Infrastructure for electronic Commerce

Internet

"The Federal Networking Council (FNC) agrees that the following language reflects our definition of the term 'Internet.'

'Internet' refers to the global information system that—

(i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons;

(ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and

(iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein."

Basis of Internet

- Packet switching

- TCP/IP communications protocol

- Client/server computing

Packet Switching

- **Packet switching** is a method of slicing digital messages into discrete units called **packets**,

- sending the packets along different communication paths as they become available,

- and then reassembling the packets once they arrive at their destination

- **Packets** is the discrete units into which digital messages are sliced for transmission over the Internet

- *The concept of packet switching is born in 1961 where "packet switching" networks was first published at Leonard Kleinrock (MIT)*

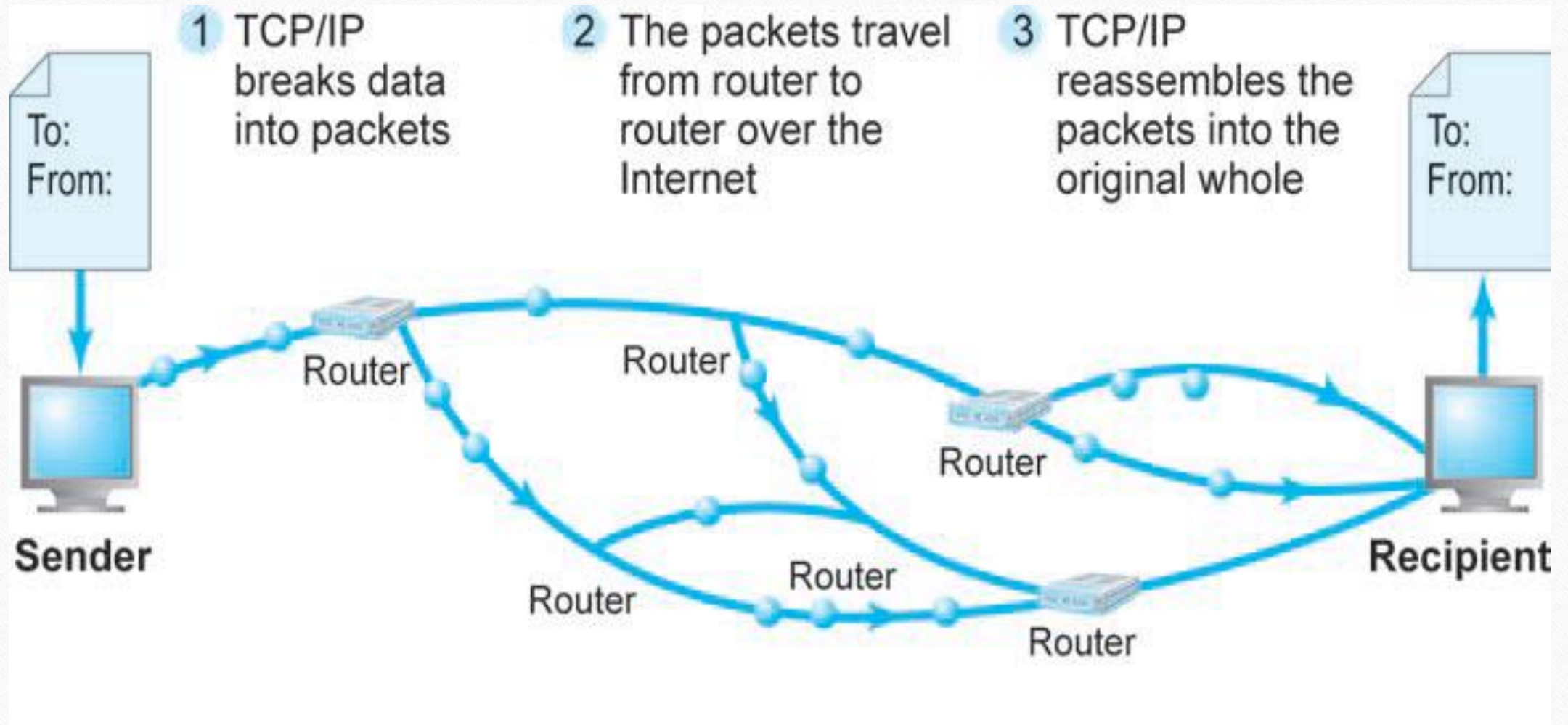# Concept of Packet Switching

- With packet switching, the communications capacity of a network can be increased by a factor of 100 or more.

- In packet-switched networks, messages are first broken down into packets.

- each packet are **digital codes** that indicate a source address and a destination address, as well as sequencing information and error control information for the packet.

- the packets travel from computer to computer until they reach their destination which are called routers

Router

- A **Router** is a special purpose computer that interconnects the different computer networks that make up the Internet and routes packets along to their ultimate destination as they travel the internet.

- Routers use a computer program called a **routing algorithm**.

  - computer program that ensures that packets take the best available path toward their destination

1 TCP/IP breaks data into packets

2 The packets travel from router to router over the Internet

3 TCP/IP reassembles the packets into the original whole

To: From:

Sender

Router

Router

Router

Router

Router

Router

To: From:

Recipient

Transmission Control Protocol (TCP)

- **Protocol** is a set of rules and standards for data transfer.

- TCP has become the core communications protocol for the Internet.

- It is a suite of communication protocols used to interconnect network devices on the internet.

- **TCP** establishes the connections among sending and receiving Web computers, and handles the assembly of packets at the point of transmission, and their reassembly at the destination end.

Internet Protocol (IP)

- **IP** provides the Internet's addressing scheme and is responsible for the actual delivery of the packets.

- **IP** defines how to address and route each packet to make sure it reaches the right destination.

- Each **gateway** computer on the network checks this IP address to determine where to forward the message.

TCP/IP

- The Defense Advanced Research Projects Agency (DARPA), the research branch of the U.S. Department of Defense, created the TCP/IP model in the 1970s for use in ARPANET, a wide area network that preceded the internet.

- TCP/IP uses the **client/server** model of communication in which a client is provided a service by another computer a server in the network.

Layers of TCP/IP

- **Network Interface Layer**

- **Internet Layer**

- **Transport Layer**

- **Application Layer**

Layers of TCP/IP

- **Network Interface Layer**

  - It is responsible for placing packets on and receiving them from the network medium, which could be a LAN or Token Ring, or other network technology.

- **Internet Layer**

  - It is responsible for addressing, packaging, and routing messages on the Internet.

Layers of TCP/IP

- **Transport Layer**

  - It is responsible for providing communication with the application by acknowledging and sequencing the packets to and from the application.

- **Application Layer**

  - It provides a wide variety of applications with the ability to access the services of the lower layers.

IP Addresses

- "How can billions of computers attached to the Internet communicate with one another?"

- There are two versions of IP currently in use: **IPv4** and **IPv6.**

- It is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication.

- An IP address serves two principal functions: host or network interface identification and location addressing.

IPv4 & IPv6

- **IPv4**
  - An **IPv4 Internet address** is a 32-bit number that appears as a series of four separate numbers marked off by periods, such as 64.49.254.91.

- **IPv6**
  - An **IPv6 Internet address** is 128 bits, so it can support up to 3.403×10^{38} addresses such as *2001:db8:0:1234:0:567:8:1.*

Client/server computing

- **Client/server computing** is a model of computing in which powerful personal computers and other Internet devices called **clients** are connected in a network to one or more **server** computers.

- **Client** is a powerful personal computer that is part of a network

- **Server** networked computer dedicated to common functions that the client computers on the network need
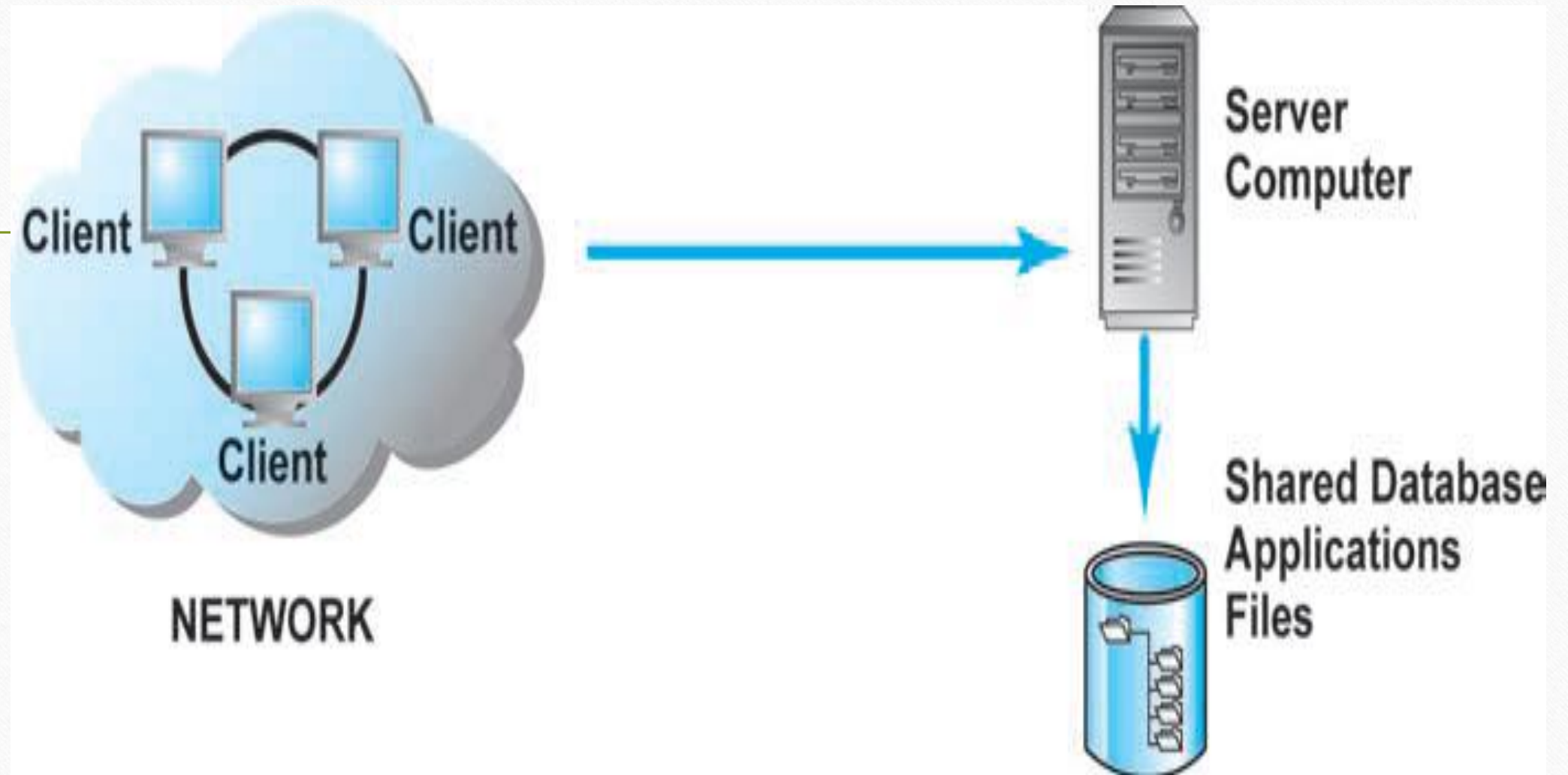
Cloud Computing

- **Cloud computing** refers to a model of computing in which firms and individuals obtain computing power and software applications over the Internet.

- Amazon, the Internet's largest retailer, is also one of the largest providers of cloud infrastructure and software services.

- Cloud computing has many significant implications for e-commerce

- Cloud computing radically reduces the cost of building and operating Websites.

- Firms can adopt "pay-as-you-go" and "pay-as-you-grow" strategies.

The Internet of Things (IOT)

- Use of the Internet to connect a wide variety of devices, machines, and sensors.

- The term is closely identified with RFID as the method of communication, although it also may include other sensor technologies, wireless technologies or QR codes.

- With the IOT, the physical world is becoming one big information system.

- "Anything that can be connected, will be connected."

WHAT IS INTERNET OF THINGS (IoT)?
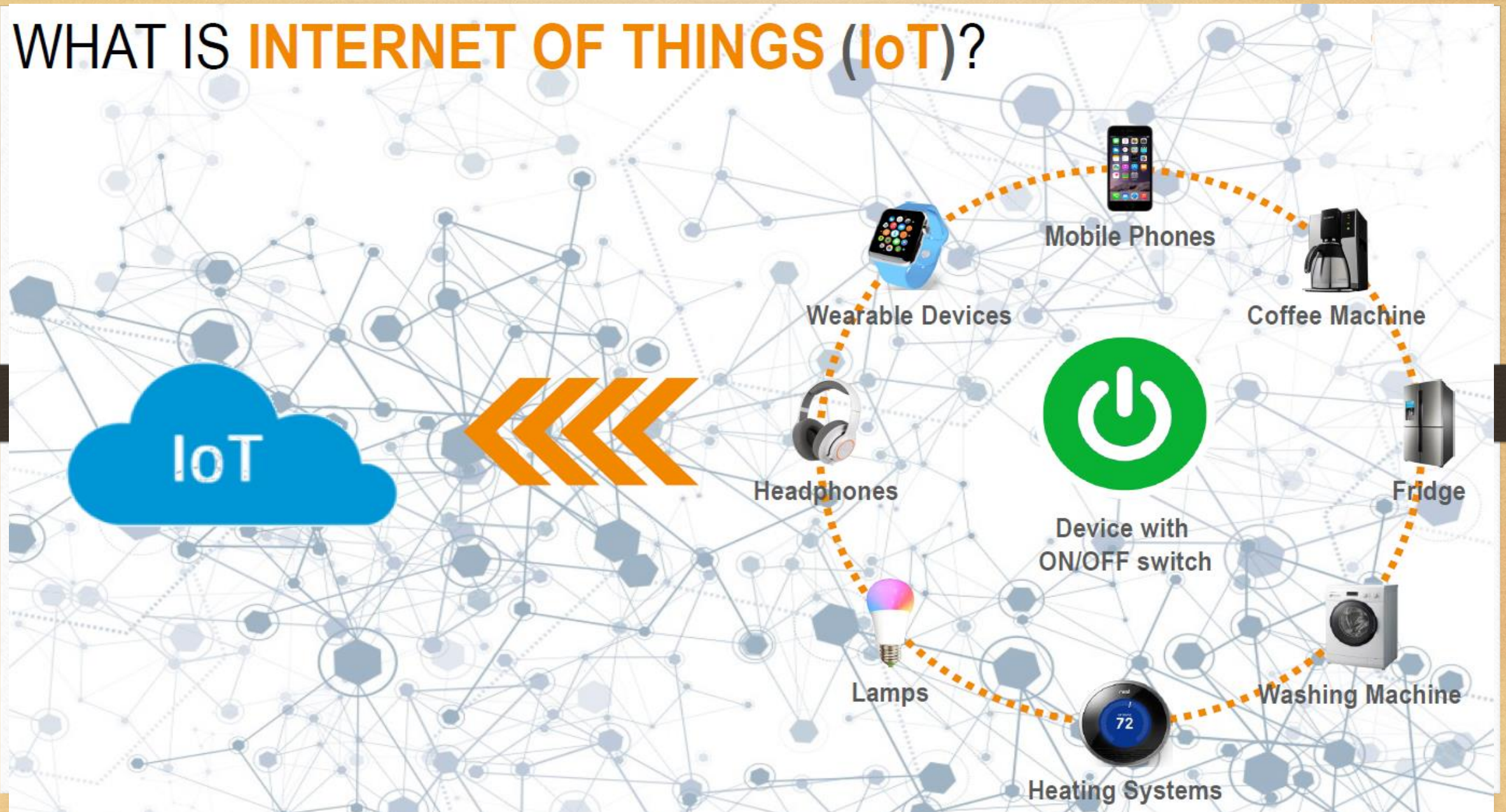
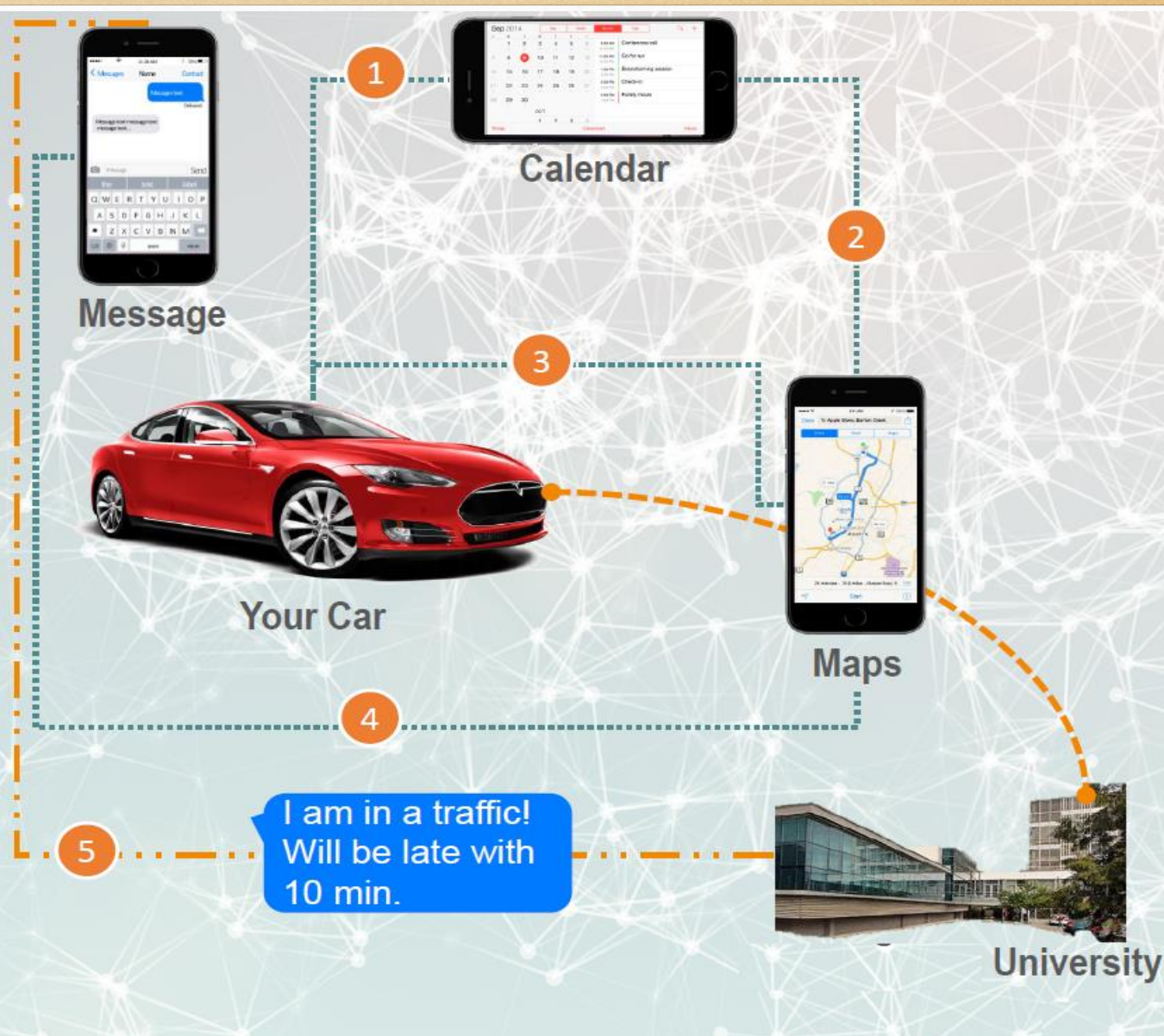# THE INTERNET OF THINGS EXAMPLE 1

Alarm ····1···· **Coffee Machine** ····2···· **Fridge**

Reminder ········ Remind me to buy milk! ····3····

The Web

- Without the Web, there would be no e-commerce.

- Web brought an extraordinary expansion of digital services to millions of amateur computer users.

- Web makes nearly all the rich elements of human expression needed to establish a commercial marketplace available to nontechnical computer users worldwide.

Components of the Web

- HTML
- HTTP
- Web server
- Browser

Hypertext

- **Hypertext** is a way of formatting pages with embedded links that connect documents to one another and that also link pages to other objects such as sound, video, or animation files.

- Hypertext refers to a word, phrase or chunk of text that can be linked to another document or text

Markup Languages

- A markup language is a language that annotates text so that the computer can manipulate that text.

- Markup languages are designed for the processing, definition and presentation of text.

- The language specifies code for formatting, both the layout and style, within a text file.

HTML

- **HyperText Markup Language (HTML)** is a GML that is relatively easy to use in web page design.

- HTML provides Web page designers with a fixed set of markup "tags" that are used to format a Web page.

- When these tags are inserted into a Web page, they are read by the browser and interpreted into a page display.

- The most recent version of HTML is HTML5.

XML

- **eXtensible Markup Language (XML) i**s a markup language specification developed by the W3C that is similar to HTML, but has a very different purpose.

- XML was designed to be both human- and machine-readable.

- XML plays an important role in many different IT systems.

- XML is often used for distributing data over the Internet.

Web server software

- Web server software refers to the software that enables a computer to deliver Web pages written in HTML to client computers on a network that request this service by sending an HTTP request.

- The two leading brands of Web server software are

  - Apache, which is free Web server shareware →52% of the market

  - Microsoft's Internet Information Services (IIS) →20% of the market

Special Server

- **Database servers**
  - access specific information within a database
- **ad servers**
  - deliver targeted banner ads
- **Mail servers**
  - provide e-mail messages
- **Video servers**
  - provide video clips.
- At a small e-commerce site, all of these software packages might be running on a single computer, with a single processor.

Web client

- Web Client is any computing device attached to the Internet that is capable of making HTTP requests and displaying HTML pages.

- The most common client is a Windows or Macintosh computer, with various flavors of Unix/Linux computers.

- However, the fastest growing category of Web clients are not computers at all, but smartphones, tablets, and netbooks outfitted with wireless Web access software.

Web Browsers

- A Web browser is a software program whose primary purpose is to display Web pages.

- Browsers also have added features, such as e-mail and newsgroups (an online discussion group or forum).

- The leading Web browsers are

  - Microsoft Internet Explorer (>55%)

  - Mozilla Firefox (>25%)

  - Google's Chrome (>20%)

  - Apple's Safari browser (>5%)

Internet & Connection

- Email

- Instant Messaging

- Chat & Online forum

Email

- **e-mail,** the most-used application of the Internet.

- Uses a series of protocols to enable messages containing text, images, sound, and video clips to be transferred from one Internet user to another.

- e-mail also allows **attachments**, which are files inserted within the e-mail message.

- About 76% of these e-mail accounts are consumer accounts and about 24% are corporate e-mail accounts

Instant Messaging

- **Instant messaging (IM)** allows you to send messages in real time, one line at a time, unlike e-mail.

- IM displays words typed on a computer almost instantaneously.

- Recipients can then respond immediately to the sender the same way, making the communication more like a live conversation than is possible through e-mail.

- Instant messaging over the Internet competes with wireless phone Short Message Service (SMS) texting, which is far more expensive than IM.

- The major IM systems are Microsoft's Windows Live Messenger, Skype, Yahoo Messenger, Google Talk, and AIM (AOL Instant Messenger).

Online Forums

- An **online forum** is a Web application that enables Internet users to communicate with each other, although not in real time.

- A forum provides a container for various discussions (or "threads") started (or "posted") by members of the forum, and depending on the permissions granted to forum members by the forum's administrator, enables a person to start a thread and reply to other people's threads.

Online Chat

- **Online chat** differs from an online forum in that, like IM, chat enables users to communicate via computer in real time, that is, simultaneously.

- However, unlike IM, which works only between two people, chat can occur among several users.

- E-commerce firms typically use online forums and online chat to help develop community and as customer service tools.

Search Engines

- **Search engines** identify Web pages that appear to match keywords, also called queries, entered by a user and then provide a list of the best matches (search results).

- Web search engines started out in the early 1990s shortly after Netscape released the first commercial Web browser.
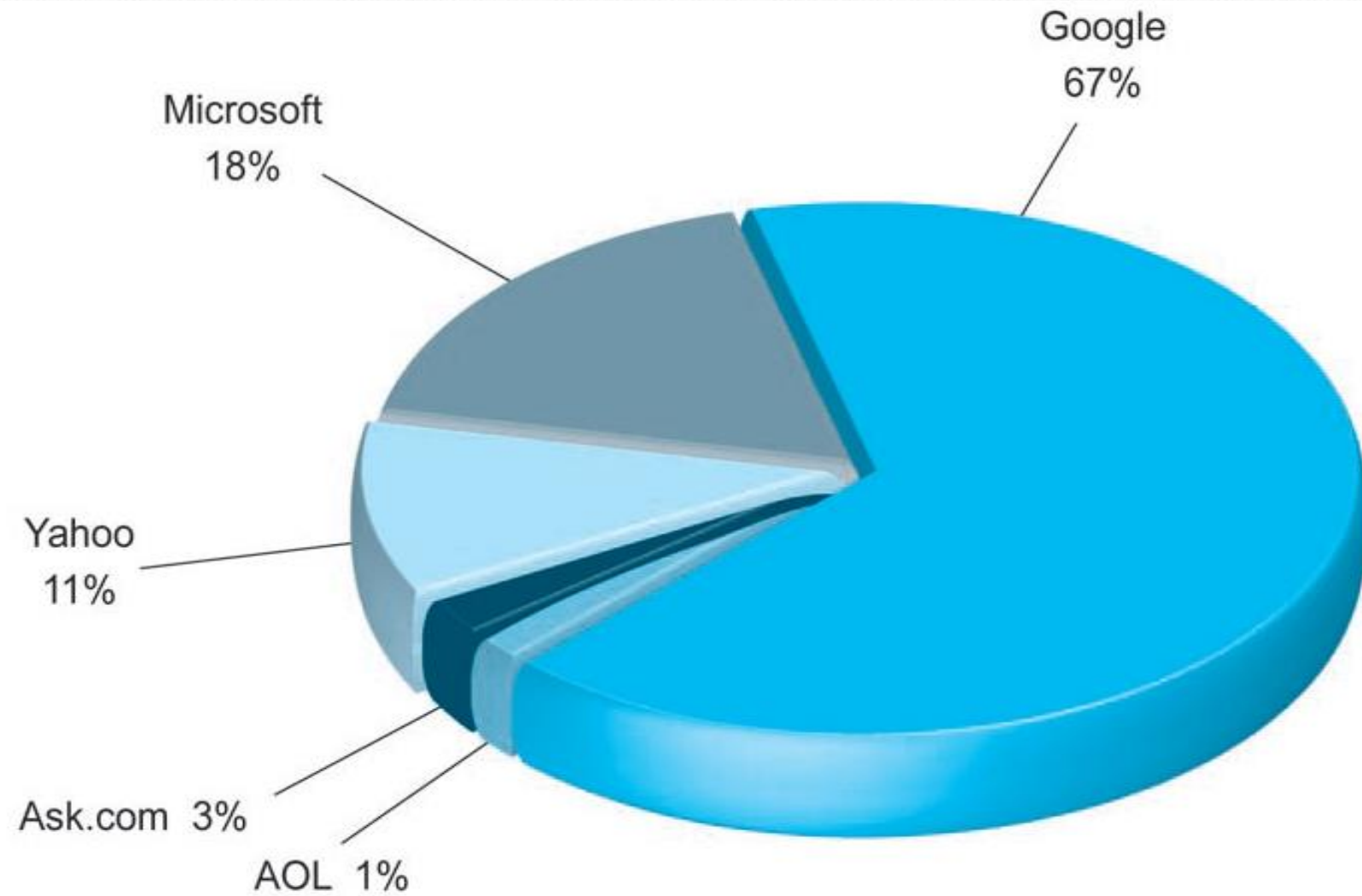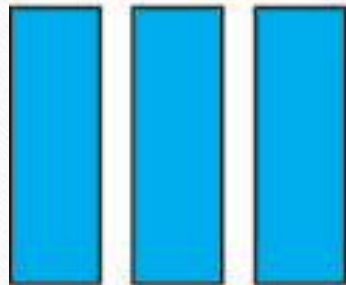
1. A user enters a search query.

2. Google's Web servers receive the search request. Google uses an estimated 1 to 2 million PCs linked together and connected to the Internet to handle incoming queries and produce search results.

6. Results delivered to user, 10 to a page.

5. Small text summaries are prepared for each Web page.

4. Using Google's PageRank software, the system measures the "importance" or popularity of each page by solving an equation with millions of variables and terms. These are likely the "best" pages for the query.
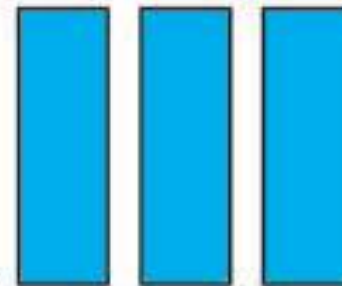
3. The search request is sent to Google's index servers, which maintain data about the Web pages that contain the keywords matching the query, and the location of those pages.