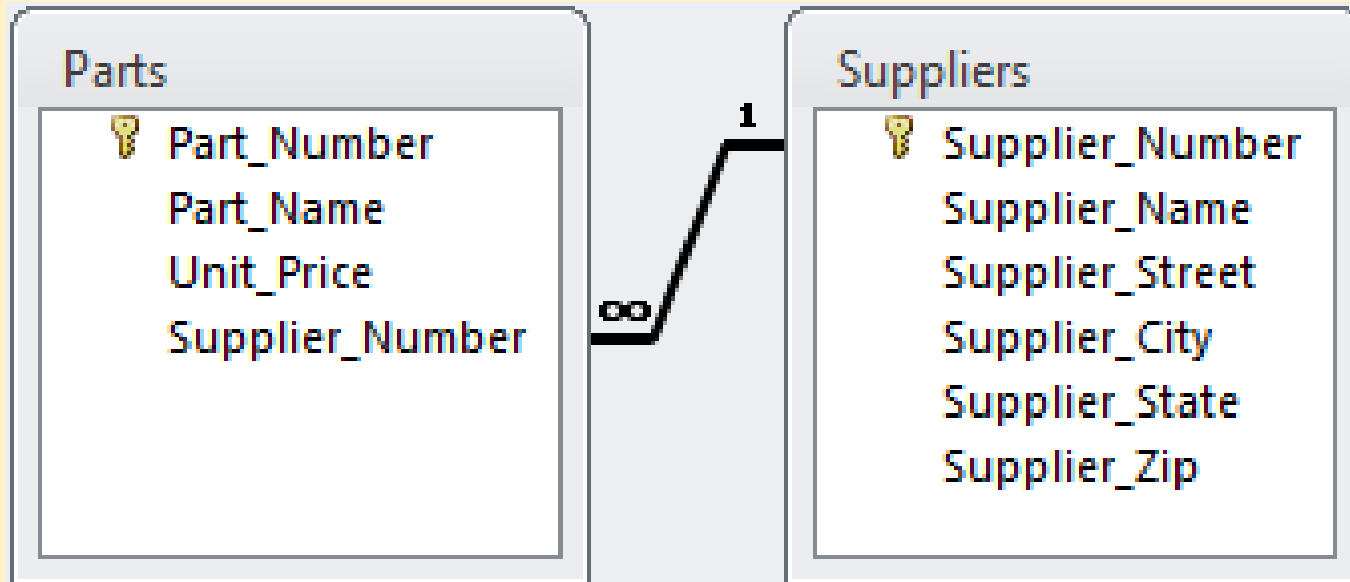
**PARTS Table**  
**Which is the primary key?**  
**Which is the foreign key?**

Order_Num	Order_Date
3502	14/02/2013
3503	15/02/2013
3504	16/02/2013

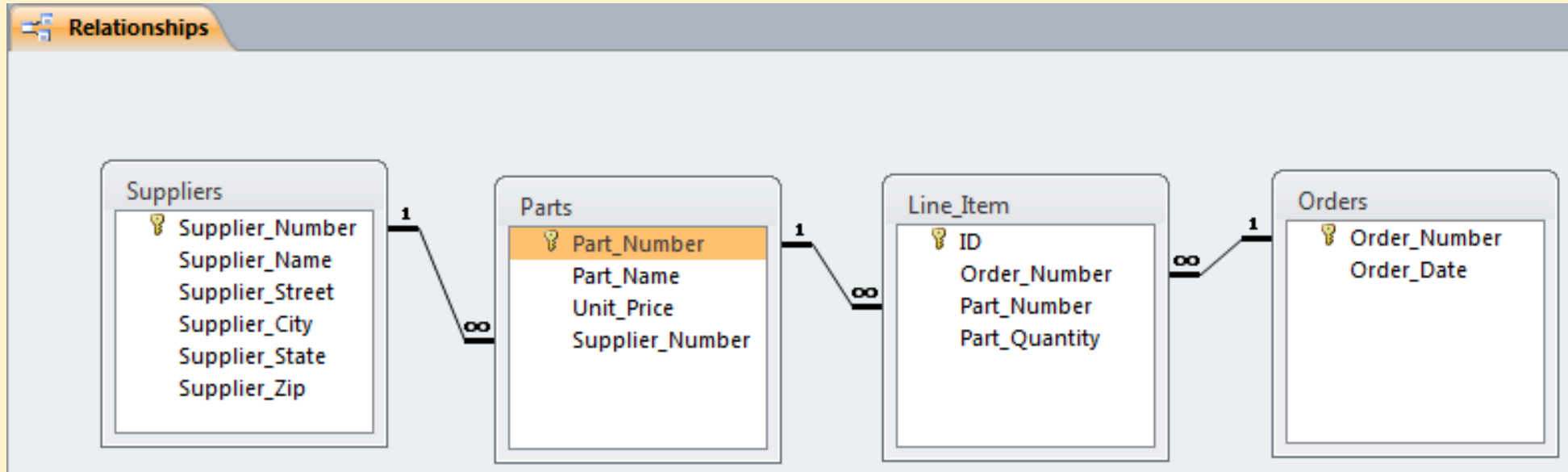
ID	Order_Num	Part_Number	Part_Quantity
1	3502	137	10
2	3502	152	20
3	3502	178	5

# Relationship diagrams in MS Access

- Entity-relationship diagram
  - Used to clarify table relationships in a relational database
  - Example – 1 supplier may supply many parts 1-∞



# Relationships- complete



Next Session

Next Topic: Group Work and recap guidelines for presentation

Groups Should:

**Read Case Study**

**As a Group discuss** and decide on:

Design a Network for EPS

**OR**

Design a Database



# Self Managed Learning

- Read:
  - Chapter 5- Essentials of Information Systems

# References

- Lynch, R. L. 2018. Strategic management. Eighth edition. Harlow: Pearson Education.
- Chaffey, D. 2009. E-business and e-commerce management strategy, implementation and practice . 4<sup>th</sup> ed. Harlow: Financial Times Prentice Hall.
- Laudon, J. & Laudon, K. 2013. Essentials of management information systems. 10<sup>th</sup> ed. Boston: Pearson
- Laudon, K. C. & Laudon, J. P. 2014. Management information systems managing the digital firm. 13<sup>th</sup> ed. Boston: Pearson.
- Porter, M. 2001. Strategy and the Internet. *Harvard Business Review* [online] Available at: < <https://hbr.org/2001/03/strategy-and-the-internet> > [Accessed 18 February 2021].