What is a Network?

When you have more than one computer or device connected together, you have a **network**.

A network allows devices to send each other data in the form of 0's and 1's (**bi**ts or **bi**nary digi**ts**).

Four Kinds of Networks

LAN	**Local Area Network**; wired with NIC & network cables; for small to medium-sized areas like a room or a building
WLAN	**Wireless Local Area Network**; wireless, uses Wi-Fi technology, connected by WNIC (wireless NIC), routers, access points; for small areas like a building
WAN	**Wide Area Network**; wired, may use submarine cables; connects many networks together over a large area (i.e. city, country, the world)
WPAN	**Wireless Personal Area Network**; wireless, uses Bluetooth technology, connected by WNIC (wireless NIC); devices connect directly to each other; for a very small area (a room)

Network Devices

NIC	**Network interface card**; a card inside a device or computer that allows it to connect to a network; usually has a port, i.e. a place to connect a network cable; a WNIC is a wireless NIC and lets you connect to Wi-Fi or Bluetooth.
Network cable	A long **cable** that carries electrical signals from the NIC of one device to the NIC of another one.
Router	Connects different types of networks together, i.e. a LAN to a WAN; they help to send packets of data to the correct destination, i.e. receiver.
Hub	Allows devices to connect to others to share data; non-intelligent (they send data everywhere and don't try to look for the correct receiver).
Switch	Allows devices to connect to others to share data; intelligent (they send data *only* to the correct receiver).

Network Devices (cont)

Bridge	Connects LANs together to make one large LAN.
Modem	"**Mo**dulator/**Dem**odulator"; carry digital signals over an analogue cable (like a telephone cable); usually used to connect to an ISP (Internet Service Provider)

The World Wide Web

The **WWW** or **World Wide Web** is one of the most popular platforms for internet services.

A **website** is a set of **pages** built using technologies like **HTML**, **CSS**, and **Javascript**. Websites can be about any topic and do many different things.

Websites are stored on **web servers**, which use a **protocol** called **HTTP** to display websites.

HTTPS ("secure HTTP") is a *secure* version of HTTP. This means it keeps all the website's data private when you connect.

Web browsers are software apps that help users connect to websites. They include include Chrome, Firefox, Safari, Opera, etc...

A web browser has a large space to display websites, and other parts like **navigation (back/next)** buttons, a **reload** button, and an **address bar** where **URLs** are entered.

URLs

A **URL**, or Uniform Resource Locator, shows where to find a file on the Internet.

Here is a URL: https://images.techadvisor.com/cmsdata/slideshow/3634008/funny_tech_memes_2.jpg

"https://" is the **protocol**. This URL uses the HTTPS protocol, which is used to send data securely.

"images.techadvisor.com" is the **website address**. It is made up of the *domain host* (www), the *domain name* (techadvisor), and the *domain type* (com). Sometimes, there is also a *country code*, like "-uk" for the United Kingdom.

"/cmsdata/slideshow/3634008/" is the **path**. This is like a list of folders that contain the file.

"funny_tech_memes_2.jpg" is the **file name**. This one ends in ".jpg", so we know this is a JPEG image file.

Web Search

Search engine	A **website**, or part of a website, that allows you to **search for different things**, like text, pictures, music, or video. Examples of search engines include Google, Bing, Yahoo, Baidu, Yandex...
Search keyword	Also called **search term**. A **word** related to the kind of thing you're looking for. An example of search keywords might be "Blackpink video".
Search results	**Things that a search engine returns** after you search with certain keywords. For instance, searching with the keywords "Blackpink video" might return a list of music videos by Blackpink.

What is the Internet?

A worldwide network of networks	A global, public network of computers
The world's largest WAN	Not the same as an *intranet!*

What is the Internet Used For?

Many things! Including...
Browsing **web pages** using the World Wide Web (WWW)
Sending and receiving **emails**
Using **search engines** to do **research**, e.g. for school projects
Sharing files and information
Video conferencing (face to face discussion using webcam, e.g. MS Teams or Zoom)
Voice calls (like Skype or Zalo)
Streaming **music** and **video** (like YouTube or Spotify)
Online **banking**
E-commerce, i.e. online **shopping**
Advertising
Blogging (writing articles or journal entries) or **vlogging** (making video journals)
Social media
Playing multi-player **online games**

Packets & Routing

To send data across the Internet, a **router** *breaks* it into small pieces called **packets**. These packets always carry a message or part of a message, and the IP address of the computer that sent the message (**sender**) and the computer that should get the message (**receiver**). An **IP address** is like the address of a house. It tells the router where to find the receiver, so it can send the message to the right place. There are two kinds of IP addresses: **IPv4** and **IPv6**.
Example of IPv4: 192.168.0.1
Example of IPv6: 2001:0db8:0000:0000:0000:8a2e:0370:7334
The router will look at its neighbours to find the best "road" to send the message. The "road" that the message takes is called its **route**. Routers look at the receiver's IP address to help them decide on the best route. This is called **routing**. Every packet can take a different route. If a network connection breaks down (e.g. because a cable breaks), routers can help packets find a new route. This is called **re-routing**. Eventually, the packet will find its way to the right place. Yay!

How Email Works

Email is **e**lectronic **mail**. It's just like regular mail ("snail mail") but it's faster, because it uses the Internet.
Imagine Jack wants to send a paper letter from Ha Noi to his friend Joe in Ho Chi Minh City. Jack writes his letter, puts it in an envelope, and brings it to the post office in Ha Noi. On the envelope, he writes the address of his friend Joe, who should receive it (i.e. the **receiver**). He also writes his own address so it's clear who sent it (i.e. the **sender**). Next, the post office in Ha Noi takes his letter and sends it to the post office in Ho Chi Minh City. Then, the post office in Ho Chi Minh City sends a mail carrier to deliver the letter to his friend Joe.. Email is the same, but instead of a post office,**email servers** are used. Imagine Jack (jack@hanoi.vn) wants to send an email **message** to Joe (joe@hcmc.vn). Jack logs into his **webmail**, writes his message, adds a subject (e.g. "Hi Joe"), and includes Joe's**email address** (joe@hcmc.vn) in the "To:" field. When Jack clicks the **Send** button, the message moves into his **outbox**, and from there it is sent to Jack's email server (i.e. hanoi.vn). Jack's email server looks at the receiver's email address (joe@hcmc.vn) and sends the message over the Internet. The message is routed to Joe's email server (i.e. hcmc.vn), which receives the message for Joe. When Joe logs into his webmail, he finds Jack's message in his **inbox**..

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Basic Email Vocabulary

email	A system for sending **electronic mail**.
electronic	Something that uses **electric transistors or circuits**, e.g. a computer.
email account	When you **pay an ISP to use their email service**, we say that you have an email account.
email address	A **string of characters in the form** *'username@server.name'* that identifies an email account. Email servers use this to know where an email message should go.
email server	A **computer** whose job is to **send and receive email messages**.
webmail	A **website** that allows you to **send and receive email**. ISPs that provide email accounts often provide webmail.
message	A **piece of information** that is sent somewhere (from a *sender* to a *receiver*).
inbox	A **folder** that contains **messages received from other email users**.
outbox	A **folder** that contains **messages to be sent to other email users**.

Parts of an Email Message

body	The **main part** of a message, containing most of the information.
subject	The **topic** of a message; what a message is about. Stored in the "Subject:" field of an email message.
sender	The **person who sends the message**. Stored in the "From:" field of an email message.
receiver	The **person who receives the message**. Stored in the "To:" field of an email message.
carbon copied receivers	**Other people who will receive copies of a message**. Stored in the "Cc:" field of an email message.
signature	The **name of a message's sender**. ex: *Mr. Jack Johnson*. Emails are note signed with a pen like letters are, so a sender will just type their name at the bottom of a message.

Parts of an Email Message (cont)

signature block	**Extra information about the sender** that appears in an email message below the signature. ex: *Student, XYZ School, New Delhi, India*.

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