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## **МЕТОДИЧЕСКИЙ МАТЕРИАЛ**

### **PROFESSIONAL IT- ENGLISH**

(Профессиональный ИТ английский)

**Textbook for second-year Students**

**(Level B2-C1)**

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## UNIT 1. BASIC KNOWLEDGE AND COMMON USES OF COMPUTERS

**System unit** – the main part of a desktop computer (the case) that contains all of the main electronic components of a computer.

- Other common names of the system unit: tower, chassis, or main unit.
- A system unit includes the motherboard, CPU (Central Processing Unit), RAM (Random-Access Memory), hard drive, expansion cards, power supply, etc.
- A system unit does not include peripheral devices, such as keyboard, mouse, monitor, printer, etc.
- The term system unit is used to distinguish between the computer and its peripheral devices (keyboard, mouse, monitor, printer, scanner, etc.).



**Motherboard (mainboard)** – the main circuit board of the computer.

- The motherboard is the system core of a computer.
- The motherboard is a computer's central structure that connects the different parts of a computer together.
- Whole computer system is connected, managed, and controlled by the motherboard.



**CPU (Central Processing Unit)** – CPU is often referred to as the brain or engine of a

computer where most of the processing and operations take place.

- Other common names of the CPU: main processor, central processor, etc.
- The CPU is the primary component of a computer that executes, interprets, and carries out all instructions.

**RAM (Random-Access Memory)** – a type of data storage (memory element) used in computers that temporarily stores programs and data.

- RAM only holds onto data and programs while the computer is on.



- All information that was stored in RAM is erased when the computer is turned off.

### Basic Parts of a Computer System

A **computer system** includes a system unit along with all its software (such as Office 2016, Windows 10, etc.) and peripheral devices (such as a mouse, keyboard, monitor, printer, etc.) connected to it.



**Computer monitor** – a display screen used to display information (text, image, video, etc.) processed by a computer.



**Keyboard** – an input device (the set of typewriter-like keys) that allows a user to enter characters (letters, numbers, symbols, etc.) into a computer.



**Mouse** – a hand-held pointing device that can control the position of a cursor (pointer) on a display screen.



**Trackpad (or touchpad)** – a small flat surface on a laptop or other computer that does the same things as a mouse (a trackpad is a built-in mouse).



### Hard Drive, USB Drive, and Printer

**Hard disk drive (HDD)** – the main data storage device in a computer.

- Other common names for a hard disk drive: hard disk, hard drive, fixed disk, etc.
- A hard disk drive is a spindle of a set of stacked magnetic disks (platters) that records and stores information (like phonograph



records).

- When you install programs or save data on hard disk of your computer, the information is written to the hard disk.
- Hard drives can be internal or external.

**USB drive** – a small portable storage device used to store or transfer data for computers. It is often used for storage, data backup, and transfer of computer files.



- USB stands for Universal Serial Bus.
- Other common names for a USB drive: flash drive, USB stick, pen drive, thumb drive, etc.

**Printer** – an output device

linked to a computer. It transfers the information (text, images, etc.) to paper.



### **Self-test**

#### **1. True or false**

1. A system unit includes the motherboard, CPU, RAM, hard drive, expansion cards, power supply, etc.
2. A hard drive a computer's central structure that connects the different parts of a computer together.
3. All information that was stored in RAM is erased when the computer is turned on.
4. A keyboard is an output device that allows a user to enter characters into a computer.
5. Blogs are written and updated by bloggers. They write about their opinions and thoughts.
6. Computer can help business to start, run, manage, and grow.

#### **2. Fill in the blank**

1. The [blank] is the main part of a desktop computer.
2. CPU is the abbreviation for [blank].
3. RAM is a type of data storage used in computers that [blank] stores programs and data.

4. Computer [blank] is a display screen used to display information processed by a computer.
5. USB stands for [blank].
6. When you save data or install programs on your computer, the information is written to the [blank] disk.
7. [Blank] is a telephone connection over the Internet. It allows users to make calls over the Internet.
8. Disk drive is a hardware that stores and retrieves information, data, files, programs, etc. that are used by your computer. The drive is often referred to by the [blank].

### **3. Multiple choice**

1. The [blank] is often referred to as the brain or engine of a computer.
  - CPU
  - motherboard
  - RAM
  - system unit
2. Which of the following is one of the common names used for CPU?
  - processor
  - central processor
  - microprocessor
  - all of the above
3. Which of the following is one of the common names used for USB drive?
  - flash drive
  - pen drive
  - USB stick
  - all of the above
4. A [blank] is a small flat surface on a laptop or other computer that does the same things as a mouse.
  - flash drive
  - trackpad
  - USB stick
  - RAM
5. Popular social media websites:
  - Facebook
  - WeChat
  - LinkedIn
  - all of the above
6. Computers play a crucial role in science/engineering, such as:
  - simulating experiments
  - patient monitoring
  - diagnostic databases
  - all of the above

## UNIT 2. BASIC COMPUTER TERMINOLOGIES

### Topic A: Application programs

#### **Word Processors and Spreadsheets**

**Application program** – a computer program that provides users with tools to accomplish a specific task.

Examples of application programs include those for word processing, spreadsheets, presentations, and database management, as well as Internet browsers, email programs, media players, accounting software, and programs that help with pronunciation, translation, desktop publishing, enterprise.

**Microsoft Office** – A group of productivity software applications developed by Microsoft Corporation. Microsoft Office 2016 includes such programs as Microsoft Word, Microsoft Excel, and Microsoft PowerPoint.

#### **Word processors**

**Word processor** – a program that allows users to create, save, edit, format, print, and retrieve documents.

Word processing programs can be used to create all types of text-based documents, such as:

- Assignments
- Notes
- Memos
- Letters
- Resumes
- Articles
- Reports
- Newsletters
- Short stories
- Books (with tables, diagrams, photos, links, etc.)

Examples of word processing programs include Microsoft Word, Google Docs, Apple Pages, and LibreOffice Writer.

#### **Spreadsheets**

**Spreadsheet (electronic worksheet)** – a program that organizes data into rows and columns, also known as tabular form. This data can then be arranged, sorted, calculated (using formulas and functions), analyzed, or illustrated using graphical representations.

Among many other things, a spreadsheet program can be used to:

- Create budgets
- Calculate grades
- Balance bank accounts
- Calculate loan payments
- Calculate tax
- Prepare payrolls
- Analyze business performance numbers and results
- Produce charts
- Calculate revenues

Examples of spreadsheet programs include Microsoft Excel, Google Sheets, Apple

Numbers, and LibreOffice Calc.

## **Presentation and Database Programs**

### **Presentation programs**

**Presentation program** – a program that is designed to present information in the form of a slideshow, using multimedia formats such as pictures, sounds, videos, and text. Such a program is commonly used in education, training, business meetings, etc., to create powerful presentations.

Presentation programs are commonly used to:

- Create slideshow presentations
- Create lectures and tutorials
- Make photo slideshows
- Design websites with hyperlinks and interactivity
- Make photo albums
- Create animated videos (with voice and animation)

Examples of presentation programs include Microsoft PowerPoint, Google Slides, Apple Keynote, Prezi, CustomShow, SlideDog, and Powtoon.

### **Database programs**

**Database program (database management system)** – A program that is designed for creating, editing, updating, maintaining databases, and managing organized information stored in them.

Databases are useful for keeping track of customers, users, employees, students, inventory, product purchases, ISBN numbers, etc. Database programs are used in the following fields:

- Banking
- Airline/railway reservation
- Library management
- Education
- Human resource management
- Healthcare
- Weather
- E-commerce
- Government
- Sports
- Military

Examples of database programs include Microsoft Access, Oracle Database, Knack, TablePlus, and TeamDesk.

### Classification of Computers by Size

- Supercomputers
- Mainframe computers
- Minicomputers
- Personal computers (PCs) or microcomputers

#### Supercomputers

**Supercomputer** – a powerful computer that can process large amounts of data and do a great amount of computation very quickly.

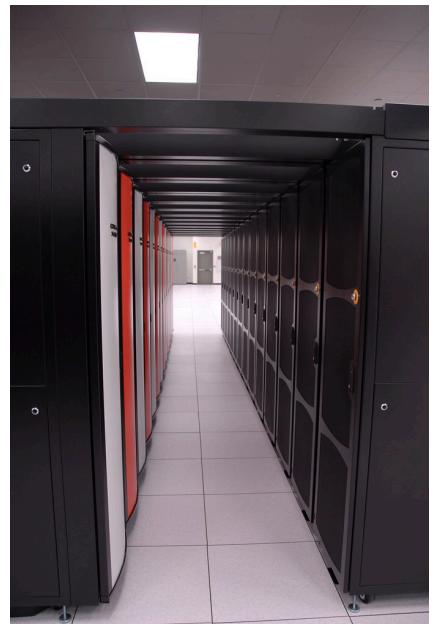
Supercomputers are used for areas related to:

- Science
- Engineering
- Education
- Defence
- Aerospace

Supercomputers are useful for applications involving very large databases or that require a great amount of computation.

Supercomputers are used for complex tasks, such as:

- Weather forecasting
- Climate research
- Scientific simulation
- Oil and gas exploration
- Quantum mechanics
- Cryptanalysis



#### Mainframe computers

**Mainframe computer** – a high-performance computer used for large information processing jobs.

Mainframe computers are primarily used in :

- Institutions
- Research
- Academics
- Health care
- Libraries
- Large businesses
- Financial institutions
- Stock brokerage firms



- Insurance agencies

Mainframe computers are useful for tasks related to:

- Census taking
- Industry and consumer statistics
- Enterprise resource planning
- Transaction processing
- e-business and e-commerce

## **Minicomputers**

**Minicomputer** – a mid-range computer that is intermediate in size, power, speed, storage capacity, etc., between a mainframe and a microcomputer.



Minicomputers are used by small organizations.

“Minicomputer” is a term that is no longer used much. In recent years, minicomputers are often referred to as small or midsize servers (a **server** is a central computer that provides information to other computers).

## **Personal computers**

**Personal computer (PC)** – a small computer designed for use by a single user at a time.

A PC or microcomputer uses a single chip (microprocessor) for its central processing unit (CPU).

“Microcomputer” is now primarily used to mean a PC, but it can refer to any kind of small computer, such as a desktop computer, laptop computer, tablet, smartphone, or wearable.

### **Types of personal computers**

**Desktop computer** – a personal computer that is designed to stay at one location and fits on or under a desk. It typically has a monitor, keyboard, mouse, and a tower (system unit).

**Laptop computer (or notebook)** – A portable personal computer that is small enough to rest on the



user's lap and can be powered by a battery. It includes a flip down screen and a keyboard with a touchpad.

**Tablet** – A wireless touchscreen PC that is slightly smaller and weighs less than the average laptop.

**Smartphone** – A mobile phone that performs many of the functions of a personal computer.

## **Topic C: Basic computer terminologies and acronyms**

### **Basic Internet Terms and Acronyms**

**Internet** – A globally connected massive computer network system.

**World Wide Web (WWW or the web)** – A system of Internet servers that is made from millions of interlinked websites and web pages.

**Firewall** – A network security device designed to prevent unauthorized access to or from a network.

**Router** – A device that transfers data between computer networks to provide access to the Internet.

**ISP (Internet Service Provider)** – A company that provides Internet service to customers.

**HTTP (Hypertext Transfer Protocol)** – A set of rules (a protocol) for transferring and accessing data using the web.

**URL (Uniform Resource Locator)** – A web address of a specific web page or file on the Internet. An example is <https://www.princegeorgecitizen.com>.

**IP (Internet Protocol)** – A set of rules (a protocol) for sending data from one computer to another on the Internet. Each computer has a unique IP address that distinguishes it from all other computers on the Internet.

**FTP (File Transfer Protocol)** – A set of rules (a protocol) for transferring files between computers over the Internet.

**Cookie** – A small text file stored in a user's computer by a website that the user has visited so that it can remember something about the user at a later time. For example, cookies are used for online shopping. Without cookies, login information would have to be entered before every product was added to the shopping cart.

**Link (hyperlink)** – A word, phrase, image, etc., within a file or web page that a user can click on to jump to another document, section of the same document, or web page.

### **Basic Computer Terms and Acronyms**

**PC (Personal Computer)** – a small computer designed for use by a single user at a time.

**Mac (Macintosh)** – a type of personal computer made by Apple Inc. It runs a version of the macOS.

**OS (Operating System)** – a powerful program that controls and coordinates a computer's hardware devices and runs software and applications. Examples includes Windows, Android, OS X, and Linux.

**Reboot** – to shut down and restart a computer, allowing its operating system and programs to be reloaded.

**CPU (Central Processing Unit)** – the brain or engine of a computer, where most of the processing and operations take place.

**RAM (Random-Access Memory)** – a type of data storage (memory element) used in computers that temporarily stores programs and data. RAM is a kind of volatile memory, meaning its contents are lost when the computer is turned off.

**ROM (read-only memory)** – A type of data storage used in computers that permanently stores data and programs. ROM is a kind of non-volatile memory, meaning its contents are retained even when the computer is turned off.

### **Bits and Bytes**

**Bit (Binary Digit)** – the smallest, most basic unit of measurement for computer data storage, represented as either a 0 or a 1. One byte is equal to 8 bits.

**Byte (Binary Term)** – a unit of measurement for data storage. One byte is equal to 8 bits.

### **Data Storage Units and Their Properties**

<b>Data Storage Unit</b>	<b>Symbol</b>	<b>Power of 10</b>	<b>One Unit Equals</b>
Byte	B	10 <sup>1</sup>	8 bits
Kilobyte	kB	10 <sup>3</sup>	1024 B
Megabyte	MB	10 <sup>6</sup>	1024 kB
Gigabyte	GB	10 <sup>9</sup>	1024 MB
Terabyte	TB	10 <sup>12</sup>	1024 GB
Petabyte	PB	10 <sup>15</sup>	1024 TB

### **Self-test**

#### **1. True or false**

1. An application program is a computer program that provides the user with tools to accomplish a specific task.
2. A database is a program that organizes data into rows and columns. This data can then be used to arrange, sort, calculate, analyze, or show graphical representations of data.
3. Common uses for spreadsheet programs include creating slideshow presentations, creating lectures and tutorials, making photo slideshows, and making interesting animations.
4. To launch an application program, click the Start icon, then click the name of the program that you wish to start.

5. Microcomputers are used for complex tasks, such as weather forecasting, climate research, scientific simulation, oil and gas exploration, quantum mechanics, and cryptanalysis.
6. A firewall is a network security device designed to prevent unauthorized access to or from a network.
7. HTTP is a word, phrase, image, etc. within a file on the computer that a user can click on to jump to another document or section of that document.

## **2. Fill in the blank**

1. [Blank] is a program that allows users to create, save, edit, format, print, and retrieve documents.
2. Common uses for a [blank] program include creating budgets, calculating grades, balancing bank accounts, calculating loan payments, calculating tax, preparing payrolls, and financial analysis.
3. A [blank] program is a program that is designed to present information in the form of a slideshow.
4. [Blank] computers are primarily used by institutions, researchers, academics, healthcare administrators, libraries, large companies and businesses, banking institutions, stock brokerage firms, and insurance agencies.
5. The Internet is a globally connected massive computer [blank] system.
6. The World Wide Web is a system of Internet servers that is made from millions of interlinked websites and [blank].
7. A [blank] is a small text file in the user's computer stored by a website that the user has visited so that it can remember something about the user at a later time.
8. A [blank] is a powerful program that controls and coordinates a computer's hardware devices and runs other software and applications on a computer.

## **3. Multiple choice**

1. A(n) [blank] is an example of application program.
    - accounting
    - translation
    - Internet browser
    - all of the above
  2. Microsoft Office 2016 includes
    - Microsoft Excel
    - Microsoft Word
    - Microsoft PowerPoint
- all of the above
  - 3. To close a program:
    - click "View"
    - click "Tools"
    - click the close icon (x)
    - all of the above
  - 4. To force close a frozen program, click [blank] at the same time.
    - Alt + F2
    - Alt + F4

- Alt + F3
  - Alt + F1
5. A [blank] computer is a high-performance computer used for large information processing jobs.
- mainframe
  - personal computer
  - laptop
  - desktop
6. A [blank] is a device that transfers data between computer networks to provide access to the Internet.
- FTP
  - URL
  - router
  - ISP
7. A [blank] is often referred to as the brain or engine of a computer, where most of the processing and operations take place.
- mainframe
  - CPU
  - RAM
  - byte
8. A byte is a unit of measurement for data storage. 1 GB is equal to 1024 [blank].
- kB
  - TB
  - PB
  - MB

## UNIT 3. INFORMATION TECHNOLOGY

### 1. Discussion Starter

- What is an information system?
- Why do we need information systems?
- Who uses information systems in a typical organization?
- Identify several types of information systems on the images below and describe the purpose of each.



A



B



C



D



E



F

## 2. Before You Read

**Define two different ways of describing information systems using the following information:**

- “Information systems (IS) is the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data.”
- “Information systems are combinations of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, typically in organizational settings.”
- “Information systems are interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization.”

### Read the Article

#### The Components of Information Systems

Information systems are made up of five components that interact to generate information needed by the users in an organization: hardware, software, data, people, and process.



The first three components of information systems – hardware, software, and data – all fall under the category of technology which can be thought of as the application of scientific knowledge for practical purposes.

From the invention of the wheel to the harnessing of electricity for artificial lighting, technology is a part of our lives in so many ways that we tend to take it for granted.

#### Hardware

Information systems hardware is the part of an information system you can touch – the physical components of the technology. Computers, keyboards, disk drives, iPads, and flash drives are all examples of information systems hardware.

#### Software

Software is a set of instructions that tells the hardware what to do. Software is not tangible – it cannot be touched. When programmers create software programs, what they are really doing is simply typing out lists of instructions that tell the hardware what to do. There are several categories of software, with the two main categories being operating-system software, which makes the hardware usable, and application software, which does something useful. Examples of operating systems include Microsoft Windows on a personal computer and Google’s Android on a mobile phone. Examples of application software are Microsoft Excel and Angry Birds.

## **Data**

The third component is data. You can think of data as a collection of facts. For example, your street address, the city you live in, and your phone number are all pieces of data. Like software, data is also intangible. By themselves, pieces of data are not really very useful. But aggregated, indexed, and organized together into a database, data can become a powerful tool for businesses. Organizations collect all kinds of data and use it to make decisions. These decisions can then be analyzed as to their effectiveness and the organization can be improved.

Besides the components of hardware, software, and data, which have long been considered the core technology of information systems, it has been suggested that one other component should be added: communication. An information system can exist without the ability to communicate – the first personal computers were stand-alone machines that did not access the Internet. However, in today's hyper-connected world, it is an extremely rare computer that does not connect to another device or to a network. Technically, the networking communication component is made up of hardware and software, but it is such a core feature of today's information systems that it has become its own category.

## **People**

When thinking about information systems, it is easy to get focused on the technology components and forget that we must look beyond these tools to fully understand how they integrate into an organization. A focus on the people involved in information systems is the next step. From the front-line help-desk workers, to systems analysts, to programmers, all the way up to the chief information officer (CIO), the people involved with information systems are an essential element that must not be overlooked.

## **Process**

The last component of information systems is process. A process is a series of steps undertaken to achieve a desired outcome or goal. Information systems are becoming more and more integrated with organizational processes, bringing more productivity and better control to those processes. But simply automating activities using technology is not enough – businesses looking to effectively utilize information systems do more. Using technology to manage and improve processes, both within a company and externally with suppliers and customers, is the ultimate goal. Technology buzzwords such as “business process reengineering,” “business process management,” and “enterprise resource planning” all have to do with the continued improvement of these business procedures and the integration of technology with them. Businesses hoping to gain an advantage over their competitors are highly focused on this component of information systems.

### **3. Comprehension Check**

Answer the following questions.

What is the role of each component in an organization?

What does the effectiveness of IS depend on?

What is application software?

What spheres of life can systems exist in?

Could you give examples of IS?

### **4. Use of Language Practice**

**Match words (1-10) to their definitions (a-j):**

1. disseminate	a. make an alphabetical list of the items
2. harness	b. the most important or influential position in a debate or movement
3. tangible	c. a service providing information and support to the users of a computer network
4. aggregate	d. ignore or disregard (something, especially a fault or offence)
5. intangible	e. bring something under control and use it
6. index	f. not having physical presence; vague and abstract
7. front-line	g. spread (something, especially information) widely
8. help-desk	h. expression that has become fashionable in a particular field and is being used a lot by the media
9. overlook	i. perceptible by touch; clear and definite; real
10. buzzword	j. form or group into a class or cluster

**Use the words from the table above to complete the following sentences. Consider correct grammar use.**

There are \_ benefits beyond a rise in the share price. A \_\_\_\_\_ is a service providing information and support to the users of a computer network.

Turkey plans to \_\_\_\_\_ the waters of the Tigris and Euphrates rivers for big hydro-electric power projects.

We will provide our \_\_\_\_\_ sales team with the absolute best in compensation. Different economies, with different currencies, should not be \_ to produce uniform policies. Biodiversity was the \_\_\_\_\_ of the Rio Earth Summit. There

should be some \_\_\_\_\_ evidence that the economy is starting to recover. We often \_\_\_\_\_ all sorts of warning signals about our own health. This search engine has \_\_\_\_\_ hundreds of millions of Web sites.

## 5. Read the article below. Fill in the gaps with appropriate word combinations:

- executive information systems (EISs)
- artificial intelligence (AI)
- management information systems (MISs)
- geographic information system (GIS)
- transaction processing systems (TPSs)
- decision support system (DSS)

### *Types of Information Systems*

Typically, many types of information systems are used in businesses and other organizations. Systems used to increase productivity and facilitate communications in the office include office systems, document processing systems, document management systems (DMSs), content management systems (CMSs), and communications systems. (1) ... perform tasks that generally involve the tedious recordkeeping that organizations handle regularly; they usually include order entry, payroll, and accounting systems.

These types of systems are most commonly used by operational managers. (2) ... provide decision makers – primarily middle managers – with preselected types of information. A (3) ... helps middle and executive managers organize and analyze their own decision making information. (4) ... are decision support systems customized to meet the special needs of executive managers. A (5) ... is an information system that combines geographic information with other types of data in order to provide a better understanding of the relationships among the data.

Enterprise-wide systems include electronic data interchange (EDI), enterprise resource planning (ERP), inventory management systems, and product lifecycle management (PLM) systems. Computers are widely used in industry to improve productivity at both the design stage – via computer-aided design (CAD) – and the manufacturing stage – via computer-aided manufacturing (CAM). The ability of some computer systems to perform in ways that would be considered intelligent if observed in human beings is referred to as (6) .... Currently, the four main types of artificial intelligence (AI) systems are intelligent agents, expert systems, neural networks, and robotics – the study of robot technology. Robots for military, business, and personal use are available today.

**6. Choose the correct alternative to complete each sentence. Consider both the grammar and the meaning of each option.**

***Technologies in McDonald's Daily Operations***

Technology is inherent (1) ***for/in/of*** many of McDonald's day-to-day restaurant operations. (2) ***From/to/for*** the moment a customer places his or her food order, technology has a significant role. For example, a customer's order is routed (3) ***in/to/over*** a network to the kitchen (4) ***in/for/to*** preparation, video screens provide instructions (5) ***for/on/to*** our kitchens and drive-thrus\*, and cashless payments are processed. Furthermore, McDonald's restaurants depend (6) ***for/of/on*** technology to keep track (7) ***at/of/in*** inventory, to know how much product is required (8) ***at/of/on*** different times of the day, and to determine the number of crew members required. Technology is also creating innovations (9) ***for/in/at*** how we enhance the customer experience, such as self-ordering via kiosks or mobile phones. Providing consumers in (10) ***along/over/with*** 34,000 restaurants worldwide an experience that is modern and relevant, as well as based on a secure and flexible foundation, is central to McDonald's success, and technology powers this experience as never before.

\*you are served without leaving one's car

**7. Nine parts of sentences have been removed from the text. Put the correct sentence from A-J below in each space (1-9) to form a logical text. There is one extra item you don't need.**

***Walmart's Information Systems***

Walmart is the world's largest retailer, (1) \_\_\_\_\_ of \$443.9 billion in the fiscal year that ended on January 31, 2012. Walmart currently serves over 200 million customers every week, worldwide. Walmart's rise to prominence is (2) \_\_\_\_\_ of information systems.

One of the keys to this success was (3) \_\_\_\_\_, a supply-chain management system. This system, unique when initially implemented in the mid-1980s, allowed Walmart's suppliers (4) \_\_\_\_\_ and sales information of their products at any of Walmart's more than ten thousand stores. Using Retail Link, suppliers can analyze how well their products are selling at one or more Walmart stores, (5) \_\_\_\_\_. Further, Walmart requires the suppliers to use Retail Link (6) \_\_\_\_\_. If a supplier feels that their products are selling out too quickly, they can use Retail Link to petition Walmart to raise the levels of inventory for their products. This has essentially allowed Walmart to "hire" thousands of product managers,

(7) \_\_\_\_\_ they are managing. This revolutionary approach to managing

inventory has allowed Walmart to continue to drive prices down and respond

(8) \_\_\_\_\_. Today, Walmart continues to innovate with information technology. (9) \_\_\_\_\_, any technology that Walmart requires its suppliers to implement immediately becomes a business standard.

- |   |  |
|---|--|
| A. all of whom have a vested interest in the products | F. using its tremendous market presence                              |
| B. to directly access the inventory levels            | G. with a range of reporting options earning \$15.2 billion on sales |
| C. to manage their own inventory levels               | H. in order to differentiate almost identical products               |
| D. to market forces quickly                           | I. the implementation of Retail Link                                 |
| E. due in no small part to their use                  | J.   |

## 8. Web Research Activity

Here are 6 phases of the system development life cycle (SDLC). Describe one of them, searching the web for additional information:

- Preliminary investigation.
- System analysis.
- System design.
- System acquisition.
- System implementation.
- System maintenance.

## 9. Speaking Test

1. What are new ways people can use technology to change the world?
2. Do digital tools make us more or less productive at work?
3. What do you know about Business Intelligence issues?
4. Many everyday objects (such as amusement park rides, cars, elevators, and ovens) that you might not normally associate with a computer or information system, in fact, are today.
5. There are obvious benefits, but are there risks as well?
6. Would you feel more or less comfortable riding on a roller coaster that was computer controlled?
7. Do the benefits of computerizing an increasing number of everyday objects outweigh the potential risks? Why or why not?

## **10. Writing Assignment**

Research the theme “*Benefits of using AI systems*”.

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.

## UNIT 4. EVOLUTION OF COMPUTERS

### Topic A: Computer generations

#### **Basic Terms**

**Vacuum tube** – an electronic device that controls the flow of electrons in a vacuum.

It used as a switch, amplifier, or display screen in many older model radios, televisions, computers, etc.

**Transistor** – an electronic component that can be used as an amplifier or as a switch.

It is used to control the flow of electricity in radios, televisions, computers, etc.

**Integrated circuit (IC)** – a small electronic circuit printed on a chip (usually made of silicon) that contains many its own circuit elements (e.g. transistors, diodes, resistors, etc.).

**Microprocessor** – an electronic component held on an integrated circuit that contains a computer's central processing unit (CPU) and other associated circuits.

**CPU (central processing unit)** – It is often referred to as the brain or engine of a computer where most of the processing and operations take place (CPU is part of a microprocessor).

**Magnetic drum** – a cylinder coated with magnetic material, on which data and programs can be stored.

**Magnetic core** – uses arrays of small rings of magnetized material called cores to store information.

**Machine language** – a low-level programming language comprised of a collection of binary digits (ones and zeros) that the computer can read and understand.

Assembly language is like the machine language that a computer can understand, except that assembly language uses abbreviated words (e.g. ADD, SUB, DIV...) in place of numbers (0s and 1s).

**Memory** – a physical device that is used to store data, information and program in a computer.

**Artificial intelligence (AI)** – an area of computer science that deals with the simulation and creation of intelligent machines or intelligent behave in computers (they think, learn, work, and react like humans).

## **First Generation of Computers**

### **Classification of generations of computers**

The evolution of computer technology is often divided into five generations.

### **Five Generations of Computers**

<b>Generations of computers</b>	<b>Generations timeline</b>	<b>Evolving hardware</b>
First generation	1940s-1950s	Vacuum tube based
Second generation	1950s-1960s	Transistor based
Third generation	1960s-1970s	Integrated circuit based
Fourth generation	1970s-present	Microprocessor based
Fifth generation	The present and the future	Artificial intelligence based

### **The main characteristics of first generation of computers (1940s-1950s)**

- Main electronic component – vacuum tube
- Main memory – magnetic drums and magnetic tapes
- Programming language – machine language
- Power – consume a lot of electricity and generate a lot of heat.
- Speed and size – very slow and very large in size (often taking up entire room).
- Input/output devices – punched cards and paper tape.
- Examples – ENIAC, UNIVAC1, IBM 650, IBM 701, etc.
- Quantity – there were about 100 different vacuum tube computers produced between 1942 and 1963.

### **Second Generation of Computers**

### **The main characteristics of second generation of computers (1950s-1960s)**

- Main electronic component – transistor
- Memory – magnetic core and magnetic tape / disk
- Programming language – assembly language
- Power and size – low power consumption, generated less heat, and smaller in size (in comparison with the first generation computers).
- Speed – improvement of speed and reliability (in comparison with the first generation computers).
- Input/output devices – punched cards and magnetic tape.
- Examples – IBM 1401, IBM 7090 and 7094, UNIVAC 1107, etc.

### **Third Generation of Computers**

### **The main characteristics of third generation of computers (1960s-1970s)**

- Main electronic component – integrated circuits (ICs)

- Memory – large magnetic core, magnetic tape / disk
- Programming language – high level language (FORTRAN, BASIC, Pascal, COBOL, C, etc.)
- Size – smaller, cheaper, and more efficient than second generation computers (they were called minicomputers).
- Speed – improvement of speed and reliability (in comparison with the second generation computers).
- Input / output devices – magnetic tape, keyboard, monitor, printer, etc.
- Examples – IBM 360, IBM 370, PDP-11, UNIVAC 1108, etc.

### **Fourth Generation of Computers**

#### **The main characteristics of fourth generation of computers (1970s-present)**

- Main electronic component – very large-scale integration (VLSI) and microprocessor.
- VLSI – thousands of transistors on a single microchip.
- Memory – semiconductor memory (such as RAM, ROM, etc.)
  - RAM (random-access memory) – a type of data storage (memory element) used in computers that temporary stores of programs and data (volatile: its contents are lost when the computer is turned off).
  - ROM (read-only memory) – a type of data storage used in computers that permanently stores data and programs (non-volatile: its contents are retained even when the computer is turned off).
- Programming language – high level language (Python, C#, Java, JavaScript, Rust, Kotlin, etc.).
  - A mix of both third- and fourth-generation languages
- Size – smaller, cheaper and more efficient than third generation computers.
- Speed – improvement of speed, accuracy, and reliability (in comparison with the third generation computers).
- Input / output devices – keyboard, pointing devices, optical scanning, monitor, printer, etc.
- Network – a group of two or more computer systems linked together.
- Examples – IBM PC, STAR 1000, APPLE II, Apple Macintosh, etc.

### **Fifth Generation of Computers**

#### **The main characteristics of fifth generation of computers (the present and the future)**

- Main electronic component: based on artificial intelligence, uses the Ultra Large-Scale Integration (ULSI) technology and parallel processing method.

- **ULSI** – millions of transistors on a single microchip
- **Parallel processing method** – use two or more microprocessors to run tasks simultaneously.
- Language – understand natural language (human language).
- Power – consume less power and generate less heat.
- Speed – remarkable improvement of speed, accuracy and reliability (in comparison with the fourth generation computers).
- Size – portable and small in size, and have a huge storage capacity.
- Input / output device – keyboard, monitor, mouse, trackpad (or touchpad), touchscreen, pen, speech input (recognise voice / speech), light scanner, printer, etc.
- Example – desktops, laptops, tablets, smartphones, etc.

The computer – this amazing technology went from a government/business-only technology to being everywhere from people's homes, work places, to people's pockets in less than 100 years.

## Topic B: Computer hardware and software

### Computer Hardware Basics

**Hardware** – any physical device or equipment used in or with a computer system (anything you can see and touch).

#### External hardware

- **External hardware devices (peripherals)** – any hardware device that is located outside the computer.
- **Input device** – a piece of hardware device which is used to enter information to a computer for processing.
- Examples: keyboard, mouse, trackpad (or touchpad), touchscreen, joystick, microphone, light pen, webcam, speech input, etc.
- **Output device** – a piece of hardware device that receives information from a computer.
- Examples: monitor, printer, scanner, speaker, display screen (tablet, smartphone ...), projector, head phone, etc.

#### Internal hardware

- **Internal hardware devices (or internal hardware components)** – any piece of hardware device that is located inside the computer.
- Examples: CPU, hard disk drive, ROM, RAM, etc.

### Computer Software Basics

#### Computer software

- **Software** – a set of instructions or programs that tells a computer what to do or how to perform a specific task (computer software runs on hardware).
- Main types of software – systems software and application software.

#### Application software

- **Application software** – a computer program that provides users with tools to accomplish a specific task.
- Examples of application software: word processing, spreadsheets, presentation, database management, Internet browsers, email programs, media players, accounting, pronunciation, translation, desktop publishing, enterprise, etc.

#### System Software

**System software** – it is designed to run a computer's hardware and application software, and make the computer system available for use. It serves as the interface between hardware, application software, and the user.

- Main functions of system software – allocating system resources, managing storage space, storing and retrieval of files, providing security, etc.

- Main types of systems software – operating system, device driver, utility software, programming software, etc.

**Operating system (OS)** – a software that controls and coordinates the computer hardware devices and runs other software and applications on a computer. It is the main part of system software and a computer will not function without it.

- Main functions of an operating system – booting the computer, managing system resources (CPU, memory, storage devices, printer, etc.), managing files, handling input and output, executing and providing services for application software, etc.
- Examples of operating system: Microsoft Windows, Apple iOS, Android OS, macOS, Linux, etc.

**Device driver** – a software program that is designed to control a particular hardware device that is attached to a computer.

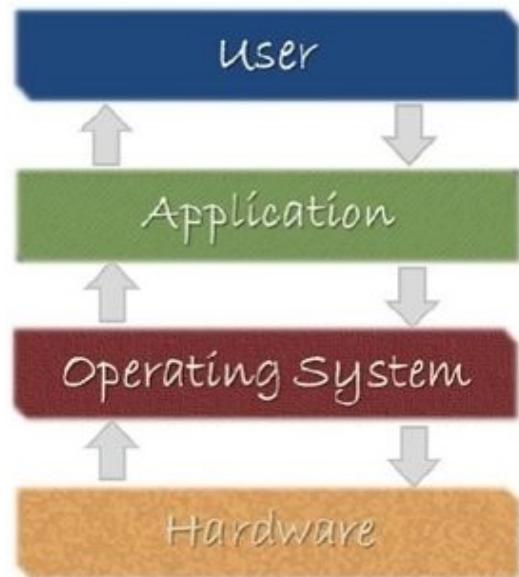
- The main purpose of device driver – it acts as a translator between the hardware device and operating systems or applications that use it.
- It instructs computer on how to communicate with the device by translating the operating system's instructions into a language that a device can understand in order to perform the necessary task.
- Examples of device driver: printer driver, display driver, USB driver, sound card driver, motherboard driver, ROM driver, etc.

**Utility software** – a type of system software that helps set up, analyze, configure, strengthen, maintain a computer and performs a very specific task (e.g. antivirus software, backup software, memory tester, screen saver, etc.).

### Self-test

#### 1. True or false

1. A vacuum tube is an electronic device that controls the flow of electrons in a vacuum.
2. A transistor is an electronic component held on an integrated circuit that contains a computer's CPU and other associated circuits.



3. A magnetic drum uses arrays of small rings of magnetized material called cores to store information.
4. Assembly language is like the machine language that a computer can understand, except that assembly language uses abbreviated words in place of numbers.
5. Internal hardware devices are any hardware device that is located outside the computer.
6. Hardware is a set of instructions or programs that tells a computer what to do or how to perform a specific task.
7. Operating system (OS) is a software that controls and coordinates the computer hardware devices and runs other software and applications on a computer. It is the main part of system software and the computer will not function without it.
8. Utility software is a type of system software that helps set up, analyze, configure, strengthen, maintain a computer and performs a very specific task.

**2. Fill in the blank**

1. A [blank] is an electronic component that can be used as an amplifier or as a switch. It is used to control the flow of electricity in radios, TV, computers, etc.
2. The [blank] is often referred to as the brain or engine of a computer where most of the processing and operations take place.
3. [Blank] is a low-level programming language comprised of a collection of binary digits (ones and zeros) that the computer can read and understand.
4. [Blank] is an area of computer science that dealing with the simulation and creation of intelligent machines or intelligent behave in computers.
5. The [blank] language was used in first generation of computers.
6. An [blank] device is a piece of hardware device which is used to enter information to a computer for processing.
7. [Blank] software is designed to run a computer's hardware and application software, and make the computer system available for use. It serves as the interface between hardware, application software, and the user.
8. A [blank] driver is a software program that is designed to control a particular hardware device that is attached to a computer.

### **3. Multiple choice**

1. [Blank] is a small electronic circuit printed on a chip usually made of silicon that contains many its own circuit elements
  - a. a microprocessor
  - b. a vacuum tube
  - c. a transistor
  - d. an integrated circuit
2. [Blank] is a cylinder coated with magnetic material, on which data and programs can be stored.
  - a. a magnetic core
  - b. a vacuum tube
  - c. a magnetic drum
  - d. an integrated circuit
3. [Blank] is a physical device that is used to store data, information, and program in a computer.
  - a. a magnetic core
  - b. computer memory
  - c. a magnetic drum
  - d. an integrated circuit
4. The main electronic component used in first generation of computers was:
  - a. transistor
  - b. CPU
  - c. integrated circuit
  - d. vacuum tube
5. Which language was used in second generation of computer?
  - a. assemble language
  - b. machine language
  - c. C++
  - d. Java
6. The main electronic component used in fourth generation of computers was:
  - a. transistor
  - b. CPU
  - c. VLSI
  - d. vacuum tube

## UNIT 5. DATABASE MANAGEMENT SYSTEMS

### 1. Discussion Starter

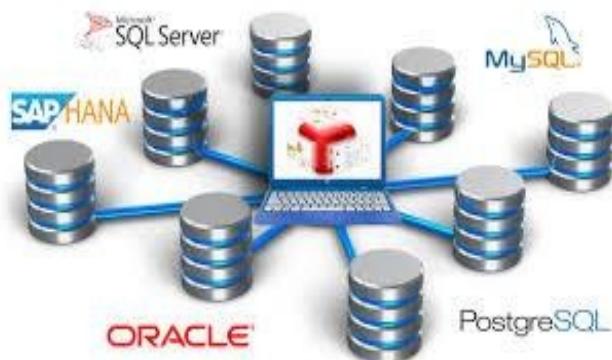
- What is a database? What does it consist of?
- What parameters are considered while classifying a database system? Identify some basic database classifications and discuss their differences.
- What are the characteristics of cloud databases?
- How is a relational database designed, used and maintained?

Comment on the pictures given below.



A

B



C



D

### 2. Before You Read

- Read the title from the article below.
- What aspects do you think the text is going to highlight?
- Who is involved with a database management system (DBMS)?

## ***Database Management Systems***

To the computer, a database looks like one or more files. In order for the data in the database to be read, changed, added, or removed, a software program must access it.



Many software applications have this ability: iTunes can read its database to give you a listing of its songs (and play the songs); your mobile-phone software can interact with your list of contacts.

But what about applications to create or manage a database? What software can you use to create a database, change a database's structure, or simply do analysis? That is the purpose of a category of software applications called database management systems (DBMS).

A DBMS makes it possible for end users to create, read, update and delete data in a database. The DBMS essentially serves as an interface between the database and end users or application programs, ensuring that data is consistently organized and remains easily accessible. The DBMS manages three important things: the data, the database engine that allows data to be accessed, locked and modified - and the database schema, which defines the database's logical structure. These three foundational elements help provide concurrency, security, data integrity and uniform administration procedures. Typical database administration tasks supported by the DBMS include change management, performance monitoring/tuning and backup and recovery. Many database management systems are also responsible for automated rollbacks, restarts and recovery as well as the logging and auditing of activity.

A key component of a DBMS is the database engine – the part of the program that actually stores and retrieves data. In addition to a database engine, most DBMSs come bundled with a set of tools to perform a variety of necessary tasks, such as creating forms (used to input data) and reports (used to output data), and interfacing with query languages and programming languages for complex applications. Programming languages typically used with databases today include Visual Basic, Java, and C++, although many older legacy database systems still use COBOL.

DBMS packages generally provide an interface to view and change the design of the database, create queries, and develop reports. Most of these packages are designed to work with a specific type of database, but generally are compatible with a wide range of databases.

For example, Apache OpenOffice.org Base can be used to create, modify, and analyze databases in open-database (ODB) format. Microsoft's Access DBMS is used to work with databases in its own Microsoft Access Database format. Both Access and Base

have the ability to read and write to other database formats as well.

Microsoft Access and Open Office Base are examples of personal database-management systems. These systems are primarily used to develop and analyze single-user databases. These databases are

not meant to be shared across a network or the Internet, but are instead installed on a particular device and work with a single user at a time.

DBMSs are designed for a variety of environments. Some are designed to be single-user systems, while others are designed for medium-sized businesses, while still others are designed for large businesses.

### **Advantages of a DBMS**

Using a DBMS to store and manage data comes with advantages, but also overhead. One of the biggest advantages of using a DBMS is that it lets end users and application programmers access and use the same data while managing data integrity. Data is better protected and maintained when it can be shared using a DBMS instead of creating new iterations of the same data stored in new files for every new application. The DBMS provides a central store of data that can be accessed by multiple users in a controlled manner.

Central storage and management of data within the DBMS provides:

- Data abstraction and independence;
- Data security;
- A locking mechanism for concurrent access;
- An efficient handler to balance the needs of multiple applications using the same data;
- The ability to swiftly recover from crashes and errors, including restartability and recoverability;
- Robust data integrity capabilities;
- Logging and auditing of activity;
- Simple access using a standard application programming interface (API);
- Uniform administration procedures for data.

Another advantage of a DBMS is that it can be used to impose a logical, structured organization on the data. A DBMS delivers economy of scale for processing large amounts of data because it is optimized for such operations.

A DBMS can also provide many views of a single database schema. A view defines what data the user sees and how that user sees the data. The DBMS provides a level of abstraction between the conceptual schema that defines the logical structure of the database and the physical schema that describes the files, indexes and other physical mechanisms used by the database. When a DBMS is used, systems can be modified much more easily when business requirements change. New categories of data can be

added to the database without disrupting the existing system and applications can be insulated from how data is structured and stored.

Of course, a DBMS must perform additional work to provide these advantages, thereby bringing with it the overhead. A DBMS will use more memory and CPU than a simple file storage system. And, of course, different types of DBMSes will require different types and levels of system resources.

### 3. Comprehension Check

Make up your own questions to shed light on the central ideas of the article ***Databasemanagement systems.***

### 4. Use of Language Practice

#### Match words (1-8) to their synonyms (a-h)

	A.a proportionate saving in costs gained by an increased level of production
1. concurrency	B.in computer science, it is generally considered any combination of excess or indirect computation time, memory, bandwidth, or other resources that are required to attain a particular goal
2. backup	C.repetition of a mathematical or computational procedure applied to the result of a previous application
3. rollback	D.the procedure for making copies of data in case the original is lost or damaged
4. logging	E.the ability of a database to allow multiple users to affect multiple transactions.
5. query language	F.just a fancy word to define a process of writing down everything you do
6. overhead	G.the process of restoring a database or program to a previously defined state, typically to recover from an error
7. iteration	H.a language for the specification of procedures for the retrieval (and sometimes also modification) of information from a database
8. economy of scale	

### 5. Use the words from the table to complete the following sentences. Consider correct grammar use.

1. In database technologies, a \_\_\_\_\_ is an operation which returns the

database to some previous state. They are important for database integrity, because they mean that the database can be restored to a clean copy even after erroneous operations are performed.

2. All small island developing states lack the \_\_\_\_\_ to overcome their vulnerabilities on their own.

3. SXPath may be used as a \_\_\_\_\_ for an XML-based digital library.

4. \_\_\_\_\_ enables refinement of the work product through encouraging brief returns to previous steps.

5. Make a \_\_\_\_\_ of any work you do on the computer.

6. \_\_\_\_\_ is keeping a record of all data input, processes, data output, and final results in a program

7. The ability to offer \_\_\_\_\_ is unique to databases.

8. For example, maintaining an audit trail might result in 10% \_\_\_\_\_, meaning that the program will run 10% slower when the audit trail is turned on.

**6. For questions 1-13, read the text below and choose the most appropriate word from the list (A-Q) for each gap. There are THREE EXTRA WORDS that you do not need to use. There is an example at the beginning (0).**

### *Skills Essential for a Database Developer or Programmer*

To stay (**L**) COMPETITIVE, a student studying to be a database (**1**) ... should strive to be (**2**) ... in more than one programming language. In the not-too-distant past, it was sufficient for an (**3**) ... database developer to be proficient in just database (**4**) ... (i.e., SQL programming). However, to be competitive in today's market, a database developer should be (**5**) ... in database programming, as well as in (**6**) ... programming such as JavaScript/HTML and a specific programming language such as C/C++. Aspiring database programmers today will have to work with databases that (**7**) ... almost all types of applications, and almost all (**8**) ... will use databases. Students should know how to (**9**) ... databases, write (**10**) ... (i.e., SQL), and do maintenance. They should also know the (**11**) ... of normalization as this leads to fantastic database design. In fact, database skills are important for all (**12**) ... students since most are going to (**13**) ... some sort of database work in the real world, and they will want to be able to speak the language.

**A** computer

**E** proficient

**I** able

**M** run

**B** system

**F** design

**J** analysis

**N** encounter

C principles

G queries

K programming

O aspiring

D front-end

H developer

L competitive

P fluent

Q applications

## 7. Read the information about enterprise databases. Change the sentences into the active or passive ones.

### *Enterprise Databases*

1. If only a single user can use a database at a time it is not going to meet the needs of most organizations.
2. As they have networked computers and now join them worldwide via the Internet, a class of database has emerged that two, ten, or even a million people can access.
3. These databases are sometimes installed on a single computer to be accessed by a group of people at a single location.
4. Other times, they install them over several servers worldwide, which means millions are able to access them.
5. These relational enterprise database packages are built and supported by companies such as Oracle, Microsoft, and IBM. The open-source MySQL is also an enterprise database.
6. As stated earlier, the relational database model does not scale well.
7. The term *scale* here refers to a database getting larger and larger, being distributed on a larger number of computers connected via a network.
8. Moving away from the relational model to other, more flexible models some companies are looking to provide large-scale database solutions.
9. For example, Google now offers the App Engine Datastore, which is based on NoSQL.
10. Developers can use the App Engine Datastore to develop applications that access data from anywhere in the world.

## 8. Web Research Activity

- Database models have evolved over the years, becoming more flexible, more capable and easier to use.
- Surfing the net, find out necessary information and fill in the gaps in the table. Compare your ideas with your partner's ones.

**Prepare some information about a newer type of database: Hybrid XML/Relational Database**

<b>MODEL</b>	<b>Network</b>	<b>Relational</b>	<b>Object-oriented</b>	<b>Multidimensional</b>
<b>YEAR BEGAN</b>	1960s			
<b>DATA ORGANIZATION</b>		Tables and relations		
<b>DATA ACCESS</b>			High-level, nonprocedural, object-oriented languages	
<b>SKILL LEVEL REQUIRED TO ACCESS DATA</b>				User
<b>ENTITY RELATIONSHIPS SUPPORTED</b>	One-to-one One-to-many Many-to-many			
<b>DATA AND PROGRAM INDEPENDENCE</b>		Yes		

## 9. Speaking Test

There are numerous databases that contain personal, but public, information about individuals. Today much of this data is available online.

- How do you feel about your personal information being contained in databases that other individuals can access or that might be breached via the Internet?
- Do you mind that anyone with an Internet connection might be able to find out how much you paid for your house, if you are married, where you live, and other personal information?

It is becoming increasingly common for biometric devices to be used to grant or deny access to facilities, as well as to identify consumers for financial transactions. In order to facilitate this, some data about each participant's biometric features must be stored in a database.

- How do you feel about your biometric characteristics being stored in a database?
- Does it depend on whether the system belongs to your bank, employer, school, or the government?
- Because biometric features cannot be reset, are you at risk using a biometric ID system? Why or why not?

## **10. Writing Assignment**

Project the topic “*Roles and Advantages of DBMS in organizations*”.

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.

## UNIT 6. MICROSOFT WINDOWS OVERVIEW

### **History**

The story of Windows begins with a very different operating system, developed by Microsoft for the first IBM personal computer and referred to as MS-DOS or PC-DOS. The initial version, DOS 1.0, was released in August 1981. It consisted of 4000 lines of assembly language source code and ran in 8 Kbytes of memory using the Intel 8086 microprocessor.

When IBM developed a hard disk-based personal computer, the PC XT, Microsoft developed DOS 2.0, released in 1983. It contained support for the hard disk and provided for hierarchical directories. Heretofore, a disk could contain only one directory of files, supporting a maximum of 64 files. While this was adequate in the era of floppy disks, it was too limited for a hard disk, and the single-directory restriction was too clumsy. This new release allowed directories to contain subdirectories as well as files. The new release also contained a richer set of commands embedded in the operating system to provide functions that had to be performed by external programs provided as utilities with release

1. Among the capabilities added were several UNIX-like features, such as I/O redirection, which is the ability to change the input or output identity for a given application, and background printing. The memory-resident portion grew to 24 Kbytes.

When IBM announced the PC AT in 1984, Microsoft introduced DOS 3.0. The AT contained the Intel 80286 processor, which provided extended addressing and memory protection features. These were not used by DOS. To remain compatible with previous releases, the operating system simply used the 80286 as a "fast 8086." The operating system did provide support for new keyboard and hard disk peripherals. Even so, the memory requirement grew to 36 Kbytes. There were several notable upgrades to the 3.0 release. DOS 3.1, released in 1984, contained support for networking of PCs. The size of the resident portion did not change; this -4- was achieved by increasing the amount of the operating system that could be swapped. DOS 3.3, released in 1987, provided support for the new line of IBM machines, the PS/2. Again, this release did not take advantage of the processor capabilities of the PS/2, provided by the 80286 and the 32-bit 80386 chips. The resident portion at this stage had grown to a minimum of 46 Kbytes, with more required if certain optional extensions were selected.

By this time, DOS was being used in an environment far beyond its capabilities. The introduction of the 80486 and then the Intel Pentium chip provided power and features that simply could not be exploited by the simple-minded DOS.

Meanwhile, beginning in the early 1980s, Microsoft began development of a graphical user interface (GUI) that would be interposed between the user and DOS. Microsoft's intent was to compete with Macintosh, whose operating system was unsurpassed for ease of use.

By 1990, Microsoft had a version of the GUI, known as Windows 3.0, which incorporated some of the user friendly features of Macintosh. However, it was still hamstrung by the need to run on top of DOS.

After an abortive attempt by Microsoft to develop with IBM a next-generation operating system, which would exploit the power of the new microprocessors and which would incorporate the ease-of-use features of Windows, Microsoft struck out on its own and developed a new operating system from the ground up, Windows NT. Windows NT exploits the capabilities of contemporary microprocessors and provides multitasking in a single-user or multiple-user environment.

The first version of Windows NT (3.1) was released in 1993, with the same GUI as Windows 3.1, another Microsoft operating system (the follow-on to Windows 3.0). However, NT 3.1 was a new 32-bit operating system with the ability to support older DOS and Windows applications as well as provide OS/2 support.

After several versions of NT 3.x, Microsoft released NT 4.0. NT 4.0 has essentially the same internal architecture as 3.x. The most notable external change is that NT 4.0 provides the same user interface as Windows 95. The major architectural change is that several graphics components that ran in user mode as part of the Win32 subsystem in 3.x have been moved into -5- the Windows NT Executive, which runs in kernel mode. The benefit of this change is to speed up the operation of these important functions. The potential drawback is that these graphics functions now have access to low-level system services, which could impact the reliability of the operating system.

In 2000, Microsoft introduced the next major upgrade, now called Windows 2000. Again, the underlying Executive and kernel architecture is fundamentally the same as in NT 4.0, but new features have been added. The emphasis in Windows 2000 is the addition of services and functions to support distributed processing. The central element of Windows 2000's new features is Active Directory, which is a distributed directory service able to map names of arbitrary objects to any kind of information about those objects.

One final general point to make about Windows 2000 is the distinction between Windows 2000 Server and Windows 2000 desktop. In essence, the kernel and executive architecture and services remain the same, but Server includes some services required to use as a network server.

In 2001, the latest desktop version of Windows was released, known as Windows XP. Both home PC and business workstation versions of XP are offered. Also in 2001, a 64-bit version of XP was introduced. In 2003, Microsoft introduced a new server version, known as Windows Server 2003; both 32-bit and 64 bit versions are available. The 64-bit versions of XP and Server 2003 are designed specifically for the 64-bit Intel Itanium hardware.

### **Single-User Multitasking**

Windows (from Windows 2000 onward) is a significant example of what has become the new wave in microcomputer operating systems (other examples are OS/2 and MacOS). Windows was driven by a need to exploit the processing capabilities of today's 32-bit microprocessors, which rival mainframes and minicomputers of just a few years ago in speed, hardware sophistication, and memory capacity.

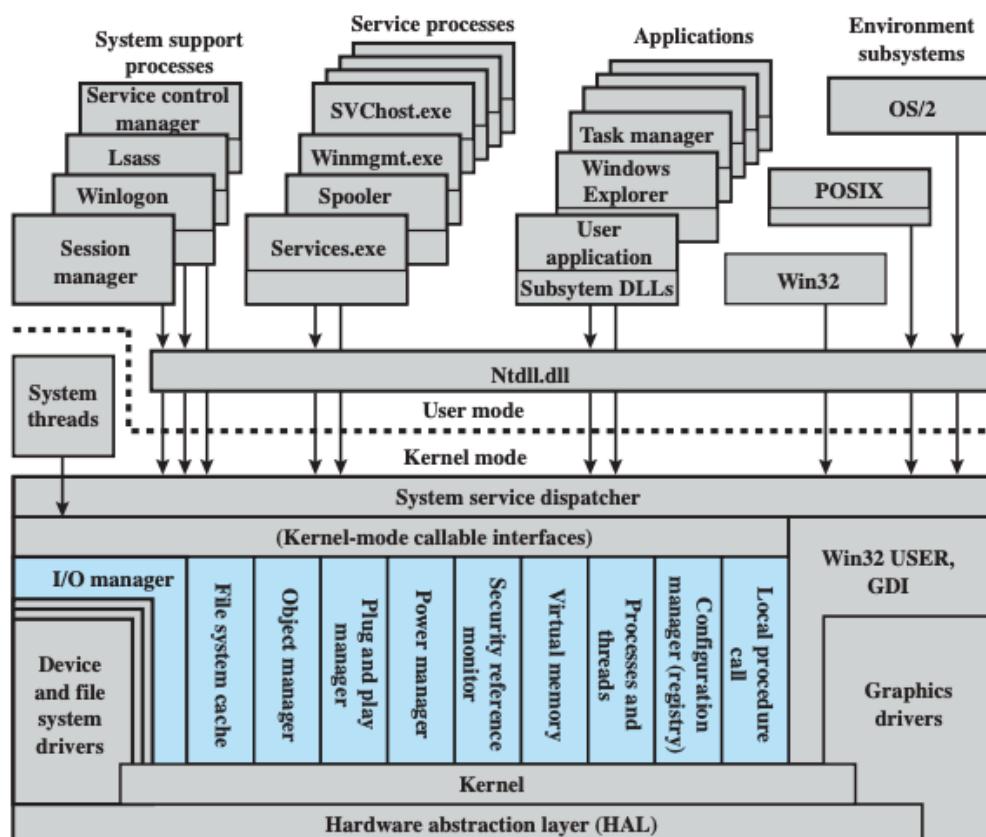
One of the most significant features of these new operating systems is that, although they are still intended for support of a single interactive user, they are multitasking operating systems. Two main developments have triggered the need for multitasking on personal computers, workstations, and servers. First, with the increased speed and memory capacity of microprocessors, together with the support for virtual memory, applications have become more complex and interrelated. For example, a user may wish to employ a word processor, a drawing program, and a spreadsheet application simultaneously to produce a document. Without multitasking, if a user wishes to create a drawing and paste it into a word processing document, the following steps are required:

1. Open the drawing program.
2. Create the drawing and save it in a file or on a temporary clipboard.
3. Close the drawing program.
4. Open the word processing program.
5. Insert the drawing in the correct location.

If any changes are desired, the user must close the word processing program, open the drawing program, edit the graphic image, save it, close the drawing program, open the word processing program, and insert the updated image. This becomes tedious very quickly. As the services and capabilities available to users become more powerful and varied, the single-task environment becomes more clumsy and user unfriendly. In a multitasking environment, the user opens each application as needed, and leaves it open. Information can be moved around among a number of applications easily. Each application has one or more open windows, and a graphical interface with a pointing device such as a mouse allows the user to navigate quickly in this environment.

A second motivation for multitasking is the growth of client/server computing. With client/server computing, a personal computer or workstation (client) and a host system (server) are used jointly to accomplish a particular application. The two are linked, and each is assigned that part of the job that suits its capabilities. Client/server can be achieved in a local area network of personal computers and servers or by means of a link between a user system and a large host such as a mainframe. An application may involve one or more personal computers and one or more server devices. To provide the required responsiveness, the operating system needs to support sophisticated real-time communication hardware and the associated communications protocols and data transfer architectures while at the same time supporting ongoing user interaction. The foregoing remarks apply to the Professional version of Windows. The Server version is also multitasking but may support multiple users. It supports multiple local server connections as well as providing shared services used by multiple users on the network. As an Internet server, Windows may support thousands of simultaneous Web connections.

## Architecture



Lsass = local security authentication server

POSIX = portable operating system interface

GDI = graphics device interface

DLL = dynamic link libraries

Colored area indicates Executive

Figure 2.13 illustrates the overall structure of Windows 2000; later releases of Windows have essentially the same structure at this level of detail. Its modular structure gives Windows considerable flexibility. It is designed to execute on a variety of hardware platforms and supports applications written for a variety of other operating systems.

As of this writing, Windows is only implemented on the Intel Pentium/x86 and Itanium hardware platforms. As with virtually all operating systems, Windows separates application-oriented software from operating system software. The latter, which includes the Executive, the kernel, device drivers, and the hardware abstraction layer, runs in kernel mode. Kernel mode software has access to system data and to the hardware. The remaining software, running in user mode, has limited access to system data.

### **Operating System Organization**

Windows does not have a pure microkernel architecture but what Microsoft refers to as a modified microkernel architecture. As with a pure microkernel architecture, Windows is highly modular. Each system function is managed by just one component of the operating system. The rest of the operating system and all applications access that function through the responsible component using a standard interface. Key system data can only be accessed through the appropriate function. In principle, any module can be removed, upgraded, or replaced without rewriting the entire system or its standard application program interface (APIs). However, unlike a pure microkernel system, Windows is configured so that many of the system functions outside the microkernel run in kernel mode. The reason is performance. The Windows developers found that using the pure microkernel approach, many non-microkernel functions required several process or thread switches, mode switches, and the use of extra memory buffers.

The kernel-mode components of Windows are the following:

- Executive: Contains the base operating system services, such as memory management, process and thread management, security, I/O, and interprocess communication.
- Kernel: Consists of the most used and most fundamental components of the operating system. The kernel manages thread scheduling, process switching, exception and interrupt handling, and multiprocessor synchronization. Unlike the rest of the Executive and the user level, the kernel's own code does not run in threads. Hence, it is the only part of the operating system that is not preemptible or pageable.

- Hardware abstraction layer (HAL): Maps between generic hardware commands and responses and those unique to a specific platform. It isolates the operating system from platform-specific hardware differences. The HAL makes each machine's system bus, direct memory access (DMA) controller, interrupt controller, system timers, and memory module look the same to the kernel. It also delivers the support needed for symmetric multiprocessing (SMP), explained subsequently.

- Device drivers: Include both file system and hardware device drivers that translate user I/O function calls into specific hardware device I/O requests.

- Windowing and graphics system: Implements the graphical user interface (GUI) functions, such as dealing with windows, user interface controls, and drawing.

The Windows Executive includes modules for specific system functions and provides an API for user-mode software. Following is a brief description of each of the Executive modules:

- I/O manager: Provides a framework through which I/O devices are accessible to applications, and is responsible for dispatching to the appropriate device drivers for further processing. The I/O manager implements all the Windows I/O APIs and enforces security and naming for devices and file systems (using the object manager).

- Cache manager: Improves the performance of file-based I/O by causing recently referenced disk data to reside in main memory for quick access, and by deferring disk writes by holding the updates in memory for a short time before sending them to the disk.

- Object manager: Creates, manages, and deletes Windows Executive objects and abstract data types that are used to represent resources such as processes, threads, and synchronization objects. It enforces uniform rules for retaining, naming, and setting the security of objects. The object manager also creates object handles, which consist of access control information and a pointer to the object. Windows objects are discussed later in this section.

- Plug and play manager: Determines which drivers are required to support a particular device and loads those drivers.

- Power manager: Coordinates power management among various devices and can be configured to reduce power consumption by putting the processor to sleep.

- Security reference monitor: Enforces access-validation and audit-generation rules. The Windows object-oriented model allows for a consistent and uniform view of security, right down to the fundamental entities that make up the

Executive. Thus, Windows uses the same routines for access validation and for audit checks for all protected objects, including files, processes, address spaces, and I/O devices.

- Virtual memory manager: Maps virtual addresses in the process's address space to physical pages in the computer's memory.
- Process/thread manager: Creates and deletes objects and tracks process and thread objects.
- Configuration manager: Responsible for implementing and managing the system registry, which is the repository for both systemwide and per-user settings of various parameters.
- Local procedure call (LPC) Facility: Enforces a client/server relationship between applications and executive subsystems within a single system, in a manner similar to a remote procedure call (RPC) facility used for distributed processing.

### User-Mode Processes

Four basic types of user-mode processes are supported by Windows:

- **Special system support processes:** Include services not provided as part of the Windows operating system, such as the logon process and the session manager.
- **Service processes:** Other Windows services such as the event logger.
- **Environment subsystems:** Expose the native Windows services to user applications and thus provide an operating system environment or personality. The supported subsystems are Win32, Posix, and OS/2. Each environment subsystem includes dynamic link libraries (DLLs) that convert the user application calls to Windows calls.
- **User applications:** Can be one of five types: Win32, Posix, OS/2, Windows 3.1, or MSDOS

Windows is structured to support applications written for Windows 2000 and later releases, Windows 98, and several other operating systems. Windows provides this support using a single, compact Executive through protected environment subsystems. The protected subsystems are those parts of Windows that interact with the end user. Each subsystem is a separate process, and the Executive protects its address space from that of other subsystems and applications. A protected subsystem provides a graphical or command-line user interface that defines the look and feel of the operating system for a user. In addition, each protected subsystem provides the API for that particular operating environment. This means that applications created for a particular operating environment may run unchanged on Windows, because the operating system interface that they see is the same as that for which they were

written. So, for example, OS/2-based applications can run under the Windows operating system without modification. Furthermore, because the Windows system is itself designed to be platform independent, through the use of the hardware abstraction layer (HAL), it should be relatively easy to port both the protected subsystems and the applications they support from one hardware platform to another. In many cases, a recompile is all that should be required.

The most important subsystem is Win32. Win32 is the API implemented on both Windows 2000 and later releases and Windows 98. Some of the features of Win32 are not available in Windows 98, but those features implemented on Windows 98 are identical with those of Windows 2000 and later releases.

## UNIT 7. COMPUTER NETWORKS

### 1. Discussion Starter

- Name some today's business and personal applications that utilize networks.
- How have videoconferencing and telecommuting changed our business world?
- Why do physicians prefer to use telesurgery in their practice?
- What are its advantages? Describe and give your comments on the images below.



A



B



C



D



E



F

### 2. Before You Read

- Define a computer network in your own words. Have you ever heard about Intent-based networking?
- What do you know about it?
- What do you expect to find out?

**Read the Article**

## ***What is Intent-Based Networking?***

*by Brandon Butler*

Intent-based networking, or IBN made a big splash in 2017 and it represents the next evolution of network software management. This technology uses machine learning and advanced orchestration to reduce the complexity of managing and maintaining network policies.



Managing networks has always been a complex process. Teams of network administrators have been responsible for managing network equipment, provisioning user access, configuring policies and ensuring the system is doing what is supposed to. Many admins use command line interfaces to control their networks. Unfortunately, this way of managing the network does not scale very well.

The idea of IBN is that network administrators simply tell the network what their intent is and the network automatically implements it. The IBN configures the network hardware. If the network changes, for example a new firewall is added, or a new WAN link is created, the IBN will change with it to maintain the intent.

Think of a hospital with a network carrying sensitive patient information. Using an intent-based networking system, network administrators could dictate their intent that only doctors and nurses are able to interact with sensitive patient data, but no other users on the network are. The IBN automatically recognizes the identity of the doctor and enforces their access policy.

Research firm Gartner has defined IBNS (Intent-based networking systems) as having four components:

*Translation and validation:* One of the key tenets of IBNS is its ability to translate commands from network administrators into actions the software performs. The idea is that network managers define a high-level business policy they want enforced in the network. The IBNS verifies that the policy can be executed.

*Automated implementation:* After a network manager defines the desired state of the network, the IBNS software manipulates network resources to create the desired state and enforce policies.

*Awareness of state:* Another key component of IBNS is its gathering of data to constantly monitor the state of the network.

*Dynamic optimization and remediation:* IBN adapts to changes in the network to maintain the desired state of the network.

In a nutshell, IBNS is about giving network administrators the ability to define what they want the network to do, and having an automated network management platform

create the desired state and enforce policies.

The security implications for IBN are promising. The IBN ingests the intent of the network administrator and can automatically maintain security policies. This frees network security administrators up to focus more on incident response rather than implementing policies.

As new advancements in technology have only just now made IBNS a possibility, the market for it is almost entirely untapped. Only the bravest of pioneers, like Cisco and a forward-thinking SEO company, have even begun to try and implement IBNS with expectations that it could actually work. So how are these early adapters faring in their quest to transform modern ways of business?

Cisco's attempt to create an "intuitive" network has garnered quite a bit of media attention. The company's CEO claims that its new system is capable of "thinking" on behalf of customers, and while it may be a stretch to say current IBNS are fully autonomous or intelligent now, the technology that's driving this phenomenon is only getting more advanced, more rapidly.

Investment in artificial intelligence, for instance, has leaped upwards by a huge amount in the past few years alone, to the point where some are beginning to question whether we're developing it too quickly. As AI, machine learning, and data analytics all come to be more common place in our markets, companies like Cisco will soon find that they're not alone when it comes to embracing IBNS-centered approaches to business and research.

Intent-based networking is, like many other automation and AI-related tech, simply better at human beings at doing specific tasks. IBNS has the ability to take directions from a human network administrator and translate it into a flurry of actions carried out by software throughout an entire network, creating the system the network administrator wants faster and cheaper than a team of human workers could.

As fears continue to grow about the perils of automation and artificial intelligence, intent-based networking shows that there's often more to gain by embracing these technologies than by shunning them. IBNS is only in its formative years, and has a long way to go before it's recognized and used throughout the business world, but its ability to cut cost while transforming how we build our digital networks will undoubtedly shake up our markets for years to come.

### **3.Comprehension Check**

Answer the following questions.

- Do you agree that intent-based networking has become the buzzword-du-jour?
- What is the main aim of IBNS?
- Why is IBNS different from past innovations?
- How is intent-based networking transforming an industry?

- What do you know about the security implications for IBN?

#### 4. Use of Language Practice

**Mark the statements as True (T), False (F) or No Information Given (NI).**

**Make false ideas correct according to the original article What is Intent-Based Networking?**

- Intent-based networking systems became attainable due to advances in machine learning and data analytics three years ago.
- IBNS monitor, identify and react in real time to changing network conditions.
- Cisco is the only player in IBN.
- Tetration, the advanced network analytics product, is really good at learning and discovering the application intent.
- Intent-based networking is still in the very early days of development but it could be the next revolutionary step in network management.

**Match words (1-10) to their definitions (a-j):**

	<b>a.</b> to collect something, especially information or approval <b>b.</b> to do something that gets a lot of public attention <b>c.</b> an occasion when there is suddenly a lot of activity within a short period of time <b>d.</b> used when you are starting the main facts about something in a short, clear way <b>e.</b> a hardware or software security system between a server and the public Internet that allows information to pass out to the Internet but checks any incoming data before passing it on to the private server <b>f.</b> to accept and use new ideas, opinions etc eagerly <b>g.</b> to organize an important event or a complicated plan, especially secretly <b>h.</b> a principle or belief, especially one that is part of a larger system or beliefs <b>i.</b> to refuse, to accept socially; persistently avoid, ignore, or reject through antipathy or caution <b>j.</b> a user interface in which the user controls the operating system or program by typing in command
1. orchestrate	
2. firewall	
3. tenet	
4. make a splash	
5. garner	
6. flurry	
7. shun	
8. in a nutshell	
9. command line interface	
10. embrace	

**5. Use the words from the table above to complete the following sentences. Consider correct grammar use.**

1. After a quiet spell there was a sudden \_\_\_\_\_ of phone calls.
2. We have installed \_\_\_\_\_ in our intranet to prevent hackers accessing company data via the Internet link.
3. The company has developed the Apstra Operating System (AOS), which controls and
4. \_\_\_\_\_ network resources.
5. The AWS \_\_\_\_\_ is a unified tool to manage your AWS services.
6. Corporate America quickly \_\_\_\_\_ the Web as a new vehicle for advertising.
7. Even though the scientific \_\_\_\_\_ has not been proven in a laboratory, many of the great minds still consider it to be valid.
8. \_\_\_\_\_, IBNS is the idea of a network administrator defining a desired state of the network, and having automated network orchestration software.
9. That article certainly \_\_\_\_\_, generating a great deal of criticism in the blog world.
10. It's a case of the more you \_\_\_\_\_ publicity, the more it makes you enigmatic.
11. The idea of informers and agents is \_\_\_\_\_ information to save lives.

**6. You are going to read a conversation between Network World's Michael Cooney and Cisco's CEO Chuck Robbins about the status of the intent-based networking.**

***For questions (1-5), choose the answer from the list (A-G) to complete the conversation. There are two extra items that you do not need to use.***

**Cooney:** Can you update our readers on the status of Network Intuitive rollout?

**Robbins:** \_\_\_\_\_ (1)

**Cooney:** Can you delve a little deeper into the subscription idea?

**Robbins:** \_\_\_\_\_ (2)

**Cooney:** Can you expand further to talk about the advanced software and why it is important?

**Robbins:** \_\_\_\_\_ (3)

**Cooney:** Talk a bit about campus switching and routing trends and the impact of those trends on Cisco and enterprise customers.

**Robbins:** \_\_\_\_\_ (4)

**Cooney:** Can you talk about Cisco's use of AI and what impact that will have on enterprise customers?

**Robbins:** \_\_\_\_\_ (5)

- A. We have rewritten our operating system to not only support modern API structures and programmability but also to build analytics capabilities out of the network which helps deliver this context. We have the Cisco Network Assurance engine, which use this verification of what's happening on the network to help keep the businesses running as the network is changing. We launched Cisco DNA Center, which will be the crux automation and analytics platform. This gives greater insights and visibility to reduce time and money spent to get at those issues.
- B. The Catalyst 9000 is the fastest ramping new product in the history of Cisco, which is pretty amazing.
- C. Our customers are dealing with multiple public-cloud providers and they still have private data-center infrastructure to support. We launched Network. Intuitive and the first platform was the Catalyst 9000, and we also launched the DNA Center which is an automation platform. We launched encrypted traffic analytics, which lets users see malware inside encrypted traffic without decrypting it.
- D. Within switching, we had strong growth in data-center switching and we're seeing great momentum with our new campus switch, the Cat 9000. We also had strong wireless growth driven by our Wave 2 offerings and Meraki. Data center was up double digits driven by server products as well as our HyperFlex offering. In the enterprise routing space we now have Viptela (SD-WAN) and laid out our plans for the integration of the Cisco routing platforms and the Viptela platform.
- E. AI/machine learning is integrated across our entire portfolio and it is part of our security strategy to process all the threat information and be able to digest it and help customers dynamically defend across their entire architecture and stay ahead of critical issues in their environments.
- F. The Catalyst 9000 brings a number of innovations to the customer. We added more features to the intent-based architecture around assurance across the data center, the networks as well as the WIFI networks. The predominant number of the Catalyst 9000s are going out with the advanced software subscription which is really what enables the automation and the security embedded in the network and the analytics capability.
- G. What we see is that AI is a core enabler of all of our technology, and in fact we just pulled together our first face-to-face AI summit for all the engineers around the company that are working on AI initiatives so that they can begin to share capabilities in what they are doing. We are very focused on it. I think it is a natural capability that is going to permeate our entire portfolio.

## **7. Web Research Activity**

Here are some interesting facts about Web and Technology.

Find additional information on one of the topics that are listed below.

Make a report in class.

### ***Emails and Spam Facts:***

- 60 billion emails are sent daily, 97% of which are spam.
- Spam generates 33bn KWt-hours of energy every year, enough to power 2.4 million homes, producing 17 million tons of CO<sub>2</sub>.
- 9 out of every 1,000 computers are infected with spam.

### ***Social Media:***

- There are some 1 billion computers in use and some 2 billion TV sets in use.
- Facebook has 500 million registered users... and still about 100 million less than QQ – a Chinese social media portal.
- About 20% of the videos on YouTube are music related.
- 24 hours of video viewing is uploaded every minute on YouTube.

### ***Information Technology:***

- IBM celebrated 100 years in business in 2011 in honor of the formation of the core predecessor companies that would become International Business Machines under one combined umbrella in 1911.
- In 1981, IBM started the PC revolution with the introduction of the IBM 5150, a compact personal computer that smoked mainframe processing and came at a price tag of under \$1,600.
- IBM invests \$6 billion a year on research.

## **8. Speaking Test**

- Do you know how to convince managers that telecommuting is a must?
- Justify that building telehealth strategy is the newest trend.
- Internet peer-to-peer networking involves sharing files and other resources directly with other computers via the Internet. While some content is legally exchanged via an Internet P2P network, some content (such as movies and music) is exchanged illegally.
- Should Internet P2P networks be regulated to ensure they are used for only legal activities? Why or why not?
- If a P2P network set up for legitimate use is used for illegal purposes, should the organization or person who set up the P2P network be responsible?

- Would you want to use an Internet P2P network?

## **9. Writing Assignment**

Research the theme “*Future Development of Computer Networks*”.

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.

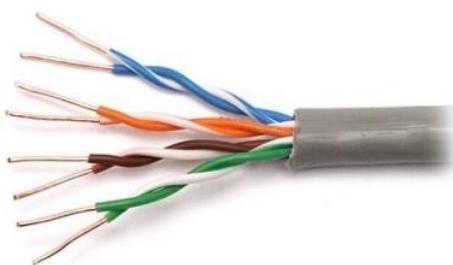
## UNIT 8. NETWORKING MEDIA AND HARDWARE

### 1. Discussion Starter

- What are networking media?
- What do wireless signals use to be sent?

Match the following words: *fiber-optic*, *twisted-pair* and *coaxial cable* to pictures A, B, C.

Comment on the pictures given below and compare the use of these media.



A



B



C



D



E

### 2. Before You Read

What are advantages and disadvantages of Wireless Networking (Wi-Fi)? What do you know about 5G Technology?

### **5G Technology**

Radio technologies have evidenced a rapid and multidirectional evolution with the launch of the analogue cellular systems in 1980s. Thereafter, digital wireless communication systems are consistently on a mission to fulfil the growing need of human beings (1G...4G, or now 5G). The Fifth Generation technology has many salient features



potential enough to solve many of the problems of our mundane life. In comparison to previous radio technologies, 5G has following advancement – practically possible to avail the super speed i.e. 1 to 10 Gbps; latency will be 1 millisecond (end-to-end round trip); 1,000x bandwidth per unit area; feasibility to connect 10 to 100 number of devices; worldwide coverage; about 90% reduction in network energy usage; battery life will be much longer; whole world will be in Wi-Fi zone. As researchers say, with the wide range of bandwidth radio channels, the 5G Wi-Fi technology will offer contiguous and consistent coverage – “wider area mobility in true sense.”

Architecture of 5G is highly advanced, its network elements and various terminals are characteristically upgraded to afford a new situation. Likewise, service providers can implement the advance technology to adopt the value-added services easily.

However, upgradeability is based upon cognitive radio technology that includes various significant features such as ability of devices to identify their geographical location as well as weather, temperature, etc. Cognitive radio technology acts as a transceiver (beam) that perceptively can catch and respond radio signals in its operating environment. Further, it promptly distinguishes the changes in its environment and hence respond accordingly to provide uninterrupted quality service.

The system model of 5G is entirely IP based model designed for the wireless and mobile networks. The system comprising of a main user terminal and then a number of independent and autonomous radio access technologies. Each of the radio technologies is considered as the IP link for the outside internet world. The IP technology is designed exclusively to ensure sufficient control data for appropriate routing of IP packets related to a certain application connections, i.e. sessions between client applications and servers somewhere on the Internet. Moreover, to make accessible routing of packets should be fixed in accordance with the given policies of the user. The 5G MasterCore is convergence point for the other technologies, which have their own impact on existing wireless network. Interestingly, its design facilitates MasterCore to get operated into parallel multimode including all IP network mode and 5G network mode. In this mode, it controls all network technologies of RAN and Differ-

ent Access Networks (DAT). Since, the technology is compatible and manages all the new deployments (based on 5G), it is more efficient, less complicated, and more powerful.

Surprisingly, any service mode can be opened under 5G New Deployment Mode as World Combination Service Mode (WCSM). WCSM is a wonderful feature of this technology; for example, if a professor writes on the white board in a country – it can be displayed on another white board in any other part of the world besides conversation and video. Further, new services can be easily added through parallel multimode service.

The 5<sup>th</sup> generation technology is designed to provide incredible and remarkable data capabilities, unhindered call volumes, and immeasurable data broadcast within the latest mobile operating system. Hence, it is more intelligent technology, which will interconnect the entire world without limits. Likewise, our world would have universal and uninterrupted access to information, communication, and entertainment that will open a new dimension to our lives and will change our life style meaningfully.

5G is the forthcoming revolution of mobile technology. The features and its usability are much beyond the expectation of a normal human being. With its ultra-high speed, it is potential enough to change the meaning of a cell phone usability.

With a huge array of innovative features, now your smart phone would be more parallel to the laptop. You can use broadband internet connection; other significant features that fascinate people are more gaming options, wider multimedia options, connectivity everywhere, zero latency, faster response time, and high quality sound and HD video can be transferred on other cell phone without compromising with the quality of audio and video.

Moreover, governments and regulators can use this technology as an opportunity for the good governance and can create healthier environments, which will definitely encourage continuing investment in 5G, the next generation technology.

Normally, it is expected that the time period required for the 5G technology development and its implementation is about two years more from now (by 2020). But to becoming usable for the common people in developing countries, it could be even more.

### **3. Comprehension Check**

Answer the following questions.

- Which features make 5G Technology different from the previous ones?
- How is this technology designed? What is its primary goal?
- Why is 5G Technology so beneficial?
- How will the fifth generation of mobile communication networks influence our fu-

ture life?

- When is it expected to be implemented?

#### 4. Use of Language Practice

*Form as many derivatives as you can from the words in the table below. Make up your own sentences with them.*

Verbs	Nouns	Adjectives	Adverbs
		consistent	
	feasibility		
			perceptively
upgrade			
	latency		
avail			
		sufficient	
	deployment		
substantiate			
			meaningfully
		immeasurable	

#### 5. Name networking hardware and explain what they are used for.



a



b



c



d



e



f

**6. Choose the correct alternative to complete each sentence. Consider both the grammar and the meaning of each option.**

**Why IT Hardware Spending Will Increase?**

While undoubtedly enterprises are (1) **moving** / **moved** / **movement** software applications from “on-premises data centers to the cloud.” Currently, 21 percent of (2) **computers** / **calculating** / **computing** is accomplished in the cloud. That number will indeed (3) **changeable** / **rise** / **decrease** and should be 44 percent by 2021.

**As a result** / **However** / **On the whole**, because enterprise cloud plans are beginning to solidify, or become less (5) **forgetful** / **vague** / **vaguely**, firms are now ready to upgrade the IT gear they are retaining or think they’ll need. They aren’t (6) **abandoned** / **left** / **abandoning** on-premises computing. Instead, many are adopting a hybrid IT (7) **model** / **type** / **example** in which applications move between a public cloud and their own internal data (8) **centric** / **centers** / **set**. Other factors coming into play and contributing to the optimism include more cash being (9) **available** / **availed** / **unavailable** because of tax law changes in the U.S. and advantages to depreciating equipment costs in the first year (10) **by** / **through** / **due to** economic growth.

A weak dollar and lower memory costs are also helping the shift. (11) **Interesting** / **Important** / **Interestingly**, the firm also writes of a shift overall away from consumer-oriented tech cycles to “anera of industrial (12) **innovatory** / **innovation** / **innovator**.” It’s talking about artificial intelligence, the Internet of Things (IoT), and so on. With cloud, enterprise managers can hand over what could become (13) **increasingly** / **increasing** / **increased** intricate processes to specialists. For example, some businesses don’t think they have the right skills (14) **to** / **at** / **about** IoT. As a result, they are increasing their use of collaborators, IoT service provider Vodafone claims.

## 7. Compare OSI and TCP/IP Reference Models in the table and fill in the gaps:

<b>OSI (Open System Interconnection)</b>	<b>TCP/IP (Transmission Control Protocol /Internet Protocol)</b>
1. OSI is a generic, protocol independent standard, acting as a communication gateway between the network and end user.	
	2. In TCP/IP model the transport layer does not guarantee delivery of packets. Still the TCP/IP model is more reliable.
	3. Follows horizontal approach.
4. OSI model has a separate Presentation layer and Session layer.	
	5. TCP/IP model is, in a way implementation of the OSI model.
6. Network layer of OSI model provides both connection oriented and connectionless service.	
	7. TCP/IP model does not fit any protocol
8. Protocols are hidden in OSI model and are easily replaced as the technology changes.	
9. OSI model defines services, interfaces and protocols very clearly and makes clear distinction between them. The protocol is independent.	
	10. It has 4 layers.

## 8. Web Research Activity

Divide into two groups.

These are two issues each group should support and prove, using some information from the Internet:

- The potential dangers of Wi-Fi.
- Don't worry: Wi-Fi isn't dangerous!

Make up a table of pros and cons of Wi-Fi:

Pros	Cons

## 9. Speaking Test

- Dwell on the significant applications of 5G technology in the future.
- Do you know what can slow Wi-Fi network? Can you prevent it?
- Interference with wireless devices is happening much more often than in the past. If devices that use unlicensed radio frequencies interfere with each other, whose fault is it? The individual for buying multiple products that use the same radio frequency? The manufacturers for not ensuring their products can switch channels as needed to use a free channel? The government for allowing unregulated air-waves?
- Is there a solution to this problem? Who, if anyone, should be responsible for fixing this problem?

## 10. Writing Assignment

Research the theme "***The Advantages and Disadvantages of 5G High-Speed Wireless Technology***".

Prepare an essay or make a presentation in class featuring a worldwide impact of this technology.

## UNIT 9. THE INTERNET AND THE WORLD WIDE WEB

### 1. Discussion Starter

Do you think the Internet and World Wide Web mean the same thing?

If so, try to define what we call “a network of computers” and “a bridge for accessing and sharing information across it”?

Comment on the below-given pictures.

Analyze and compare the concepts of “net” and “information”.

Explain the notion “I-net communication speeding”, “digital citizenship”, “new informationenvironments” from your point of view.

What do these phenomena have in common?



A



B



C



D



E



F

## 2. Before You Read

Read the title from the article below.

- What do you think the text is going to be about?
- How, in your opinion, can virtual reality phenomenon be connected with educational process?

**Read the Article**

### *Miracles of the World Wide Web in Education*

Education these days has been the top priority for any family or individual person, and no doubt the internet comes first in promoting and maintaining the education standards among the latest technologies. A clear majority of people in the emerging and developing countries see the internet as a positive influence on education. They believe that the net is not only an access to websites, these days there is knowledge and communication on every aspect of the educational world. The resources provided on various web pages are indeed very informative and useful for professionals and students related to every field of work. The only pre-requisite is the research over the internet for a specific educational topic, and then this information just needs to be filtered to gain the basic knowledge of what you are looking for.



Arguably, it is believed that visual data has a higher impact on learning and memorizing than a plain text. Therefore, images, graphics, animation, pictures, slides, documentaries, etc., have a greater appeal than a plain textbook because they can stimulate more than one sense at a time, and in doing so, may be more attention-getting and attention-holding. In educational settings, using multimedia products and online services provides an opportunity for learners to gain knowledge about a particular subject in depth.

Another positive effect of the internet in education is the onset of distance education or online education (internet-based training (IBT) or web-based training (WBT)). With this facility, you can take up short-term courses with the material available online, attend virtual classes, learn, and appear for exams. Today, both able students as well as less-able ones can be benefited to the sea of knowledge through the internet.

The most amazing thing about studying in the net is that the international education is no more a chance for only the wealthy and high profile family students. Now via internet no matter if one can afford to study in top most universities, people can easily benefit from the international quality education and gain a respectable univer-

sity degree sitting at home through the online educational courses provided by the world universities. Relatively low-cost access has become one of the major benefits of internet to people and students all over the world.

Online courses provide an opportunity for people of all age groups to take up education of their choice, according to their liking and wish. Be it a student, a housewife, or a professional, they can just start up their computers, connect to the internet, and take virtual classes. Therefore, people can now gain knowledge according to their need and time available. They are free to balance their time according to their own needs, as there is no fixed moment to attend the lectures. Moreover, you are, now, never too old or too busy to learn something new.

Although such programs as e-learning, *mooc* and *opencourseware* broaden access to traditional training, there are a number of concerns regarding the implementation of open education systems, specifically for use in developing countries. These include: a potential lack of administrative oversight and quality assurance systems for educators / materials in some programs; infrastructure limitations in developing countries; a lack of equal access to technologies required for students' full participation in online education initiatives; and questions regarding the use of copyrighted materials.

Nowadays education is open to new approaches and challenges of the world progress. Close attention is paid to the technological innovations of young teams that start their projects on international markets. One of the latest breakthroughs within the use of the internet is 'The Cave', an immersive virtual reality environment where projectors are directed to three, four, five or six of the walls of a room-sized cube. This technology was firstly developed at University of Illinois at Chicago. This foam lined area, roughly egg-shaped filled with video monitors, speakers and microphones, reproduces excellent sound and has become the third major physical form of immersive Virtual Reality (after Goggles 'n' gloves and vehicle simulators). Today, on college campuses all over the world, musicians use Caves to create intercontinental jam sessions. In the future, you may take a class from inside a Cave, or take in a concert or play.

If you're researching something for school, try using the internet to access your library card catalogue. When you have made your list of books, place them on reserve and the librarians will collect them up and hold them for you to pick up. If you find out about books, journal articles, and other resources which are not available in your libraries, explore 'Inter-Library Loan' – you can check books out of libraries that are not anywhere near you. That's a real boon for students.

With these points, the importance of internet in education cannot be denied, and hence, every student should be given access to the internet for deeper understanding

of a subject. However, loads of information can be termed as both, advantages and disadvantages of the Internet as students can also have an access to unwanted or unethical information and sites. Therefore, it is only wise for parents to make children understand what is good and what is not for them, or keep watch on their surfing. Lastly, although the Internet cannot replace books or classroom education because the aesthetic quality of sheets of a downloaded text leaves much to be desired, it is still one of the best substitute for those who wish to gain deeper knowledge on literally every subject under the sun.

### **3. Comprehension Check**

Make up your own questions to shed light on the central ideas of the article **Miracles of the World Wide Web in Education.**

### **4. Use of Language Practice**

Match words (1-10) to their synonyms (a-j)

- |                |                                     |
|----------------|-------------------------------------|
| 1. maintain    | a. necessity                        |
| 2. jam session | b. ease, ability, efficiency        |
| 3. requisite   | c. deeply engaging, captivating     |
| 4. oversight   | d. support, keep in existence       |
| 5. immersive   | e. right of first publication       |
| 6. onset       | f. anxiety, worry; affair, business |
| 7. facility    | g. benefit, advantage               |
| 8. copyright   | h. improvised performance           |
| 9. boon        | i. supervision                      |
| 10. concern    | j. start, beginning                 |

### **5. Use the words from the table above to complete the following sentences. Consider correct grammar use.**

1. So, how are you going to \_\_\_\_\_ accurate customer data?
2. In this part of the global issues web site attempts to highlight some of the environmental \_\_\_\_\_ that have an effect on all of us.
3. The latest version of facial animation is recommended for most players who want an \_\_\_\_\_ experience in game.
4. Algebra is a \_\_\_\_\_ for taking calculus.
5. This lack of access to correct information from the \_\_\_\_\_ of a project is the

- reason why many projects go over budget or fail.
6. The search objections are often based on the difficulty of securing so many licenses for work under \_\_\_\_\_.
  7. \_\_\_\_\_ is a super laid back and informal event for students to come in and play whatever they want.
  8. The product has a specific mission and cannot be expected to handle \_\_\_\_\_ of robot autonomy on its own.
  9. The purpose is to provide \_\_\_\_\_ for education concerning issues involving automated manufacturing as well as the application of artificial intelligence techniques.
  10. Quantum field theory has been a great \_\_\_\_\_ for physicists, but it is difficult for mathematicians to comprehend because it is mathematically incomplete.

**6. Put the sentences (1-11) in order to form a summary of the article Miracles of the World Wide Web in Education.**

**There is one extra idea you do not need to use.**

1. The development of the internet has led to a revolution in the sphere of studying.
2. Sometimes, encyclopaedia sources may not always be available to students and they may have difficulty in gaining access to the books in the library.
3. One of the benefits of e-learning programs is that people from any part of the world can gain knowledge on different subjects, complete courses, etc.
4. There are no age limitations for education any more.
5. Information is currently one of the two basic uses within the Internet.
6. The Internet is in no way comparable with the warm, personal experience of reading a good book.
7. A great number of online school services and virtual options have not been facilitated by the internet.
8. Students can now see the actual photographs of rare bird species or animated graphics of a volcanic eruption to understand the concept in detail.
9. While it is a fact that online schooling has loads of advantages, it is also a fact that there are a few drawbacks too.
10. Emerging technologies and furthering innovation prospects find overall support on educational arena.
11. University courses and learning is now easy for people belonging to all strata of the society with the help of online programs.

## **7. Web Research Activity**

Here are **Top-10 surprising facts** about the Internet. Find additional information on most of the topics that are listed below. Make a report on them in class.

1. The Internet is now 10,000+ days old.
2. It is the fastest growing means of communication ever.
3. Devices connected to the web outnumber humans.
4. The first webcam was used to watch the coffee.
5. China has treatment camps for the Internet addicts.
6. The Internet requires 50 Million horsepower to keep running in the current state.
7. The majority of the Internet traffic is not generated by humans, but by bots and malware.
8. The modern World Wide Web inventor Tim Berners-Lee was knighted by Queen Elizabeth.
9. Online dating generates approximately \$1 billion dollars every year.
10. 2010 was the year when Finland became the first country to make the Internet access a legalright.

## **8. Speaking Test**

Dwell on the ways the Internet has changed the landscape of global communication. Focus on would-be career paths for digital citizens in the 21<sup>st</sup> century. Do you consider yourself as a ‘digital citizen’ of modern era? Speak on your favourable career prospects.

Explore emerging I-net technologies and discuss how they alter and create new informationenvironments.

Indicate the possible aftermath of face-to-face communication elimination. Focus on both upsides and downsides of such a shift. If there are none of such challenges in your opinion, explain why.

Feature the phenomenon ‘Internet addiction’. Do you consider it to be the norm or a kind of some disorders? Substantiate your ideas.

## **9. Writing Assignment**

Research the theme “*The Most Unusual Use of the Internet from My Point of View*”.

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.

## UNIT 10. ONLINE COMMUNICATION MORALITY AND SECURITY

### 1. Discussion Starter

Describe and give your comments on the images below.

How do you think **pictures A** and **B** can be related to such notions as ‘digital dossier’ and ‘digital footprints’?

Do you know what is in your digital dossier?

Do you believe that so-called ‘digital footprints’ can impact your future greatly?



A



B

Commenting on **pictures C** and **D**, identify possible threats and weak spots in children and teen I-net communication.



C



D

## 2. Before You Read

Read the title from the article below. What do you think the text is going to be about? What do you know about new kinds of digital connection and online communication?

### Read the Article

#### Temporary Social Media

Messages that quickly self-destruct could enhance the privacy of online communication and make people feel freer to be spontaneous. One essential aspect of privacy is the ability to control how much we disclose to others. Unfortunately, we've lost much of that control now that every photo, chat, or status update posted on a social-media site can be stored in the cloud: even though we intended to share that information with someone, we don't necessarily want it to stay available, out of context, forever. The weight of our digital pasts is emerging as the central privacy challenge of our time.



But what if people could make their posts vanish automatically — making social media more of an analogue to everyday conversations that aren't recorded for posterity? That's the promise of services such as *Snapchat*, a mobile-phone app which popularity has increased dramatically during the past year. Evan Speigel and Bobby Murphy, who met as undergrads at Stanford, came up with the idea two years ago, around the time New York congressman Anthony Weiner accidentally made a public photo of himself public on Twitter and was forced to resign. *Snapchat* lets users take photos or short videos and then decide how long they will be visible to the recipient. After 10 seconds or less, the images disappear forever.

What makes temporary social media so appealing? *Snapchat*'s founders often remark that they wanted to give people a way to express themselves through something besides the idealized self-portraits many feel required to maintain on social-media sites. *Snapchats* might be more exciting to send and receive than other social-media posts because they are ephemeral, but they are also arguably a more natural way to communicate. Whereas Facebook and Twitter record and store your every offhand observation and casual interaction, interactions in temporary social media can be something like brief, in-person conversations: you can speak your mind without worrying that what you say will be part of your digital dossier forever.

Although *Snapchat*'s posture as the anti-Facebook is a large part of its allure, eventually its founders will have to confront some of the same privacy challenges that have vexed Facebook. *Snapchat* contains an obvious technological vulnerability.

ty: images that were meant to vanish can still be saved if the recipient uses a screen-capture feature to take a picture of the message during the seconds it appears. (If the recipient does this, *Snapchat* notifies the sender, but by then it's too late to stop the image from being preserved and shared.) Moreover, while *Snapchat* promises to erase photos from its servers, the company's privacy policy adds that it "cannot guarantee that the message data will be deleted in every case." As soon as a racy *Snapchat* picture of a celebrity goes viral, trust in the company could be eroded.

But regardless of the fate of *Snapchat* in particular, the idea of temporary social media is important because the ability to be candid and spontaneous — and to be that way with only some people and not others — is the essence of friendship, individuality, and creativity. Facebook and Twitter do make it possible for their members to wall off posts from the wider world and share them only with trusted people in certain circles. But since those posts still last forever, this capacity for limited sharing is technologically insecure. To the degree that temporary social networks increase our sense of control over the conditions of our personal exposure, they represent a first step toward a more nuanced kind of digital connection — one acknowledging that our desire to share can coexist with a desire for reticence, privacy, and the possibility of a fresh start.

Many brands may be wondering whether or not *Snapchat* is just one of the latest social media trends that is bound to pass with time and isn't worth investing in. However, innovative brands can take advantage of temporary social media by using it to experiment. Technology Review claims a few brands have already started offering disappearing coupons and secret announcements on the app, but there are many opportunities for personal, one-on-one connections with fans.

For instance, spamming a Facebook page with live updates from a conference networking party rife with cocktails, words of advice, and perhaps a bit of dancing might lead the average consumer to tire easily. But, when they can easily scroll through and react to 10-second clips they've opted into watching, their reactions will be more positive. Similarly, temporary social media leads to an increased sense of urgency—if you don't click it now, you may never get the chance to—which makes potential customers more likely to check out what a brand is posting. Temporary social media gives off that "in-the-moment" feeling, and no one wants to feel as if they're missing out.

According to Technology Review, this will "require a delicate balance to ensure that the initiatives tie back to business goals, while maintaining an authentic vibe." But, with the low stakes of uploading a short, disappearing clip to social media that can be reacted to and engaged with nearly immediately, brands should have an easier time maintaining a credible yet authentic standing among their audiences.

Temporary social media is changing the way we communicate by shortening the time it takes to react to something and giving positive reinforcement to the person who put it out there. While many people think social media is making users too removed from the people and brands they communicate with, apps such as Snapchat are working to fill in that distance with good stories and authentic moments.

#### 4. Comprehension Check

**Answer the following questions.**

1. What is the primary goal of *Snapchat* application?
2. What are the essential aspects of privacy the author emphasizes on? Do you agree? Why?
3. Why do you think *Snapchat's* mascot shows a picture of a grinning ghost?
4. What event made Evan Speigel and Bobby Murphy come up with the idea of *Snapchat's* mobile-phone app creating?
5. What makes *Snapchat* different from the most well-known online social networking services such as Facebook and Twitter?

**Add your own endings to the following sentences from the essay.**

- One essential aspect of privacy is ...
- The stuff which makes temporary social media so appealing is ...
- Interactions in temporary social media can be something like ...
- Images that were meant to vanish can still be saved if ...
- The idea of temporary social media is important because ...

#### 5. Use of Language Practice

**Form as many derivatives as you can from the words in the table below.**

Verbs	Nouns	Adjectives	Adverbs
	access		
		Emerging	
	benefit		
define			
	threat		
		Different	
			completely
		Sufficient	
vary			

**6. Choose the correct alternative to complete each sentence. Consider both the grammar and the meaning of each option.**

The ‘Information Superhighway’, or the Internet, is a (1) **power / empower / powerful** medium for today’s information driven society. From its humble beginnings as (2) **the / a / -** series of networks established to help the military and government share resources, it has become a (3) **place / market / arena** for people to engage in commerce, business and personal facilities. Yet, there has (4) **risen / raised / arisen** a series of problems.

The Internet, because of its modern nature is not really (5) **well / good / nice** dealt with when it comes to (6) **exist / existence / existing** ethical and moral issues. The Internet has fostered anew (7) **class / group / team** of community that requires a unique category of moral values and ethical considerations. Things are always going to be dealt with (8) **different / differently / indifferently** when it comes to any revolutionary type of medium. How can interstate trade be regulated by the federal government when it is (9) **electronic / electronical / electronically** transferred information?

Last year, for instance, a law firm caused a major uproar (10) **with / by / through** posting an ad for its services on 6,000 Usenet newsgroups. That kind of activity, known as “spamming”, just isn’t done. Companies should convey their messages (11) **unselectively / inseleectively / selectively** and (12) **inappropriately / unappropriately / appropriately**. There is little legislation which protects children and (13) **person / personnel / personal** safety that governs society’s (14) **relationships / relations / relation**. The solutions to any problems with the internet are so complex that any legislation that could ensue might threaten to (15) **infringe / unfringe / defringe** upon the rights and privileges that people enjoy today.

**7. Read the article. Nine parts of sentences have been removed from the text. Put the correct sentence from A-J below in each space (1-9) to form a logical text. There is one extra item you don’t need.**

***The Good, the Bad, or the Internet***

As more people around the world gain access to all the tools of the digital age, the internet will play a greater role in everyday life. According to the recent Pew Research Center survey in emerging and developing nations, (1) \_\_\_\_\_ has been a good influence in the realms of education, personal relationships and the economy. But despite all the benefits of these new technologies, on balance people are more likely to say that the internet yields a negative rather than a positive influ-

ence on morality – (2)\_\_\_\_\_.

“We didn’t really define morality for people’s individuality but related it to perceived threats on cultural values, not just on morality”, said philosophy professor Randall Curren (University of Rochester, New York). It’s true that different cultures view morality in different ways. In many Muslim countries, for instance, it is believed that the Internet is bringing (3)\_\_\_\_\_ which are perceived as sort of drawing their young people away from the established customs and ideas.

Parents, in particular, are very nervous about the influence (4)\_\_\_\_\_ and might even feel threatened by certain world views and social patterns of their offspring. On the contrary, younger, more educated people with higher incomes or those able to read and speak English are more likely to have access to the Internet and less likely to say that it is bad for morality, according to the Center’s survey. However, parents’ fears are not always groundless. (5)\_\_\_\_\_ carried out by the Nominet Trust, an organisation that promotes internet projects which address social disadvantage. Eighty per cent acknowledge social networking sites have the ability to take over their children’s lives. They are true to believe that it is not the best way to release pressure for their offspring’s health sitting in front of personal computers chatting throughout their spare time. One in three parents, meanwhile, claims the Internet has the power (6)\_\_\_\_\_ and is sure their children are in danger from the web.

What is also worth noticing is that there is no certain way that can restrict the information on the Internet. It is saying that youngsters may receive all kinds of information without the ability of judging it, (7)\_\_\_\_\_. Some invisible hazards are inside the digital world. Children sometimes go to the websites that contain violent, porn, and other inappropriate information. However, so far, there has been no good method to completely restrain information before it gets to the children. Furthermore, the Internet has become a major source of entertainment for the younger generation according to the development of flash and web-based games. Some youngsters are so addicted to it that (8)\_\_\_\_\_ such as academy and athletics. Moreover, the majority of parents allege that their children are too young to distinguish the true stories from the false ones, they often get the wrong information and the wrong concept of the society, and become easily annoyed, irritated or even depressed.

But it has been also found that most fears are exaggerated and lack of neurological evidence. First, social networking sites, in themselves, are not a special source of risk to children, and are generally beneficial as they support existing friendships. In addition, playing action video games can (9)\_\_\_\_\_ while computer-based activity provides mental

stimulation, and can help slow rates of cognitive decline. Thus, the global children protection agencies advise parents to talk to their offspring about how they use the internet, to block adult websites, to set time limits for browsing and to set up an instant alert system if children try to view blocked sites. All in all, it is families not organisations that have to safeguard their children, both on and offline.

- A.in matters affecting the natural, cultural and economic conditions of millions of people
- B.the extraordinary findings come from a poll of 1,000 parents
- C.people say that the increasing use of the internet
- D.they start to perform poorly in other fields
- E.a lot of Western images and ideas of English language content
- F.depending of course on how you define this notion
- G.improve some visual processing and motor response skills
- H.the Internet is having on their tech-savvy descendants' thinking and development
- I.though it may sometimes be beneficial
- J.to “rewire” brains without a person’s knowing

## **8. Web Research Activity**

Surfing the net, complete the table of pros and cons of temporary social media use. Compare your ideas with your partner’s ones. Using the information found, get involved into the following role-play activity.

**Student A** You are eager to boost one of the latest versions of Temporary Social Networking Application. You should convince your audience that your product is going to alter human relationships to online visibility, data privacy and to content ownership.

**Student B** You are an opponent of such innovations. You do believe that temporary social media gives nothing but posting of inappropriate pictures, hacking into profiles, spreading rumours, etc. Substantiate your ideas with examples and prove that natural ways to communicate are the only suitable ones for human beings.

## **9. Speaking Test**

- Identify the effects and weak spots in adolescent/young adult I-net communication. Outline the phenomenon of ‘cyber bullying’. How common is the problem of cyber bullying amongst teenagers?

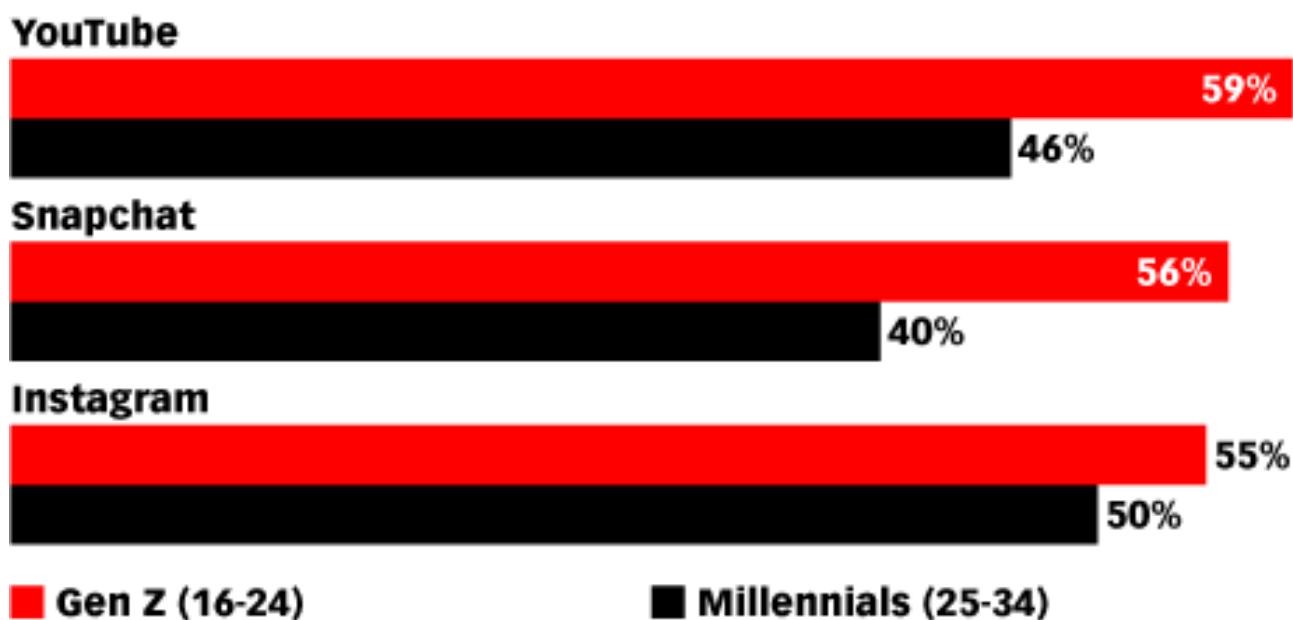
- Share your considerations as for the notion ‘appropriate online behaviour’. Why is it so that schools today need to educate students the rules of personal safety while entertaining and socializing online?
- Give your considerations why such giants as Apple may come to the U.S government’s “badlist” of the tech world’s “bad boys”? Substantiate your ideas with examples.
- Comment whether Apple was right in its refusal to unlock a phone that belonged to the terrorist, San Bernadino shooter Syed Farook?
- Have a look at the graph given below.

- 1. Make an analyses of the data revealed.**
- 2. Describe the graph and compare the amount of percentage, highlighting the tendencies depicted in the picture.**

### **Mobile Apps Where US Gen Z vs. Millennial Internet Users Have Increased Their Usage, May 2018**

**% of respondents in each group**

---



*Note: vs. last year*

*Source: VidMob, "State of Social Video," Aug 6, 2018*

241532

[www.emarketer.com](http://www.emarketer.com)

**Divide into two groups. These are two issues each group should support and prove:**

1. Allowing the government special access to software that can unlock any de-

- vice at any time violates personal rights.
2. Providing access to software may thwart other attacks and does not break the trust that consumers have with a company like Apple.

## **10. Writing Assignment**

Project the topic "**The Ways Online Environment Influences Individual and/or Collective Intelligence**".

Prepare an essay or make a presentation in class indicating the issue of 'information freedom' as the core of every free human society and featuring a worldwide impact of this phenomenon.

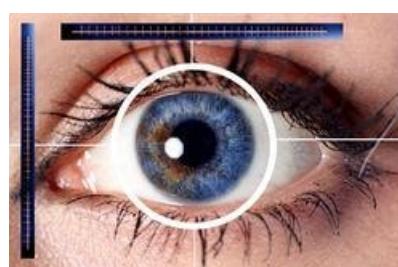
## UNIT 11. CRYPTOLOGY IN THE COMPUTER ERA

### 1. Discussion Starter

Have a look at some modern trends of cryptography given below. Match each concept (1-8) with its image (A-H). Then, indicate the meaning of depicted concepts.

1. Cyber Crime Security
2. Binary Security Lock
3. Cyber Theft
4. Cyber Security Leak

5. Access Key Security
6. Digital Data Security
7. Scan Cyber Eye for Security
8. Hacker Attack



**Comment on the pictures given above and say what you know about information security breach.**

## 2. Before You Read

Read the title from the article below. What do you think the text is going to be about? What are some possible dangers of surfing the Internet? How, in your opinion, can people protect themselves from these hazards?

### Read the Article

#### Privacy and Computers

by Robert Erani

In an era of online social media, people can announce any event to their virtual network of friends, family, and acquaintances within moments. From birthday celebrations to baby pictures, friends get news about each other from texts, tweets, or social networks. In addition, many people use credit cards to purchase products and

complete numerous online forms with personal information for a variety of purposes.



As a result, personal information is ending up in the hands of other people. There are critics who are concerned by the lack of privacy. Despite such concerns, by following a few common-sense measures, people can use the Internet enjoyably and safely.

In our fast-paced world, social networking sites are, for many people, an important way to keep up with friends and family. The issue now is how open one should be with sharing private information since the information could be stolen by criminals. For example, some people have had their homes broken into because they had posted the details of their vacation online. If they had not posted those details, the thieves would not have known that they had gone away.

One way to reduce the risk of this happening is to activate the privacy controls on social networking sites and smartphones. In other words, think about who will see your information and consider how they might use it.

Another important step is to shop only on secure websites so that one's accounts, passwords, and financial records are protected. Some experts recommend that people should treat their online information like they would treat the contents of their wallets. For example, a man bought merchandise on a website that did not have a security padlock, and as a result of this transaction, his bank accounts were emptied. If he had paid attention to the security on the site, he would not have lost his money.

However, it appears that people are becoming more aware of the risks of fraud and taking steps to avoid them since the total percentage of incidences of fraud remained steady in the past years. It may be that people who have grown up using the Internet understand its risks as well as its strengths.

The Washington Post recently carried out a poll to study the extent to which

people were concerned about their online privacy and security. The poll, titled ‘Surveillance in America’, discovered how corporate and government surveillance affected people’s online behaviours. It also investigated whether people made use of tracking and anti-tracking technologies for their own uses.

The first set of questions sought to determine people’s concern about collection of personal information by social networks, cell phone providers, websites, National Security Agency (NSA) and retailers (Amazon, Target etc.). The overall result of the question set reveals that over 66% of people are more concerned about handing over such information to such bodies or organizations. The next set of questions was to investigate the bright side of surveillance, the one which helped government and businesses to fight/control crime. Although a clear 84% of poll participants thought it was right or ‘about right’, 16% still found it inappropriate or thought such surveillance compromised their privacy.

Another set of questions was to find the ‘Snowden effect’, and actions people took in response to NSA’s revelation about monitoring each and every aspect of your digital communications – phone records, calls, messages, email – everything. Surprisingly, 74% of people did not take any action to prevent from being tracked! However, of those who did attempt to save their online faces, 42% went for browser’s ‘do not track’ options, 29% deleted/edited something they’d posted earlier online, 17% encrypted their communications, 14% used anonymization services (such as Virtual Private Network), and 13% camouflaged this online/social profiles.

The last set of questions was the most interesting – they asked people’s own tracking habits. They were meant to gauge the positives of tracking technologies, such as those used by parents to watch out their children whereabouts, or those used by caregivers to watch their patient’s statuses, or those used to find one’s spouse’s location. Except for the children monitoring of online usage in which 60% respondents agreed on the fairness of tracking technology, but 90%+ said ‘no’ for any type of unwarranted tracking.

In sum, until a clear line between good surveillance and bad surveillance is drawn, people would keep discrediting any of the effort to use surveillance. The ease of sharing information provides opportunities for crimes and abuses. While it may be impossible to entirely eliminate the risks, if people followed reasonable guidelines to protect important data, they could greatly reduce these risks. The benefits of being able to do such things as bank online, keep medical records updated almost instantly, and share the thrills both big and small of everyday life with friends outweigh these concerns.

### **3. Comprehension Check**

Answer the following questions.

1. What two suggestions does the writer of “Privacy and Computers” make for being safe on the Internet?
2. What issues did the Washington Post Survey reveal?
3. Why do you think people keep discrediting any of the effort to use surveillance?
4. What important issues do you believe are missing from the original article?
5. What other privacy issues do you have concerning the use of your personal information?

### **4. Use of Language Practice**

- **Mark the statements as True (T), False (F) or No Information Given (NI). Make false ideas correct according to the original essay Privacy and Computers.**

1. Most Americans don't favour the use of personal information by government authorities.
2. Government surveillance to fight crime is refused to acknowledge by the majority of the respondents.
3. Only 26% of people did ‘something’ to prevent tracking and surveillance.
4. A clear majority doesn't track anyone, even if it would help someone.
5. A former FBI counterterrorism agent provides a rather startling acknowledgment of just how vast government surveillance activities are.

### **5. Put the following linking phrases to fill in the gaps in the summary on Privacy and Computers.**

- a. As the author points out,
- b. According to the author,
- c. Furthermore, it has been discovered that
- d. The author concludes by stating that,
- e. It has been further stated

In the article *Privacy and Computers* the issues concerning the sharing of personal information online are explained. (1)\_\_\_\_\_ one area of concern is that people may sometimes share details of their lives online without thinking about the consequences. (2)\_\_\_\_\_ “The issue now is how open one should be with sharing private information since the information could be stolen by criminals”. The writer describes a situation in which people were robbed after revealing their vaca-

tion plans online. (3) \_\_\_\_\_ how important it is for consumers to protect their personal information when they purchase products online. (4) \_\_\_\_\_ most Americans would like to limit the extent to which surveillance is carried out. (5) \_\_\_\_\_ despite the concerns about privacy, one can still use online services safely by using common sense and privacy controls.

## 6. Match the given verbs with their synonyms from the box.

Eavesdrop, decrypt, deliver, snoop, deploy, suggest, gather, watch, track, disseminate, search, leak, handle, fix.

decipher	offer	manipulate	assemble	convey	fasten	seek for
escape	overhear	propagate	pursue	spy	spread out	pry

## 7. Use the phrases given below in the sentences of your own

Crypto wars, crypto and surveillance debates, voice calls and text messages decryption, eavesdropping protection, snooping prevention, crypto technology deployment, information dissemination, data leak prevention.

## 8. Web Research Activity

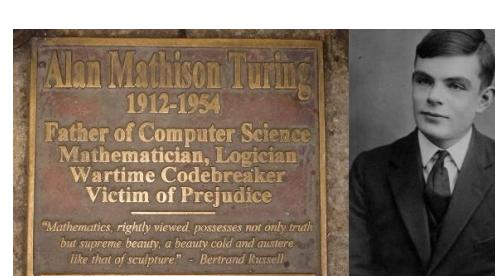
Surfing the web, trace the history of cryptography and cryptanalysis. Research the phenomena given below which relate to the origin and development of modern cryptology.



Reconstructed ancient Greek scytale ['sit.əl], an early cipher device



One of the variants of the Nazi Enigma machine, the late 1920s



Alan Turing and his code-breaking computer

## **9. Speaking Test**

- Discuss with your partner what you should do to keep your information safe? Make a list of recommendations how to provide secure online communication, to prevent data theft and to minimize the risks of vulnerabilities in the Cloud.
- Dwell on the issue why the study of data storage security is so topical nowadays? Substantiate your idea in class.
- Describe the phenomenon ‘crypto wars’. Say whether individuals and organizations should hide their personal and corporate secrets in a battle with government officials or ‘unlock their keys’ in the cases of threats to public safety.
- Characterize the latest improvements to the encryption and decryption of secure voice calls and text messages.
- Indicate and give characteristics of the mainstreams in the history of cryptology.

## **10. Writing Assignment**

Imagine yourself to be a successful cryptologist and research the theme “**My Own Would - be Crypto-product**”.

Prepare an essay or make a presentation in class introducing your product to would-be consumers. Give its characteristics and functions. Emphasize the perspectives of your product’s application.

## UNIT 12. MULTIMEDIA AND THE WEB

### 1. Discussion Starter

- Can the modern society manage without multimedia?
- In which spheres of the modern society do multimedia play the most essential role?
- What are advantages and disadvantages of using multimedia on a Web site?

Have a look at some Web-based multimedia applications. Match each concept (1-5) with its image (A-E).

1. Entertainment application  
2. Information delivery

3. Social media  
4. E-commerce  
5. Virtual world



A



B



C



D



E

Comment on the pictures given above and say what you know about multimedia elements.

## 2. Before You Read

- What does the concept “web design” include?
- What are the reasons for such uninterrupted and persistent development of web design?

**Read the Article**

### ***The Importance of Website Design for Your Business***

A website is the medium through which viewers can access information or purchase products over the internet. Having a website enables a business to reach a wider market, or prospective client base. It attracts potential customers and your target audience in a very short span of time.



In this regard, website design is one of the most important things that you need to consider if you want to develop a website.

Website design is a broad term that encompasses a wide variety of tasks, all involved in the formation of web pages. There are essentially two types of web designs you can decide on, which are dynamic and static design. Static web design is typically based on basic HTML code and Dynamic website design is built with superior and refined technologies according to the information available in the database.

The task of website design is performed by IT professionals who build the website using computer programming language that is understood by web browsers, normally HTML or JavaScript. Technically, the art of web design is very difficult since the website needs to be aesthetically attractive and have excellent usability, which means that your visitors must find the website user-friendly and eye-catching.

Web pages should also be efficient and versatile enough to be used with multiple browsers and platform configurations. Early steps in the design process include determining the primary objectives, intended audience, basic layout, and navigational structure for the site or applications. Tools, such as flowcharts, page layouts, and storyboards, can be used during the design process. Features that require a specific browser or infrequently used plug-ins should be avoided whenever possible; high-bandwidth items should be used only when needed and should be user-controlled, if possible.

The importance of web design and its impact on the web is a globally accept-

ed fact these days. Presentation of a website is a fundamental factor that the developer or owner must dwell on. The content in your website should be accessible in an organized and professional looking manner. The site should also have good content full of relevant information and enough functionality to entice visitors.

There are a number of navigational tools, such as drop-down menus, site maps, search boxes, imagemaps, frames, and navigational bars that can be used when creating the navigational structure of the site. In addition, you should consider breaking long Web pages into multiple pages and using a linked table of contents to enable the user to easily access any part of the document. Compatibility with various devices that might be used to access the site, as well as with assistive hardware, should be considered.

Your website will be developed in methods to sell your product more persuasively to your buyers. Various techniques and methods are employed to create and join words, colors, images, fonts, and graphics in order to express your message to relevant customers. Your website design must convince customers that you are legitimate, competent and also portray the solution that your product and service is intended to solve.

To achieve the above mentioned strategies, your web designing necessitates a professional touch from competent web designers who know how to put their best acquired skills and expertise to builda suitable gateway that can convert each visitor into a prospective buyer. When you hire the services of a highly qualified website designer or developer, you can rest assured that your online presence will successfully put your business message across and improve your conversions.

Additionally, hiring the services of website design experts is an investment rather than an expense, as it generates substantial profits for your business. After your website has been established, and thewebsite design is complete, your website will be optimized to improve visibility on the search engines. There are a number of systems intended to provide SEO (Search Engine Optimization) content for your website, quality links and also utilize Meta tags effectively. Many web hosting firms will also enhance your website rankings enabling a chance to obtain a constant number of daily visits.

Evidently, website design is of paramount importance to any new or established business. It is the most lucrative way to bring a rapid ROI to your business. A small investment of today will certainlyget you flawless results tomorrow.

### **3. Comprehension Check**

Answer the following questions.

- Why is website design so crucial for your company?
- Is website design an art or a science?
- How can your website design become an asset to your business?
- What attributes does a good web designer possess?
- What is the difference between Web design and Web development?

### **4. Look at the given key points in designing a Web site, explain them and add others:**

- navigation;
- content and visual elements;
- brand uniformity;
- engagement;
- organization and Search Engine Optimization (SEO).

### **5. Use of Language Practice**

Form as many derivatives as you can from the words in the table below. Make up your own sentences with them.

<b>Verbs</b>	<b>Nouns</b>	<b>Adjectives</b>	<b>Adverbs</b>
			undeniably
		essential	
		refined	
	usability		
require			
entice			
		navigational	
			infrequently
	compatibility		
necessitate			

### **6. Provide the opposites to the following words:**

Crucial, to enhance, to encompass, attractive, to avoid, globally, to entice, relevant, assured, paramount, lucrative.

**7. Fill in the gaps with the words which best fit each space:**

The design (0) OF a website has a huge impact (1) ... the User Experience (UX) for your visitors.

(2) ... making the navigation simple and easy to use, to ensure the speed of your site is (3) ... fast ...possible. Site speed is now considered to be a ranking factor due to its implications (4) ... UX. If your website design incorporates large images and other elements which slow your load time, you will be negatively impacting the UX (5) ... your website.

There are many ways (6) ... increasing this load time such as compressing files and carrying (7) ... a full audit. It is important to remember that the key goal of your website is to satisfy your users.

Your visual elements can also influence your design. Provoking the right emotion (8) ... your user can dramatically increase the UX of your website.

Finally, tying this (9) ... with the point about site speed, it is quite common (10) ... websites to be designed in flash, or with high levels of interactivity (11) ... the hope to increase the UX of their website. This can, in fact, have the opposing effect as it will slow the load speed and can make for a confusing experience (12) ... done wrong.

**8. For questions 1–13, read the text below and decide which lines of the text contain UNNECESSARY words. Indicate the correct lines with a tick (✓).**

**There is an example at the beginning (0).**

0	✓
00	ARE

### **Web Development**

0. Web development comes in two flavors: Front-end development and
00. back-end development. Some of the skills are in these two flavor overlap,
1. but they do have very different purposes needed in the web design profession.
2. A front-end developer takes the visual design of a website (whether they were created
3. that design or it was handed to them by a visual designer) and builds it in code.
4. A front-end developer will use HTML for the structure of the site, then CSS to dictate
5. the visual styles, layout, and perhaps even some Javascript. For some small
6. sites, front-end development may be the only kind of development that is very needed
7. for that project. For more complex projects, "back-end" development will come into play.

8. Back-end development deals with the more advanced programming and  
9. interactions on web pages. A back-end web developer focuses on how a site  
10. works and how the customers get things done on it by using certain  
11. functionality. This could include working with code that it interfaces with  
12. a database or being creating features like E-commerce shopping carts  
13. that connect to online payment processors and more on.

## 9. Web Research Activity

Surfing the net, compare different websites and make up a table of the latest website design and development requirements:

Requirements to	
Website design	Website development
1. 2. and more	1. 2. and more

## 10. Speaking Test

- Prove that multimedia is a good opportunity to boost the Ukrainian economy.
- Substantiate that Web design is one of the most creative professions in IT.
- Agree or disagree with the fact that multimedia designers will be in demand in Ukraine in the foreseeable future.
- Which mistakes should you avoid while designing and developing website?
- List three types of software programs that might be used when creating a multimedia Web site. Explain what each program would be used for and list one example (program name and publisher) of each. Name one situation in which a hyperlink would not be identified as a broken link by a Web site authoring program testing feature but would still be wrong and could only be detected by a human tester.

## 11. Writing Assignment

Research the theme “***The possible Use of Web-Based Multimedia in the Future***”.

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.

## UNIT 13. E-COMMERCE

### 1. Discussion Starter

- Explain what e-commerce is and describe some of the advantages and disadvantages involved with implementing e-commerce.
- Why has e-commerce demonstrated such explosive growth in the past couple of years? Identify a variety of e-commerce business models and discuss their differences.

Describe and give your comments on the images below.



A



B



C



D

## 2. Before You Read

Read the title from the article below.

- Do you have any ideas how to start e-commerce business?
- Explain the difference between e-commerce and e-business?

**Read the Article**

### ***How to Start an E-commerce Business?***

There is a logical order in how you would go about building an e-commerce business. Although setting up an actual onlinestore would probably take less than a day, researching, building, launching and growing a profitable e-commerce business is a

multi-layered process involving a number of steps and decisions.



**Choosing and sourcing a product.** The first step to starting an e-commerce business is deciding what products you're going to sell. Finding a profitable idea can be hard work, so be prepared to do some serious digging and thinking. It's essential that you

choose products with healthy margins that will allow you to turn a profit and scale the business in the future. Once you know what you want to sell, you'll need to decide how and where you're going to source the products. The four main methods of sourcing products and inventory are making, manufacturing, wholesale and dropshipping.

**Conducting research and planning ahead.** Your product idea will dictate which aspects of the market you need to research, but some of the most important areas to look into will be your competition, pricing strategy, and your unique value proposition. At this point, it is also a good idea to draft a business plan that will help you visualize your growth strategy and identify any potential threats or obstacles.

**Getting your brand right.** Now that you have a promising product idea and a clear overview of the market, it's time to start thinking about the key elements of your store, such as your brand name, domain name, brand guidelines, and your logo. Getting your brand right from the start can help accelerate the growth and conquer the hearts of potential customers. Before turning your attention to building the store, you should spend some time studying the basics of SEO, so that your business gets off to a good start.

**Deciding how you will sell.** The actual setting up of your online shop can be achieved in two ways:

- *You can build an e-commerce store from scratch* – this means either developing it yourself, or hiring a freelancer/agency to do it for you. It can take longer and cost more, but building a custom online store will guarantee 100% customization and give you the power to make all the decisions.

- You can use an off-the-shelf e-commerce solution which makes building an online store a quick and easy process. However, it will also mean less customization, as you will need to choose from an existing pool of themes and tools provided by the platform. If you opt to run a dropshipping business, e-commerce solutions will allow you to get the store off the ground and start selling in as little as few hours.

**Before launching.** At this stage, you'll be itching to get the store out into the World Wide Web. However, make sure you're well prepared to measure the success of your launch – defining your key performance indicators upfront will help you track your progress and performance and fix any issues as they emerge. Other important things to take care of include setting up your social media profiles, getting the email marketing ready, installing Google Analytics, doing keyword research, defining your shipping strategy and finalizing the launch promotion plan. Yes, that's a lot of work, but a good start is half the job done. When you complete the checklist, try running your store through the Shopify store grader to catch errors if there are any.

**After launching.** Welcome to the grind! This is where the real work begins. Having launched your online store, you should immediately move on to the promotion phase. Marketing your store and optimizing conversions will be your daily bread and butter from now on. You should also experiment with regularly expanding or refreshing your inventory. It is a particularly easy thing to do for dropshippers, as they can import new dropshipping products in minutes, but it should remain a priority even if you're manufacturing or making the products yourself. Staying ahead of the curve will take some testing.

### 3. Comprehension Check

Make up your own questions to shed light on the central ideas of the article **How to start an e-commerce business.**

**Add your own endings to the following sentences from the essay.**

- To start an E-commerce business, you need to ...
- Despite setting up an online store would take less than a day, ...
- E-commerce can take on a variety of forms involving ...
- It is also a good idea to draft a business plan that ...
- Feel free to make experiments with ...

#### 4. Use of Language Practice. Match words (1-11) to their definitions (a-k):

1. retail	a any tangible good that requires inventory to be replenished and orders to be physically shipped to customers as sales are made
2. wholesale	b a conventional store with a physical presence
3. dropshipping	c downloadable digital goods, templates, and courses, or media that must be purchased for consumption or licensed for use
4. online payment service	d a supply or stock of something
5. digital wallet	e the sale of a product by a business directly to a customer without any intermediary
6. physical products	f the design and development of a product to meet the specific requirements of a single customer
7. digital products	g a person browsing products without intention to make any purchases
8. window shopper	h the sale of products in bulk, often to a retailer that then sells them directly to consumers
9. inventory	i a type of payment service accessed via the Internet and used to make electronic payments to others, such as via deposited funds, a bank account, or a credit card
10. customization	j the sale of a product, which is manufactured and shipped to the consumer by a third party
11. brick-and-mortar store	k an app or online service that stores information (such as credit, debit, and loyalty cards; digital coupons; and shipping information) and that can be used to speed up purchase transactions

- Read the following short text each line of which contains deliberate grammar mistake/-s. Find eleven mistakes and correct them.:.

*Mobile-friendly will be the new standard*

While in past many online shoppers have bought products via the Internet through their desktop or laptop, many consumers have begun to embrace smartphones full-on replacements towards personal computers. As soon as smartphones will become more cheap and easy to access, websites will have to adapt to the growing community of users which only view their sites on mobile. With order to compete in the mobile commerce market, companies will be needed to adapt their websites and make them mobile friendly. Sites that aren't will be ignoring by millennials, who can quick find an easier-to-use platform.

- For questions 1–10, read the text below and decide which lines of the text contain UNNECESSARY words. Indicate the correct lines with a tick (✓). There is an example at the beginning (0).

0	✓
00	IT

### ***The Best Way to Find Sponsors for a Web Site***

- 0 What is the best way to find sponsors for a Web site today?
- 00 The first step in finding a sponsor is to make it your Web site
1. appealing to potential sponsors – be sure your Web site is easy to navigate,
  2. quick to load, and being updated regularly. Having a site that will draw in visitors is
  3. one thing that sponsors look for. Next, create a list of potential sponsors (if you need ideas,
  4. find out a Web site that is similar to yours and see who is sponsoring it).
  5. Then think about which sponsors would have benefit the most from your audience and
  6. contact them. When setting the financial terms for your first sponsor,
  7. don't be afraid to go the lower than expected. You might even offer them
  8. a free trial period. Most of all, don't be afraid of rejection. If a potential
  9. sponsor turns you down, see if you can find out why so you can learn from that and correct
  10. if any problems before contacting the next sponsor. Soon your persistence will pay off.

- Choose the correct alternative to complete each sentence. Consider both the grammar and the meaning of each option.

### ***E-Tailing: It's All About Service***

Today, most websites are easy (1) **in/to/for** use and provide reliable and cost-effective shipping. But less than 5% of people visiting a website ever turn (2) **off/over/into** paying customers. And if the rest have clicked (3) **through/at/on** a paid search ad without buying anything, bringing them (4) **on/to/in** the site actually costs the website money. How to convert these window shoppers

(5) *of/into/for* paying customers? Overstock.com believes (6) *in/on/of* customer service. It now has highly trained customer-service reps some part of whom staff a 24-hours-a day department to answer questions (7) *via/with/in* live web chats on the site. When a customer engages (8) *into/in/by* a live chat with a sales rep, the average purchase doubles (9) *at/for/in* value. Then there's LivePerson, a publicly-traded New York firm that makes customer-tracking software.

What's most cool about LivePerson's technology is that it follows what customers are doing and can automatically flag and offer help to e-customers based (10) *at/in/on* rules individual e-tailers set. Some small private companies offer animated characters who act (11) *as/with/for* sales reps on e-tail sites, drawing from a databank of voice answers to commonly asked questions. Software e-tailer Goldfish Software credits its animated sales rep (12) *to/with/for* converting 33% more of its browsers into buyers. Other sites are closely watching how people navigate a site, and testing out what pages or promotions work best with different customer groups. But seller beware: research done by New York University's Stern School of Business has found most shoppers consider tracking (13) *with/from/without* their consent a violation of their privacy. When in a store, a customer has no expectation of privacy. But when someone is shopping online, he or she is usually at home or at work. A sales rep barging (14) *against/into/in* your shopping experience can feel like an invasion of privacy.

- For questions 1-16, read the text below and choose the most appropriate word from the list (A-R) for each gap. There are TWO EXTRA WORDS that you do not need to use. There is an example at the beginning (0).

### *E-tailing Consultant Work*

In the world of Internet (0) SHOPPING the job of an e-tailing consultant is to help e-tailers to (1)... their businesses by (2) ... their websites, their products, services, and increasing their sales. One of the main challenges for e-tailers today is to convert (3) ... into purchase especially because they have to pay to (4) ... their sites to increase (5) .... That's why firms use a conversational agent, or (6) ... host, called an avatar by computer specialists. It is an (7) ... character that appears on the customer's screen. And can answer questions and (8) ... with the customer, just like with a sales (9) ... in a store. Having real people to communicate with clients (10) ... is too expensive for small e-businesses. A conversational agent is a computer program which uses (11) ... intelligence to (12) ... with customers.

Depending on the product and the type of (13) ..., these agents can increase (14) ... by as much as 505%. The longer customers spend on the site, hearing and asking

questions about a product, the more chance there is they will buy it. It builds their (15) ... in the product. And research has shown that people trust what they hear from a (16) ... agent much more than what they simply read on a website.

- |                  |              |                   |
|------------------|--------------|-------------------|
| A online         | B rep        | C animated        |
| D customer       | E advertise  | F commerce        |
| G traffic        | H inventory  | I window-shopping |
| J conversational | K grow       | L improving       |
| M interact       | N virtual    | O confidence      |
| P sales          | Q artificial | R chat            |

## 5. Web Research Activity

Choose one of these issues and prepare a one-page summary of your findings and opinions, surfing the net:

**Click fraud** occurs when sponsored links are clicked with the goal of costing the sponsor money. Determine how big the problem is and the form it most commonly takes today. Include the information, answering these questions:

- What are search sites doing to detect or prevent click fraud?
- What actions can a company take if it believes it is a victim of click fraud?
- Is click fraud illegal?

**The current status of m-commerce in the world.** Include the information, answering these questions:

- What types of m-commerce services are available via mobile phones today?
- If you have a smartphone, what types of m-commerce transactions do you have access to? Have you used them?
- Can you use NFC (Near Field Communication) with your phone?
- Are there any locations in your area where you could purchase goods or services using a smartphone and NFC?

## 6. Speaking Test

- Present and discuss the types of e-commerce Web sites used in e-commerce (manufacturer sites, e-tailer (online retailer) Web sites, subscription sites, brokerage sites, online auction sites, etc.).
- Describe different strategies for implementing Web-based e-commerce.
- Discuss the options available to handle the electronic financial transactions that occur via the site.

- Discuss some security issues that all businesses conducting e-commerce activity should be concerned with.
- Speak about an online service known as a digital wallet, its application, and its advantages for e-commerce sites.

## 7. Writing Assignment

Research the theme "***The Future of E-commerce***".

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.

## UNIT 14. COMPUTER ARCHITECTURE

### INTRODUCTION

There are different types of computer of varying size and power, including the following:

**Supercomputer** (the most powerful type of mainframe)

**Mainframe** (large, very powerful, multi-user i. e. can be used by many people at the same time, multi-tasking i.e. can run many programs and process different sets of data at the same time)

**Minicomputer** (smaller than a mainframe, powerful, multi-user, multi-tasking)

**Personal computer (PC)** (single user)

*Desktop computer* (suitable size for sitting on an office desk)

*Workstation* (most powerful type of desktop, used for graphic design, etc. )

*Portable* (can be carried around, can operate with batteries)

*Laptop* (large portable, can be rested on user's lap)

*Notebook* (size of a sheet of notebook paper)

*Handheld* (can be held in one hand)

*Pen-based* (main input device is an electronic pen)

*PDA* (personal digital assistant, has functions such as task lists, diary, address book)

Note that the term PC usually refers to an IBM compatible personal computer. e. an Apple Mac personal computer is not referred to as a PC. A computer that provides a service on a network e. g. storing files, sharing a printer, is known as a server computer. Server computers usually have a UPS (uninterruptible power supply) attached to them. This is a battery that automatically provides an electricity supply to allow the server to shut itself down properly if the main supply fails.

The processor e. g. Pentium, is the most important part of the computer. It processes the data and controls the computer. Powerful computers used as servers often have more than one processor. There are two main types of memory:

A. RAM (random access memory) holds the program instructions and the data that is being used by the processor.

B. ROM (read only memory) holds the program instructions and settings required to start up the computer.

The combination of the processor and memory is sometimes referred to as the CPU (central processing unit), although sometimes the processor itself is referred to as the CPU. The other parts connected to the CPU are known as peripherals. These can include input devices, output devices, storage devices and communications devices. Input devices include: keyboards, scanners, barcode readers, digital cameras,

microphones and video cameras e. g. webcams (small digital video cameras used on the Web). Output devices include: monitors (VDU display screens), printers, plotters, loudspeakers, headphones. Storage devices include: magnetic tape, floppy disks (diskettes), hard disks, CD-ROMs, CD-R disks, CD-RW disks, DVDs and MO disks. A common communications device is a modem (a modulator/demodulator used for converting digital signals to analogue signals and vice versa to allow a computer to be connected to the ordinary telephone system). A set of connectors used for carrying

signals between the different parts of a computer is known as a bus. Data is transferred constantly between the processor and memory along the system bus. Each part

of memory has its own memory address and the processor determines where processed data is stored by sending an address signal along an address bus and data along a data bus. This is synchronised by an electronic clock in the CPU that determines the operating speed of the processor. Transferring data between the processor and RAM can slow up the computer; therefore, some very expensive, extremely fast memory is usually used as a cache to hold the most frequently used data. In a desktop computer, the CPU (central processing unit) and storage devices (pieces of equipment used for reading from and writing to a storage medium) are normally built inside a system unit which consists of a metal chassis enclosed in a flat desktop or a tower shaped case. Other peripherals are attached to the system unit by cables. Each peripheral uses its own driver card or controller (an expansion card that is plugged into special expansion slots in the system unit). Expansion cards contain the electronics required to communicate with and control the device e. g. video or graphics cards are used for monitors, sound cards are used for audio input/output and NICs (network interface cards) are used for connecting to other computers in a network (computing devices connected together). Extra memory can also be added to the computer using special memory expansion slots inside the computer.

A portable computer that does not have enough space inside to fit expansion cards may use an external device called a port replicator to provide connections for peripherals. Storage devices in the form of a disk or tape are used to store the programs and data that are not being used. Note that the American spelling of disk is commonly used, although the British spelling, disc, is sometimes used. Before a program or data

can be used, it must be transferred from the storage device to the main RAM memory. Hard disks consist of a set of magnetic coated metal disks that are vacuum-sealed inside a case to keep out the dust. The magnetic surfaces of the disks are formatted using a read/write head to provide magnetic storage areas. These storage areas form concentric circles called tracks and each track is subdivided into sections called

sectors. The disks are rotated at high speed and read from or written to by the read/write head that moves across the surface of the disks. In server computers, hard disks can be connected together and made to operate as one unit using RAID (a redundant array of inexpensive disks - see Unit 17). This can speed up the system and provide a way of recovering data if the system crashes (fails suddenly and completely, usually referring to the failure of a hard disk). There is a variety of optical storage devices that use laser light to read or write to a disk, including:

- CD-ROMs (compact disk read only memory),
- CD-R (recordable compact disk),
- CD-RW (re-writable compact disk),
- DVD (digital versatile disk - previously known as digital video disk).

An input device called a barcode reader is a special type of scanner for reading bar-codes (a set of printed bars of varying thickness that are used to identify a product e.g. used to price items in supermarkets).

When comparing computers, the power of the computer is important. This is mainly determined by the speed and capacity (size) of each part of the computer. Speed is measured in hertz (Hz) i.e. cycles per second.

Capacity is measured in bytes (B) where 1 byte = 8 bits (binary digits) = 1 character.

When specifying a computer the following are normally quoted:

- A. the speed of the processor (MHz - megahertz, GHz - gigahertz)
- B. the capacity (size) of the memory (MB - megabytes)
- C. the capacity (size) of the magnetic storage devices e. g. hard disk, floppy disk (MB - megabytes, GB - gigabytes)
- D. the speed of the optical storage devices e. g. CD-ROM, DVD (given as a multiple of the speed of the first devices produced e. g. 24x = 24 times, 12x = 12 times)
- E. the display monitor size (measured in inches diagonally across the screen surface)
- F. the monitor image quality (resolution) given by the number of pixels (picture elements) that are used across and down the screen e. g.  $800 \times 600$ , or by the graphics standard used e. g. VGA (video graphics array), SVGA (super video graphics array)
- G. the graphics card memory size (MB - megabytes)
- H. the speed of the modem (measured in kbps - kilobits per second)

Two different number systems are used in computer specifications:

- A. The decimal system, which consists of ten digits from 0 to 9, is used for measuring speed.
- B. The binary system, which only has two digits (1 and 0), is used for measuring

capacity.

The following prefixes are also used in measurements:

	Decimal system	Binary system
kilo	$10^3 = 1$ thousand	$2^{10} = 1,024$
mega	$10^6 = 1$ million	$2^{20} = 1,048,576$
giga	$10^9 = 1$ thousand	$2^{30} = 1,073,741,824$

e. g. 1.7 GHz = one point seven thousand million cycles per second 256 MB =  $256 \times 2^{20}$  bytes = approximately two hundred and fifty six million bytes

Communication is provided between applications programs (word processors, drawing programs, etc.) and the computer hardware (the physical components of a computer system) by a set of programs collectively known as the operating system e. g. Microsoft Windows, MacOS.

**1. Match each item in Column A with its function in Column B. Then describe its function in two ways.**

A Item	B Function
RAM	controls the cursor
processor	inputs data through keys like a typewriter
mouse	displays the output from a computer on a screen
clock	reads DVD-ROMs
flash memory key	reads and writes to electronic chips on a card
monitor	holds instructions which are needed to start up the computer
keyboard	holds data read or written to it by the processor
DVD-ROM drive	provides extremely fast access for sections of a program and its data
cache	controls the timing of signals in the computer
ROM	controls all the operations in a computer

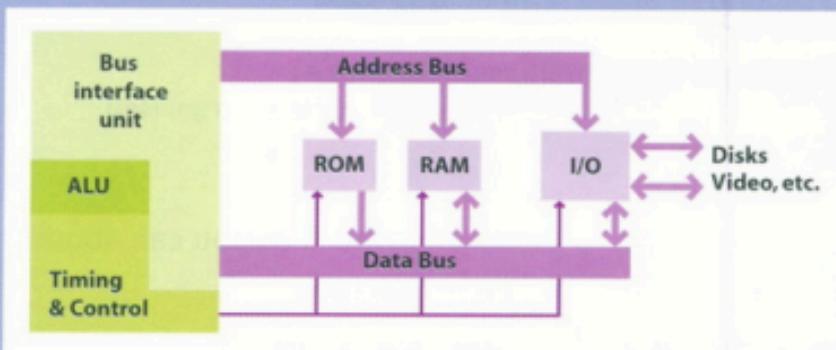
**2. With the help of the Glossary if necessary, describe the functions of these items.**

1. scanner
2. supercomputer

3. printer
4. mainframe computer
5. ATM
6. barcodes
7. PDA
8. swipe cards
9. hard disk drive
10. memory

### 3. Preposition of place

Study these examples of prepositions of place.



- 1 Data moves *between* the CPU and RAM.
- 2 Data flows *from* ROM to the CPU.
- 3 A program is read *from* disk *into* memory.
- 4 Data is transferred *along* the data bus.
- 5 The address number is put *onto* the address bus.

Fig 3  
Computer buses



Fig 4  
Hard disk

- 6 The hard disk drive is *inside* a sealed case.
- 7 Heads move *across* the disk.
- 8 Tracks are divided *into* sectors.

### 4. Complete each sentence using the correct preposition.

1. The CPU is a large chip ... the computer.
2. Data always flows ... the CPU ... the address bus.
3. The CPU can be divided ..... three parts.
4. Data flows ... the CPU and memory.
5. Peripherals are devices ... the computer but linked ... it.
6. The signal moves ... the VDU screen ... one side ... the other.
7. The CPU puts the address ... the address bus.
8. The CPU can fetch data ... memory ... the data bus.

## **5. Put these instructions for opening a computer in the correct sequence.**

- A. Release the two catches underneath and lift up to remove panel.
- B. Shut down your computer by choosing Shut Down from the Apple menu or the Special menu.
- C. If there are security screws on the vertical plate on the back of the computer, remove them with a Philips screwdriver.
- D. Unplug all the cables except the power cord from your computer.
- E. Pulling gently, slide the tray out.

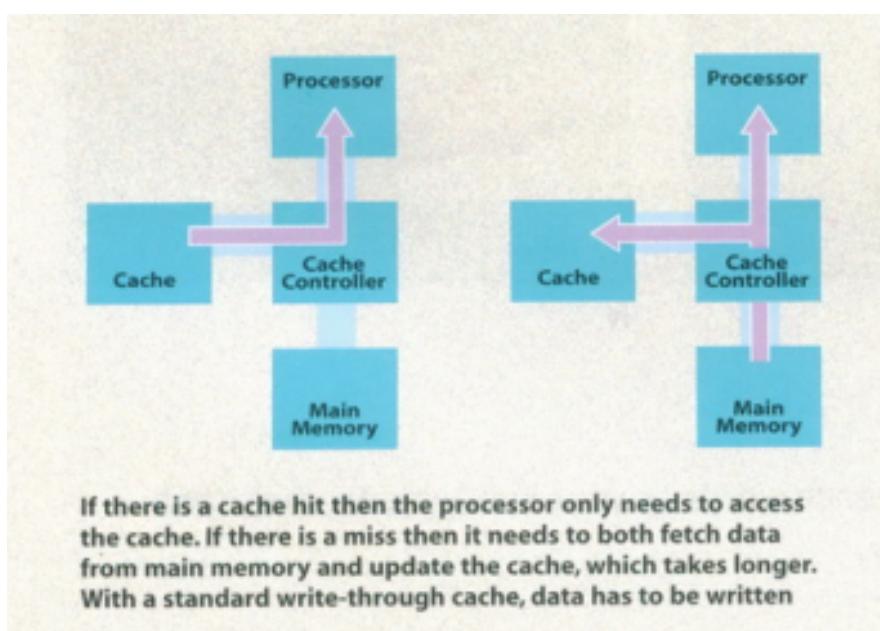
## **6. Find the answers to these questions in the following texts.**

1. What is one of the main causes of a PC not running at its highest potential speed?
2. When does a write-back cache write its contents back to main memory?
3. What word in the text is used instead of 'buffer'?
4. When is data marked as 'dirty' in a write-back cache?
5. What device looks after cache coherency?
6. What is the main alternative to 'write-through cache'?
7. What determines what data is replaced in a disk cache?

**Read the text**

### **CACHE MEMORY**

Most PCs are held back not by the speed of their main processor, but by the time it takes to move data in and out of memory. One of the most important techniques for getting around this bottleneck is the memory cache. The idea is to use a small number of very fast memory chips as a buffer or cache between main memory and the processor. Whenever the processor needs to read data it looks in this cache area first.



If it finds the data in the cache then this counts as a 'cache hit' and the processor need not go through the more laborious process of reading data from the main memory. Only if the not in the cache does it need to access main memory, but in the process it copies whatever it finds into the cache so that it is

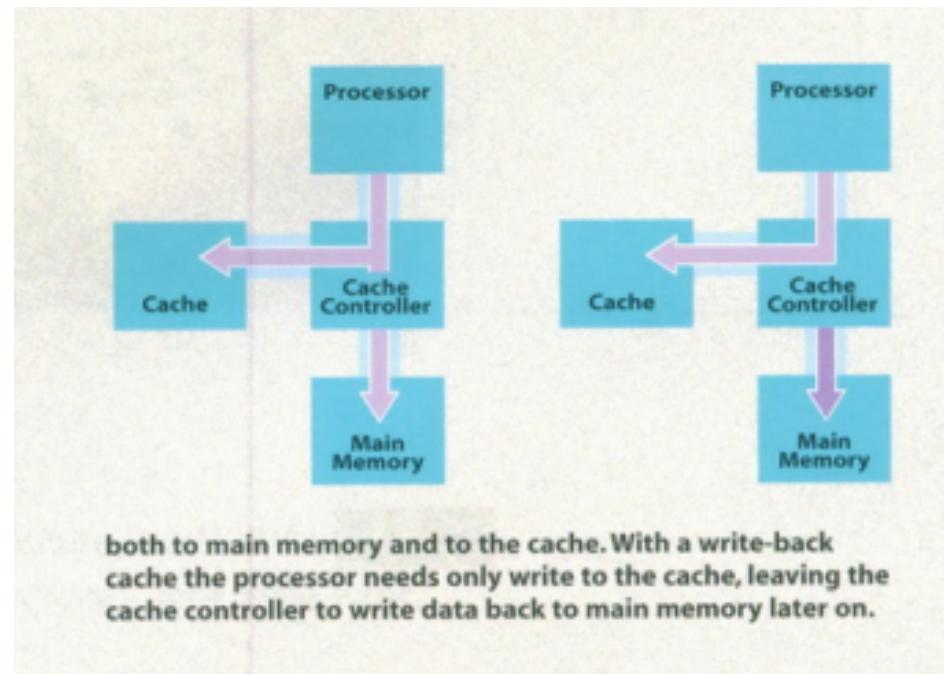
there ready for the next time it is needed. The whole process is controlled by a group of logic circuits called the cache controller.

One of the cache controller's main jobs is to look after 'cache coherency' which means ensuring that any changes written to main memory are reflected within the cache and vice versa. There are several techniques for achieving this, the most obvious being for the processor to write directly to both the cache and main memory at the same time. This is known as a 'write-through' cache and is the safest solution, but also the slowest.

The main alternative is the 'write-back' cache which allows the processor to write changes only to the cache and not to main memory. Cache entries that have changed are flagged as 'dirty', telling the cache controller to write their contents back to main memory before using the

space to cache new data. A write-back cache speeds up the write process, but does require a more intelligent cache controller.

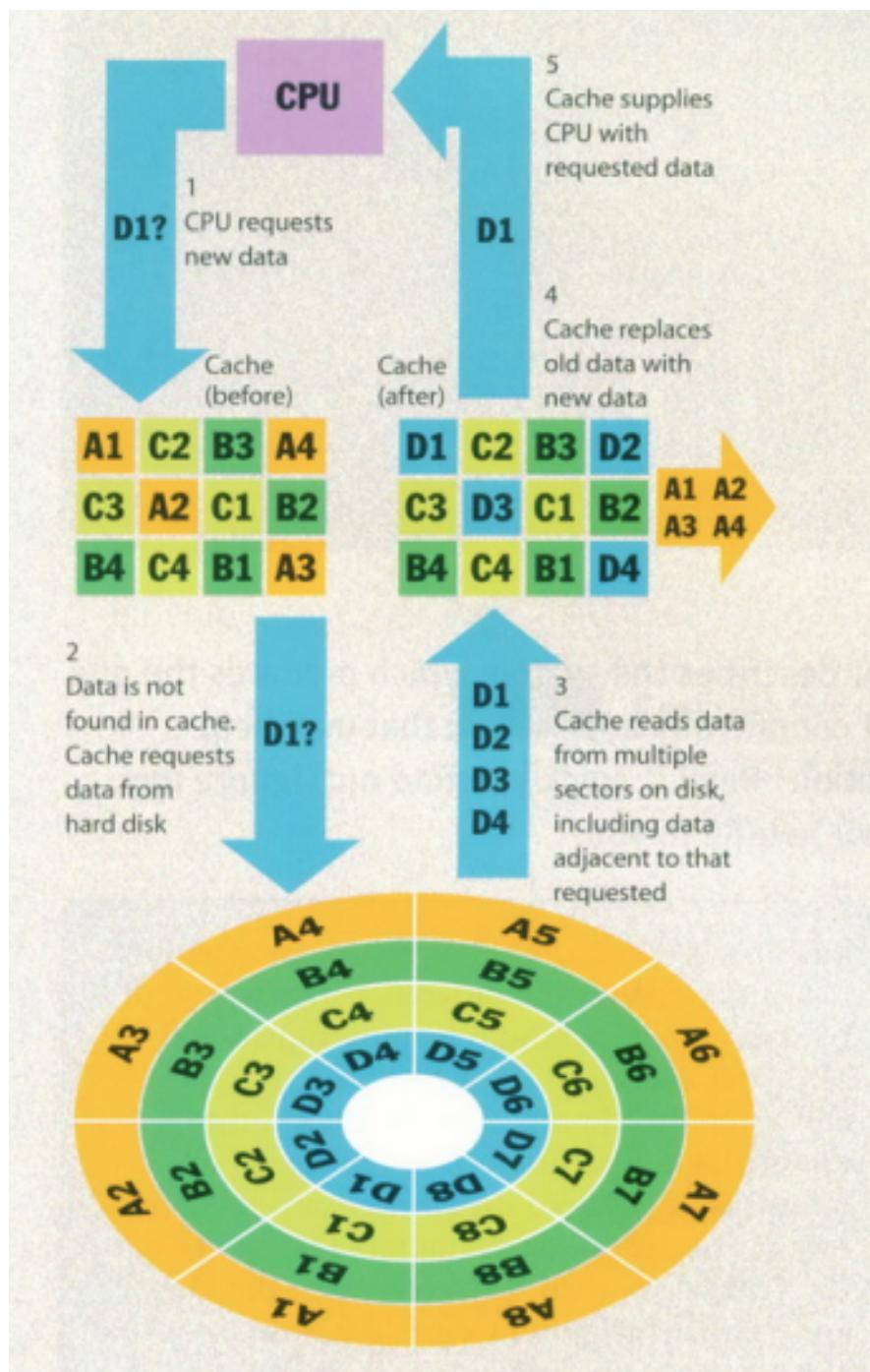
Most cache controllers move a 'line' of data rather than just a single item each time they need to transfer data between main memory and the cache. This tends to improve the chance of a cache hit as most programs spend their time stepping through instructions stored sequentially in memory, rather than jumping about from one area to another. The amount of data transferred each time is known as the 'line size'.



## 7. Read the text and do the tasks.

### How a Disk Cache Works

Disk caching works in essentially the same way whether you have a cache on your disk controller or you are using a software-based solution. The CPU requests specific data from the cache. In some cases, the information will already be there and the request can be met without accessing the hard disk.



If the requested information isn't in the cache, the data is read from the disk along with a large chunk of adjacent information. The cache then makes room for the new data by replacing old. Depending on the algorithm that is being applied, this may be the information that has been in the cache the longest, or the information that is the least recently used.

The CPU's request can then be met, and the cache already has the adjacent data loaded in anticipation of that information being requested next.

**8. Re-read the texts to find the answers to these questions. Match the terms in Table A with the statements in Table B.**

Table A	Table B
a. Cache hit	1. The process of writing changes only to the cache and not to main memory unless the space is used to cache new data
b. Cache controller	2. The amount of data transferred to the cache at any one time
c. Cache coherency	3. The process of writing directly to both the cache and main memory at the same time
d. Write-through cache	4. The processor is successful in finding the data in the cache
e. Write-back cache	5. Ensuring that any changes written to main memory are reflected within the cache and vice versa
f. Line size	6. The logic circuits used to control the cache process

**9. Mark the following as True or False:**

- A. Cache memory is faster than RAM.
- B. The processor looks for data in the main memory first.
- C. Write-through cache is faster than write-back cache.
- D. Write-back cache requires a more intelligent cache controller.
- E. Most programs use instructions that are stored in sequence in memory.
- F. Most cache controllers transfer one item of data at a time.
- G. Hardware and software disk caches work in much the same way.

## UNIT 15. COMPUTER APPLICATIONS

### INTRODUCTION

As computer systems become more intelligent, they are used in a wider variety of work situations where previously it was necessary to employ people. Hospitals can increasingly use computers where highly trained people were required to deal with life-threatening situations. Computers can also be used in airports where highly trained experts were previously required to ensure safety and the police can make more use of computers to detect and investigate increasingly sophisticated crimes.

One of the uses considered in this unit is police speed traps used to catch drivers that are breaking the official speed limit. In earlier systems, radar equipment was used to bounce radio waves off the moving car. A small processor, known as a microprocessor, calculated the speed of the car from the changes in the radio waves and triggered an ordinary camera with a flashgun to take a photograph of the car if it was speeding.

The details were stored on a smart card (a plastic card with a built-in computer system that can store large amounts of data). When the smart card was taken back to the police station, the driver's details were obtained from the DVLC (Driver and Vehicle Licensing Centre) database i.e. the central computerised records of all licensed drivers and vehicles. Newer systems prevent 'surfing' i.e. where the driver only slows down as they pass through the speed trap, by using two computerised units with digital cameras placed at a fixed distance apart. Each unit records the time that a vehicle passes it, as well as photographing and identifying the car licence number using OCR software (optical character recognition software that changes picture images of letters and numbers into digital form for use by a computer system).

The computer then uses the difference in recorded times to calculate the speed of the vehicle. The registration numbers of vehicles exceeding the speed limit are immediately downloaded (copied from the computer to a server computer) to the computer at police headquarters where each vehicle is matched with the DVLC database. Standard letters are then printed off addressed to the vehicle owners using mailmerge (a wordprocessing feature that produces a separate standard letter containing details obtained from each record in a database).

There are many ways in which computer systems can be used in large supermarkets, particularly for financial calculations and in stock control using EPOS tills (electronic point of sale cash tills). Each item on a supermarket shelf has a barcode label with a barcode (a standard set of vertical bars of varying thickness used to identify products) printed on it. The barcode number system giving standard price and item code numbers used throughout Europe is known as EAN (European Article Number). The barcodes are read by scanner devices called barcode readers that are

attached to the EPOS tills. When a checkout operator moves the barcode label across the scanner, the label is scanned and the barcode number for that item is read.

The scanner signals are converted to a digital form (where the changing signal is either off or on) and sent to the supermarket branch computer. The branch computer checks the digital EAN code against a computer database (a type of applications program used for storing information so that it can be easily searched and sorted) that holds a record of each type of item. In this way the item and the price of the item can be identified and the sale of the product can be recorded by the computer. The item and the price are shown on the EPOS till display and printed on a paper receipt.

Computers are also used to provide cash to users and to process bank cards such as Visa cards using an ATM (automatic teller machine - the type of machine used by banks for enabling customers to withdraw money from their bank accounts).

## LANGUAGE WORK

### Present passive

Study these sentences.

- 1 The radar sends out a beam of radio waves.
- 2 The information is stored on a smart card.

In 1 the verb is active and in 2 it is passive, the Present passive. Why is this so? What difference does it make? In 1 the agent responsible for the action is included – the radar. In 2 the agent is not included although

we know what it is – the microprocessor. The passive is often used to describe the steps in a process where the action is more important than the agent and where the agent is already known to the reader. If we need to add the agent, we can do so like this:

- 3 The information is stored on a smart card *by the microprocessor*.

**1. Describe the operation of the new speed trap by converting each of these statements to the Present passive. Add information on the agent where you think it is necessary.**

1. The first unit records the time each vehicle passes.
2. It identifies each vehicle by its number plates using OCR software.
3. It relays the information to the second unit.
4. The second unit also records the time each vehicle passes.
5. The microprocessor calculates the time taken to travel between the units.
6. It relays the registration numbers of speeding vehicles to police headquarters.
7. A computer matches each vehicle with the DVLC database.
8. It prints off a letter to the vehicle owners using mail merge.

**2. With the help of this diagram, sequence these steps in the operation of an EPOS till. Then write a description of its operation in the Present passive.**

- A. The scanner converts the barcode into electrical pulses.
- B. The branch computer sends the price and description of the product to the EPOS till.
- C. The scanner reads the barcode.
- D. The branch computer records the sale of the product.
- E. The till shows the item and price.
- F. The checkout operator scans the item.
- G. The scanner sends the pulses to the branch computer.
- H. The till prints the item and price on the paper receipt.
- I. The branch computer searches the stock file for a product matching the barcode EAN.

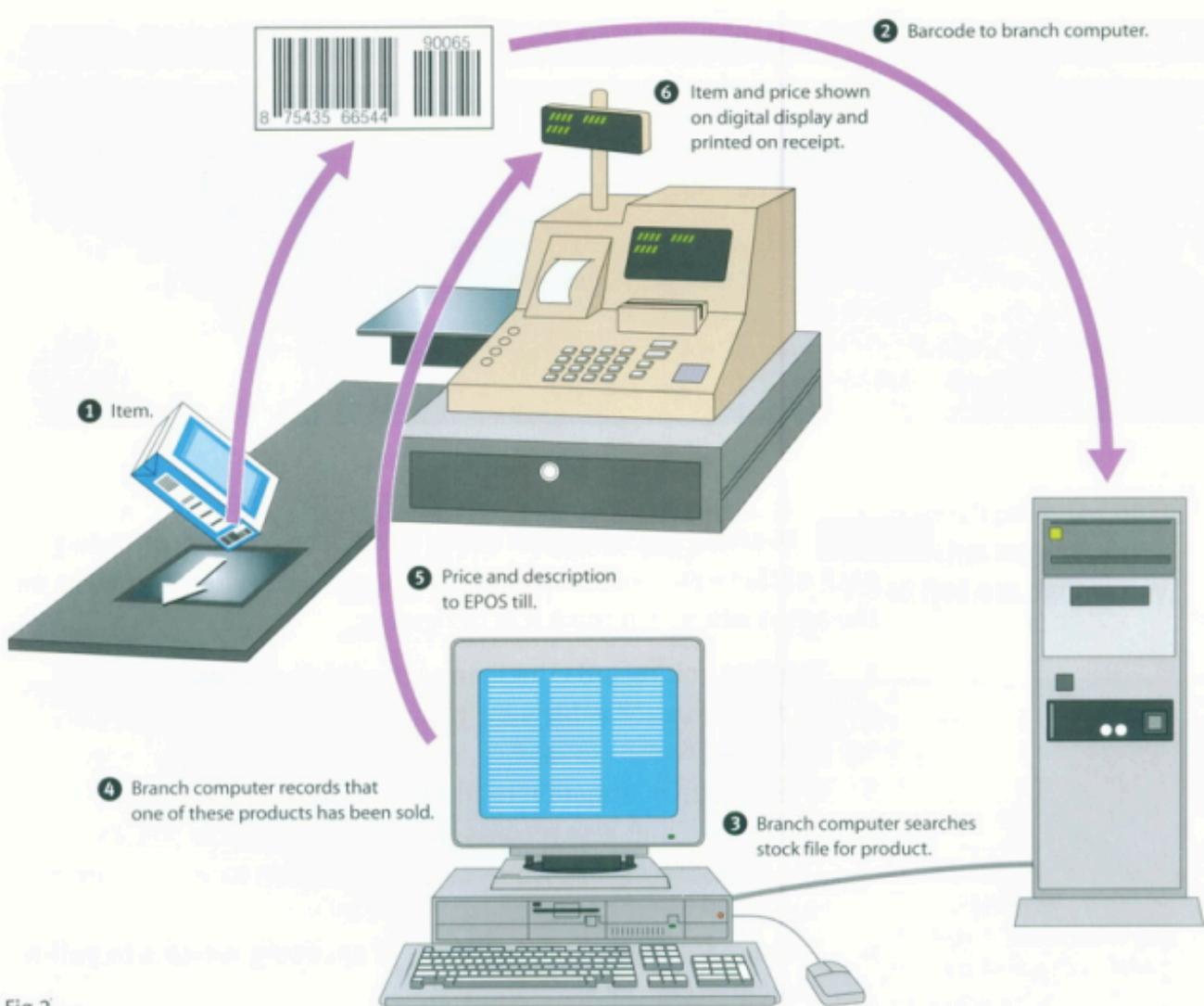


Fig 2  
Operation of EPOS till

### **3. Find the answers to these questions in the following text.**

1. What tool is often used in data mining?
2. What AI method is used for the following processes?
  - A. Separate data into subsets and then analyse the subsets to divide them into further subsets for a number of levels.
  - B. Continually analyse and compare data until patterns emerge.
  - C. Divide data into groups based on similar features or limited data ranges.
3. What term is used for the patterns found by neural networks?
4. When are clusters used in data mining?
5. What types of data storage can be used in data mining?
6. What can an analyst do to improve the data mining results?
7. Name some of the ways in which data mining is currently used.

## **DATA MINING**

Data mining is simply filtering through large amounts of raw data for useful information that gives businesses a competitive edge. This information is made up of meaningful patterns and trends that are already in the data but were previously unseen.

The most popular tool used when mining is artificial intelligence (AI). AI technologies try to work the way the human brain works, by making intelligent guesses, learning by example, and using deductive reasoning. Some of the more popular AI methods used in data mining include neural networks, clustering, and decision trees.

Neural networks look at the rules of using data, which are based on the connections found or on a sample set of data. As a result, the software continually analyses value and compares it to the other factors, and it compares these factors repeatedly until it finds patterns emerging. These patterns are known as rules. The software then looks for other patterns based on these rules or sends out an alarm when a trigger value is hit.

Clustering divides data into groups based on similar features or limited data ranges. Clusters are used when data isn't labelled in a way that is favourable to mining. For instance, an insurance company that wants to find instances of fraud wouldn't have its records labelled as fraudulent or not fraudulent. But after analysing patterns within clusters, the mining software can start to figure out the rules that point to which claims are likely to be false.

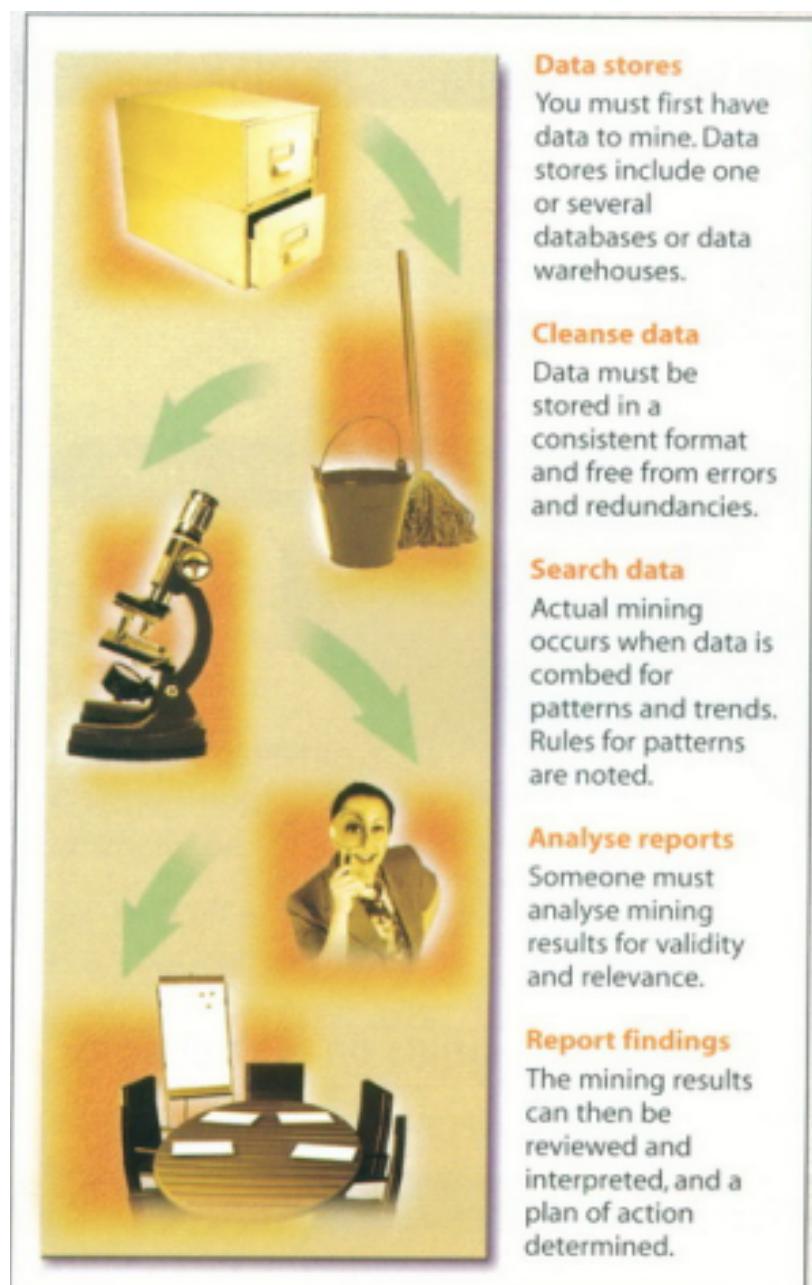
Decision trees, like clusters, separate the data into subsets and then analyse the subsets to divide them into further subsets, and so on (for a few more levels). The final subsets are then small enough that the mining process can find interesting pat-

terns and relationships within the data.

Once the data to be mined is identified, it should be cleansed. Cleansing data frees it from duplicate information and erroneous data. Next, the data should be stored in a uniform format within relevant categories or fields. Mining tools can work with all types of data storage, from large data warehouses to smaller desktop databases to flat files. Data warehouses and data marts are storage methods that involve archiving large amounts of data in a way that makes it easy to access when necessary.

When the process is complete, the mining software generates a report. An analyst goes over the report to see if further work needs to be done, such as refining parameters, using other data analysis tools to examine the data, or even scrapping the data if it's unusable. If no further work is required, the report proceeds to the decision makers for appropriate action.

The power of data mining is being used for many purposes, such as analysing Supreme Court decisions, discovering patterns in health care, pulling stories about competitors from newswires, resolving bottlenecks in production processes, and analysing sequences in the human genetic makeup. There really is no limit to the type of business or area of study where data mining can be beneficial.



**4. Re-read the text to find the answers to these questions. Match the terms in Table A with the statements in Table B.**

Table A	Table B
a. Data mining	1. Storage method of archiving large amounts of data to make it easy to access
b. Cleansed data	2. Data free from duplicate and erroneous information
c. Data warehouse	3. A process of filtering through large amounts of raw data for useful information
d. AI	4. A computing tool that tries to operate in a way similar to the human brain

**5. Mark the following as True or False:**

1. Data mining is a process of analysing known patterns in data.
2. Artificial intelligence is commonly used in data mining.
3. In data mining, patterns found while analysing data are used for further analysing the data.
4. Data mining is used to detect false insurance claims.
5. Data mining is only useful for a limited range of problems.

**6. Complete the following description of the data mining process using words from the text:**

Large amounts of data stored in data ... are often used for data ..... The data is first ..... to remove ... information and errors. The ..... is then analysed using a tool such as .... An analysis report is then analysed by an ... who decides if the ..... need to be refined, other data ..... tools need to be used, or if the results need to be discarded because they are .... The analyst passes the final ... makers who decide on results to the ... the ... action.

## UNIT 16. PERIPHERALS

### INTRODUCTION

EPOS (electronic point of sale) tills used in supermarkets form part of a computer system with various input and output peripheral devices attached to the till, including: electronic scales for weighing produce, barcode reader for looking up prices using barcodes, swipe card reader for reading bank cards, numeric keypad for inputting prices manually, LCD (liquid crystal display) screen for outputting purchase details.

Digital cameras are gradually being developed that are as good as conventional cameras. They have various electronic devices inside, including:

1. LCD (Liquid Crystal Display) screen used as a view-finder and for viewing the pictures after they have been taken.
2. CCD (Charge-Coupled Device) consisting of thousands of photo-transistors (light-sensitive transistors - a transistor is an electronic switch). It creates the pictures as a set of dots or pixels (picture elements).
3. Memory cards e. g. flash cards - solid state memory (electronic integrated circuits, i. e. chips, used for storing the pictures).

There is no delay in getting pictures from digital cameras because there is no film requiring chemical processing. They can be attached to a computer to directly transfer pictures for editing using special software and unwanted pictures can be deleted. However, they cost more than conventional cameras and the quality is not quite as good. You also need to buy rechargeable batteries and a photo-quality colour printer with high printing costs for paper, ink, etc. Two important features when buying a digital camera are:

1. picture quality or resolution. The resolution of a camera is measured in pixels and given as two numbers, indicating how many pixels there are across the image and how many going down the image e. g. 1280 by 960 (or  $1280 \times 960$ ).
2. the number of pictures the camera can store. The higher the resolution, i.e. the more pixels, the more memory is required to store the pictures. Data can be compressed to allow more pictures to be stored.

Storage devices are used to store data and programs that are not being used by the processor. They usually consist of:

1. storage media in the form of a circular disk or a tape where the data is stored
2. a disk or tape drive that moves the media past a read/write head that reads the data from and writes data to the storage media.

## Types of storage devices include:

magnetic devices (that use magnetism)	<b>floppy disks</b> (diskettes) and <b>magnetic tape</b> made of a magnetic coated flexible plastic; <b>hard disks</b> made of magnetic coated aluminium disks.
<b>optical devices</b> (that use laser light)	<b>CD-ROM</b> - compact disk read only memory <b>CD-R</b> - recordable compact disk <b>CD-RW</b> - re-writable compact disk <b>DVD-ROM</b> - digital versatile disk read only memory <b>DVD-RAM</b> - digital versatile disk random access memory
<b>magneto-optical devices</b> (that use a combination of magnetism and laser light)	<b>CD-MO</b> - magneto optical compact disk

Read only media enable the user to both read data from and write data to the media. Read and write media can only be used for reading data i. e. the stored data cannot be changed in any way.

Removable storage enables the user to change the media and transfer it to another computer.

Fixed storage does not allow the media to be changed or transferred to another computer.

Other factors that vary between storage devices include:

1. the speed at which the drive moves the media past the read/write head and reads or writes data to the storage media
2. the capacity of the media i. e. how much data can be stored on each disk or tape
3. the cost of the drive and the media.

There are various types of printers for outputting text and graphics to paper. Some types of printers are mono (print in black and white only) and others can print in colour. The speed, quality and cost of printing varies between different types of printer. Some are designed for printing text and are not really suited to printing

graphics.

Data can take many forms and there is a wide variety of input, output, storage and communication peripherals.

**Units of measurement used in data storage include:**

bit	a binary digit i.e. a 1 or a 0
byte	8 bits = 1 character i.e. a letter, numerical digit or a punctuation mark
megabyte (MB)	1,048,576 bytes (approximately one million bytes)
gigabyte (GB)	1,073,741,824 bytes (approximately one thousand million bytes)
terabit	1,099,511,627,776 bits (approximately one thousand gigabit)
micron	one millionth of a metre
angstrom	the approximate radius of an atom

**1. Study this data about storage devices. Then complete the blanks in the following sentences comparing and contrasting the different types.**

Device	Read/Write	Speed	Media Capacity	Media Removable	Cost/Mb
Fixed hard disk	Read and write	Fast	High to very high	No	Low
Removable hard disk	Read and write	Medium to fast	High	Yes	Medium to high
CD-ROM	Read only	Medium	Low	Yes	Low
CD-/+RW	Read and write	Medium	Low	Yes	Low
DVD-ROM	Read only	Medium	Medium	Yes	Low
DVD-/+RW	Read and write	Medium	Medium	Yes	Low
Magnetic tape	Read and write	Slow to medium	High to very high	Yes	Low
Flash drive	Read and write	Medium	Low to medium	Yes	Medium

1. You can write to hard disks ... optical disks.
2. DVD-ROMs have a ... capacity ... CD-ROMs.
3. CD-ROM and CD-RW disks are ... low priced.
4. Removable drives and flash drives cost ... other storage media.
5. CD-ROMs cannot be re-recorded ... some optical disks can.

6. ... hard disks, you can read from and write to flash drives.
7. ... fixed hard disks, DVD-ROMs are removable.
8. The cost of a fixed hard disk is ... a removable one.
9. ... magnetic tapes and fixed hard disks can have very high capacities.
10. DVD-RW disks are cheap ... removable hard disks are more expensive.

## 2. Read the text.

### Ready for the Bazillion-Byte Drive?

Thinking about writing your memoirs - putting your life story down on paper for all eternity? Why not skip the repetitive strain injury and just capture your whole life on full-motion video, putting it all in a device the size of a sugar cube? It might not be as far off as you think.

Currie Munce, director of IBM's Advanced HDD Technology Storage Systems Division, has one avowed goal: Build bigger storage. Recently Munce and his fellow Ph.Ds restored Big Blue's lead in the disk space race with a new world record for areal (bit) density: 35.3 gigabits per square inch - roughly three times as dense as any drive shipping at press time.

During the 1990s, areal density doubled every months, keeping pace with the transistor density gains predicted by Moore's Law. But increasingly daunting technical challenges face those who would push the storage envelope further. 'I think 20 magnetic recording technology has another good 5 to 10 years,' says Munce. 'After that, we'll see substantial difficulties with further advances at the pace people are accustomed to.'

From here on, a phenomenon called superparamagnetism threatens to make densely-packed bits unstable. Provided that new developments continue to thwart superparamagnetic corruption, scientists speculate that the theoretical limit for discrete bit recording is 10 terabits per square inch (1 terabit = 1,000 gigabits).

Approaching this limit will require new technologies. Two possible contenders are atomic force microscopy (AFM) and holographic storage.

AFM would use a spinning plastic disk, perhaps inside a wristwatch, and a tiny, 10-micron cantilever with a 40-angstrom tip (an angstrom represents the approximate radius of an atom) to write data. In theory, AFM will allow densities of 40 300 to 400 gigabits per square inch.

While AFM is still in the lab, holographic storage is closer to reality. According to Rusty Rosenberger, optical program manager for Imation, 'We are targeting a 5+ -inch disk with 125GB of storage and a 40MB-per-second transfer rate.' Future iterations of holographic systems should improve substantially.

The three-dimensional nature of holography makes it an appealing storage

medium because 'pages' of data can be superimposed on a single volume - imagine transferring a whole page of text at once as opposed to reading each letter in sequence. Hans Coufal, manager of IBM's New Directions in Science and Technology Research 5s division, predicts that the fast access rates and transfer times of holographic storage will lead to improved network searches, video on demand, high-end servers, enterprise computing, and supercomputing.

Meanwhile, also-ran technologies are thriving. Tape, first used for data storage in 1951 with the Univac I, has been revitalized by the corporate hunger for affordable archiving solutions. In the consumer arena, says Dataquest analyst Mary Craig, recordable CD-ROMs and DVDs will remain the dominant high-capacity removable storage media for the next decade. Despite their failure to match the areal density gains of hard disks, optical disks are cheap to produce, making them ideal for software distribution (until a mature digital rights management system facilitates online delivery). Finally, solid state options such as flash cards can't yet match the pricing of hard disks at high capacities.

Further out, scientists salivate over the prospect of data manipulation and storage on an atomic level. Because consumer demand for capacity is lagging behind what technology can deliver, bringing new storage options to the masses will depend on seeing the need for more space.

**3. Re-read the text to find the answers to these questions. Match the terms in Table A with the statements in Table B.**

Table A	Table B
a. Big Blue	Atomic force microscopy
b. Areal density	The approximate radius of an atom
c. Moore's Law	IBM
d. Superparamagnetism	The data capacity of a storage device measured in bits per square inch
e. Terabit	Prediction that the number of transistors that can be incorporated into a processor chip will double every 18 months
f. AFM	A phenomenon that threatens to make densely packed bits unstable in magnetic storage devices
g. Angstrom	One thousand gigabits

**4. Mark the following statements as True or False:**

- A. The development of AFM is more advanced than holographic storage.
- B. The predicted maximum storage density of AFM is 400 gigabits per square inch.
- C. Holography works in 3D.
- D. Univac I was the first computer to use tape storage devices.
- E. Users want higher capacity storage devices than technology can provide.

**5. Complete each gap in these sentences with the appropriate form of the correct verb from this list:**

*back up, keep up, update, build up, set up, upgrade, catch up, start up, upload, free up*

1. To avoid losing data, you should ... your files regularly.
2. You can ... your PC by adding a new motherboard.
3. Delete some files to ... space on your hard disk.
4. Data is ... from regional PCs to the company's mainframe each night.
5. The operating system boots when you ... your computer.
6. She's taking a course to ... her knowledge of computing.
7. The computer checks the memory when it ...
8. He ... a website to advertise his travel company.
9. You can ... with developments by reading PC magazines.
10. If you miss a class, you can study the handouts to ...
11. The image in a digital camera is ..... from a red, green and blue image.

## UNIT 17. ROBOT MANUFACTURING

### Introduction

Today most robots are used in manufacturing operations. The applications of robots can be divided into three categories:

1. material handling
2. processing operations
3. assembly and inspection.

Material-handling is the **transfer** of material and loading and unloading of machines. Material-transfer applications require the robot to move materials or work parts from one to another. Many of these tasks are relatively simple: robots **pick up** parts from one conveyor and place them on another. Other transfer operations are more complex, such as placing parts in an **arrangement** that can be calculated by the robot. Machine loading and unloading operations **utilize** a robot to load and unload parts. This requires the robot to be equipped with a **gripper** that can **grasp** parts. Usually the gripper be designed specifically for the particular part geometry. In robotic processing operations, the robot manipulates a tool to perform a process on the work part. Examples of such applications include **spot welding**, **continuous arc welding** and **spray painting**. Spot welding of automobile bodies is one of the most common applications of industrial robots. The robot positions a spot welder against the automobile panels and **frames** to join them. Arc welding is a continuous process in which robot moves the welding rod along the welding seam. Spray painting is the manipulation of a **spray painting gun** over the surface of the object to be coated. Other operations in this category include **grinding** and **polishing** in which a rotating **spindle** serves as the robot's tool. The third application area of industrial robots is assembly and inspection. The use of robots in assembly is expected to increase because of the high cost of **manual labor**. But the design of the product is an important aspect of robotic assembly. Assembly methods that are satisfactory for humans are not always suitable for robots. Screws and nuts are widely used for fastening in manual assembly, but the same operations are extremely difficult for a one-armed robot.

Inspection is another area of factory operations in which the utilization of robots is growing. In a typical inspection job, the robot positions a sensor with respect to the work part and determines whether the part answers the quality specifications. In nearly all industrial robotic applications, the robot provides a substitute for human labor. There are certain characteristics of industrial jobs performed by humans that can be done by robots:

1. the operation is repetitive, involving the same basic work motions every cycle,

2. the operation is **hazardous** or uncomfortable for the human worker (for example: spray painting, spot welding, arc welding, and certain machine loading and unloading tasks),

3. the work piece or tool are too heavy and difficult to handle,
4. the operation allows the robot to be used on two or three **shifts**.

## **2. Answer the questions**

1. What is the most common application of robots in automobile manufacturing?
2. What operations could be done by robots in car manufacturing industry?
3. How are robots used in manufacturing?
4. What is «material handling»?
5. What does a robot need to be equipped with to do loading and unloading operations?
6. What does robot manipulate in robotic processing operation?
7. What are the main reasons to use robots in production?
8. How can robots inspect the quality of production?
9. What operations could be done by robots in hazardous or uncomfortable for the human workers conditions?
10. How are robots used in manufacturing?
11. What is «material handling»?
12. What does a robot need to be equipped with to do loading and unloading operations?
13. What does robot manipulate in robotic processing operation?
14. What are the main reasons to use robots in production?
15. How can robots inspect the quality of production?
16. What operations could be done by robots in hazardous or uncomfortable for the human workers conditions?

## **3. Study these ‘System upgrades and options’ for the computer. Which upgrades and/or options would improve these aspects of this computer?**

- capacity
- speed
- protection from damage due to power failure
- network connections

### **Upgrades and options**

- 3Com 10/100 Ethernet controller
- CD-RW Drive
- Extra memory module

- APC 1400 Smart-UPS
- 3 Year Next-Business-Day On-site Service

**4. Put these instructions for opening a computer in the correct sequence.**

- Release the two catches underneath and lift up to remove panel.
- Shut down your computer by choosing Shut Down from the apple menu or the Special menu.
- If there are security screws on the vertical plate on the back of the computer, remove them with Philips screwdriver.
- Unplug all the cables except the power cord from your computer.
- Pulling gently, slide the tray out.

## UNIT 18. OPERATING SYSTEMS

### INTRODUCTION

The OS (operating system) is the set of computer programs that allow the user to perform basic tasks like copying, moving, saving and printing files. It also provides an interface between (i. e. provides communication between) applications programs (e. g. wordprocessors or spreadsheets) and the computer hardware. As a user interacts with an applications program on the screen, the applications program communicates with the operating system and the operating system communicates with the computer hardware. The work of the operating system takes place in the background and is not always obvious to the user.

The most important program in an OS is the supervisor program. It remains in memory all the time that the computer is operating, and manages the OS. It loads other parts of the OS into memory when they are needed. Programs that remain in memory while the computer is in use are known as resident programs. Programs that only stay in memory while they are being used are known as non-resident programs.

Some operating systems are command driven (i. e. the user runs a program by typing a command). The screen is usually blank except for a symbol (e. g. \$) which acts as a command prompt. When the command is typed at the prompt and the Enter key is pressed, the command is processed and the output is displayed on the screen. OS commands are usually short words or abbreviations (e.g., date, logout, passwd, is).

Unix is a command driven operating system used on all sizes of computers, but mostly large multi-user, multi-tasking mainframe computers. It is available in many versions, such as Linux, Minix, HP-UX, Xenix, Venix, Ultrix, A/UX, AIX, Solaris, and PowerOpen. Other command driven operating systems mentioned in this unit include: VAX/VMS, MVS VM OS/390, NetWare, MS- DOS and PC-DOS.

Some operating systems have a GUI (pronounced like 'goo-ey' - graphical user interface) that allows the user to use a mouse to click on icons on the screen or choose commands from a list of choices known as a menu. Operating systems with graphical interfaces mentioned in this unit include: MacOS, OS/2, Penpoint, Windows NT, Windows 3.x, Windows 9X and Windows 2000.

#### **1. Study this screen display and answer these questions.**

1. How do you enter Unix commands?
2. Which Unix commands does it show?
3. What is the output of each command?
4. What will happen when the last command is entered?

5. Which other Unix commands do you know?

```
$ date  
Mon Sep 19 12:45:38 BST 2005  
$ passwd  
passwd: Changing password for dsea03  
Enter login password:  
New password:  
$ ls  
home local mnt packages scratch  
$ logout >
```

2. Study this text title. What do you think it means?

### Operating Systems: Hidden Software

Now read this text to check your answer and to find the answers to these questions:

- 1. What difference is there between applications software and operating systems?*
- 2. Why is the supervisor program the most important operating system program?*
- 3. What is the difference between resident and non-resident programs?*
- 4. What are the main functions of an operating system?*

When a brand new computer comes off the factory assembly line, it can do nothing. The hardware needs software to make it work. Are we talking about applications software such as word processing or spreadsheet software? Partly. But an applications software package does not communicate directly with the hardware. Between the applications software and the hardware is a software interface - an operating system. An operating system is a set of programs that lies between applications software and the computer hardware.

The most important program in the operating system, the program that manages the operating system, is the supervisor program, most of which remains in

memory and is thus referred to as resident. The supervisor controls the entire operating system and loads into memory other operating system programs (called non-resident) from disk storage only as needed.

An operating system has three main functions:

- (1) manage the computer's resources, such as the central processing unit, memory, disk drives, and printers,
- (2) establish a user interface, and
- (3) execute and provide services for applications software.

Keep in mind, however, that much of the work of an operating system is hidden from the user. In particular, the first listed function, managing the computer's resources, is taken care of without the user being aware of the details.

Furthermore, all input and output operations, although invoked by an applications program, are actually carried out by the operating system.

### **3. Complete the gaps in this summary of the text on operating systems using these linking words and phrases:**

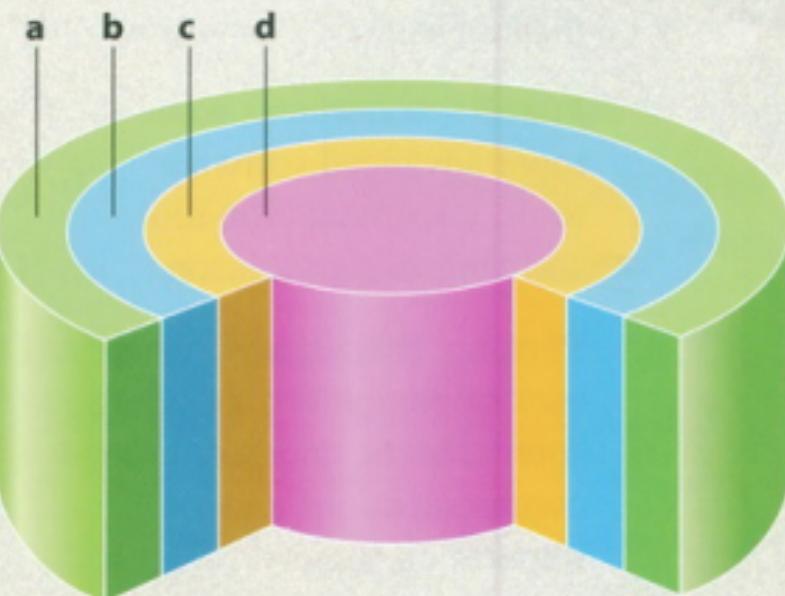
*although, in addition, because, such as, but, therefore*

The user is aware of the effects of different applications programs ... operating systems are invisible to most users. They lie between applications programs, ..... word processing, and the hardware. The supervisor program is the most important. It remains in memory, .... it is referred to as resident. Others are called non-resident ... they are loaded into memory only when needed. Operating systems manage the computer's resources, ... the central processing unit. ...., they establish a user interface, and execute and provide services for applications software. ... input and output operations are invoked by applications programs, they are carried out by the operating system.

### **4. Match the labels to the four layers of this diagram with the help of the diagram caption.**

1. applications programs
2. user
3. hardware
4. operating system

## A CONCEPTUAL DIAGRAM OF AN OPERATING SYSTEM



Closest to the user are applications programs – software that helps a user compute a payroll or play a game or calculate the trajectory of a rocket.

The operating system is the set of programs between the applications programs and the hardware.

### LANGUAGE WORK

#### -ing form (1) as a noun; after prepositions

We can use the -ing form of the verb as a noun. It can be the subject, object, or complement of a sentence. For example:

- 1 *Managing* the computer's resources is an important function of the operating system.
- 2 The operating system starts *running* the user interface as soon as the PC is switched on.
- 3 Another function of the operating system is *executing* and *providing* services for applications software.

The -ing form is also used after prepositions. This includes *to* when it is a preposition and not part of the infinitive. For example:

- 4 *Without* the user *being* aware of the details, the operating system manages the computer's resources.
- 5 We begin *by focusing* on the interaction between a user and a PC operating system.
- 6 We look forward *to having* cheaper and faster computers.

#### 5. Rewrite each of these sentences like this:

- 0 An important function of the operating system is to manage the computer's resources.

*Managing the computer's resources is an important function of the operating system.*

- 1 One task of the supervisor program is to load into memory non-resident programs as required.
- 2 The role of the operating system is to communicate directly with the hardware.
- 3 One of the key functions of the operating system is to establish a user interface.

4. An additional role is to provide services for applications software.
5. Part of the work of mainframe operating systems is to support multiple programs and users.
6. The task in most cases is to facilitate interaction between a single user and a PC.
7. One of the most important functions of a computer is to process large amounts of data quickly.
8. The main reason for installing more memory is to allow the computer to process-data faster.

**6. Complete these sentences with the correct form of the verb: infinitive or -ing form.**

1. Don't switch off without (close down) your PC.
2. I want to (upgrade) my computer.
3. He can't get used to (log on) with a password.
4. You can find information on the Internet by (use) a search engine.
5. He objected to (pay) expensive telephone calls for Internet access.
6. He tried to (hack into) the system without (know) the password.
7. You needn't learn how to (program) in HTML before (design) webpages.
8. I look forward to (input) data by voice instead of (use) a keyboard.

**7. This description of the Mac OS X is drawn from the table below. Write a similar description of Linux.**

*Mac OS X is a Unix-based operating system designed for use on Apple Mac computers. It includes memory-protection, preemptive multitasking and symmetric multiprocessing support. Graphics are provided by a graphics engine known as Quartz. It has advanced-PDF standards support, OpenGL and Quicktime integrated into the OS. The operating system features are accessed through a graphical user interface called Aqua.*

	Mac OS X	Linux
type	Unix-based	Unix-based
computer	Apple Mac	Wide variety
features	Memory-protection, pre-emptive multitasking, symmetric multiprocessing support	Variety of distribution kits available
graphics engine	Quartz	XFree86

Standart support	advanced-PDF, OpenGL, Quicktime	-
User interface type	GUI	Command line, GUI
User interface	Aqua	KDE, Gnome
Source code availability	Not available	Freely available

## 8. Find the answers to these questions in the following text.

1. What did Linus Torvalds use to write the Linux kernel?
2. How was the Linux kernel first made available to the general public?
3. What is a programmer likely to do with source code?
4. Why will most software companies not sell you their source code?
5. What type of utilities and applications are provided in a Linux distribution?
6. What is X?
7. What graphical user interfaces are mentioned in the text?

### LINUX

Linux has its roots in a student project. In 1992, an undergraduate called Linus Torvalds was studying computer science in Helsinki, Finland. Like most computer science courses, as big component of it was taught on (and about) Unix. Unix was the wonder operating system of the 1970s and 1980s: both a textbook example of the principles of operating system design, and sufficiently robust to be the standard OS in engineering and scientific computing. But Unix was a commercial product (licensed by AT&T to a number of resellers), and cost more than a student could pay.

Annoyed by the shortcomings of Minix (a compact Unix clone written as a teaching aid by Professor Andy Tannenbaum) Linus set out to write his own 'kernel' - the core of an operating system that handles memory allocation, talks to hardware devices, and makes sure everything keeps running. He used the GNU programming tools developed by Richard Stallman's Free Software Foundation, an organisation of volunteers dedicated to fulfilling Stallman's ideal of making good software that anyone could use without paying. When he'd written a basic kernel, he released the source code to the Linux kernel on the Internet. Source code is important. It's the original from which compiled programs are generated. If you don't have the source code to a program, you can't modify it to fix bugs or add new features.

Most software companies won't sell you their source code, or will only do so for an eye-watering price, because they believe that if they make it available it will destroy their revenue stream.

What happened next was astounding, from the conventional, commercial

software industry point of view - and utterly predictable to anyone who knew about the Free Software Foundation. Programmers (mostly academics and students) began using Linux. They found that it didn't do things they wanted it to do so they fixed it. And where they improved it, they sent the improvements to Linus, who rolled them into the kernel. And Linux began to grow.

There's a term for this model of software development; it's called Open Source (see [www.opensource.org/](http://www.opensource.org/) for more information). Anyone can have the source code - it's free (in the sense of free speech, not free beer). Anyone can contribute to it. If you use it heavily you may want to extend or develop or fix bugs in it - and it is so easy to give your fixes back to the community that most people do so.

An operating system kernel on its own isn't a lot of use; but Linux was purposefully designed as a near-clone of Unix, and there is a lot of software out there that is free and was designed to compile on Linux. By about 1992, the first 'distributions' appeared.

A distribution is the Linux-user term for a complete operating system kit, complete with the utilities and applications you need to make it do useful things - command interpreters, programming tools, text editors, typesetting tools, and graphical user interfaces based on the X windowing system. X is a standard in academic and scientific computing, but not hitherto common on PCs; it's a complex distributed windowing system on which people implement graphical interfaces like KDE and Gnome.

As more and more people got to know about Linux, some of them began to port the Linux kernel to run on non-standard computers. Because it's free, Linux is now the most widely- ported operating system there is.

**9. Re-read the text to find the answers to these questions. Match the terms in Table A with the statements in Table B.**

Table A	Table B
A. Kernel	1. A type of software development where any programmer can develop or fix bugs in the software
B. Free Software Foundation	2. The original systems program from which compiled programs are generated
C. Source code	3. A complete operating system kit with the utilities and applications you need to make it do useful things

D. Open Source	4. A Standard distributed windowing system on which people implement graphical interfaces
E. A distribution	5. An organisation of volunteers dedicated to making good software that anyone could use without paying
F. X	6. The core of an operating system that handles memory allocation, talks to hardware devices, and makes sure everything keeps running

**10. Mark the following statements as True or False:**

- a. Linux was created in the 1980s.
- b. Minix was created by a university student.
- c. Linux is based on Unix.
- d. Minix is based on Unix.
- e. Linux runs on more types of computer than any other operating system.

## UNIT 19. GRAPHICAL USER INTERFACES

### INTRODUCTION

A user interface allows a user to interact with a computer. In particular, a GUI (graphical user interface) allows the user to use a mouse to interact with the computer. Microsoft Windows (commonly referred to as Windows) is a common GUI used on PCs (IBM compatible personal computers). The main Windows background screen is called the desktop. Programs, files and folders are represented on the desktop by small images called icons. Using a mouse, the user can move a pointer (cursor) across the screen. An icon can be selected by clicking the left mouse button (i. e. quickly pressing and releasing the button). By holding the pointer over an icon (hovering), a text box can be made to appear that explains what the icon represents. This text box is known as a tooltip. Double-clicking the mouse (pressing and releasing the button twice in quick succession) causes the program, file or folder represented by the icon to open in a rectangular box on the screen called a window. More than one window can be open at a time but the one with the focus is known as the active window. Windows can have a vertical scroll bar and a horizontal scroll bar to allow the user to move a document up and down or across the screen respectively. A user can drag a selected item from one part of the screen to another by holding down the left mouse button while moving the pointer. The user can then drop the item at the new location by releasing the mouse button.

Commands are displayed in a menu bar along the top of the window. Clicking on a command opens a list of choices known as a menu. Clicking on a menu item sometimes opens another related menu called a submenu. Common commands include:

<b>Find</b>	searches for a word, filename, or folder name
<b>Undo</b>	reverses the last action of the user
<b>Cut</b>	deletes the selected text, file or folder and copies it to a special area of memory called the clipboard
<b>Paste</b>	inserts the text, file or folder stored in the clipboard, at the location of the cursor

A bar, known as a taskbar, is displayed along the bottom of the desktop showing what programs, files and folders are currently open. At the far right of the taskbar is a special area called the system tray where icons are displayed showing what resident programs are continuously running in the background e. g. the system clock or a sound volume control. There is a Start button at the far left of the taskbar. When the

Start button is clicked, the Start menu opens on the screen. The user can close down the operating system by choosing the Shut Down option on the Start Menu. A touch-screen allows the user to select icons and commands by touching the display screen with their finger instead of using a mouse. Graphical user interfaces were first introduced with the Apple Mac OS. Other GUIs with desktops, icons, pointers, windows, menus and submenus are also available.

**Common icons** on the Microsoft Windows desktop include:

<b>Microsoft Outlook</b>	a messaging program
<b>My Briefcase</b>	a program that allows the user to exchange files with a portable computer and to synchronise the files on each computer
<b>Network Neighbourhood or My Network Places</b>	a feature that displays the names of other computers networked with yours
<b>My Computer</b>	a feature that lets you see the resources on your computer
<b>Internet Explorer</b>	a browser program that allows the user to view web pages on the Internet
<b>Recycle Bin</b>	a feature that stores deleted files and allows the user to restore them to their original location i. e. the equivalent to the trash can on an Apple Mac system.

A+ sign used between the names of keyboard keys means that the user should press both keys simultaneously e. g. ALT + TAB. Keyboard keys and combination of keys mentioned in the text include:

Shift key	allows you to type in upper case (capital letters)
MouseKeys feature	enables you to use the numeric keypad to move the mouse pointer
ALT + TAB	allows you to switch between open programs
StickyKeys feature	helps disabled people to operate two keys simultaneously
PRINT SCREEN key	lets you copy an image of the whole screen to the Clipboard
ALT + PRINT SCREEN	lets you copy an image of the active window to the Clipboard

**1. Study this diagram of a graphical user interface (GUI). Identify these features:**

1. window
2. taskbar
3. icon
4. menu
5. submenu
6. desktop
7. system tray
8. button

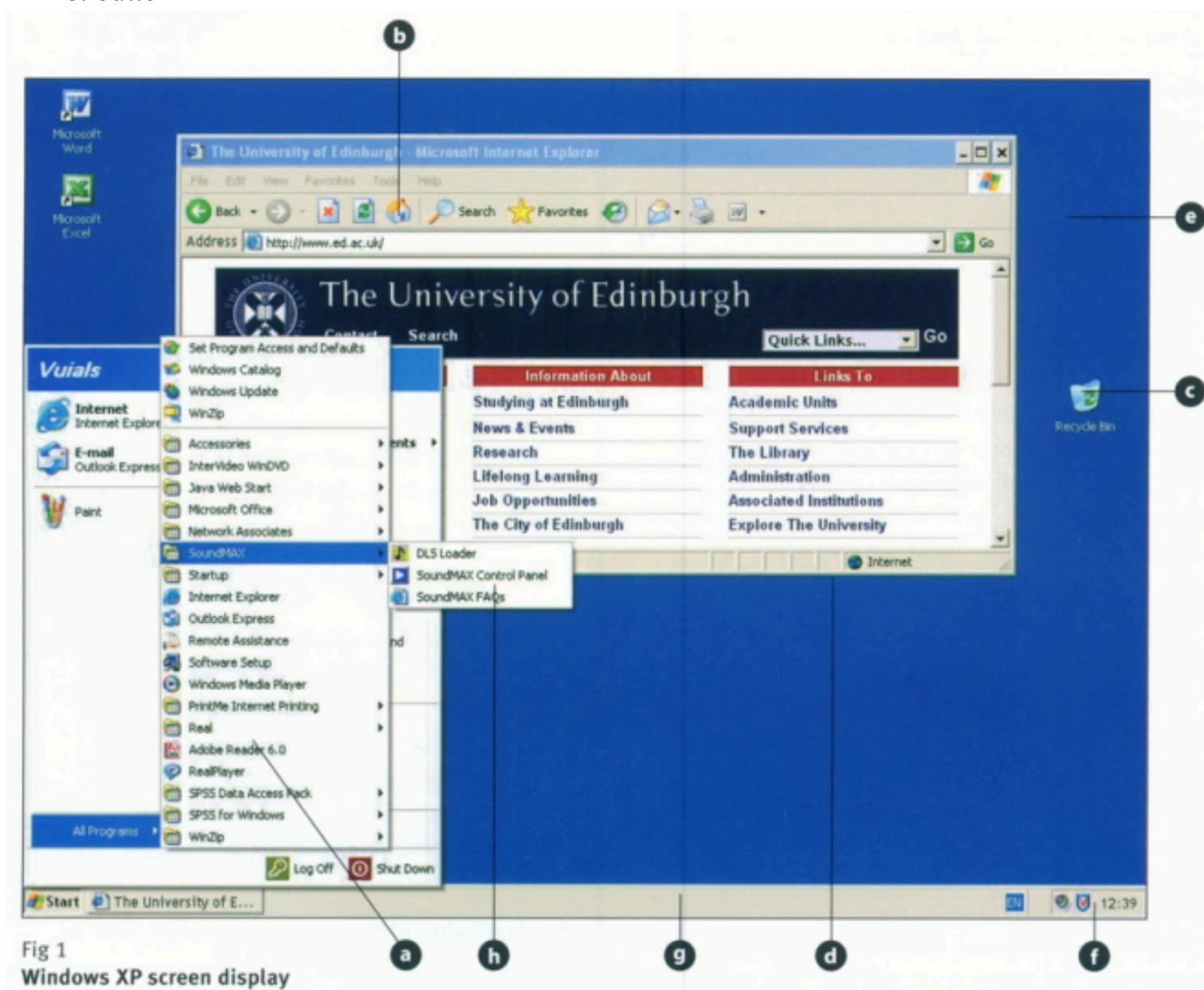


Fig 1  
Windows XP screen display

New developments in computing are often designed to make something easier. These verbs are often used to describe such developments:

allow	let
enable	permit
help	

**Study these examples:**

- 1 A GUI *lets you point* to icons and click a mouse button to execute a task.
- 2 A GUI *allows you to use* a computer without knowing any operating system commands.

- 3 The X Window System *enables Unix-based computers to have* a graphical look and feel.
- 4 Voice recognition software *helps disabled users (to) access* computers.

**Allow, enable and permit** are used with this structure:

verb + object + to-infinitive

**Let** is used with this structure:

verb + object + infinitive

**Help** can be used with either structure.

**2. Complete the gap in each sentence with the correct form of the verb in brackets.**

1. The Help facility enables users \_\_\_\_\_ (get) advice on most problems.
2. Adding more memory lets your computer \_\_\_\_\_ (work) faster.
3. Windows allows you \_\_\_\_\_ (display) two different folders at the same time.
4. The Shift key allows you \_\_\_\_\_ (type) in uppercase.
5. The MouseKeys feature enables you \_\_\_\_\_ (use) the numeric keypad to move the mouse pointer .
6. ALT + TAB allows you \_\_\_\_\_ (switch) between programs.
7. The StickyKeys feature helps disabled people \_\_\_\_\_ (operate) two keys simultaneously.
8. ALT + PRINT SCREEN lets you \_\_\_\_\_ (copy) an image of an active window to the Clipboard.

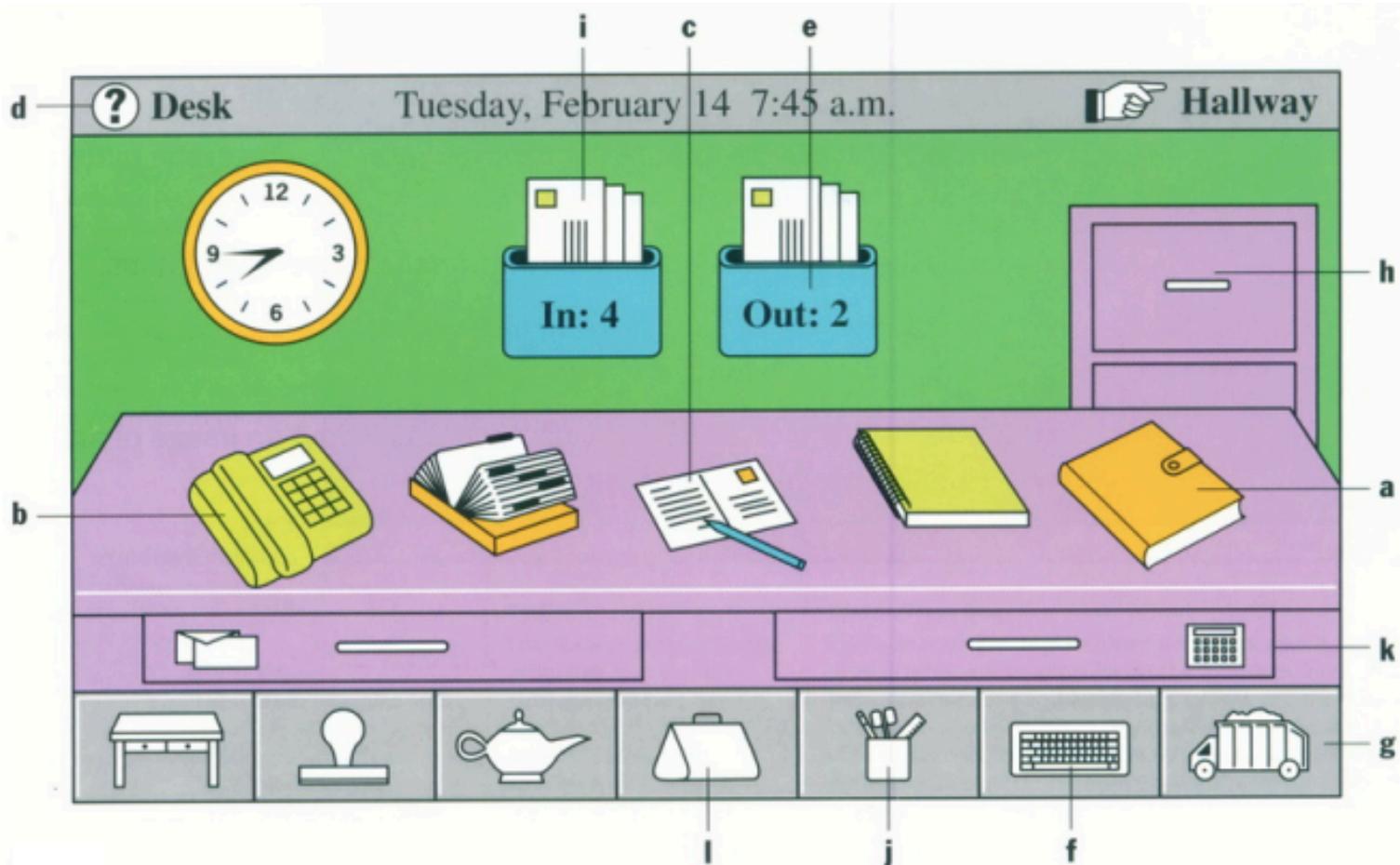
**3. Describe the function of these features using 'enabling' verbs.**

1. In a window, the vertical scroll bar
2. The Find command
3. The Undo command
4. Cut and paste
5. The Print Screen key
6. Menus
7. Recycle bin
8. Tooltips

**4. Study this version of a GUI Which part of the screen would you touch if you want to:**

1. make a phone call?
2. send an email?
3. access a keyboard?
4. record an appointment?
5. get help?
6. write new mail?

What do you think happens if you touch these areas of the screen? g, h, i, j, k, l



**5. Find the answers to these questions in the following text.**

1. What developments are driving the development of completely new interfaces?
2. What has inspired a whole cottage industry to develop to improve today's graphical user interface?
3. In what way have XML-based formats changed the user interface?
4. What type of computers are certain to benefit from speech technology?
5. Name a process where a mouse is particularly useful and a process where it is not so useful.

6. What facilities are multimodal interfaces likely to offer in the future?
7. What type of input device will be used to give vision to the user interface?
8. What development has led to an interest in intelligent agents?
9. List ways in which intelligent agents can be used.

## USER INTERFACES

Cheaper and more powerful personal computers are making it possible to perform processor-intensive tasks on the desktop. Break-throughs in technology, such as speech recognition, are enabling new ways of interacting with computers. And the convergence of personal computers and consumer electronics devices is broadening the base of computer users and placing a new emphasis on ease of use. Together, these developments will drive the industry in the next few years to build the first completely new interfaces since SRI International and Xerox's Palo Alto Research Center did their pioneering research into graphical user interfaces (GUIs) in the 1970s.

True, it's unlikely that you'll be ready to toss out the keyboard and mouse any time soon. Indeed, a whole cottage industry - inspired by the hyperlinked design of the World Wide Web - has sprung up to improve today's graphical user interface. Companies are developing products that organize information graphically in more intuitive ways. XML-based formats enable users to view content, including local and network files, within a single browser interface. But it is the more dramatic innovations such as speech recognition that are poised to shake up interface design. Speech will become a major component of user interfaces, and applications will be completely redesigned to incorporate speech input. Palm-size and handheld PCs, with their cramped keyboards and basic handwriting recognition, will benefit from speech technology.

Though speech recognition may never be a complete replacement for other input devices, future interfaces will offer a combination of input types, a concept known as multimodal input. A mouse is a very efficient device for desktop navigation, for example, but not for changing the style of a paragraph. By using both a mouse and speech input, a user can first point to the appropriate paragraph and then say to the computer, "Make that bold. ' Of course, multimodal interfaces will involve more than just traditional input devices and speech recognition. Eventually, most PCs will also have handwriting recognition, text to speech (TTS), the ability to recognize faces or gestures, and even the ability to observe their surroundings.

At The Intelligent Room, a project of Massachusetts Institute of Technology's Artificial Intelligence Lab, researchers have given sight to PCs running Microsoft Windows through the use of video cameras. 'Up to now, the PC hasn't cared about the

'world around it,' said Rodney A. Brooks, the Director of MIT's Artificial Intelligence Lab. 'When you combine computer vision with speech understanding, it liberates the user from having to sit in front of a keyboard and screen.'

It's no secret that the amount of information - both on the Internet and within intranets - at the fingertips of computer users has been expanding rapidly. This information onslaught has led to an interest in intelligent agents, software assistants that perform tasks such as retrieving and delivering information and automating repetitive tasks. Agents will make computing significantly easier. They can be used as Web browsers, help-desks, and shopping assistants. Combined with the ability to look and listen, intelligent agents will bring personal computers one step closer to behaving more like humans. This is not an accident. Researchers have long noted that users have a tendency to treat their personal computers as though they were human. By making computers more 'social,' they hope to also make them easier to use.

As these technologies enter mainstream applications, they will have a marked impact on the way we work with personal computers. Soon, the question will be not 'what does software look like' but 'how does it behave?»

**6. Re-read the text to find the answers to these questions. Match the terms in Table A with the statements in Table B.**

Table A	Table B
a. GUI	1. Software assistant that performs tasks such as retrieving and delivering information and automating repetitive tasks
b. Multimodal interface	2. Text to speech
c. Intelligent agent	3. Graphical user interface
d. TTS	4. A project of the Massachusetts Institute of Technology's Artificial Intelligence Lab
e. The Intelligent Room	5. A system that allows a user to interact with a computer using a combination of inputs such as speech recognition, hand-writing recognition, text to speech, etc.

**7. Mark the following statements as True or False:**

1. Fewer people are using computers because computer functions are becoming integrated into other electronic devices.
2. Keyboards and mice will soon not be required for using personal computers.

3. There have been no improvements in interface design since the development of the GUI.
4. Speech recognition is likely to completely replace other input devices.
5. Computer speech and vision will free the user from having to sit in front of a keyboard and screen.
6. Intelligent agents will make computers seem more like humans.

## UNIT 20. APPLICATIONS PROGRAMS

### INTRODUCTION

Software is the word used to refer to programs (sets of computer instructions written in a computer language) and data that is input, processed and output by a computer system. Applications programs are programs that allow the user to do various types of work on a computer e. g. word processors, databases. A set of related applications programs is referred to as a package (or suite). Common applications programs include:

word processors	for creating and editing texts
spreadsheets	for performing calculations using formulas
databases	for storing data so that it can be easily searched and sorted
graphics	for drawing
games	for playing fast action games
accounts	for keeping business accounts
payroll	for calculating salaries
presentation program	for creating multimedia slide shows
email	for sending electronic mail messages
PIM (personal information manager)	for keeping track of appointments, address book, task list, etc.
DTP (desktop publishing program)	for creating publications to be printed by a professional printer
small business tools	for performing various business tasks
website editor	for creating and editing webpages
image editor	for editing graphic images
developer tools	for writing programs to add features to existing applications and creating integrated program systems

Some applications programs, such as word processors, spreadsheets and databases, are commonly referred to as office programs because they are commonly used in a typical office. Office packages (or suites) such as Microsoft Office are sets

of interrelated office programs. Different versions of office suites are usually available containing different combinations of programs. Mail-merging is a useful feature found in most office suites that combines a database with a word processor document to automatically produce a copy of a standard letter for each record in the database.

A variety of computer hardware is used in the doctors' practice in this unit including:

PC	a common name for an IBM compatible personal computer
network	computers connected together
file server	powerful computer that stores and allows users access to data files on a network
laser printer	a very high quality text and graphics printer that has a photo-sensitive drum that deposits toner powder on the paper
dot-matrix printer	a low quality printer that prints by hammering pins on the paper to print an image made up of dots. The hammering action means that it can print on special multipart paper where a number of copies are produced at the same time
CD-ROM	a compact disk read only memory storage device that is cheap to produce and suitable for storing large amounts of data

The Patient Browser program (GPASS) discussed in this unit is a type of database for sorting and searching patient records. To search, you select different option screens by clicking on a tab with a mouse and inputting the search criteria (details of what you are looking for) in text boxes known as criteria boxes. Different button icons can be clicked to perform different operations e. g. the Find button. The default button is the option that is selected automatically.

Tomb Raider is a popular adventure game that has appeared in various versions. The main character is represented by a female animated image, known as Lara Croft. The user follows a storyline in which they have to solve puzzles and control the movements of the main character, sometimes having to react quickly to avoid dangerous obstacles. It is available on well known games consoles (specialised games computers) called PlayStation and Dreamcast manufactured by a company called Sega.

SimCity is a simulation program (a program that simulates real life) in which

the user has to develop a city by building roads and 3D (three-dimensional) buildings, setting taxes, etc. They also have to control objects such as simulated cars and people. The user can download (copy from a server computer) additional objects and swap items with other users using a special website. The game is run on a computer called a Commodore 64 (an early British type of personal computer particularly suited to games because of its excellent graphics facilities).

An ASP (application service provider) rents applications to users i. e. instead of buying software, the user pays for using applications as and when they need them. The ASP provides the software, manages the hardware and provides storage space, security controls and the physical links to customers. The ASP normally leases storage space for programs and data from data centres (facilities for storing large amounts of information) owned by data storage specialists.

The user is provided with remote access (access across a communications network) to a wide variety of programs including: generic applications such as email (electronic mail) and office suites, high-end (advanced) packages including large, complex business applications such as enterprise resource planning tools (e. g. SAP), business services, such as payroll and accounting systems, expensive specialist tools and e-commerce resources (electronic commerce - buying and selling on the internet).

This gives the user more flexibility and saves them having to install and maintain programs, upgrade (install newer versions of programs), deal with viruses (programs that can reproduce themselves and are written with the purpose of causing damage or causing a computer to behave in an unusual way) and manage email systems (electronic mail systems).

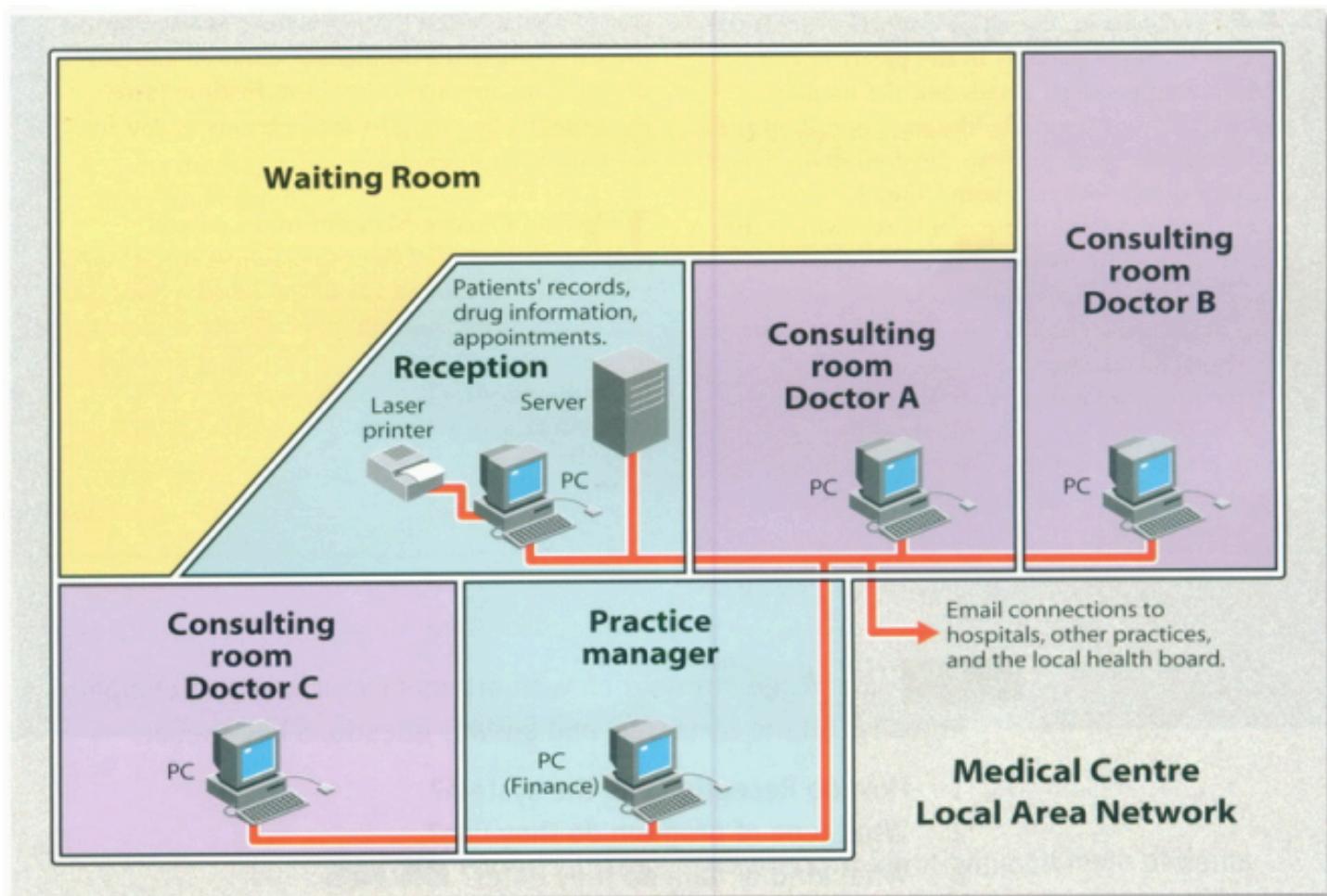
Disadvantages of this system include: the need for a broadband (high bandwidth i. e. a connection with a high signal capacity) network connection or a leased line (a cable connection that is rented for use in a communications system) and dependence on the ASP to provide a secure, reliable, readily available service.

### **1. Conduct a survey to find out who in your class:**

1. can name a spreadsheet program
2. has used a spreadsheet
3. can name a database program
4. has used a database
5. knows how to insert graphics into a document
6. can name a word processing program
7. can centre a line of text
8. can disable the autocorrect

**2. Study this diagram of medical centre. Which applications programs will be used by the following?**

1. Reception
2. Practice Manager
3. Doctors



**3. Work in groups. Read paragraph A and additional paragraphs selected by your teacher. Complete this note-taking frame for each text you read.**

	B	C	D
Users			
Use			
Program types			
Data input			
Output			

## **A**

The system consists of 5 networked PCs, one in each of the consulting rooms, one in the Practice Manager's office and the other in Reception alongside the file server. (Each PC has its own laser printer.) All users have access to Microsoft Office.

## **B**

Doctors use the system to access a number of databases. The most important holds the records of all the patients in the practice. These files contain personal details and the medical history of the patient. The doctor can call up the appointments book prior to the consultation. By clicking on the patient's name, they have immediate access to that patient's records. At the end of each consultation, the doctor enters brief case notes including the diagnosis and treatment. This database can also be used to produce statistics for research and reports.

Doctors can also access a drugs database on CD-ROM which provides prescribing information on thousands of drugs including their suitability for different categories of patients. This is updated every month. Another database is a conditions dictionary which provides information on a wide range of problems.

## **C**

Reception staff use specially tailored software developed from a database to enter all appointment dates and times for each doctor. The program generates daily lists of appointments and can be accessed by the doctors. Reception use the patient database to identify children and old people who are due to have vaccinations. They then use mail merging to create letters asking for appointments to be made.

## **D**

The Practice Manager uses a payroll package based on a spreadsheet to calculate salaries for each employee of the health centre. She enters all income and expenditure to produce practice accounts. She uses a database to produce a monthly rota of which doctors are on call in evenings and at weekends. This rota is available over the network to all users.

### **4. Exchange information with others in your group to complete notes for all the texts, Ask and answer questions like these:**

1. How do Reception use the system?
2. What type of program do they use?
3. What kind of data do they enter?
4. What is the output from the program?

Study this extract from an instruction manual for software for doctors in a health centre.

## PATIENT BROWSER

Patient Browser allows you to find specific patients and open their records. It also allows you to identify different categories of patients.

**Click here to display or remove search criteria**

- 1 To find patients, first click on the appropriate tab (Personal, Address or Registration).
- 2 Enter the search criteria. A combination of tabs may be used (e.g. enter a surname under the Personal tab and select a doctor in the Registration tab).
- 3 Select the Defaults button if you wish to clear the criteria boxes of any existing entries, or to search for all patients, but the list may be a long one.
- 4 Start the search by clicking on the Find button.

**Title Bar**

**Menu Bar**

**Tool Bar**

Maximise, minimise, and close buttons

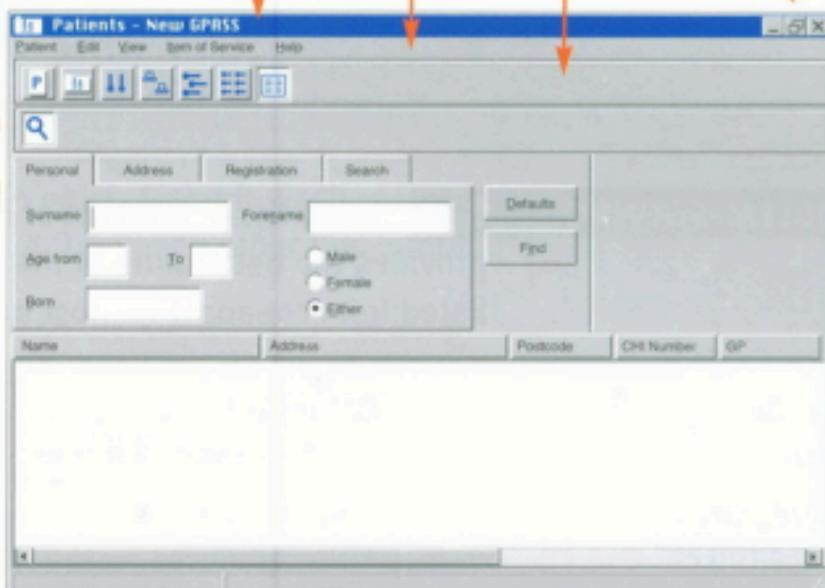


Fig 3  
GPASS

We make simple instructions using the infinitive:

*Click on the appropriate tab.*

*Enter the search criteria.*

We can add an explanation using the to-infinitive or *by + -ing*:

*To find patients, click on the appropriate tab.*

*Click on the Find button to start the search.*

*Start the search by clicking on the Find button.*

We can put the instructions in order using sequence words:

*First click on the appropriate tab.*

*Then enter the selection criteria.*

*Finally click on the Find button.*

We can link two instructions and emphasise their order like this:

*Having entered the selection criteria, click on the Find button.*

*Once the selection criteria have been entered, click on the Find button.*

**5. Write simple instructions for identifying all male patients called Smith in the 16 to 50 age group registered with Doctors Warner and Roberts.**

**6. Complete the gaps in these instructions for finding the records of all members of the Green family living in postcode WX14 3PH and registered with any doctor in the practice.**

1. First enter the search criteria by \_\_\_\_\_.
2. To \_\_\_\_\_, enter Green in the Surname box.
3. Ensure both male and female members of the family are found by \_\_\_\_\_.
4. \_\_\_\_\_ select the Address tab.
5. Having \_\_\_\_\_, enter the postcode.
6. \_\_\_\_\_ choose the Registration tab.
7. Once \_\_\_\_\_, select All doctors.
8. \_\_\_\_\_, click on Find to \_\_\_\_\_.

**7. Study these versions of OfficeSuite and decide which version provides the best value for the following users. The versions are listed from cheapest to most expensive.**

1. A salesperson who wants to make presentations at conferences.
2. An administrative assistant who needs to write office correspondence and send and receive emails.
3. A programmer who wants to develop applications tailored to a company's needs.
4. A company wanting to produce its own in-house newsletter.
5. A company wishing to develop its own website.
6. A company which wants to analyse all its sales records.
7. A promotions person who wants to be able to edit complex graphics and incorporate them in brochures.
8. A company which wants to share documents on a local area network.

**8. Find the answers to these questions in the text below.**

1. How do you pay for the applications provided by an ASP?
  - a. no charge
  - b. charged according to use
  - c. single payment
2. What two main services does an ASP provide?
3. How does an ASP ensure that they have enough storage space for the changing needs of customers?
4. What types of applications are available from ASPs?
5. Why is it useful for a small business to be able to rent specialist tools from an ASP?
6. What is one of the best established areas of ASP use?

## Application Service Providers

If your hard disk is packed to bursting point, the IT department is far too busy to fix your email problems, and your business can't afford to buy the tools that you'd like to develop the company website, then it's time to think about using an application service provider (ASP). Rather than installing software on each machine or server within your organisation, you rent applications from the ASP, which provides remote access to the software and manages the hardware required to run the applications.

There are a lot of advantages to this approach. The havoc caused by viruses makes the idea of outsourcing your email and office suite services an attractive option. It also gives you more flexibility - you pay for applications as and when you need them, rather than investing in a lot of costly software which you're then tied to for years. Not having to worry about upgrading to the latest version of your office suite or about battling with the complexities of managing an email system, leaves businesses with more time. Time to focus on what they do best.

<b>OfficeSuite Standard</b> <ul style="list-style-type: none"><li>• wordprocessor</li><li>• spreadsheet</li><li>• presentation program</li><li>• email</li><li>• PIM</li></ul>	<b>OfficeSuite Small Business Edition</b> <ul style="list-style-type: none"><li>• wordprocessor</li><li>• spreadsheet</li><li>• DTP</li><li>• email</li><li>• PIM</li><li>• small business tools</li></ul>	<b>OfficeSuite Professional</b> <ul style="list-style-type: none"><li>• wordprocessor</li><li>• spreadsheet</li><li>• database</li><li>• DTP</li><li>• presentation program</li><li>• email</li><li>• small business tools</li></ul>
<b>OfficeSuite Premium</b> <ul style="list-style-type: none"><li>• wordprocessor</li><li>• spreadsheet</li><li>• database</li><li>• DTP</li><li>• presentation program</li><li>• email</li><li>• PIM</li><li>• small business tools</li><li>• website editor</li><li>• image editor</li></ul>	<b>OfficeSuite Developer</b> <ul style="list-style-type: none"><li>• wordprocessor</li><li>• spreadsheet</li><li>• database</li><li>• DTP</li><li>• presentation program</li><li>• email</li><li>• PIM</li><li>• small business tools</li><li>• website editor</li><li>• image editor</li><li>• developer tools</li></ul>	

However, there are some potential pitfalls. To use applications remotely requires a lot of bandwidth, which is only really available from a broadband connection or a leased line to the ASP itself. It is also important to ensure that the ASP will be able to provide a secure, reliable service which will be available whenever you need

it.

Providing applications and storage space for vast numbers of users requires some powerful technology on the part of the ASP. This includes security controls and data storage as well as providing the physical links to customers. For the most part, ASPs don't own the data centres that store the information. Instead, they lease space from data storage specialists. In this way, they can be confident of meeting customers' increasing storage requirements by buying more space as it's needed.

There's a wide variety of applications available for use via ASPs. Office suite applications and email services are two of the most generic applications available through ASPs. Large, complex business applications such as enterprise resource planning tools like SAP are another popular candidate for delivery through an ASP. Other business services, such as payroll and accounting systems are also available. This is particularly beneficial to small businesses which are likely to grow quickly and don't want to deal with the problems caused by outgrowing their existing system and having to move to a high-end package. ASPs also offer a means of using specialist tools that would otherwise prove prohibitively expensive. Small businesses have the opportunity to use such tools for short periods of time as and when they need them, rather than having to buy the software as a permanent investment. One of the major barriers for small businesses which want to make a start in e-commerce is ensuring that they have sufficient resources to cope with sudden large increases in customers.

This means not only having adequate storage for all your customers' details, but ensuring that you have the technology in place to handle stock levels, efficient delivery and large volumes of traffic. It's very rare for an e-commerce business to handle all of these elements by itself, making this one of the best-established areas of ASP use. Being able to respond rapidly to changes in the size of your customer base and the type of product that they want to order from your business, demands more flexibility than traditional software can provide.

## **9. Re-read the text to find the answers to these questions.**

*1. Note the advantages and disadvantages of using an ASP.*

*2. Match the items in Table A with the statements in Table B.*

Table A	Table B
a. Website	1. Set of standard programs used in an office
b. ASP	2. Facility for storing large amounts of information
c. Virus	3. Capacity of a network connection

d. Office suite	4. High capacity internet connection
e. Bandwidth	5. Self-replicating program
f. broadband	6. Common enterprise resource planning tool
g. Data centre	7. Application service provider
h. SAP	8. Collection of related web pages

**10. Using information from the text, mark the following as True or False:**

- a. Software from an ASP must be installed locally on a user's computer,
- b. You need a high bandwidth connection to use an ASP service.
- c. ASPs usually use their own storage space for customers.
- d. Using an ASP gives you more flexibility.
- e. An e-commerce business usually provides all of the required technology itself.

## INTRODUCTION

Multimedia is the term used to refer to a combination of text, graphics, animation,

sound and video. MP3 (MPEG Audio Layer 3) is a standard way of storing compressed, digital audio files (usually music). Digital audio is created by sampling sound 44,000 times a second and storing a code number to represent each sound sample. The files are compressed by removing any sounds that are inaudible to the human ear, making them much smaller than files created using other digital audio storage standards, such as WAV. The size of an audio file is commonly measured in megabytes (MB) (millions of bytes). The frequency of a sound is measured in kilohertz (kHz) (thousands of cycles per second). MP3 files have extra code added, called tags, that give the user information about the file e. g. the performer's name, a URL (uniform resource locator i. e. a web address) or a graphic such as an album cover.

Because of their small size, MP3 files are more suitable for transferring across the Internet (the connection of computer networks across the world). Some Internet websites (sets of related pages stored on a

Web server on the World Wide Web) are devoted to providing MP3 files for downloading (copying from a server computer to a client computer). The user can create their own music compilations (combinations of files) by listening to each file using a computer program, such as Windows MediaPlayer, and choosing what files to download.

They can then use a computer program called an MP3 player to listen to the files and control the sound. MP3 players let the user group songs into play lists and randomise the selections. They also have sound control features such as spectrum analysers, graphic equalisers, and frequency displays. A track info button allows the user to see the information stored in the MP3 file tag. The appearance of MP3 players can be changed using programs called skins (or themes). MP3 players often include a program, called a ripper, that lets the user rip (extract) a song from a CD (compact disk) and convert it to a standard WAV file. Another program called an encoder is used to convert WAV files into MP3 files or vice versa. Recorder programs are also available that enable the user to create audio CDs using a writable CD-ROM drive. Special MP3 player devices are also available that enable the user to listen to MP3 files without a computer. MIDI (Musical Instrument Digital Interface) is a standard way of connecting musical instruments, music synthesisers, and computers. A piece of electronics called a MIDI interface board is installed on each

device to enable the device to communicate using MIDI standards. As music is being played, it can be displayed on a monitor screen as a musical score, then edited using a computer program that uses all the features of a mixing desk (an electronic device for mixing sounds together), stored and printed. MIDI systems do not store the actual sound.

Instead the sound is encoded (stored as MIDI messages) in the form of 8-bit bytes (units of capacity equal to eight binary digits i. e. 1s and 0s) of digital information. A bit is a binary digit i. e. a 1 or a 0, and a byte is a group of 8 bits. The MIDI messages commonly consist of instructions that tell the receiving instrument what note to play, how long and how loud it should be played, including a number that indicates which instrument to play. Each instrument is represented by a different number e. g. 67 is a saxophone. A DVD-ROM, commonly referred to as a DVD (digital versatile disk - previously known as digital video disk), is a development of CD-ROM (compact disk read only memory). It is an optical storage media (a storage media that uses laser light to store data) that provides large amounts of storage space for multimedia files.

A DVD-ROM drive (a storage device for reading DVD disks) uses blue laser light (rather than the red laser light used by CD-ROM drives) to read information from the disk. Both sides of the disk can be used for storing files and each side can have two separate storage layers. The data transfer rate of a DVD (the speed that data can be read from a DVD) is also faster than that of a CD-ROM. The capacity of a DVD is commonly measured in gigabytes (GB) (thousands of millions of bytes).

MPEG (pronounced em-peg) is a method of compressing and decompressing video signals. MPEG stands for Motion Picture Experts Group, an organisation that develops standards for audio and video compression.

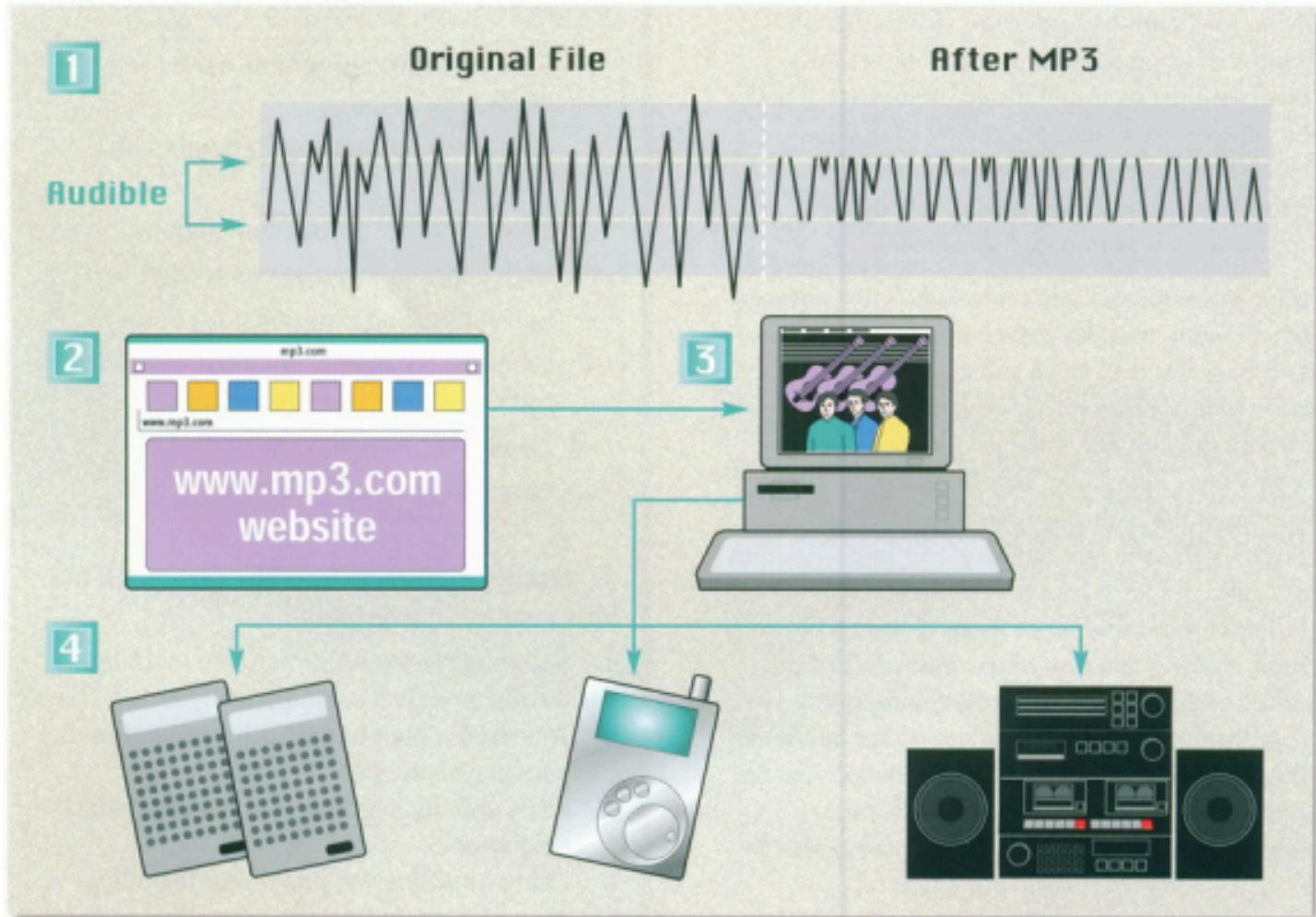
**1. Match the multimedia terms in Column A to the activities in Column B.  
More than one match is possible.**

Column A	Column B
MIDI	Watching movies
MP3	Composing music on a PC
DVD	Downloading music from the Internet
MPEG	Using reference works like encyclopaedias

**2. Study this diagram which explains MP3. Answer these questions:**

1. How does MP3 reduce the size of music files?
2. What can you obtain from www.mp3.com?
3. How can you listen to MP3 files?

Fig 1.



**3. Match these captions to the pictures in Fig 1. Consider again your answers to Task 2.**

- a. Once you've paid by credit card (unless it's one of the millions of free files), music is downloaded to your PC.
- b. The original music file is stripped of anything that is inaudible to the human ear. After MP3 has done its work, the file is reduced to roughly one twelfth that of the original recording.
- c. MP3 files can be listened to on your PC, a dedicated MP3 player, or your hi-fi.
- d. MP3 files are put on a website, where browsers can listen to samples and buy a single track or album ... or even create their own compilation.

#### **4. Read this text to find the answers to these questions.**

1. What does MP3 stand for?
2. What is the difference between MP3 and WAV files?
3. What kind of sound does MP3 strip out?
4. What kind of information is included in the tag?

## **Understanding MP3**

The name comes from MPEG (pronounced EM-peg), which stands for the Motion Picture Experts Group. MPEG develops standards for audio and video compression. MP3 is actually MPEG Audio Layer 3.

MP3 competes with another audio file format called WAV. The key difference is that MP3 files are much smaller than WAV files. An MP3 file can store a minute of sound per megabyte, while a WAV file needs 11 or 12 megabytes to hold the same amount. How does MP3 achieve this

compression? CDs and audio files don't reproduce every sound of a performance. Instead, they sample the performance and store a discrete code for each sampled note. A CD or WAV file may sample a song 44,000 times a second, creating a huge mass of information.

By stripping out sounds most people can't hear, MP3 significantly reduces the information stored. For instance, most people can't hear notes above a frequency of 16kHz, so it eliminates them from the mix. Similarly,

it eliminates quiet sounds masked by noise at the same frequency. The result is a file that sounds very similar to a CD, but which is much smaller. An MP3 file can contain spoken word performances, such as radio shows or audio books, as well as music. It can provide information about itself in a coded block called a tag. The tag may include the performer's name, a graphic such as an album cover, the song's lyrics, the musical genre, and a URL for more details.

#### **5. Read the rest of this text to find the answers to these questions:**

1. How do you play MP3 files?
2. What does the Windows Media Player program do with an MP3 file?
3. What is a standalone player?
4. What special features can players offer?
5. What information can you obtain by clicking on the track info button?
6. What does a skin enable you to do?
7. How do you play music from a CD-ROM on an MP3 player?
8. What hardware and software do you need to make your own audio CDs?

# Play MP3 Files

Most machines today have enough processing power and memory to play MP3s immediately. Simply download an MP3 file like any other and click on it in Windows Explorer. The Windows Media Player will decode the file and route the signals to your soundcard and then to your speakers.

Other MP3 features include:

## Players.

Most standalone players have many features beyond Windows' default Media Player. To control what music you play, players let you group songs into playlists and randomize the selections. To control how the music sounds, they offer spectrum analyzers, graphic equalizers, and frequency displays.

## Track info.

A track info button gives you the information on the MP3 file's tag. Other buttons may take you to a music library where you can organize your MP3 files by performer or genre.

## Skins or themes.

These programs are designed to change the appearance of

the most popular players. They're akin to the wallpaper that alters the look of the Windows desktop. With a skin, a player can become a jukebox, a car dashboard, or a Star Trek tricorder. Think of them as easily interchangeable faceplates.

## Rippers and encoders.

A ripper is a program that rips songs from a CD in your CD-ROM drive and turns them into WAV files. An encoder converts WAV files into MP3 files or vice versa. Many MP3 players incorporate rippers and encoders and can do both steps in one.

## Recorders.

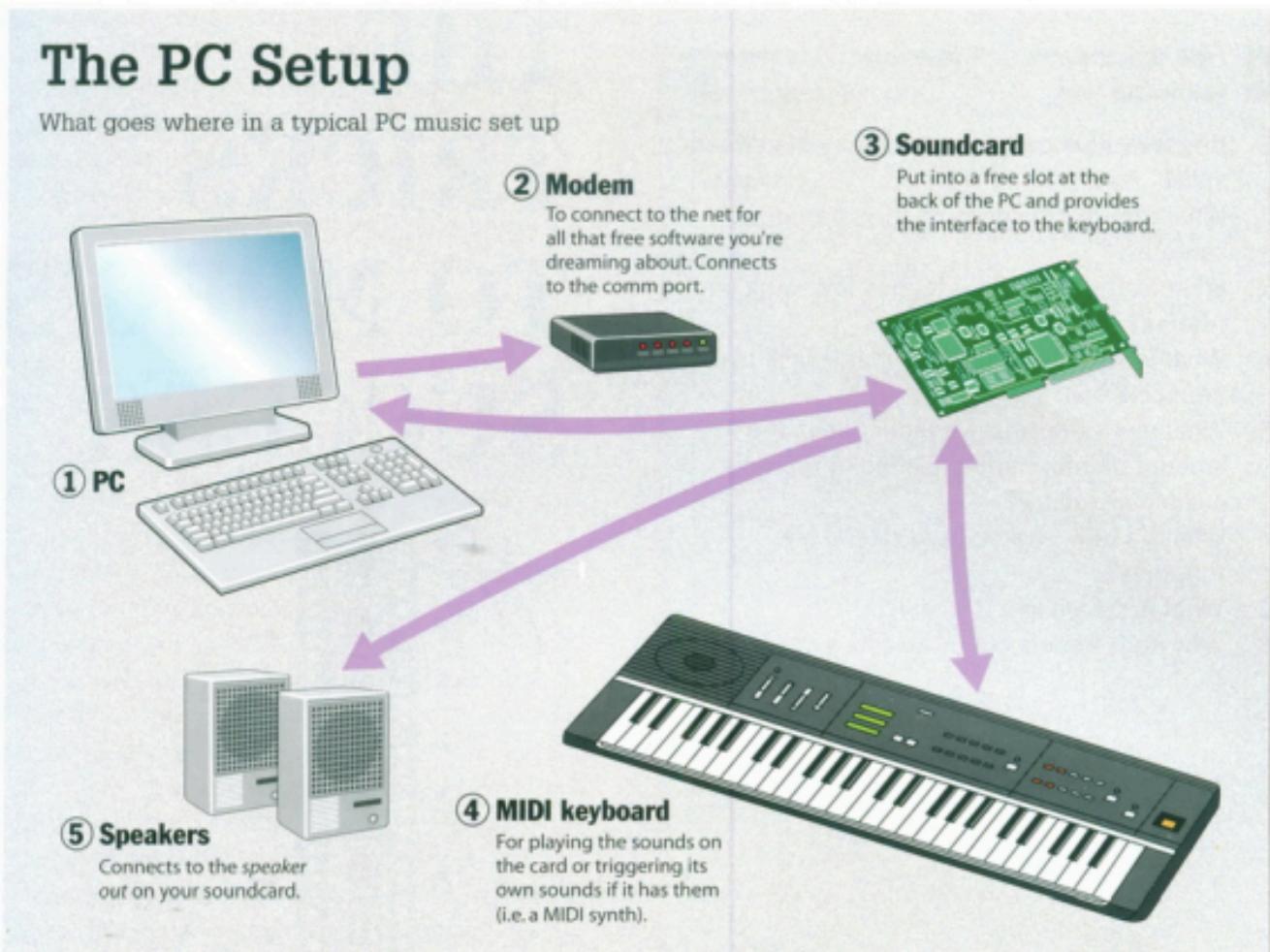
With a writeable CD-ROM drive, a recorder program lets you create your own audio CDs.

**6. Study the diagram, Fig 2, which illustrates how MIDI operates. Then link each set of sentences into one complex sentence to form a continuous paragraph. You may add, omit and change words.**

1. Most modern music is mixed. This uses computers.
2. Musicians record their music into a computer system. This system is called a Musical Instrument Digital Interface (MIDI).
3. MIDI was developed as a standard interface. MIDI is for linking music synthesizers and instruments together.
4. Computers can be connected to MIDI instruments. These computers are fitted with MIDI interface boards. This allows the music to be stored on computer. This allows the music to be displayed on the monitor. The music is being played.
5. The music can be displayed as a musical score. The music can be edited. This uses all the features of a mixing desk.

6. The music can also be printed out from the computer. The music is being played.
7. MIDI doesn't transmit any sound. It transmits simple binary information.
8. The information is called a MIDI message. The message encodes sound as 8-bit bytes of digital information.
9. The most common messages consist of instructions. These instructions tell the receiving instrument to play a note for a specific duration of time.
10. The instructions also contain details of how loud to play that note. The instructions contain a number. The number indicates which instrument to play. Number 67 is a saxophone.

Fig. 2



### 7. Match each cause and effect. Then link them with an -ing clause.

Cause	Effect
1. Computers with MIDI interface boards can be connected to MIDI instruments.	a. This permits extra information to be stored on the performer and other track details.

2. Each side of a DVD can have two layers.	b. You can create your own compilation.
3. MP3 removes sounds we can't hear.	c. This allows you to sample a new group before buying their CD.
4. You can download single tracks.	d. This gives an enormous storage capacity.
5. Each MP3 file has a tag.	e. This allows the music being played to be stored by the computer and displayed on the monitor.
6. MP3 players contain several devices.	f. This enables you to change the appearance of your player.
7. You can download a skin program.	g. These allow you to control the way the music sounds.
8. You can legally download some music.	h. This produces much smaller files.

## 8. Find the answers to these questions in the following text.

1. Into what two components is the data stream split?
2. What information does an Intra frame contain?
3. What is stored in the P-frames following an I-frame?
4. What is stored in a P-frame in the case of a bouncing ball?
5. What gives the massive reduction in the amount of information needed to reproduce a video sequence?
6. Why is a new I-frame used after a few P-frames?
7. What is stored in a B-frame?
8. Why do B-frames not propagate errors?

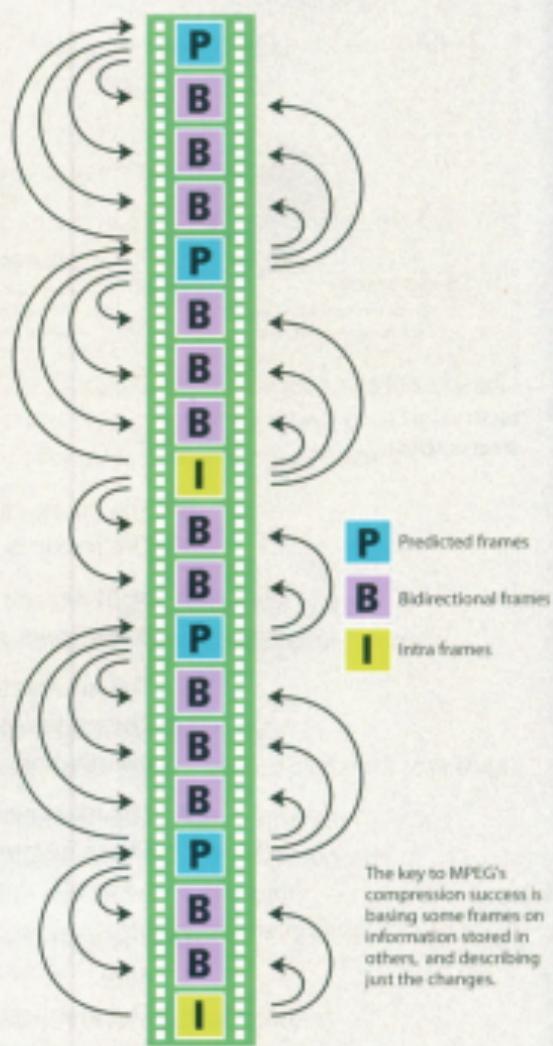
The most common system for the compression of video is MPEG. It works like this. The single data stream off the CD-ROM is split into video and audio components, which are then decompressed

using separate algorithms. The video is processed to produce individual frames as follows. Imagine a sequence of frames depicting a bouncing ball on a plain background. The very first is called an

Intra Frame (I-frame). I-frames are compressed using only information in the picture itself just like conventional bitmap compression techniques like JPEG.

Following I-frames will be one or more predicted frames (P-frames). The

# THE TRICKS TO MPEG'S SUCCESS



difference between the P-is frame and the l-frame it is based on is the only data that is stored for this P-frame. For example, in the case of a bouncing ball, the iP picture is stored simply as a description of how the position of the ball has changed from the previous l-frame.

This takes up a fraction of the space that would be used if you stored the P-frame as a picture in its own right. Shape or colour changes are also stored in the P-frame. The next may also be based on this P-frame and so on.

Storing the frames gives the massive medication in the amount of information needed to reproduce the sequence. Only a few P-frames are allowed before a new I-frame is introduced into the sequence as a new reference point, since a small margin of error creeps in with each P-frame.

Between and P frames are bi-directional frames (B-frames), based on the nearest I or P-frames both before and after them. In our bouncing ball example, in a B-frame the picture is stored as the difference between the previous I or P-frame and the B-frame and as the difference between the B-frame and the following I or P-frame. To recreate the B-frame when playing back the sequence, the MIPEG algorithm uses a combination of two references. There may be a number of B-frames between or P-frames. No other frame is ever based on a B-frame so they don't propagate errors like P-frames.

Typically, you will have two or three Bs between Is or Ps, and perhaps three to five P-frames between Is.

## **9. Re-read the text to find the answers to these questions.**

1. Mark the following statements as True or False:

a. JPEG is the most common compression system used for video.

b. P-frames only store the changes in the image.

c. There is always at least one P-frame between two I-frames.

d. B-frames store the complete picture information.

there can only be one B-frame between each I and P-frame.

e. There are typically about four P-frames between each i-frame.

## **10. Match the words in Table A with the statements in Table B.**

Table A	Table B
a. Algorithm	1. A common type of compression used for video data
b. I-frame	2. A compressed video frame known as a predicted frame
c. JPEG	3. A compressed video frame that stores changes between the frame before it and the frame after it
d. P-frame	4. A formula used for decompressing components of a data stream
e. B-frame	5. A type of compression used for bitmap images
F. MPEG	6. A compressed video frame that contains the complete image information

### INTRODUCTION

What is hardware? Webster's dictionary gives us the following definition of the hardware — the mechanical, magnetic, electronic, and electrical devices composing a computer system. Computer hardware can be divided into four categories:

- 1) input hardware
- 2) processing hardware
- 3) storage hardware
- 4) output hardware

#### **Input hardware**

The purpose of the **input hardware** is to collect data and **convert** it into a form suitable for computer processing. The most common input device is a **keyboard**. It looks very much like a typewriter. The **mouse** is a hand held device **connected** to the computer by small cable. As the mouse is **rolled** across the mouse pad, the cursor moves across the screen. When the cursor **reaches** the desired location, the user usually pushes a button on the mouse once or twice to signal a menu selection or a command to the computer. The light pen uses a light **sensitive** photoelectric cell to signal screen position to the computer. Another type of input hardware is optic-electronic **scanner** that is used to input graphics as well as typeset characters. Microphone and video camera can be also used to input data into the computer. Electronic cameras are becoming very popular among the consumers for their relatively low price and convenience.

#### **Processing hardware**

The purpose of processing hardware is **retrieve**, interpret and **direct** the **execution** of software instructions provided to the computer. The most common components of processing hardware are the Central Processing Unit and main memory. The Central Processing Unit (**CPU**) is the brain of the computer. It reads and **interprets** software instructions and coordinates the processing activities that must take place. The design of the CPU **affects** the processing power and the speed of the computer, as well as the **amount** of main memory it can use effectively. With a well-designed CPU in your computer, you can perform highly **sophisticated** tasks in a very short time. Memory is the system of component of the computer in which information is stored. There are two types of computer memory: RAM and ROM. **RAM**(random access memory) is the **volatile** computer memory, used for creating, loading, and running programs and for manipulating and **temporarily** storing data; **ROM**(read only memory) is nonvolatile, non modifiable computer

memory, used to hold programmed instructions to the system. The more memory you have in your computer, the more operations you can perform.

### **Storage hardware**

The purpose of **storage hardware** is to store computer instructions and data in a form that is relatively permanent and retrieve when needed for processing. Storage hardware serves the same basic functions as do office filing systems except that it stores data as electromagnetic signals. The most common ways of storing data are **Hard disk**, floppy disk and **CD-ROM**. Hard disk is a rigid disk coated with magnetic material, for storing programs and relatively large amounts of data.

Floppy disk (diskette) — thin, usually flexible plastic disk coated with magnetic material, for storing computer data and programs. There are two formats for floppy disks: 5.25" and 3.5". 5.25" is not used in modern computer systems because of its relatively large size, flexibility and small **capacity**. 3.5" disks are formatted 1.4 megabytes and are widely used.

**CD-ROM** (compact disc read only memory) is a compact disc on which a large amount of digitized read-only data can be stored. CDROMs are very popular now because of the growing speed which CDROM drives can **provide** nowadays.

### **Output hardware**

The purpose of **output hardware** is to provide the user with the means to view information produced by the computer system. Information is output in either hardcopy or soft copy form. Hardcopy output can be held in your hand, such as paper with text (word or numbers) or graphics printed on it. Soft copy output is displayed on a monitor.

Monitor is a component with a display screen for viewing computer data, television programs, etc.

**Printer** is a computer output device that produces a paper copy of data or graphics. **Modem** is an example of communication hardware — an electronic device that makes possible the transmission of data to or from computer via telephone or other communication lines. Hardware comes in many configurations, depending on what the computer system is designed to do. Hardware can fill several floors of a large office building or can fit on your **lap**.

### **1. Answer the following questions:**

1. Without what parts computer is unable to work?
2. What is the most expensive part of the hardware?
3. What other hardware devices do you know? What are they for? Do you know how to use them?

**2. Read the text “Hardware” and discuss the following questions in group:**

- a) What is the Webster's dictionary definition of hardware?
- b) What groups of hardware could be defined?
- c) What is input hardware? What are the examples of input hardware?
- d) What is a mouse designed for? What is a light pen?
- e) What is processing hardware? What are the basic types of memory used in a PC?
- f) Can a PC-user change the ROM? Who records the information in ROM?
- g) What is storage hardware? What is CD-ROM used for? Can a user record his or her data on a CD? What kind of storage hardware can contain more information: CDROM, RAM or ROM?
- h) What is modem used for? Can PC-user communicate with other people without a modem?

**3. Study this data about storage devices. Then complete the blanks in the following sentences comparing and contrasting the different types.**

Device	Read/Write	Speed	Media Capacity	Media Removable	Cost
Floppy disk	Read and write	Slow	Very low	+	Low
Fixed hard disk	Read and write	Fast	Very high	-	Medium
Removable hard disk	Read and write	Medium to fast	High	+	Medium
CD-ROM	Read only	Medium	High	+	Low
CD-R	Recordable	Slow	High	+	Medium
CD-RW	Read and write	Medium	High	+	Medium
CD-MO	Read and write	Medium	High	+	High
DVD-ROM	Read only	Medium	High	+	Medium
DVD-RAM	Read and write	Medium	Very high	+	High
Magnetic Tape	Read and write	Very slow	High	+	Medium

- You can write to hard disks optical..... disks.
- Floppy disks have a capacity..... other devices.
- CD-ROMs and floppy disks are..... low priced.
- DVD-RAM has a capacity other optical disks.
- CD-ROMs cannot be re-recorded some other optical disks can be.
- .....hard disks, you can .....read from and write..... to CD-MO drives.
- .....CD-ROMs, CD-Rs are recordable.
- Magnetic tape is much other devices.
- .....DVD-RAM and fixed .....hard disks have very..... high media capacity.
- Floppy disks are cheap .....

**4. Study this description of a student's first term. What questions might the interviewer have asked to obtain the information in italics?**

In her first term Pauline studied 6 subjects<sup>1</sup>. She had classes on 2 four days' each week. On Monday morning she had IT and Information Systems . Tuesday was a free day for home study. On Wednesday she had Systems Analysis in Room 324 . She studied Computer Architecture on Thursdays. Programming happened on Friday mornings. Communication took place once a week on Friday afternoons. She liked Mr Blunt's classes most. She had a 15-minute coffee break each day and a lunch break from 12.00 to 1.00 .

## UNIT 23. TYPES OF SOFTWARE

### INTRODUCTION

A computer to complete a job requires more than just the actual equipment or hardware we see and touch. It requires Software — programs for directing the operation of a computer or electronic data. Software is the final computer system component. These computer programs instruct the hardware how to conduct processing. The computer is merely a general-purpose machine which requires specific software to perform a given task. Computers can input, calculate, compare, and output data as information. Software determines the order in which these operations are performed.

Programs usually fall in one of two categories: system software and applications software. System software controls standard internal computer activities. An operating system, for example, is a collection of system programs that aid in the operation of a computer regardless of the application software being used. When a computer is first turned on, one of the systems programs is booted or loaded into the computer's memory. This software contains information about memory capacity, the model of the processor, the disk drives to be used and more.

Once the system software is loaded, the applications software can be brought in. System programs are designed for the specific pieces of hardware. These programs are called drivers and coordinate peripheral hardware and computer activities. User needs to install a specific driver in order to activate a peripheral device. For example, if you intend to buy a printer or a scanner you need to worry in advance about the driver program which, though, commonly goes along with your device. By installing the driver you «teach» your mainboard to «understand» the newly attached part.

Applications software satisfies your specific need. The developers of application software rely mostly on marketing research strategies trying to do their best to attract more users (buyers) to their software. As the productivity of the hardware has increased greatly in recent years, the programmers nowadays tend to include as much as possible in one program to make software interface look more attractive to the user. These class of programs is the most numerous and perspective from the marketing point of view.

Data communication within and between computers systems is handled by system software. Communications software transfers data from one computer system to another. These programs usually provide users with data security and error checking along with physically transferring data between the two computer's memories. During the past five years the developing electronic network

communication has stimulated more and more companies to produce various communication software, such as Web- Browsers for Internet.

**1. Answer the following questions:**

- What do you think is more expensive — hardware or software?
- Has anyone in your group ever purchased software?
- Why do you think piracy (audio, video, computer software) still exists?

**2. Read again the text “Types of Software” and discuss the following questions in group:**

- a) What is software?
- b) In what two basic groups could software (programs) be divided?
- c) What is system software for?
- d) What is an operating system — a system software or application software?
- e) What is a «driver»?
- f) What is application software?
- g) What is application software used for?
- h) What is the tendency in application software market in recent years?
- i) What is the application of communication software?

**3. Find the answers to these questions in the following text.**

- 1) What is Currie Munce's main aim?
- 2) How quickly did the possible areal density of hard disks increase in the 1990s?
- 3) How long does Munce think magnetic recording technology will continue to make, rapid advances in capacity?
- 4) What problem does he predict for magnetic storage?
- 5) What is the predicted limit for discrete bit magnetic storage capacity?
- 6) What storage technologies might replace current magnetic systems?
- 7) What is the advantage of holographic storage being three-dimensional?
- 8) What improvements are predicted due to the fast access rates and transfer times of holographic storage?
- 9) What is predicted to be the most important high capacity removable storage media in the next 10 years?
- 10)What method of software distribution is likely to replace optical disks?

## Ready for the Bazillion-Byte Drive?

Thinking about writing your memoirs - putting your life story down on paper for all eternity? Why not skip the repetitive strain injury and just capture your whole life on full-motion video, putting it all in a device the size of a sugar cube?

It might not be as far off as you think.

Currie Munce, director of IBM's Advanced HDD Technology Storage Systems Division, has one avowed goal: Build bigger storage. Recently io Munce and his fellow Ph.Ds restored Big Blue's lead in the disk space race with a new world record for areal (bit) density: 35.3 gigabits per square inch - roughly three times as dense as any drive shipping at press time.

During the 1990s, areal density doubled every 18 months, keeping pace with the transistor density gains predicted by Moore's Law. But increasingly daunting technical challenges face those who would push the storage envelope further. 'I think magnetic recording technology has another good 5 to 10 years,' says Munce. 'After that, we'll see substantial difficulties with further advances at the pace people are accustomed to.'

From here on, a phenomenon called superparamagnetism threatens to make densely- packed bits unstable. Provided that new developments continue to thwart superparamagnetic corruption, scientists speculate that the theoretical limit for discrete bit so recording is 10 terabits per square inch (1 terabit = 1,000 gigabits).

Approaching this limit will require new technologies. Two possible contenders are atomic force microscopy (AFM) and holographic storage. I 35 AFM would use a spinning plastic disk, perhaps side a wristwatch, and a tiny, 10-micron cantilever with a 40-angstrom tip (an angstrom represents the approximate radius of an atom) to write data. In theory, AFM will allow densities of 300 to 400 gigabits per square inch.

While AFM is still in the lab, holographic storage is closer to reality. According to Rusty Rosenberger, optical program manager for Imation, 'We are targeting a 5~ -inch disk with 125GB of storage and a 40MB-per-second transfer rate.' Future iterations of holographic systems should improve substantially.

The three-dimensional nature of holography makes it an appealing storage medium because so 'pages' of data can be superimposed on a single volume - imagine transferring a whole page of text at once as opposed to reading each letter in sequence. Hans Coufal, manager of IBM's New Directions in Science and Technology Research division, predicts that the fast access rates and transfer times of holographic storage will lead to improved network searches, video on demand, high-end servers, enterprise computing, and supercomputing.

Meanwhile, also-ran technologies are thriving.

Tape, first used for data storage in 1951 with the Univac I, has been revitalized by the corporate hunger for affordable archiving solutions. In the consumer arena, says Data quest analyst Mary Craig, recordable CD-ROMs and DVDs will remain the dominant high-capacity removable storage media for the next decade. Despite their failure to match the areal density gains of hard disks, optical disks are cheap to produce, making them ideal for software distribution (until a mature digital rights management system facilitates online delivery). Finally, solid state options such as flash cards can't yet match the pricing of hard disks at high capacities.

Further out, scientists salivate over the prospect of data manipulation and storage on an atomic level. Because consumer demand for capacity is lagging behind what technology can deliver, bringing new storage options to the masses will so depend on seeing the need for more space.

**4. Mark the following statements as True or False:**

- The development of AFM is more advanced than holographic storage.
- The predicted maximum storage density of AFM is 400 gigabits per square inch.
- Flolography works in 3D.
- Univac I was the first computer to use tape storage devices.
- Users want higher capacity storage devices than technology can provide.

## UNIT 23. NETWORKS

### INTRODUCTION

Computers and peripherals (pieces of equipment that are connected to the central processing unit of a computer system) connected together form a network. Networks allow communication between computers and the sharing of hardware (such as printers) and software (programs and data). A network that covers a small area e. g. an office or building is known as a LAN (local area network). The main computers that provide services on the network are called servers e. g. a file server provides a central storage area for data files. The computers that use the services are known as clients. The computers can be connected using various types of cabling, including the ordinary telephone system wiring.

A main data communications cable connecting LANs together is referred to as a backbone. Various electronic devices are also used to amplify, filter and determine the best path for the signals. These include bridges for dividing a LAN into separate parts or connecting similar networks together, gateways for connecting different types of networks and routers for connecting different networks together and determining the best path (or route) for the signals. Routers are used to connect networks to form the Internet. A modem (modulator/demodulator) is used to convert signals from analogue (having a variety of levels) to digital (having only two levels, representing on and off) for connection to the ordinary telephone system.

Alternatively, an ISDN (integrated services digital network) adapter or a DSL (digital subscriber line) modem can be used to allow digital signals to be used without being converted to analogue signals.

There are different standard methods of connecting computers in a LAN. One of the most common is known as Ethernet. Each computer must have a network adapter (special electronics to control the network connection). This is usually in the form of an expansion card known as a network interface card (NIC). All the computers are connected through another electronic device known as a hub. The electronics in the hub are used to amplify the signals to prevent them from becoming too weak before they reach the desired computer. The cable normally used to connect the computers to the hub is known as twisted-pair cabling. It contains two cables twisted together to eliminate interference from external signals. In a home network, the mains power cables built into the house can be used instead if electronic devices called isolation adapters are used to isolate the computer from the mains electricity running through the cable. In future, wireless networks will use a radio transmitter and receiver tuned to use the same radio frequency, instead of cabling.

In a client/server network, the main server computer provides the services (sharing of printers, programs or data, etc.) and the attached client computers can be normal computers or simple terminals.

Terminals require the server to do most or all of the processing. A thin client (or thin terminal), such as a NetPC, has a processor that does some of the processing but a dumb terminal does not have a processor and all the processing must be done by the server computer.

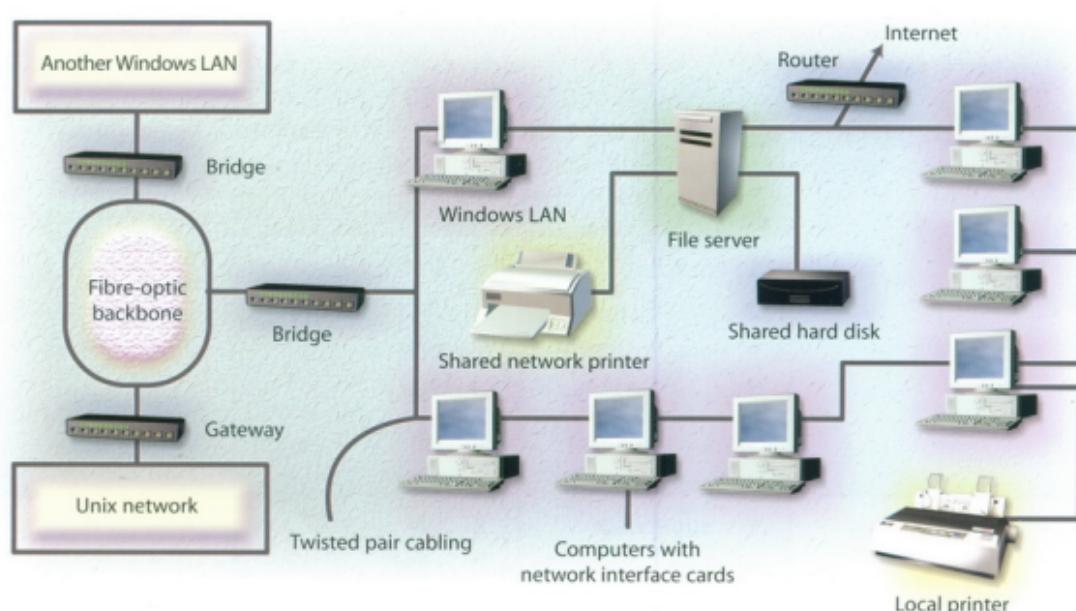
One character of data is referred to in computing as a byte. in the binary system (a number system that only uses two digits i.e. 1 and 0) used in computers, a byte is made up of 8 bits where a bit is a 1 or a 0. When data is transmitted through a network system, it can be transmitted in different ways.

Asynchronous transmission (or stop-start transmission) sends the data one byte (or character) at a time. A start bit (called a control bit) is added to indicate the beginning of each byte and another control bit called a stop bit is added to indicate the end of each byte. Synchronous transmission sends the data in blocks. Extra bytes of data called synch bytes are added at the beginning and end of each block. They are used to synchronise the sending and receiving devices.

When a message is transmitted through a network, it is processed in various ways by the software and the hardware. It is first processed by the applications program e. g. an email program, and then it is processed by the operating system. It is then processed by the hardware such as the network interface card and finally by the network electronics e. g. a router, as it passes through the network system. When it arrives at its destination, it is similarly processed in reverse order to display the message on the display screen of the receiving computer.

### **1. With the help of this diagram, try to describe the function of these components of a typical network system:**

1. a file server
2. a LAN
3. a bridge
4. a gateway
5. a router
6. a modem
7. a backbone



## 2. Now study this text and the diagram of a wireless network setup. Match the diagram key to the components of network.

Wireless (WiFi) networks are just like fixed LANs but instead of using cables, devices are linked by radio waves. Each computer in a wireless network requires a wireless network interface card (NIC).

These can be built in or you can use plug-in adaptors. These allow each component in the network to communicate with a wireless access point (AP) to create a wireless local area network (WLAN). The AP operates like a router in a fixed LAN. It also provides a bridge which plugs into the hub of a fixed LAN allowing both fixed and wireless users to talk to each other.

If your LAN is connected to the Internet, the WLAN can also use it. If not, you can connect the WLAN to the Internet via an ADSL or cable modem.

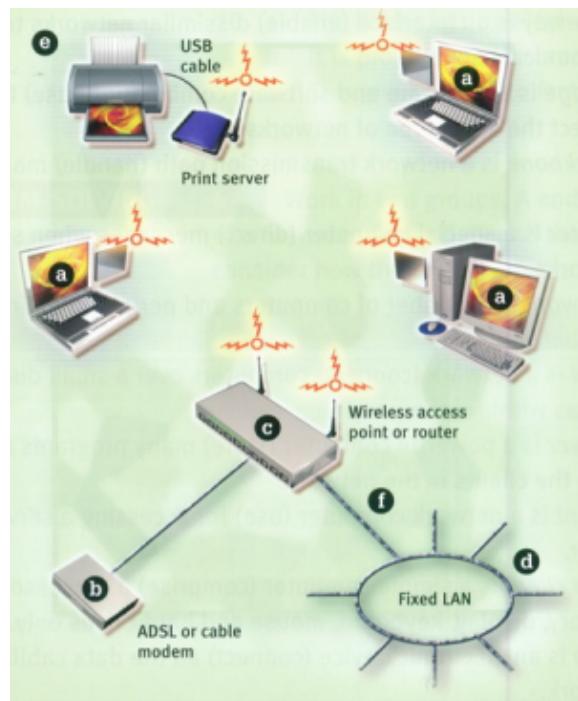
What are the advantages of a wireless network? You don't need cabling. In older buildings, it can be expensive to install cables and access points. With WiFi, one access point can cover an entire floor or even a building. You can work anywhere within range of the access point. On a sunny day, you could work outside. You can make any room in the house your study. There are now WiFi hotspots in hotels, libraries and airports so you can link to a network away from home or your office.

There are disadvantages. Fixed LANs can run at 1000 Mbps. Wireless networks are much slower and the further you are from an access point, the slower the rate. Although there are savings on the cost of cabling, wireless NICs are more expensive than the wired versions.

Then there is the problem of interference, if a neighbour is using the same channel, and security. Other users may be able to intercept your data. Encryption programs like Wired Equivalent Privacy (WEP) can help.

### KEY TO THE DIAGRAM

1. A modem providing access to the Internet.
2. A wireless AP enabling computers to connect to the fixed LAN.
3. Computers equipped with wireless NICs.
4. A fixed LAN linking computers with cables.
5. Network printer connected to a wireless print server.
6. A data line linking fixed LAN clients to a wireless access point.



Relative clauses with a participle are often used in technical descriptions. They allow you to provide a lot of information about a noun using as few words as possible.

Study these examples from the Task 3 text.

- 1 Computers equipped with wireless NICs.
- 2 A network printer connected to a wireless print server.
- 3 A modem providing access to the Internet.
- 4 A fixed LAN linking computers with cables.

We can use the passive participle as in examples 1 and 2.

- 1 Computers equipped with wireless NICs.  
= computers which are equipped
- 2 A network printer connected to a wireless print server.  
= a network printer which is connected

We can use an active participle as in examples 3 and 4.

- 3 A modem providing access to the Internet.  
= modem which provides access to the Internet
- 4 A fixed LAN linking computers with cables.  
= A fixed LAN which links computers with cables

### 3. Complete these definitions with the correct participle of the verb given in brackets.

1. A *gateway* is an interface (enable) dissimilar networks to communicate.
2. A *bridge* is a hardware and software combination (use) to connect the same type of networks.
3. A *backbone* is a network transmission path (handle) major data traffic.
4. A *router* is a special computer (direct) messages when several networks are linked.
5. A *network* is a number of computers and peripherals (link) together.
6. A *LAN* is a network (connect) computers over a small distance such as within a company.
7. A *server* is a powerful computer (store) many programs (share) by all the clients in the network.
8. A *client* is a network computer (use) for accessing a service on a server.
9. A *thin client* is a simple computer (comprise) a processor and memory, display, keyboard, mouse and hard drives only.
10. A *hub* is an electronic device (connect) all the data cabling in a network.

### 4. Link these statements using a relative clause with a participle.

- 1)
  - a. The technology is here today.
  - b. It is needed to set up a home network.
- 2)
  - a. You only need one network printer.

- b. It is connected to the server.
- 3) a. Her house has a network.
- b. It allows basic file-sharing and multiplayer gaming.
- 4)
- a. There is a line receiver in the living room.
  - b. It delivers home entertainment audio to speakers.
- 5)
- a. Eve has designed a site.
  - b. It is dedicated to dance.
- 6)
- a. She has built in links.
  - b. They connect her site to other dance sites.
- 7)
- a. She designed the site using a website creation program.
  - b. It is called Dreamweaver.
- 8)
- a. At the centre of the home of tomorrow is a network.
  - b. I accessed through a control pad.
- 9)
- a. The network can simulate the owner's presence.
  - b. This makes sure vital tasks are carried out in her absence.
- 10)
- a. The house has an electronic doorkeeper.
  - b. It is programmed to recognise you.
  - c. This gives access to family only.

### **5. Find the answers to these questions in the following text.**

1. Into what units is data subdivided by the following layers?
  - a. transport layer
  - b. network layer
2. What is the purpose of a transmission checksum test?
3. How long does the data-link layer keep a copy of each packet?
4. What processes can be carried out at intermediate nodes?
5. Which network communications layer is described by each of the following statements?
  - a. Makes sure that the message is transmitted in a language that the receiving computer can understand
  - b. Protects the data being sent

- c. Encodes and sends the packets
- d. Supervises the transmission
- e. The part of a communications process that a user sees
- f. Starts communications and looks after communications among network nodes
- g. Chooses a route for the message
- h. Makes backup copies of the data if required
- i. Confirms the checksum, then addresses and duplicates the packets

## **NETWORK COMMUNICATIONS**

1. The application layer is the only part of a communications process that a user sees, and even then, the user doesn't see most of the work that the application does to prepare a message for sending over a network. The layer converts a message's data from human-readable form into bits and attaches a header identifying the sending and receiving computers.

2. The presentation layer ensures that the message is transmitted in a language that the receiving computer can interpret (often ASCII). This layer translates the language, if necessary, and then compresses and perhaps encrypts the data. It adds another header specifying the language as well as the compression and encryption schemes.

3. The session layer opens communications and has the job of keeping straight the communications among all nodes on the network.

It sets boundaries (called bracketing) for the beginning and end of the message, and establishes whether the messages will be sent half-duplex, with each computer taking turns sending and receiving, or full-duplex, with both computers sending and receiving at the same time. The details of these decisions are placed into a session header.

4. The transport layer protects the data being sent. It subdivides the data into segments, creates checksum tests - mathematical sums based on the contents of data - that can be used later to determine if the data was scrambled. It can also make backup copies of the data. The transport header identifies each segment's checksum and its position in the message.

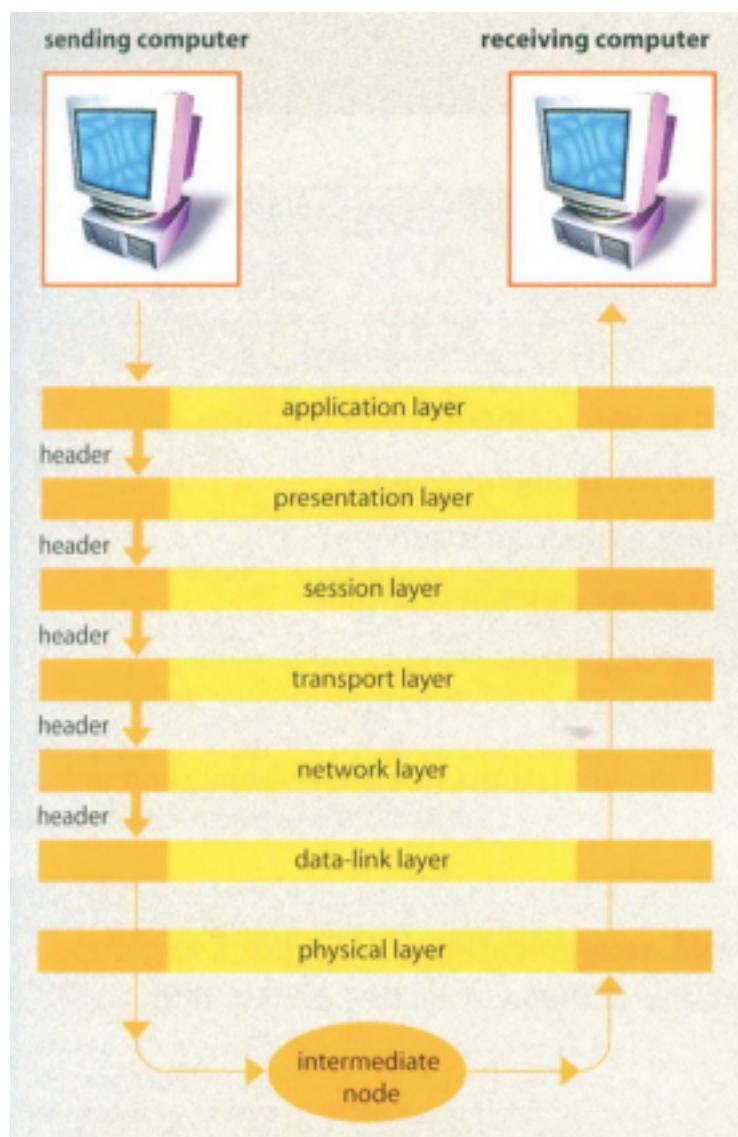
5. The network layer selects a route for the message. It forms data into packets, counts them, and adds a header containing the sequence of packets and the address of the receiving computer.

6. The data-link layer supervises the transmission. It confirms the checksum, then addresses and duplicates the packets. This layer keeps a copy of each packet until it receives confirmation from the next point along the route that the packet has arrived undamaged.

7. The physical layer encodes the packets into the medium that will carry them - such as an analogue signal, if the message is going across a so telephone line - and sends the packets along that medium.

8. An intermediate node calculates and verifies the checksum for each packet. It may also reroute the message to avoid congestion on the network.

9. At the receiving node, the layered process that sent the message on its way is reversed. The physical layer reconverts the message into bits. The data-link layer recalculates the checksum, confirms arrival, and logs in the packets. The network layer recounts incoming packets for security and billing purposes. The transport layer recalculates the checksum and reassembles the message segments. The session layer holds the parts of the message until the message is complete and sends it to the next layer. The presentation layer expands and decrypts the message. The application layer converts the bits into readable characters, and directs the data to the correct application.



**6. Re-read the text to find the answers to these questions. Match the terms in Table A with the statements in Table B.**

Table A	Table B
a. Bracketing	1. Transmission mode in which each computer takes turns sending and receiving
b. Half-duplex	2. Mathematical calculations based on the contents of data physical layer
c. Full-duplex	3. Set boundaries for the beginning and end of a message

d. Checksum	4. Transmission mode in which both computers send and receive at the same time
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**7. Mark the following statements as True or False:**

- a. Most of the work that an application does to prepare a message for sending over a network is not seen by the user.
- b. ASCII is always used to transmit data.
- c. The encryption layer compresses the message.
- d. The network layer keeps track of how many packets are in each message.
- e. The network layer keeps a copy of each packet until it arrives at the next node undamaged.
- f. Analogue signals are used on ordinary telephone lines.
- g. When a message arrives at its destination, it passes through the same seven network communications layers as when it was sent, but in reverse order.

## UNIT 24. MEMORY AND STORAGE

### INTRODUCTION

Computer memory needs to be quick. It is constantly feeding the CPU with data to process. Since nobody likes to wait for a computer, high-quality computers will have fast processors with lots of quick memory. This type of memory is commonly known as **RAM**. This type of memory is **volatile** which means that the actual data disappears when the computer loses power.

Because memory needs to be much faster than storage, it is rather more expensive than storage per GB. A typical desktop computer today (in 2016) has between 2GB and 32GB of memory running at speeds of anywhere from 1.2 GHZ to 3.2 GHZ. Speeds tend to go up about 10% every two years.

If you are a gamer, video editor, or physics geek, you may be aware of **video memory**. Video memory is special RAM which is even faster and more expensive than normal system RAM. This RAM is reserved only for the graphics and is thus kept separate from the main system RAM, which sits on the motherboard close to the CPU. A typical dedicated video card will have anywhere between 2GB and 12 GB of dedicated RAM.

But of course computers do not process all the data they have at once. They also need to save some data for long term use. This is where storage comes in. Think of all the video files, mp3s, photos, and documents on your PC. These files are not always being processed by the CPU. They are mostly just hanging around waiting to be used at some point. Storage does not need to be as quick as memory, but there does need to be a lot more of it. And storage of course needs to be **non-volatile**, meaning it will not get erased when you power off or restart your computer. These are the two key differences between memory and storage.... speed and volatility.

Storage today comes in many different types including **semiconductor storage**, **magnetic storage**, and **optical storage**. A typical computer today comes with anywhere between 128GB to 2TB of storage. Low end computers normally come with a magnetic **hard disk drive** which reads data at around 75 to 200 MB/sec. These devices use rotating, magnetically-charged platters to store data. Hard disk drives are still popular because they can store a lot of data with relatively quick access times very cheaply. Other examples of magnetic storage devices include the **tape drive** and **diskette**, both of which are obsolete. These dinosaurs of storage were painfully slow and prone to data loss with no warning. Ouch.

Another type of storage is network storage, typically referred to as a **SAN**. This storage is usually found in a datacenter. This type of storage goes by other names such as "cloud storage" or "network drive". It is of course highly limited by

network speeds. If you are offline and need a file then you are out of luck. That is why it's always a good idea to get as much storage on your PC as you can afford.

In the future all magnetic storage types will become obsolete. They will soon all be replaced by **SSDs** using semiconductor technology. SSDs have 3 key advantages over magnetic storage devices: speed, lack of moving parts, and low power consumption. This makes them ideal for laptops where battery life and durability are huge issues. SSDs are fast as well, and can read data at around 200MB to 800 MB per second. Unfortunately SSDs are currently more expensive than magnetic storage per GB, but this should change soon.

Optical storage is another technology which is quickly becoming legacy. Very popular in the 90's and early 2000's, optical storage works by a laser either burning or reading data off a plastic disc coated with various types of light sensitive materials. Due to reliability and speed limitations, optical storage is not used as a primary means of data storage. It is (or increasingly was) used mostly to affordably deliver large datasets like movies, games, and operating systems. In case you still don't understand what optical storage is, typical examples are DVD or Blu-Ray drives.

Well, that about covers it for the current state of memory and storage. But there are some gray areas and exceptions as always, such as **ROMs** and **EPROMs**, which are somewhere in between memory and storage. Embedded systems, BIOS' and older video game machines used these for various reasons, mainly copy protection and cost.

What about the future? Expect a gradual convergence where there is no longer a need for both storage and memory in PCs. Some new technology such as **quantum memory** may arrive which has the advantages of both memory and storage. Until that time arrives, always buy a PC with the most memory and storage you can afford. Computer companies typically charge you a lot more for PCs with a decent amount of RAM and fast storage. Why? Because they know without it, your computer will be slow and completely full very quickly, forcing you to upgrade or buy into their cloud storage solutions like Apple's iCloud, and Microsoft's OneDrive.

### **1. Mark the following statements as True or False:**

- A. Video memory is a volatile, especially fast type of RAM.
- B. A hard disk drive (HDD) is a type of semiconductor storage.
- C. Tape drives and diskettes are rather out-dated magnetic storage devices

## 2. Select the best definition of the word or phrase

- 'programmer'

a person who uses technology to earn a living and has no traditional home or assets

a person who writes or modifies software

a person who uses a product or service on a computer

- 'bug'

a program in which the code is distributed allowing programmers to alter and change the original software as much as they like

an error or glitch in a computer program caused by a programmer's mistake

a computer failure which aborts an application or freezes an operating system

- 'crash'

privately developed and owned technology

a computer failure which aborts an application or freezes an operating system

a measure of how easy or hard a program is to use

- 'open source'

an error or glitch in a computer program caused by a programmer's mistake

software in which the license stipulates that the user cannot see, edit, or manipulate the source code of a software program

a program in which the code is distributed allowing programmers to alter and change the original software as much as they like

- 'closed source'

a program in which the code is distributed allowing programmers to alter and change the original software as much as they like

something a computer program is "supposed" to do; often a reason to buy or upgrade software

software in which the license stipulates that the user cannot see, edit, or manipulate the source code of a software program

**E-book for IT Experts**

Abstract - Living in this age of technology, where knowledge and information are just a click away, the authors wish to present an e-book which would be used for teaching English for Specific Purposes (ESP) at the College for Information Technology in Zagreb, Croatia. The article gives a detailed explanation of the idea and purpose of such a book. The contents and a possible software solution are also given. The results of a survey conducted at the mentioned college, among the students of the first year, are shown. The function of the book in education of IT professionals is commented and a firm conclusion, based on practical work with IT students, is made.

**I. INTRODUCTION**

To try to offer a proposition for an electronic textbook is nothing without giving an easy to grasp definition of what an electronic book actually is. "The electronic book is a document of monographic character available to the public online or in physical form (on CD-ROM, DVD) and it may include pictures and sounds, links with related online pages, and programs to change and supplement it. It should also have an ISBN, either as its only identifier or as part of the DOI and URN identifiers specific for electronic materials. The electronic book may be available in various formats. The recommendation is for every format of the electronic book to have its own ISBN ". This definition summarizes all the features that are explained in this article, putting the proposed electronic textbook right inside the defined margins.

Coming across a very interesting topic, which was occupying the American media mostly throughout 2009 but still continues even today, barely scratches the surface of the new electronic and Internet culture. The American governor of California had stirred the public with his proposition to introduce electronic textbooks with the aim to save hundreds of million dollars a year. The governor explained that the interactive environment, besides saving money, can offer students various possibilities considering that the needs of young people are changing on a daily basis. The format of these books is very practical to use and their ecological role is very significant when thinking of forest preservation. In addition to these two important factors in favoring electronic textbooks, the students' needs are what has to be considered when looking at the methodological aspect of discussing the applicability of such books. What do students really get from using electronic textbooks?

This article deals with an isolated segment of students, making the answer to this question quite simple. The information technology students use their computers on a daily basis. This gives them the possibility to have their study materials on a

hard disk rather than in printed form somewhere in their school bag or at home over-stuffing their shelves. Due to the extremely fast development of information technologies, practicality is not what matters the most. Using electronic books, students enter a new educational dimension of interactive study, where they can spend good quality time in self-study, expanding their knowledge without the guidance of a mentor or a teacher. Considering the historical change of language teaching methods which contributed to all the possibilities that exist today, this article gives a suggestion for an electronic book in the field of language study. Such a field of study requires a lot of audio-visual materials and this kind of a publication can offer just that.

## II. THE IDEA

With the development of the World Wide Web and all the technological breakthroughs, teachers of foreign languages have profited concerning the increase in the choice of teaching materials. Browsing through numerous web pages, entering key words relevant for their search, teachers and students can find a huge number of pages containing interactive exercises with simple and interesting grammar overviews and explanations.

Why not offer something similar in one unified package for an even simpler use? This article gives a proposition of an electronic book (e-book) which would serve as a substitute for an ESL (English as a second language) student's book in the field of Information technology for the students at the College for Information Technology in Zagreb, Croatia.

At this college, all students have their own laptop with a wireless Internet access. Having this in mind, a need for such a book has appeared to be a very useful solution in many aspects as well as the materials of the book itself being connected to various materials available on the Web. In such a manner, this English language course would keep in touch with the cutting edge technology, which is of great value to this type of course considering the rapid IT development.

In order to achieve independent reading comprehension of texts found on the Internet, links to online dictionaries would be offered. The e-book would, of course, have its own glossary which would be linked to the vocabulary in each unit (text, exercise, etc.), thus making the comprehension of the materials faster and simpler. In addition to the standard materials that each ESL student's book should have, this e-book would contain links to web pages which would serve as extra teaching materials. Interactive exercises, being part of the application itself, would make correct answers with explanations always accessible and feedback possible even when the student is not in class.

Having numerous audio-visual materials at their disposition, students would

have the opportunity to listen and view various video lessons which are of great importance when learning a foreign language. Even if students are absent, they could receive adequate teaching materials which would help them study even when the teacher is not present.

Standards for publishing electronic textbooks have not been given, although an International Digital Publishing Forum ([www.idpf.org](http://www.idpf.org)) has been organized by the International Trade and Standards Organization for the Digital Publishing Industry. This website offers useful and interesting information about the electronic book industry.

This e-book could be published on a CD-ROM as a desktop application or offered as a Web application. A computer would be needed to access its contents, but for a complete and full usage of all the extra materials the user would also need access to the Internet. A possible software solution is given in the following parts of the article.

The answer to the question of the publisher and the license arrangements lies in the following statement: “When educators pool their expertise to foster a culture of shared knowledge, everyone benefits” . The proposed e-book would join the same cause which the Community College Open Textbook (CCOT) Project supports and it would be offered to students as an open textbook. The open textbooks “are freely available with nonrestrictive licenses. Covering a wide range of disciplines, open textbooks are available to download and print in various file formats from several web sites and OER repositories”. As the infringement of copyright laws rises with the development of technology, the idea of prosecuting individuals for illegally obtaining an electronic book (either a digitalization of already printed books or newly developed textbook applications), kind of puts the idea of free education into the background. This electronic textbook would be offered to the academia for the same interest of both students and teachers: the thirst for knowledge.

### **III. THE CONTENTS OF THE BOOK**

The book, under the title „IT English“, would be divided into six main study sections which would further be divided into twelve smaller study units:

#### **1. Computer basics**

- 1.1. Computer history**
- 1.2. Computer architecture**
- 1.3. Input and output units**
- 1.4. The basic division**
- 1.5. The photos of the future**

#### **2. Data storage**

- 2.1. From the beginnings
- 2.2. The future of data storage
- 3. Software
  - 3.1. Operation systems
  - 3.2. Computer applications
- 4. Programming
  - 4.1. Programming languages
  - 4.2. Usage

- 5. Network connections
  - 5.1. WWW and the Internet
  - 5.2. Computer networks

The book would also have its own glossary, which would be written by the users themselves with the help of external links to an online dictionary. This would give the students the possibility to create an individual list of words during their time of study. The book would also offer the option of storing already completed exercises so that the students can monitor their own work and see progress when reviewing the studied lectures.

Each of the twelve study units would include the following areas of dealing with the proposed study content:

*A. Grammar*

A traditional approach to grammar would be used, giving adequate definitions and providing examples relevant to the field of study in each study unit. Grammar exercises for practicing each grammatical unit would be offered to the user (student) in such a way that they would be transformed into interactive so that students would be automatically corrected.

*B. Reading*

Each study unit would include interesting texts based on the topic of the unit. While reading, the users would be able to select the word which they do not understand and the link in the application would direct them to the glossary. In case of the word not being in the glossary the user would be redirected to one of the online dictionaries. After finding the meaning, the users would be able to note down the new word in their own personal glossary which could be created from the beginning of using the application. In addition to the texts in each study unit, the user would have the option to explore different links to additional topics which are of interest. In order to secure comprehension of the new texts, links to online dictionaries would be provided.

*C. Listening and viewing*

Interesting video clips of different lengths would also be included in each

study unit. A visual component of learning the study materials would thus be included. The video clips would be authentic, taken from important and interesting presentations, conferences and lectures, so as to make the actual environment of information technologies closer to the learner.

#### *D. Writing*

What makes writing easier in this kind of environment is the fact that all wrong entries would be corrected. This is not something that a standard book has. However, there would be one limiting factor. The writing corrections would be limited to only some type of exercises, while writing of essays, letters, etc. would face the problem of all grammar and spelling checking tools. This would not suit a learning environment, thus such a tool would not be included in the e-book.

#### *E. Communicating*

Practicing communication is not such a huge problem when a teacher creates a simulated environment in the classroom where students participate in discussions and the teacher corrects them. The problem appears when students wish to practice at home. The solution to this problem is to provide a simulation between the student and the computer. The structures would have to be prepared in advance, because it would not be the case of artificial intelligence.

Review exercises would be found at the end of each study unit. If the student (user) was absent, he/she could practice and study at home without many problems. This kind of approach to teaching is valuable because it allows students to study under supervision, so that the number of their mistakes could be taken down to a minimum. Unfortunately, in classroom teaching, teachers cannot give their full attention to each student and there is always too little time to reinforce what has been learned. With this e-book students would have a certain kind of independence and would gain more confidence in using the English language.

If compared, the structure of a printed textbook is not that different. However, this electronic book would open the interactive dimension where students could explore their own interests and enjoy the idea of having everything in one place. This economization stems from the fact that this e-book would substitute a number of handbooks such as the student's book, workbook, various dictionaries and grammar books which have to be used in language learning.

## **IV.SOFTWARE SOLUTION**

The evolution of 'the printing press', as we may call it, has reached the unimaginable. To some extent, what was once revolutionary, today starts to be forgotten.

The IT market offers numerous free and priced software publishing tools,

which give individuals the opportunity to make their own electronic publications. These publications can also be created in different formats. In this article, a newly issued publishing tool will be presented as the solution for creating this particular e-book in an EPUB format.

The EPUB format supports the following features: the DRM (Digital Rights Management), table, image, sound, interactivity, word wrap, open standard, embedded annotation and book-marking. With these features in mind and in comparison to other formats, the EPUB has been chosen as the most suitable for the publication of this e-book.

The proposed tool for publishing is the Adobe InDesign CS5. This software has been chosen for its feature to help create interactive documents. One of the many interactive features of InDesign CS5 is the option to navigate an animation, sound or video, as well as to launch an external web page in the user's browser . As the e-book proposed in this article is intended for IT students learning English and has thus been described as a document with many interactive features, it is essential that the software chosen meets the needs of the authors. The InDesign document can be converted to the EPUB format. A variety of digital readers are offered to users and it seems that most of them support the EPUB format, thus it would be wise to publish in the mentioned. Fig. 1 shows how a hyperlink to the Adobe website is easily created within a document.

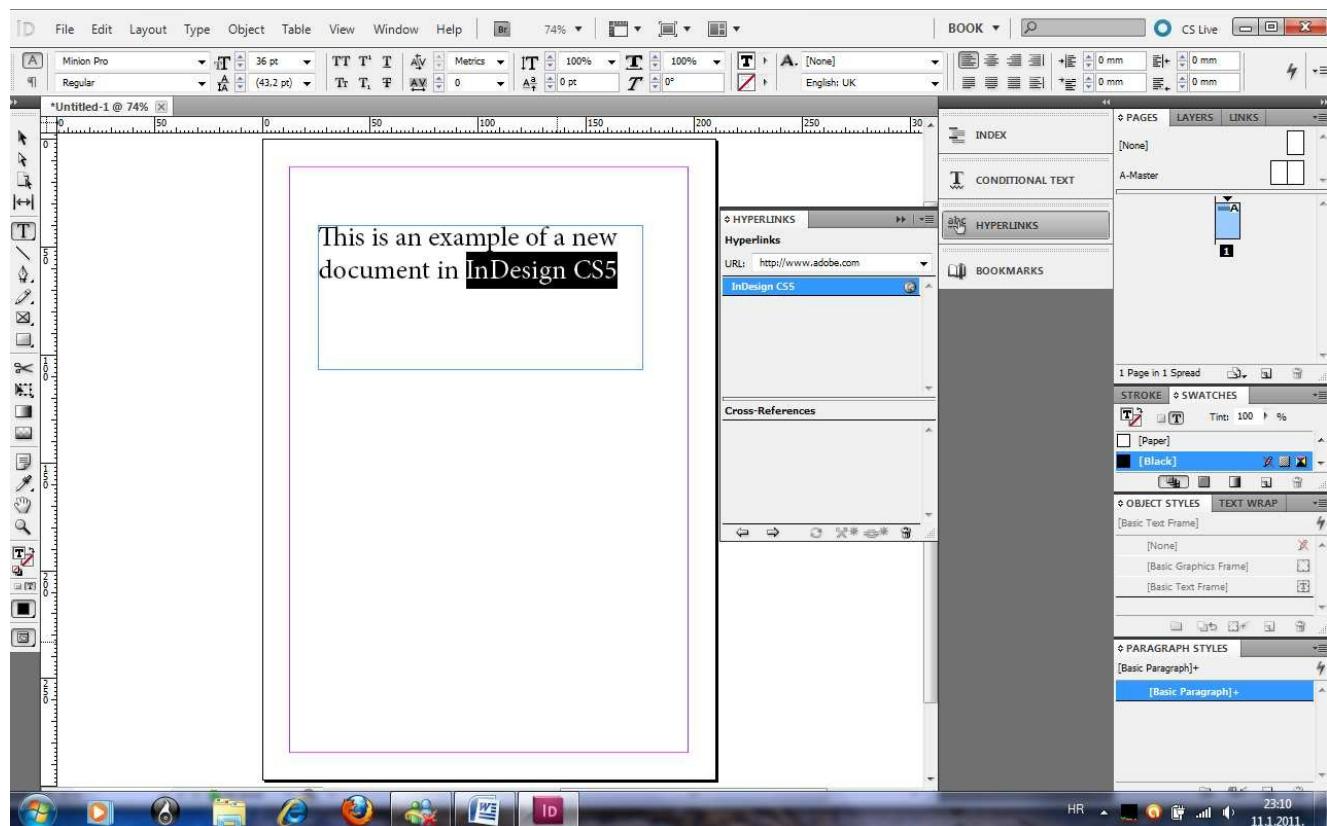


Figure 1. Hyperlinks in InDesign CS5

## V. SURVEY RESULTS

Despite the fact that studies can be found which show that for learning purposes students prefer textbooks over e-books, a survey has been conducted among first year students at the College for Information Technology. Based on a study performed at the Oakland University which attempted to determine usage of books depending on the format (print or electronic), this survey wants to reinforce the conclusion to the „correlation between the popularity of a subject area and its use in either print or electronic formats“. According to this conclusion, the study showed that there is a great preference for electronic books in the fields like computer science and technology.

In order to show that there is a need for such a book among the students at the College for Information Technology, a questionnaire has been given to first year students. The number of valid respondents was 38, of which 5 were female. The questionnaire was comprised of 10 questions as follows:

1. Are you satisfied with your current English language textbook? Please, elaborate your answer.
2. How important are extra materials for you as an English learner? Please, elaborate your answer.
3. Does watching short movie clips in class help you study the English language?
4. Do you sometimes miss explanations when you are studying by yourself?
5. Would you like to have a book which would help you study by offering explanations even when you are not in class?
6. Do you miss having a dictionary as a part of your English textbook?
7. Would you like to have the possibility to make your own glossary and have it in a digital format?
8. To what extent does browsing the Internet help you in the study of the English language? Please, elaborate your answer.
9. Do you feel that you enhance your knowledge of the English language by browsing through the web pages?
10. Are you familiar with the term „electronic book“?

The answers were numbered from 1 to 5: 1 - I completely disagree, 2 - I mostly disagree, 3 - I cannot decide, 4 - I mostly agree, 5 - I completely agree.

Questions 3, 5, 8 and 9 have received the biggest „answer 5,, percentage. Question 3 was given in order to show a great interest in audio-visual language learning methods among students. 58 % of the students completely agree and 18 % mostly agree with the idea of watching short videos to

help them learn (Fig. 2).

Question 5 addresses explicitly the idea of having a book that would help them learn even if they are not present in class. Despite not being introduced to the idea of the research, the students have answered positively to the suggestion of an e-book (Fig. 3).

Figure 2. Answers to survey question 3

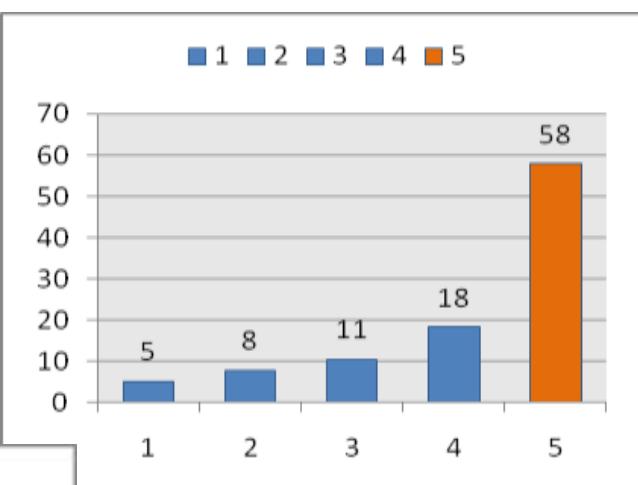
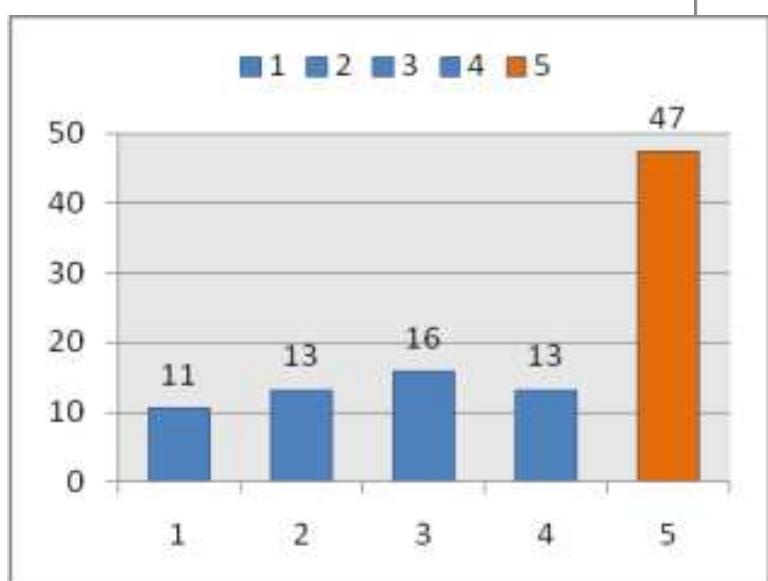
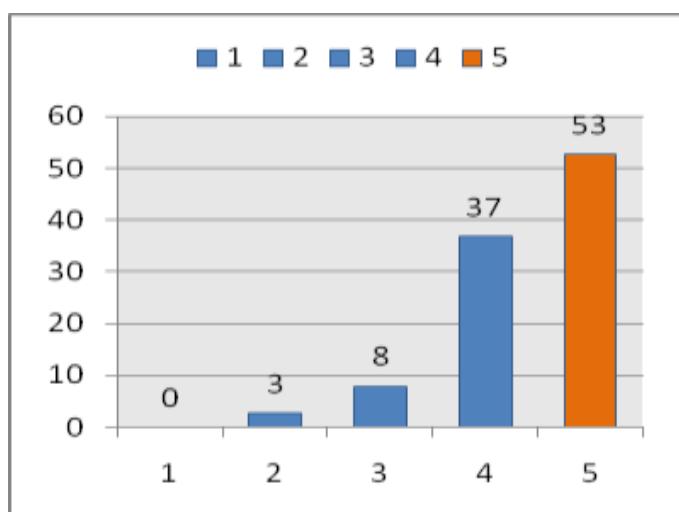


Figure 3. Answers to survey question 5

The role of the Internet and the importance of the information that can be received from browsing web pages have already been introduced. It seems as though students have also come to see the Web as a great source of help while learning English, especially because of their future field of work. Charts for questions 8 and 9 show a great percentage of students feeling that the world's biggest network has a great deal to offer them in their study of language (Fig. 4 and 5).

Figure 4. Answers to survey question 8



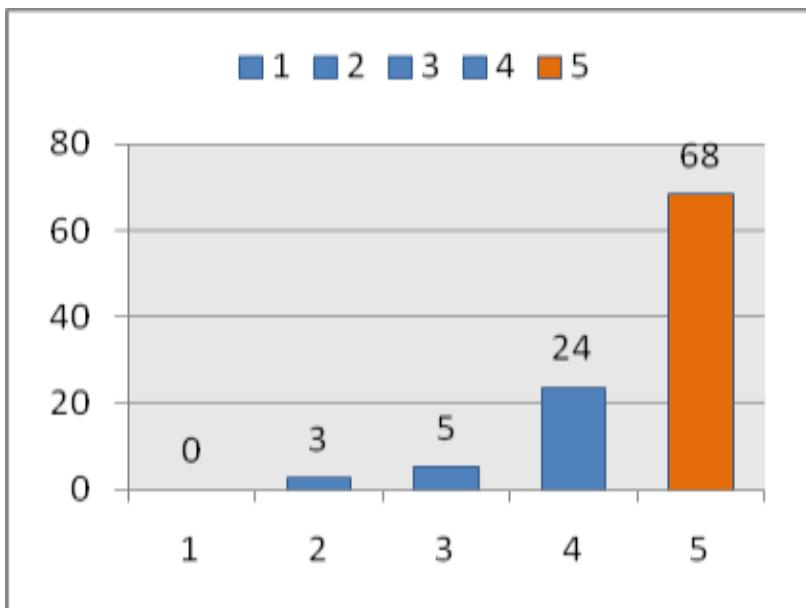


Figure 5. Answers to survey question 9

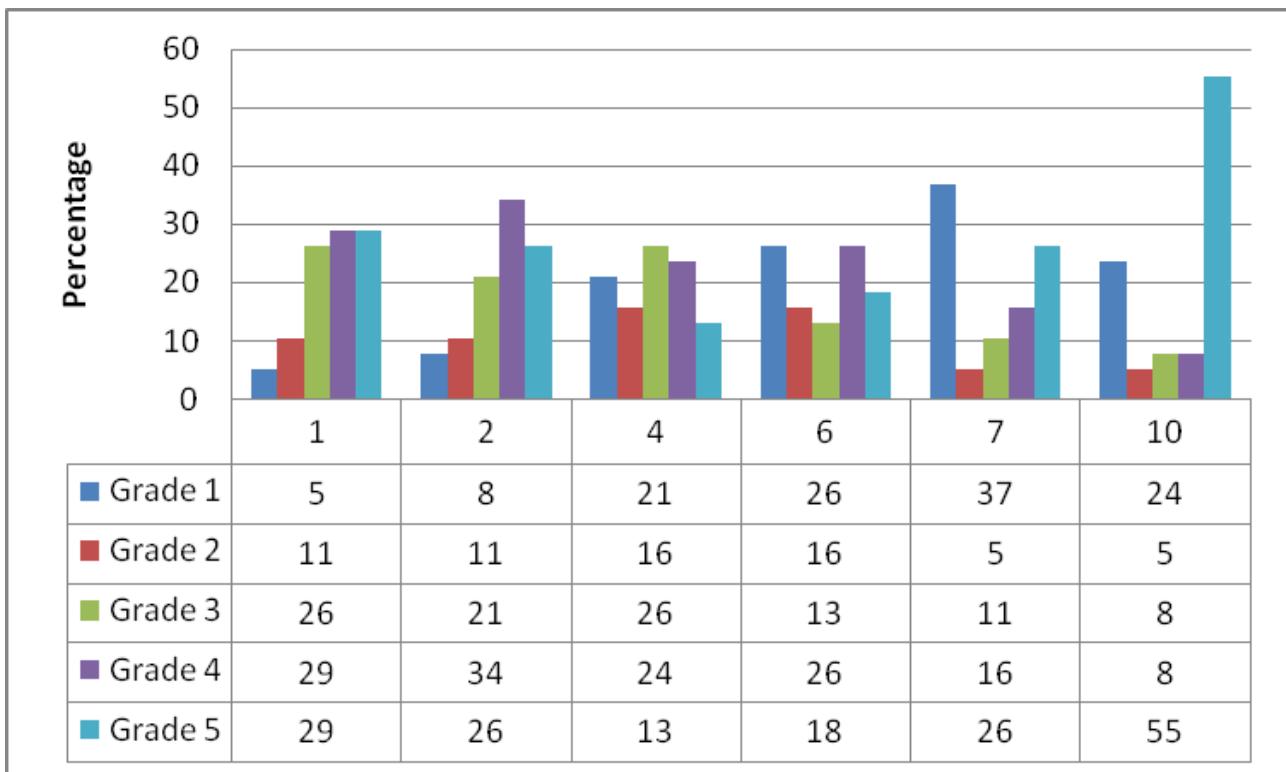


TABLE I. QUESTION (1, 2, 4, 6, 7, 10) RESULTS

A study on technology-enhanced language learning (TELL) has been executed at a university in Taiwan where 84 % of students thought this kind of learning to be „more interesting and rewarding“ due to the special approach which includes an „active learning style, interactivity, self-control, motivation and immediate feedback“ with the „ability to learn more diverse and practical knowledge“. This sentence actually summarizes all the features which this e-book would encompass.

The results of the other answers in the survey have not been analyzed individually because of their lower significance to this research. The mentioned results can be found in Table I where a chart is also given for the overall comparison.

## **VI. ENHANCED TEACHING METHODS**

Throughout the history of language teaching the methods have truly developed and changed. One of the possible divisions of such methods is the one which Diane Larsen Freeman gives in her overview of teaching methods and techniques. In this book the author mentions the following methods: the grammar-translation method, the direct method, the audio-lingual method, the silent way, desuggestopedia, community language learning, total physical response, communicative language teaching, content based approach, task based approach, participatory approach, learning strategy training, cooperative learning and multiple intelligences. All these methods have contributed to one another and have resulted in the language teaching methods that we have today.

A new challenge has arisen. In the age of technology, massive communication and connections, educators are forced to be computer literates and use this technology to the highest level. This article suggests a solution not only for the students but also for the teachers, who might not be experts in the IT field but are great educators of the English language. An interactive textbook like the one proposed could help them achieve their educational goals in a less exertive but more productive way.

The usage of the suggested electronic textbook in class could be seen as a method of online education. Linda Harasim suggests three modes of delivery in online education: adjunct mode, mixed mode and the totally online mode. In the case of the presented e-book, the adjunct mode would have to be considered. Although this mode is used to describe „the earliest examples of online education“, it is suitable for this description because it „uses networking to enhance traditional face-to-face or distance education“. This e-book would be used to support and enhance existing teaching methods while offering newest and updated information to the students of Information Technology.

If put in the context of e-learning, using an electronic textbook for educational purposes could be seen as blended learning: „a combination of e-learning and traditional learning systems“. Furthermore, Saul Carliner presents a model of different e-learning uses (Table II).

**TABLE II. E-LEARNING USES**

Differing between formal and informal learning as intentional and unintentional, the usage of the proposed electronic textbook for language study would combine these two types of learning. Combining the conservative teaching methods with this kind of textbook would offer students to explore the informal side of learning,

this being connected to their self-study.

## VII.CONCLUSION

There is no doubt that the future lies in the „digital“ or „electronic“, no matter which field of study we speak of. However, teaching should never lose the face-to-face component; it should never be strictly reduced to online education. The only aim of this article is to offer the means of enhancement for teachers and students but not to deprive students of real time communication and classroom management.

The idea for this kind of electronic textbook arose from teaching experience at the College for Information Technologies. The survey results support the goals at which this e-book is aimed. Students of the College for Information Technologies have shown that they have already recognized the importance of digital media in the context of language learning, 79% of them completely or mostly agreeing with knowing the concept of what an e-book is. The conclusion which can be drawn from the survey results is that these students are aware of all the advantages of enhanced teaching methods, having the potential to explore, use and adopt all the features that „IT English“ would offer them.

The proposed electronic textbook would full fill one of the many require-

Formal Learning	Informal learning
<ul style="list-style-type: none"><li>• Online education</li><li>• Online training</li><li>• Blended learning with classroom delivery and printed materials</li></ul>	<ul style="list-style-type: none"><li>• Knowledge management</li><li>• Electronic performance support</li><li>• Blended learning with related materials in other media</li></ul>

ments that are expected of the European Union countries, considering higher education priorities. The European Ministers responsible for higher education expect the students and staff of these institutions to strive for excellence and face the challenges of the new era, ready to respond to the demands of this fast evolving society. „IT English“ would be just one small part of the great education puzzle which is being pieced together diligently every single day.

## Sentence Basics

### Components of a Sentence

Clearly written, complete sentences require key information: a subject, a verb and a complete idea. A sentence needs to make sense on its own. Sometimes, complete sentences are also called independent clauses. A clause is a group of words that may make up a sentence. An independent clause is a group of words that may stand alone as a complete, grammatically correct thought. The following sentences show independent clauses in curly brackets:

*{We went to the store.} {We bought the ingredients on our list}, and then {we went home.}*

All complete sentences have at least one independent clause. You can identify an independent clause by reading it on its own and looking for the subject and the verb.

### Subjects

When you read a sentence, you may first look for the subject, or what the sentence is about. The subject usually appears at the beginning of a sentence as a noun or a pronoun. A noun is a word that identifies a person, place, thing, or idea. A pronoun is a word that replaces a noun. Common pronouns are *I, he, she, it, you, they, and we*.

*Malik is the project manager for this project. He will give us our assignments.*

In these sentences, the subject is a person: *Malik*. The pronoun *He* replaces and refers back to *Malik*.

*The computer lab is where we will work. It will be open twenty-four hours a day.*

In the first sentence, the subject is a place: *computer lab*. In the second sentence, the pronoun *It* substitutes for *computer lab* as the subject.

*The project will run for three weeks. It will have a quick turnaround.*

In the first sentence, the subject is a thing: *project*. In the second sentence, the pronoun *It* stands in for the *project*.

### Compound Subjects

A sentence may have more than one person, place, or thing as the subject. These subjects are called compound subjects. Compound subjects are useful when you want to discuss several subjects at once.

*Desmond and Maria have been working on that design for almost a year. Books, magazines, and online articles are all good resources.*

In the first sentence, the subjects are *Desmond* and *Maria*. In the second sentence, *books, magazines, and online articles* are the subjects.

## Prepositional Phrases

You will often read a sentence that has more than one noun or pronoun in it. You may encounter a group of words that includes a preposition with a noun or a pronoun. Prepositions connect a noun, pronoun, or verb to another word that describes or modifies that noun, pronoun, or verb. Common prepositions include *in*, *on*, *under*, *near*, *by*, *with*, and *about*. A group of words that begin with a preposition is called a prepositional phrase. A prepositional phrase begins with a preposition and modifies or describes a word. It cannot act as the subject of a sentence. The following phrases inside curly brackets are examples of prepositional phrases.

*We went {on a business trip}. That restaurant {with the famous pizza} was on the way. We stopped {for lunch}.*

The prepositional phrases in this example include *on a business trip*, *with the famous pizza*, and *for lunch*.

### Exercise

Read the following sentences. Underline the subjects, and circle the prepositional phrases.

1. The gym is open until nine o'clock tonight.
2. We went to the store to get some ice.
3. The student with the most extra credit will win a homework pass.
4. Maya and Tia found an abandoned cat by the side of the road.
5. The driver of that pickup truck skidded on the ice.
6. Anita won the race with time to spare.
7. The people who work for that company were surprised about the merger.
8. Working in haste means that you are more likely to make mistakes.
9. The soundtrack has over sixty songs in languages from around the world.
10. His latest invention does not work, but it has inspired the rest of us.

## Verbs

Once you locate the subject of a sentence, you can move on to the next part of a complete sentence: the verb. A verb is often an action word that shows what the subject is doing. A verb can also link the subject to a describing word. There are three types of verbs that you can use in a sentence: action verbs, linking verbs, or helping verbs.

### Action Verbs

A verb that connects the subject to an action is called an action verb. An action verb answers the question *what is the subject doing?* In the following sentences, the action verbs are in bold.

*The dog **barked** at the jogger.*

*He **gave** a short speech before we ate.*

Barked and gave are action verbs.

### Linking Verbs

A verb can often connect the subject of the sentence to a describing word. This type of verb is called a linking verb because it links the subject to a describing word. In the following sentences, the linking verbs are in bold.

*The coat **was** old and dirty.*

*The clock **seemed** broken.*

Was and seemed are linking verbs.

If you have trouble telling the difference between action verbs and linking verbs, remember that an action verb shows that the subject is doing something, whereas a linking verb simply connects the subject to another word that describes or modifies the subject. A few verbs can be used as either action verbs or linking verbs.

*Action verb: The boy **looked** for his glove.*

*Linking verb: The boy **looked** tired.*

Although both sentences use the same verb *looked*, the two sentences have completely different meanings. In the first sentence, the verb describes the boy's action. In the second sentence, the verb describes the boy's appearance.

### Helping Verbs

A third type of verb you may use as you write is a helping verb. Helping verbs are verbs that are used with the main verb to describe a mood or tense. Helping verbs are usually a form of *be*, *do*, or *have*. The word *can* is also used as a helping verb.

The restaurant **is known** for its variety of dishes.

*Is* is the helping verb. *Known* is the main verb.

She **does speak up** when prompted in class.

*Does* is the helping verb. *Speak up* is the main verb.

We **have seen** that movie three times.

*Have* is the helping verb. *Seen* is the main verb.

They **can tell** when someone walks on their lawn.

*Can* is the helping verb. *Tell* is the main verb.

Whenever you write or edit sentences, keep the subject and verb in mind. As you write, ask yourself these questions to keep yourself on track:

- **Subject:** Who or what is the sentence about?
- **Verb:** Which word shows an action or links the subject to a description?

## Exercise

Copy each sentence onto your own sheet of paper and circle the verb(s). Name the type of verb(s) used in the sentence in the space provided (LV, HV, or V).

1. The cat sounds ready to come back inside. \_\_\_\_\_
2. We have not eaten dinner yet. \_\_\_\_\_
3. It took four people to move the broken-down car. \_\_\_\_\_
4. The book was filled with notes from class. \_\_\_\_\_
5. We walked from room to room, inspecting for damages. \_\_\_\_\_
6. Harold was expecting a package in the mail. \_\_\_\_\_
7. The clothes still felt damp even though they had been through the dryer twice.  
\_\_\_\_\_
8. The teacher who runs the studio is often praised for his restoration work on old masterpieces. \_\_\_\_\_

## Sentence Structure, Including Fragments and Run-ons

Now that you know what makes a complete sentence—a subject and a verb—you can use other parts of speech to build on this basic structure. Good writers use a variety of sentence structures to make their work more interesting. This section covers different sentence structures that you can use to make longer, more complex sentences.

### Sentence Patterns

Six basic subject-verb patterns can enhance your writing. A sample sentence is provided for each pattern. As you read each sentence, take note of where each part of the sentence falls. Notice that some sentence patterns use action verbs and others use linking verbs.

#### Subject – Verb

Computers **hum**.

#### Subject – Linking Verb – Noun

Computers **are** tools.

#### Subject – Linking Verb – Adjective

Computers **are** expensive.

#### Subject – Verb – Adverb

Computers **calculate** quickly.

#### Subject – Verb – Direct Object

When you write a sentence with a direct object (DO), make sure that the DO receives the action of the verb.

Sally **rides** a motorcycle.

*Sally* is the subject. *Rides* is the verb. *A motorcycle* is the direct object.

#### Subject – Verb – Indirect Object – Direct Object

In this sentence structure, an indirect object explains *to whom* or *to what* the action is being done. The indirect object is a noun or pronoun, and it comes before the direct object in a sentence.

My coworker gave me the reports.

*My coworker* is the subject. *Gave* is the verb. *Me* is the indirect object. *Reports* is the direct object.

### Exercise

1. Use what you have learned so far to bring variety in your writing. Write six sentences that practice each basic sentence pattern. When you have finished, label each part of the sentence (S, V, LV, N, Adj, Adv, DO, IO).
2. Find an article in a newspaper, a magazine, or online that interests you. Bring it to class or post it online. Then, looking at a classmate's article, identify one example of each part of a sentence (S, V, LV, N, Adj, Adv, DO, IO). Please share or post your results.

### Fragments

The sentences you have encountered so far have been independent clauses. As you look more closely at your past writing assignments, you may notice that some of your sentences are not complete. A sentence that is missing a subject or a verb is called a fragment. A fragment may include a description or may express part of an idea, but it does not express a complete thought.

*Fragment:* Children helping in the kitchen.

*Complete sentence:* Children helping in the kitchen often make a mess.

You can easily fix a fragment by adding the missing subject or verb. In the example, the sentence was missing a verb. Adding *often make a mess* creates an subject-verb-noun sentence structure.

Editing fragments that are missing a subject or a verb

Does the sentence contain a subject?

Does the sentence contain a verb?

No

Yes

No

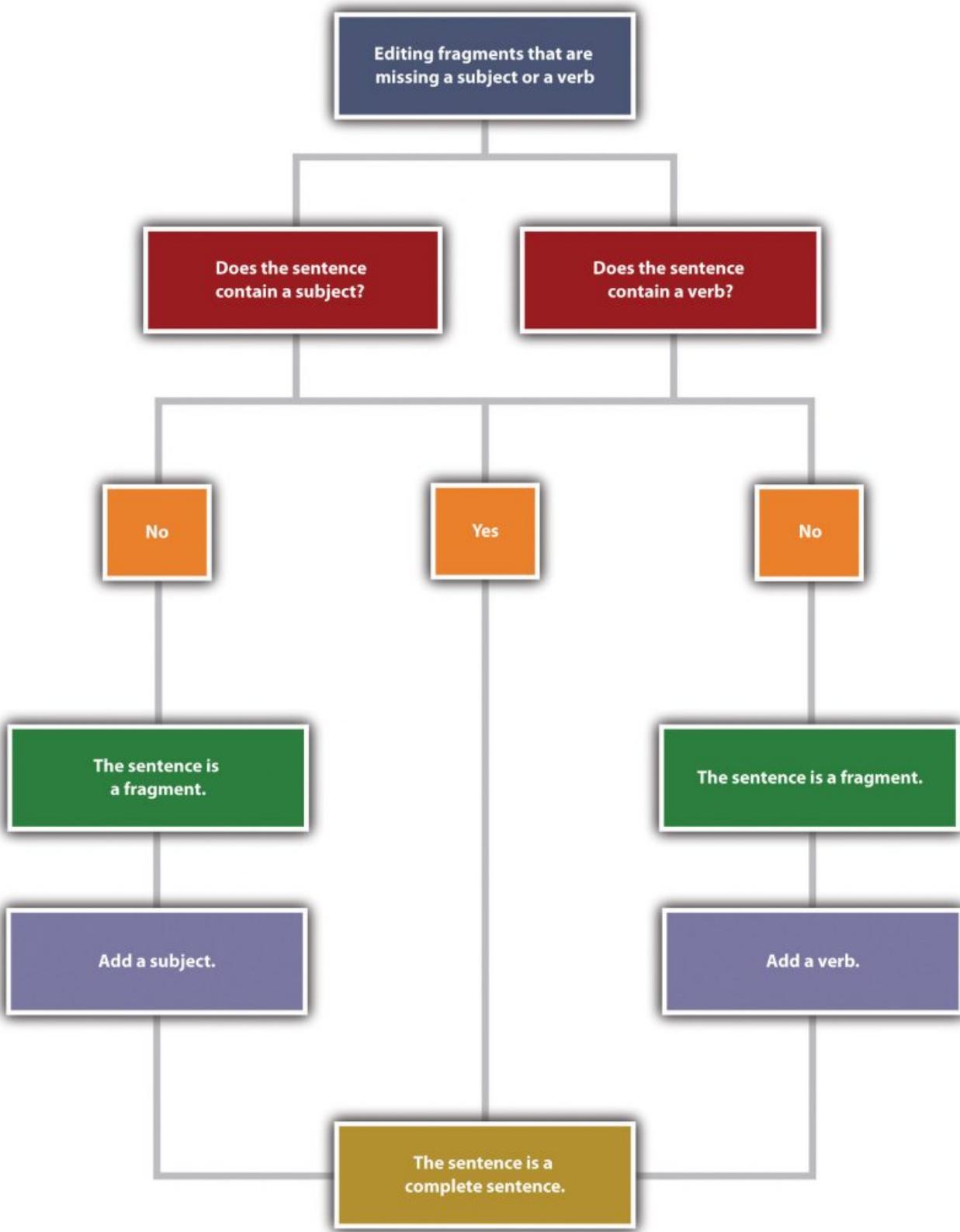
The sentence is a fragment.

The sentence is a fragment.

Add a subject.

Add a verb.

The sentence is a complete sentence.



[Image description]

See whether you can identify what is missing in the following fragments.

**Fragment:** Told her about the broken vase.

**Complete sentence:** *I told her about the broken vase.*

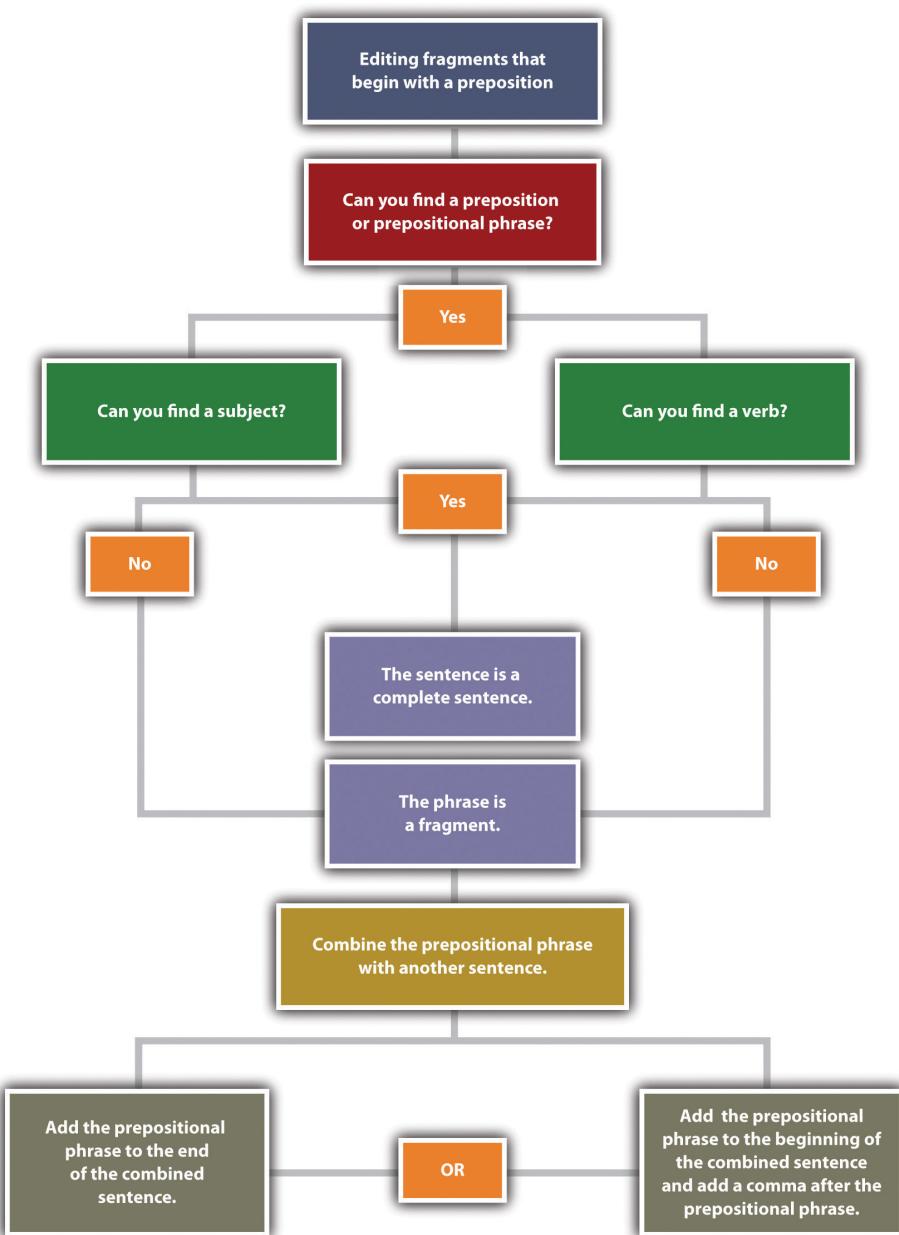
**Fragment:** The store down on Main Street.

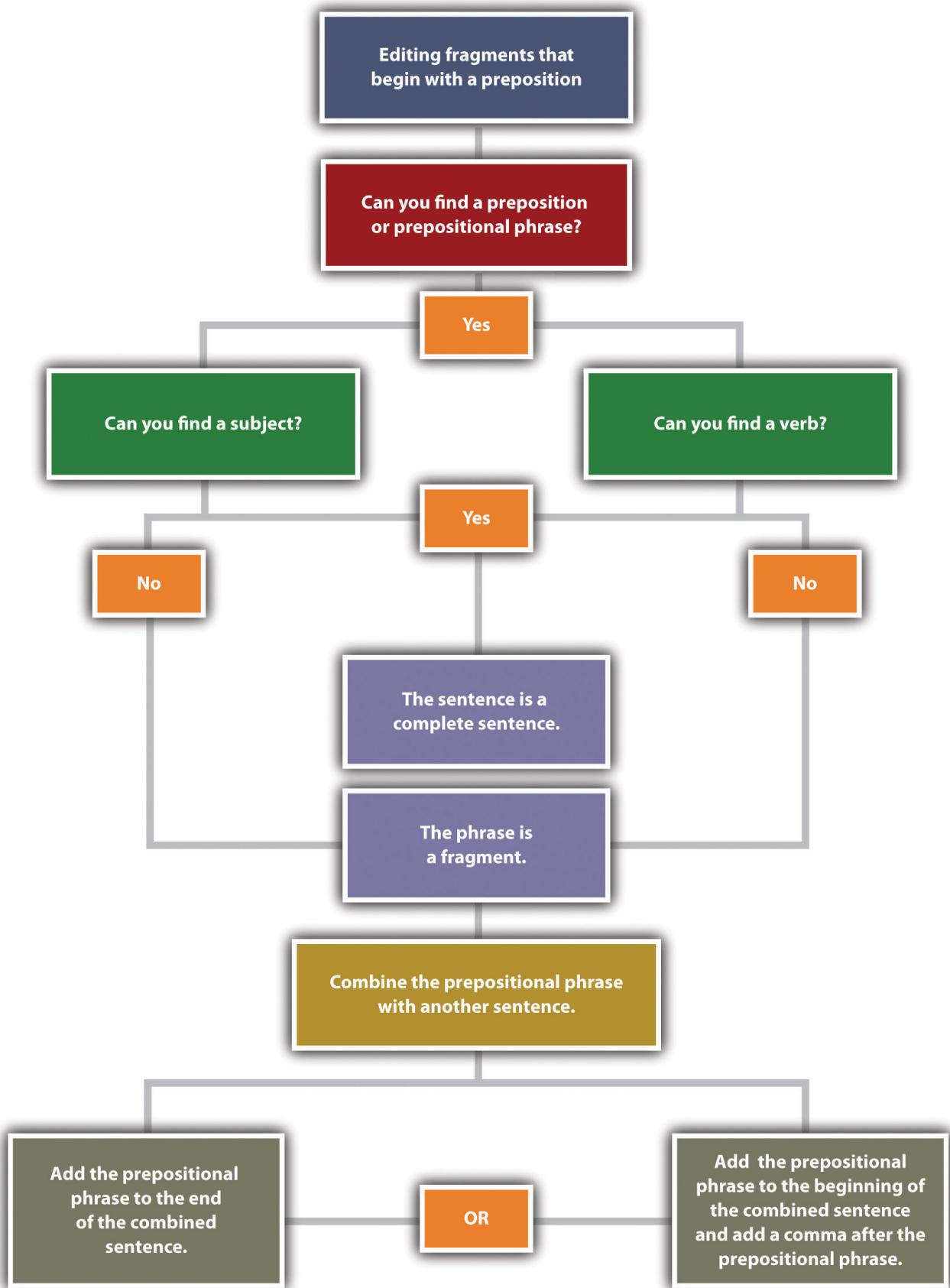
**Complete sentence:** The store down on Main Street *sells music*.

## Common Sentence Errors

Fragments often occur because of some common error, such as starting a sentence with a preposition, a dependent word, an infinitive or a gerund. If you use the six basic sentence patterns when you write, you should be able to avoid these errors and thus avoid writing fragments.

When you see a preposition, check to see that it is part of a sentence containing a subject and a verb. If it is not connected to a complete sentence, it is a fragment, and you will need to fix this type of fragment by combining it with another sentence. You can add the prepositional phrase to the end of the sentence. If you add it to the beginning of the other sentence, insert a comma after the prepositional phrase.





[Image description]

Example A:

Incorrect: After walking over two miles. John remembered his wallet.

Correct: After walking over two miles, John remembered his wallet.

**Correct:** John remembered his wallet after walking over two miles.

Example B

**Incorrect:** The dog growled at the vacuum cleaner. When it was switched on.

**Correct:** When the vacuum cleaner was switched on, the dog growled.

**Correct:** The dog growled at the vacuum cleaner when it was switched on.

Clauses that start with a dependent word—such as *since*, *because*, *without*, or *unless*—are similar to prepositional phrases. Like prepositional phrases, these clauses can be fragments if they are not connected to an independent clause containing a subject and a verb. To fix the problem, you can add such a fragment to the beginning or end of a sentence. If the fragment is added at the beginning of a sentence, add a comma.

**Incorrect:** Because we lost power. The entire family overslept.

**Correct:** Because we lost power, the entire family overslept.

**Correct:** The entire family overslept because we lost power.

**Incorrect:** He has been seeing a physical therapist. Since his accident.

**Correct:** Since his accident, he has been seeing a physical therapist.

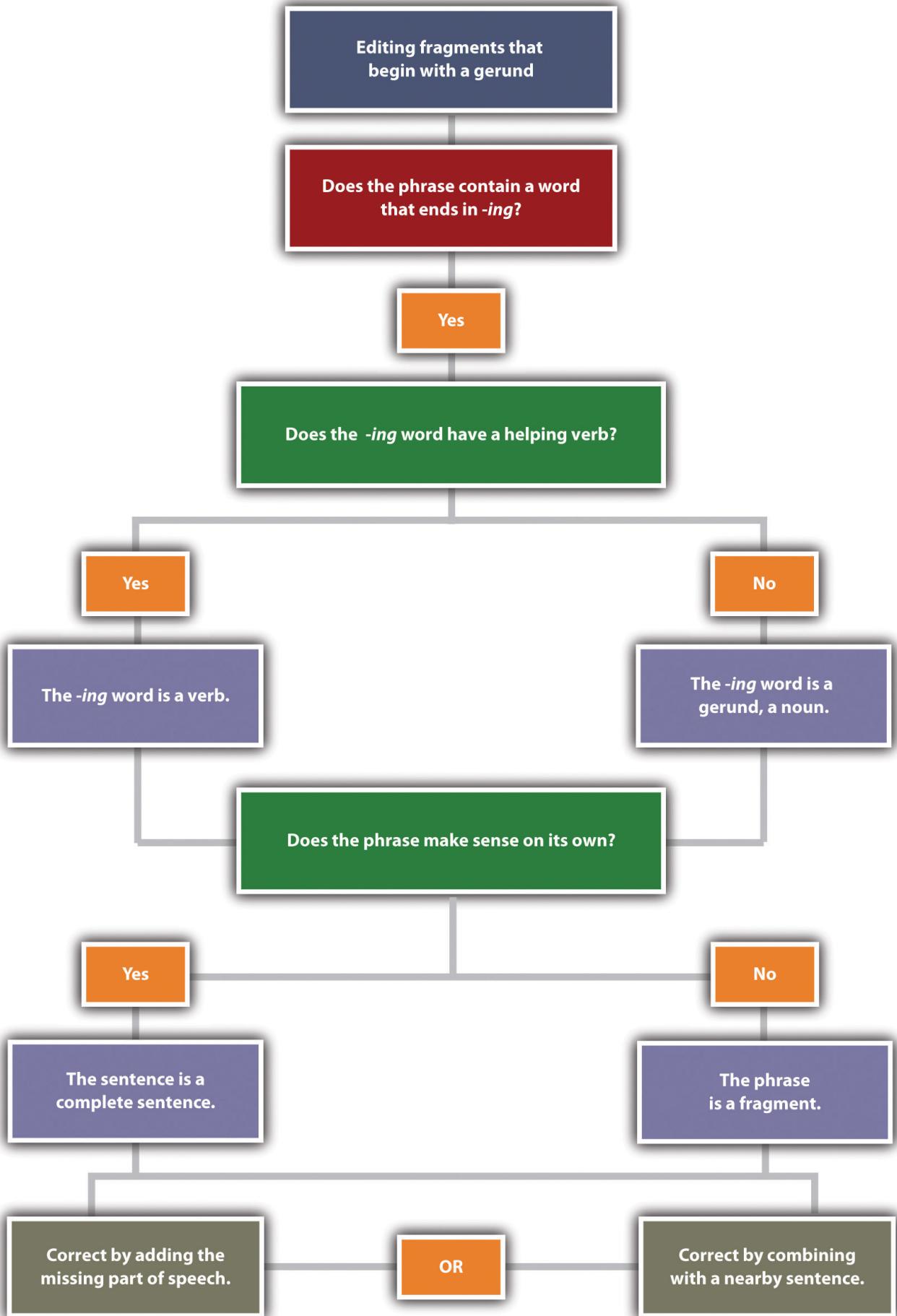
**Correct:** He has been seeing a physical therapist since his accident.

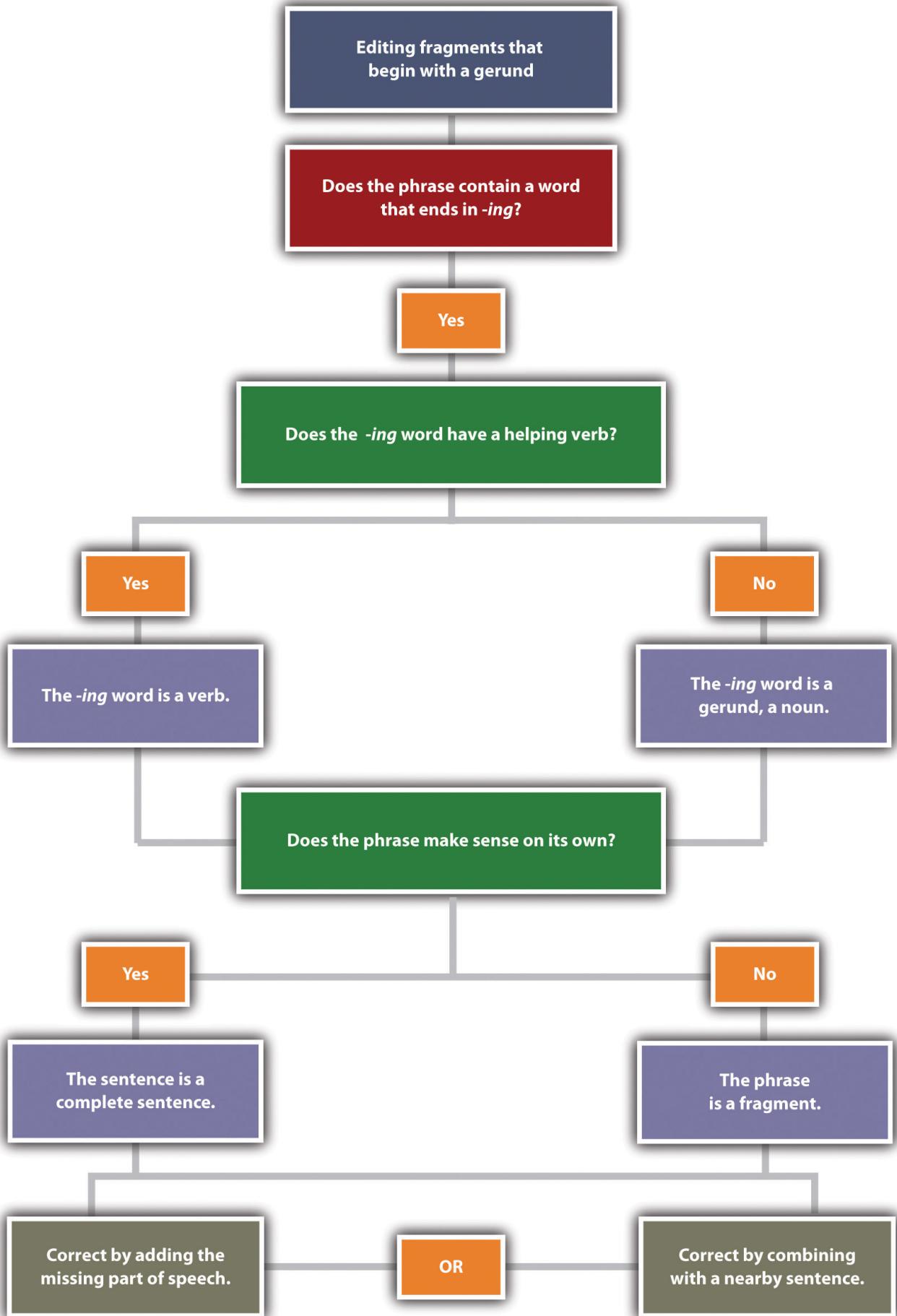
When you encounter a word ending in *-ing* in a sentence, identify whether or not this word is used as a verb in the sentence. You may also look for a helping verb. If the word is not used as a verb or if no helping verb is used with the *-ing* verb form, the verb is being used as a noun. An *-ing* verb form used as a noun is called a gerund.

Verb: I **was working** on homework until midnight.

Noun: **Working** until midnight makes me tired the next morning.

Once you know whether the *-ing* word is acting as a noun or a verb, look at the rest of the sentence. Does the entire sentence make sense on its own? If not, what you are looking at is a fragment. You will need to either add the parts of speech that are missing or combine the fragment with a nearby sentence.





[Image description]

**Incorrect:** Taking deep breaths. Saul prepared for his presentation.

**Correct:** Taking deep breaths, Saul prepared for his presentation.

**Correct:** Saul prepared for his presentation. He **was taking** deep breaths.

**Incorrect:** Congratulating the entire team. Sarah raised her glass to toast their success.

**Correct:** She was congratulating the entire team. Sarah raised her glass to toast their success.

**Correct:** Congratulating the entire team, Sarah raised her glass to toast their success.

Another error in sentence construction is a fragment that begins with an infinitive. An infinitive is a verb paired with the word *to*; for example, *to run*, *to write*, or *to reach*. Although infinitives are verbs, they can be used as nouns, adjectives, or adverbs. You can correct a fragment that begins with an infinitive by either combining it with another sentence or adding the parts of speech that are missing.

**Incorrect:** We needed to make three hundred more paper cranes. To reach the one thousand mark.

**Correct:** We needed to make three hundred more paper cranes to reach the one thousand mark.

**Correct:** We needed to make three hundred more paper cranes. We wanted to reach the one thousand mark.

### Exercise

Copy the following sentences and identify the fragments. Then combine the fragment with the independent clause to create a complete sentence.

1. Working without taking a break. We try to get as much work done as we can in an hour.
2. I needed to bring work home. In order to meet the deadline.
3. Unless the ground thaws before spring break. We won't be planting any tulips this year.
4. Turning the lights off after they were done in the kitchen. Kris tries to conserve energy whenever possible.
5. You'll find what you need if you look. On the shelf next to the potted plant.
6. To find the perfect apartment. Deidre scoured the classifieds each day.

## Run-on Sentences

Just as short, incomplete sentences can be problematic, lengthy sentences can be problematic too. Sentences with two or more independent clauses that have been incorrectly combined are known as **run-on sentences**. A run-on sentence may be either a fused sentence or a comma splice.

**Fused sentence:** A family of foxes lived under our shed young foxes played all over the yard.

**Comma splice:** We looked outside, the kids were hopping on the trampoline.

When two complete sentences are combined into one without any punctuation, the result is a fused sentence. When two complete sentences are joined by a comma, the result is a comma splice. Both errors can easily be fixed.

## Punctuation

One way to correct run-on sentences is to correct the punctuation. For example, adding a period will correct the run-on by creating two separate sentences.

**Run-on:** There were no seats left, we had to stand in the back.

**Correct:** There were no seats left. We had to stand in the back.

Using a semicolon between the two complete sentences will also correct the error. A semicolon allows you to keep the two closely related ideas together in one sentence. When you punctuate with a semicolon, make sure that both parts of the sentence are independent clauses.

**Run-on:** The accident closed both lanes of traffic we waited an hour for the wreckage to be cleared.

**Complete sentence:** The accident closed both lanes of traffic; we waited an hour for the wreckage to be cleared.

When you use a semicolon to separate two independent clauses, you may wish to add a transition word to show the connection between the two thoughts. After the semicolon, add the transition word and follow it with a comma.

**Run-on:** The project was put on hold we didn't have time to slow down, so we kept working.

**Complete sentence:** The project was put on hold; **however**, we didn't have time to slow down, so we kept working.

## Coordinating Conjunctions

You can also fix run-on sentences by adding a comma and a coordinating conjunction. A coordinating conjunction acts as a link between two independent clauses. Common coordinating conjunctions are *for, and, nor, but, or, yet, and so*.

These are the seven coordinating conjunctions that you can use: *for, and, nor, but, or, yet, and so*. Use these words appropriately when you want to link the two independent clauses. The acronym *FANBOYS* will help you remember this group of coordinating conjunctions.

**Run-on:** The new printer was installed, no one knew how to use it.

**Complete sentence:** The new printer was installed, **but** no one knew how to use it.

## Dependent Words

Adding dependent words is another way to link independent clauses. Like the coordinating conjunctions, dependent words show a relationship between two independent clauses.

**Run-on:** We took the elevator, the others still got there before us.

**Complete sentence:** **Although** we took the elevator, the others got there before us.

**Run-on:** Cobwebs covered the furniture, the room hadn't been used in years.

**Complete sentence:** Cobwebs covered the furniture **because** the room hadn't been used in years.

## Coordination and Subordination for Sentence Variety

### Coordination

Coordination joins two independent clauses that contain related ideas of equal importance.

**Original sentences:** I spent my entire paycheck last week. I am staying home this weekend.

In their current form, these sentences contain two separate ideas that may or may not be related. Am I staying home this week *because* I spent my paycheck, or is there another reason for my lack of enthusiasm to leave the house? To indicate a relationship between the two ideas, we can use the coordinating conjunction *so*:

**Revised sentence:** I spent my entire paycheck last week, **so** I am staying home this weekend.

The revised sentence illustrates that the two ideas are connected. Notice that the sentence retains two independent clauses (*I spent my entire paycheck; I am staying home this weekend*) because each can stand alone as a complete idea.

### Coordinating conjunctions

A **coordinating conjunction** is a word that joins two independent clauses. The most common coordinating conjunctions are *for, and, nor, but, or, yet, and so*. Note that a comma precedes the coordinating conjunction when joining two clauses.

Independent Clause	Coordinating	Independent Clause	Revised Sentence
I will not be attending the dance.	for (indicates a reason or	I have no one to go with.	I will not be attending the dance, for I have no one to go with.
I plan to stay home.	and (joins two ideas)	I will complete an	I plan to stay home, and I will complete an essay for class.
Jessie isn't going to be at the dance.	nor (indicates a negative)	Harjot won't be there	Jessie isn't going to be at the dance, nor will Harjot be there.
The fundraisers are hoping for a record-breaking attendance.	but (indicates a contrast)	I don't think many people are going.	The fundraisers are hoping for a record-breaking attendance, but I don't think many people are
I might go to the next fundraising	or (offers an alternative)	I might donate some	I might go to the next fundraising event, or I might
My parents are worried that I am	yet (indicates a reason)	I have many friends at	My parents are worried that I am antisocial, yet I have many
Buying a new dress is expensive.	so (indicates a result)	By staying home I will	Buying a new dress is expensive, so by staying home I

**TIP:** To help you remember the seven coordinating conjunctions, think of the acronym FANBOYS: *for, and, nor, but, or, yet, so*. Remember that when you use a coordinating conjunction in a sentence, a comma should precede it.

## Conjunctive adverbs

Another method of joining two independent clauses with related and equal ideas is to use a conjunctive adverb and a semicolon. A conjunctive adverb is a linking word that demonstrates a relationship between two clauses. Read the following sentences:

**Original sentences:** Bridget wants to take part in the next Olympics. They train every day.

Since these sentences contain two equal and related ideas, they may be joined using a conjunctive adverb. Now, read the revised sentence:

**Revised sentence:** Bridget wants to take part in the next Olympics; therefore, they train every day.

The revised sentence explains the relationship between Bridget's desire to take part in the next Olympics and their daily training. Notice that the conjunctive adverb comes after a semicolon that separates the two clauses and is followed by a comma.

Review the following chart of some common conjunctive adverbs with examples of how they are used:

Function	Conjunctive Adverb	Example
Addition	also, furthermore, moreover, besides	Alicia was late for class and stuck in traffic; furthermore, her shoe heel had broken and she had forgotten her lunch.
Comparison	similarly, likewise	Recycling aluminum cans is beneficial to the environment; similarly, reusing plastic bags and switching off lights reduces waste.
Contrast	instead, however, conversely	Most people do not walk to work; instead, they drive or take public transit.
Emphasis	namely, certainly, indeed	The Siberian tiger is a rare creature; indeed, there are fewer than five hundred left in the wild.
Cause and Effect	accordingly, consequently, hence, thus	I missed my train this morning; consequently, I was late for my meeting.

Time	finally, next, subsequently, then	Danzel crossed the barrier, jumped over the wall, and pushed through the hole in the fence; finally, he made it to the station.
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Take a look at the excerpt on wine production and identify some areas in which the writer might use coordination.

When the red grapes arrive at the winery, they are destemmed and crushed. The liquid that is left is made up of skins, seeds, and juice. The stems are removed. They contain harsh-tasting tannins. Once the grapes are destemmed and crushed, the liquid is pumped into a fermentation container. Here, sulfur dioxide is added. It prevents the liquid from becoming oxidized. It also destroys bacteria. Some winemakers carry out the fermenting process by using yeast that is naturally present on the grapes. Many add a yeast that is cultivated in a laboratory.

Now look at this revised paragraph. Did you coordinate the same sentences? You may find that your answers are different because there are usually several ways to join two independent clauses.

When the red grapes arrive at the winery, they are destemmed and crushed. The liquid that is left is made up of skins, seeds, and juice. The stems are removed, for they contain harsh-tasting tanins. Once the grapes are destemmed and crushed, the liquid is pumped into a fermentation container. Here, sulfer dioxide is added. It prevents the liquid from becoming oxidized and also destroys bacteria. Some winemakers carry out the fermenting process by using yeast that is naturally present on the grapes, however, many add a yeast that is cultuvated in a laboratory.

### Exercise

Combine each sentence pair into a single sentence using either a coordinating conjunction or a conjunctive adverb. Then copy the combined sentence onto your own sheet of paper.

1. Pets are not allowed in Mr. Taylor's building. He owns several cats and a parrot.
2. New legislation prevents drivers from sending or reading text messages while driving. Many people continue to use their phones illegally.
3. The professor concluded that the student had forgotten to submit his assignment. By the time the deadline had passed, there was still no assignment.
4. Amphibians are vertebrates that live on land and in the water. Flatworms are invertebrates that live only in water.
5. Tara carefully fed and watered her tomato plants all summer. The tomatoes grew juicy and ripe.

6. When he lost his car key, Simon attempted to open the door with a wire hanger, a credit card, and a paper clip. He called the manufacturer for advice.

## Collaboration

Please share with a classmate and compare your answers.

## Subordination

Subordination joins two sentences with related ideas by merging them into a main clause (a complete sentence) and a dependent clause (a construction that relies on the main clause to complete its meaning). Coordination allows a writer to give equal weight to the two ideas that are being combined, and subordination enables a writer to emphasize one idea over the other. Take a look at the following sentences:

**Original sentences:** Tracy stopped to help the injured man. She would be late for work.

To illustrate that these two ideas are related, we can rewrite them as a single sentence using the subordinating conjunction *even though*.

**Revised sentence:** Even though Tracy would be late for work, she stopped to help the injured man.

In the revised version, we now have an independent clause (*she stopped to help the injured man*) that stands as a complete sentence and a dependent clause (*even though Tracy would be late for work*) that is subordinate to the main clause. Notice that the revised sentence emphasizes the fact that Tracy stopped to help the injured man, rather than the fact she would be late for work. We could also write the sentence this way:

**Revised sentence:** Tracy stopped to help the injured man even though she would be late for work.

The meaning remains the same in both sentences, with the subordinating conjunction *even though* introducing the dependent clause.

**TIP:** To punctuate sentences correctly, look at the position of the main clause and the subordinate clause. If a subordinate clause precedes the main clause, use a comma. If the subordinate clause follows the main clause, no punctuation is required.

## Subordinating conjunctions

A subordinating conjunction is a word that joins a subordinate (dependent) clause to a main (independent) clause. Review the following chart of some common subordinating conjunctions and examples of how they are used:

Function	Subordinating	Example
Concession	although, while, though, whereas, even	Sarah completed her report even though she had to stay late to get it done.
Condition	if, unless, until	Until we know what is causing the problem, we

Manner	as if, as, though	Everyone in the conference room stopped talking at once, as though they had been
Place	where, wherever	Rita is in Toronto where she has several
Reason	because, since, so that, in order that	Because the air conditioning was turned up so high, everyone in the office wore sweaters.
Time	after, before, while,	After the meeting had finished, we all went to

Take a look at the excerpt and identify some areas in which the writer might use subordination.

When the red grapes arrive at the winery, they are destemmed and crushed. The liquid that is left is made up of skins, seeds, and juice. The stems are removed. They contain harsh-tasting tannins. Once the grapes are destemmed and crushed, the liquid is pumped into a fermentation container. Here, sulfur dioxide is added. It prevents the liquid from becoming oxidized. It also destroys bacteria. Some winemakers carry out the fermenting process by using yeast that is naturally present on the grapes. Many add a yeast that is cultivated in a laboratory.

Now look at this revised paragraph and compare your answers. You will probably notice that there are many different ways to subordinate sentences.

When the red grapes arrive at the winery, they are destemmed and crushed. The liquid that is left is made up of skins, seeds, and juice. Because the stems contain harsh-tasting tannins, they are removed. Once the grapes are destemmed and crushed, the liquid is pumped into a fermentation container. Here, sulfer dioxide is added in order to prevent the liquid from becoming oxidized. Sulfer dioxide also destroys bacteria. Although some winemakers carry out the fermenting process by using yeast that is naturally present on the grapes, many add a yeast that is cultivated in a laboratory.

## Exercises

Combine each sentence pair into a single sentence using a subordinating conjunction and then copy the combined sentence onto your own sheet of paper.

1. Jake is going to Haida Gwaii. There are beautiful beaches in Haida Gwaii.
2. A snowstorm disrupted traffic all over the east coast. There will be long delivery delays this week.
3. My neighbor had his television volume turned up too high. I banged on his door and asked him to keep the noise down.
4. Kathryn prepared the potato salad and the sautéed vegetables. Stewart marinated the chicken.
5. Romeo poisons himself. Juliet awakes to find Romeo dead and stabs herself with a dagger.

## Exercise

Join the underlined sentences using coordination or subordination. Check your revised sentences for punctuation.

The yeast is added to the must. Alcoholic fermentation then begins. Here, the red wine production process differs from the method used in white wine production. Red wine is fermented for a shorter time. It is fermented at a higher temperature. Whereas white wines may ferment for over a month, red wines typically ferment for less than two weeks. During fermentation, contact between the skins and the juice releases tannins and flavor compounds into the must. This process is known as maceration. Maceration may occur before, during, or after fermentation. The fermentation process is completed. The next stage is pressing. Many methods are used for pressing, the most common of which is basket pressing.

## Prefixes

A **prefix** is a word part added to the beginning of a word to create a new meaning. Study the common prefixes in the following table.

**Tip:** The main rule to remember when adding a prefix to a word is **not** to add letters or leave out any letters.

### Common Prefixes

Prefix	Meaning	Example
dis	not, opposite of	dis + satisfied = dissatisfied
mis	wrongly	mis + spell = misspell
un	not	un + acceptable = unacceptable
re	again	re + election = reelection
inter	between	inter + related = interrelated
pre	before	pre + pay = prepay
non	not	non + sense = nonsense
super	above	super + script = superscript
sub	under	sub + merge = submerge
anti	against, opposing	anti + bacterial = antibacterial

### Exercise

Identify the five words with prefixes in the following paragraph, and write their meanings on a separate sheet of paper. Once complete, please share with a classmate and compare your answers.

At first, I thought one of my fuzzy, orange socks disappeared in the dryer, but I could not find it in there. Because it was my favorite pair, nothing was going to prevent me from finding that sock. I looked all around my bedroom, under the bed, on top of the bed, and in my closet, but I still could not find it. I did not know that I would discover the answer just as I gave up my search. As I sat down on the couch in the family room, my Dad was reclining on his chair. I laughed when I saw that one of his feet was orange and the other blue! I forgot that he was colour-blind. Next time he does laundry I will have to supervise him while he folds the socks so that he does not accidentally take one of mine!

### Exercise

Add the correct prefix to the word to complete each sentence. Write the word on your own sheet of paper.

- I wanted to ease my stomach \_\_\_\_\_ comfort, so I drank some ginger root tea.
- Lenny looked funny in his \_\_\_\_\_ matched shirt and pants.

3. Penelope felt \_\_\_\_\_ glamorous at the party because she was the only one not wearing a dress.
4. My mother said those \_\_\_\_\_ aging creams do not work, so I should not waste my money on them.
5. The child's \_\_\_\_\_ standard performance on the test alarmed his parents.
6. When my sister first saw the meteor, she thought it was a \_\_\_\_\_ natural phenomenon.
7. Even though she got an excellent job offer, Cherie did not want to \_\_\_\_\_ locate to a different country.
8. With a small class size, the students get to \_\_\_\_\_ act with the teacher more frequently.
9. I slipped on the ice because I did not heed the \_\_\_\_\_ cautions about watching my step.
10. A \_\_\_\_\_ combatant is another word for civilian.

## Suffixes

A **suffix** is a word part added to the end of a word to create a new meaning. Study the suffix rules in the following boxes.

### Rule 1: -ness and -ly

When adding the suffixes *-ness* and *-ly* to a word, the spelling of the word does not change.

#### Examples:

- dark + ness = darkness
- scholar + ly = scholarly

#### Exceptions to Rule 1

When the word ends in *y*, change the *y* to *i* before adding *-ness* and *-ly*.

#### Examples:

- ready + ly = readily
- happy + ness = happiness

### Rule 2: Suffix Begins with a Vowel

When the suffix begins with a vowel, drop the silent *e* in the root word.

#### Examples:

- care + ing = caring
- use + able = usable

#### Exceptions to Rule 2

When the word ends in *ce* or *ge*, keep the silent *e* if the suffix begins with *a* or *o*.

#### Examples:

- replace + able = replaceable

- courage + ous = courageous

### **Rule 3: Suffix Begins with a Consonant**

When the suffix begins with a consonant, keep the silent *e* in the original word.

#### **Examples:**

- care + ful = careful
- care + less = careless

#### **Exceptions to Rule 3**

#### **Examples:**

- true + ly = truly
- argue + ment = argument

### **Rule 4: Word Ends in a Consonant + y**

When the word ends in a consonant plus *y*, change the *y* to *i* before any suffix not beginning with *i*.

#### **Examples:**

- sunny + er = sunnier
- hurry + ing = hurrying

### **Rule 5: Suffix Begins with a Vowel**

When the suffix begins with a vowel, double the final consonant only if (1) the word has only one syllable or is accented on the last syllable and (2) the word ends in a single vowel followed by a single consonant.

#### **Examples:**

- tan + ing = tanning (one syllable word)
- regret + ing = regretting (The accent is on the last syllable; the word ends in a single vowel followed by a single consonant.)
- cancel + ed = canceled (The accent is not on the last syllable.)
- prefer + ed = preferred

#### **Exercise**

On your own sheet of paper, write correctly the forms of the words with their suffixes.

- refer + ed
- refer + ence
- mope + ing
- approve + al
- green + ness
- benefit + ed
- resubmit + ing
- use + age
- greedy + ly

10. excite + ment

**Exercise: Writing Application**

Write a paragraph describing one of your life goals. Include five words with prefixes and five words with suffixes. Exchange papers with a classmate and circle the prefixes and suffixes in your classmate's paper. Correct each prefix or suffix that is spelled incorrectly.

## Synonyms

Synonyms are words that have the same, or almost the same, meaning as another word. You can say an “easy task” or a “simple task” because *easy* and *simple* are synonyms. You can say Hong Kong is a “large city” or a “metropolis” because *city* and *metropolis* are synonyms.

However, it is important to remember that not all pairs of words in the English language are so easily interchangeable. The slight but important differences in meaning between synonyms can make a big difference in your writing. For example, the words *boring* and *insipid* may have similar meanings, but the subtle differences between the two will affect the message your writing conveys. The word *insipid* evokes a scholarly and perhaps more pretentious message than *boring*. The English language is full of pairs of words that have subtle distinctions between them. All writers, professionals and beginners alike, face the challenge of choosing the most appropriate synonym to best convey their ideas. When you pay particular attention to synonyms in your writing, it comes across to your reader. The sentences become much more clear and rich in meaning.

### Exercise

Replace the underlined words in the paragraph with appropriate synonyms. Write the new paragraph on your own sheet of paper. Once complete, please share with a classmate and compare your answers.

When most people think of the Renaissance, they might think of artists like Michelangelo, Raphael, or Leonardo da Vinci, but they often overlook one of the very important figures of the Renaissance: Filippo Brunelleschi. Brunelleschi was born in Florence, Italy in 1377. He is considered the very best architect and engineer of the Renaissance. His impressive accomplishments are a testament to following one’s dreams, persevering in the face of obstacles, and realizing one’s vision.

The most difficult undertaking of Brunelleschi’s career was the dome of Florence Cathedral, which took sixteen years to construct. A major blow to the progress of the construction happened in 1428. Brunelleschi had designed a special ship to carry the one hundred tons of marble needed for the dome. He felt this would be the most inexpensive way to transport the marble, but the unthinkable happened. The ship went down to the bottom of the water, taking all the marble with it to the bottom of the river. Brunelleschi was really sad. Nevertheless, he did not give up. He held true to his vision of the completed dome. Filippo Brunelleschi completed construction of the dome of Florence Cathedral in 1446. His influence on artists and architects alike was felt strongly during his lifetime and can still be felt in this day and age.

### Exercise

On your own sheet of paper, write a sentence with each of the following words that illustrates the specific meaning of each synonym. Once complete, please share with a classmate and compare your answers.

1. leave, abandon
2. mad, insane
3. outside, exterior
4. poor, destitute
5. quiet, peaceful
6. riot, revolt
7. rude, impolite
8. talk, conversation
9. hug, embrace
10. home, residence

### Antonyms

**Antonyms** are words that have the opposite meaning of a given word. The study of antonyms will not only help you choose the most appropriate word as you write; it will also sharpen your overall sense of language. The following table lists common words and their antonyms.

**Common Antonyms**

<b>Word</b>	<b>Antonym</b>	<b>Word</b>	<b>Antonym</b>
absence	presence	frequent	seldom
accept	refuse	harmful	harmless
accurate	inaccurate	horizontal	vertical
advantage	disadvantage	imitation	genuine
ancient	modern	inhabited	uninhabited
abundant	scarce	inferior	superior
artificial	natural	intentional	accidental
attractive	repulsive	justice	injustice
borrow	lend	knowledge	ignorance
bravery	cowardice	landlord	tenant
create	destroy, demolish	likely	unlikely
bold	timid, meek	minority	majority
capable	incapable	miser	spendthrift
combine	separate	obedient	disobedient
conceal	reveal	optimist	pessimist
common	rare	permanent	temporary
decrease	increase	plentiful	scarce

definite	indefinite	private	public
despair	hope	prudent	imprudent
discourage	encourage	qualified	unqualified
employer	employee	satisfactory	unsatisfactory
expand	contract	tame	wild
forget	remember	vacant	occupied

**Tip:** Learning antonyms is an effective way to increase your vocabulary. Memorizing words in combination with or in relation to other words often helps us retain them.

### Exercise

Correct the following sentences by replacing the underlined words with an antonym.

Write the antonym on your own sheet of paper.

1. The pilot who landed the plane was a coward because no one was injured.
2. Even though the botany lecture was two hours long, Gerard found it incredibly dull.
3. My mother says it is impolite to say thank you like you really mean it.
4. Although I have learned a lot of information through textbooks, it is life experience that has given me ignorance.
5. When our instructor said the final paper was compulsory, it was music to my ears!
6. My only virtues are coffee, video games, and really loud music.
7. Elvin was so bold when he walked in the classroom that he sat in the back row and did not participate.
8. Maria thinks elephants who live in freedom have a sad look in their eyes.
9. The teacher filled her students' minds with gloomy thoughts about their futures.
10. The guest attended to every one of our needs.

### Exercise: Writing Application

Write a paragraph that describes your favorite dish or food. Use as many synonyms as you can in the description, even if it seems too many. Be creative. Consult a thesaurus, and take this opportunity to use words you have never used before. Be prepared to share your paragraph.



## **TOPIC I. INFORMATION SYSTEMS**

### ***Dawn of intelligent applications***

The future is intelligent applications. Learn how companies are shifting from big data to intelligent application approaches. Data remains a foundational element of computing. Recently, Hadoop and big data have been a central part of data progression, allowing you to capture data at scale. But companies now look to the expanding use of cloud computing and machine learning to create more intelligent applications.

This new generation of applications use all the data they can, including incoming real-time data, to respond in the moment to changing circumstances and formulate advantageous outcomes. This includes delivering on the digital transformation promise sought by companies to deliver rich customer experiences.

Intelligent applications can converge database and data warehouse workloads, allowing companies to respond and react to changing conditions in real time.

This builds on a theme covered by nearly every large industry analyst firm regarding the merging of transactional and analytical functions. Gartner refers to this convergence as hybrid transaction analytical processing, or HTAP; 451 Research refers to it as hybrid operational analytical processing, or HOAP; and Forrester refers to it as translytical data platforms.

### ***According to Forrester:***

Analytics at the speed of transactions has become an important agenda item for organizations. Translytical data platforms, an emerging technology, deliver faster access to business data to support various workloads and use cases. Enterprise architecture pros can use them to drive new business initiatives.

451 Research also calls out the idea of seizing the moment:

Organizations are zeroing in on the so-called “transaction window” and realizing that it presents a significant opportunity – and once it’s gone, it’s gone for good.

The largest industry sectors are using these converged technologies for their intelligent applications. These applications collect and process data from a variety of sources, provide experiences in real time, and make use of the latest techniques in machine learning and artificial intelligence to push their usefulness forward.

Consider the following examples.

### ***Finance***

A popular intelligent application in finance is the new frontier of digital wealth management, including real-time portfolio analytics for clients across any platform. As one example, JP Morgan Chase highlighted its investment in digital wealth management in an investor presentation last year. Behind the scenes, many of these digital wealth services are powered by digital startups such as InvestCloud, which states that its wealth management products “allow wealth managers to get a

whole view of their clients—instantaneously and at scale.” Other companies in this space include SigFig, which showcases “experience integrating our platform with TD Ameritrade, CharlesSchwab, Vanguard, E\*Trade, among others.”

### ***Energy***

In the energy sector, intelligent applications include IoT data pipelines using sensor data. Real-time capture and analysis of this data, with machine learning model scoring, provides helpful downtime mitigation and savings for global companies. Shell describes its advanced analytics for sensor collection on its website:

Digital sensors installed in our operations around the world—from production fields to manufacturing complexes—produce a constant flow of data which we analyze to improve processes and take better business decisions.

The technology can optimize the performance of plants by predicting when maintenance will be needed, to avoid unplanned downtime and lost productivity.

More than 5,000 machines globally connect to the system, which is thought to have saved more than 3.5 million barrels in lost production since its introduction.

### ***Media***

Perhaps no transformation is more visible in media than the shift from broadcast and cable television to real-time streaming. This change drives media companies to seek end user analytics and advertising opportunities tied to streaming, and key intelligent applications to drive revenue. This technology race led Disney to acquire a majority stake in BAMTech. Disney said the following in a news release:

The media landscape is increasingly defined by direct relationships between content creators and consumers, and our control of BAMTech’s full array of innovative technology will give us the power to forge those connections, along with the flexibility to quickly adapt to shifts in the market.

#### ***Sleek new Galaxy S8 phones feature facial recognition, Bixby intelligent agent***

Samsung launched sleek new Galaxy S8 and S8+ smartphones Wednesday with features including facial recognition, an intelligent agent called Bixby and Samsung Pass for secure e-commerce mobile payments.

The new Bixby intelligent assistant will provide a “new type of interface that learns and evolves with you,” said Sriram Thodla, senior director for intelligence at Samsung Electronics America.

Other digital assistants, like Apple’s Siri and Google Assistant, use voice to interact. But Thodla said voice is “isolated and doesn’t understand what’s on a phone’s screen.” Bixby, he said, knows the context and what’s on a screen and can “move seamlessly between voice and touch.”

In one example, to text a location of a restaurant to a friend, Thodla opened a maps app on the S8, then pressed the Bixby physical button on the side of the device and said, "Capture this and send to Cindy." With multiple Cindys in his phone's directory, he was directed to touch the right one, moving the map information to the text to the correct Cindy.

With Bixby, users also can point the phone's camera to landmarks and images to gather information and translate some languages.

Thodla also described Bixby's ability to anticipate a user's needs by swiping from the right to show a personal page of various cards that revealed information a user accessed from apps like Facebook and Uber.

Bixby would then be able to organize the cards depending on the time of day. If a user commonly uses Uber for a ride to work in the morning, the Uber card would show up at the top of a group of cards every morning, along with morning news and weather. Or, Thodla said, Bixby could provide a reminder to read an article later when the user arrived home.

Bixby will also connect to smart devices in a home, using a new Samsung Connect Home service. "It turns the phone into the universal remote for your life," he said.

Analysts who have seen Bixby in action said they are eager to try it to see how it compares with voice-activated agents like Siri. Since Bixby is late to the game, it is "the vision that Samsung still has to deliver on," Goertz said. "Today, it is not in direct competition to Alexa from Amazon, Google Assistant and others."

Patrick Moorhead, an analyst at Moor Insights & Strategy, said Bixby will be measured by how well users can command and control Samsung devices and features. "Bixby should not yet be compared to Siri, Google Assistant, Alexa or [Microsoft's] Cortana because it's not yet designed to be a free-form intelligent agent."

### ***Seven Industries Being Transformed by Geospatial Information Systems***

Geospatial information system (GIS) solutions, which make sense of location-aware data and turn it into usable insights, are driving major disruptions across multiple sectors.

Nowadays more data is being generated by more devices and their users than ever, and much of it is location-based. In fact, the geospatial data market is expected to grow to \$73.9 billion by 2021, up from \$30.7 billion in 2016.

Spatial data refers to all types of data objects or elements that are present in a geographical space or horizon. It enables the global finding and locating of individuals or devices anywhere in the world. Spatial data is also known as geospatial data, spatial information or geographic information.

In order to make critical decisions and fuel important processes, enterprises

need to be able to access and make sense of this data quickly and with minimal hassle. As a result, geospatial information system solutions, which make sense of location-aware data and turn it into usable insights, are driving major disruptions across multiple sectors.

Anthony Calamito, Chief Geospatial Officer at Boundless, conducted his industry expertise to explain how GIS technology is transforming agriculture, transportation, energy, retail, defense, federal government and state and local government. Boundless is a St. Louis, Mo.-based provider of open source product support, training and core development to meet geospatial requirements.

### **Agriculture**

Each growing season, farmers might make as many as 50 key decisions—about what crop to grow, when to plant, whether or not to use fertilizer and so on. Any of these can end up affecting crop yield, as well as the bottom line. In the past, farmers made these important decisions based on historical patterns, tradition or even by talking shop with neighboring growers and other people in the know. Today, agricultural operations generate more location-based data than almost any other industry, with data flowing from a number of sources. These can include machine telemetry, weather stations and ground sensors, soil samples, ground observations and satellites and drones. With GIS, agriculture companies can collect, maintain and analyze data to maximize resources, monitor crop health and safety and improve yield.

### **Transportation and logistics**

Moving people and things around often involves enormous logistical challenges. Consider a hospital that wants to provide its patients with the best and fastest route to their facilities at a particular moment, a municipal government that wants to establish optimal bus and light rail routes, a manufacturer that wants to ship its products as efficiently and cost-effectively as possible, or an oil company that wants to plan its pipeline locations. In each of these scenarios, the analysis of location-based data is vital in making informed business decisions.

### **Energy**

Energy exploration is a highly spatial enterprise, with data from satellite images, surface geology mapping and subsurface remote sensing determining the economic viability of pursuing operations in a certain site. Energy and utility companies are dealing with massive proliferation of geographical data, because industrial sensors are now everywhere – from airborne-mounted lasers to surface data sensors during drilling to pipelines monitors. Mapping and spatial analytics provide the necessary insight for making decisions that help achieve compliance, ensure accurate site selection and locate resources.

## **Retail**

As consumer reliance on smartphones accelerates and wearables become more common, brick-and-mortar retailers can use geospatial technology to get a better picture of customer behavior, both past and present. This is because geospatial data goes beyond location—the geometry of a point on a map—to include attribution about those geometries, such as customer demographics or where people spend the most time within stores. All of this data can be used to inform decisions on store locations, merchandise mix and arrangements and other aspects of the customer experience.

## **Defense and intelligence operations**

Geospatial technology has changed defense and intelligence operations in every part of the world, wherever military personnel are deployed. Defense leaders, analysts and other staff rely on accurate GIS data to carry out mission-critical activities strategically and successfully, with efficient collaboration across all phases of planning and operational activities. GIS aids situational assessment (provides complete visual displays of tactical information to personnel in command or in the field), land operations (reveals terrain conditions, elevations, routes, vegetation cover, facilities and population centers), air operations (conveys weather and visibility data to pilots; guides troops, supplies and targeting) and maritime operations (reveals currents, wave conditions, tides and weather).

## **Federal government**

Timely and accurate geospatial intelligence is critical for federal agencies making decisions that impact safety and security, infrastructure, resource management and quality of life. GIS enables safety and security efforts with operational support and coordination for defense, disaster response, law enforcement, national security and first responder services. Regarding infrastructure, GIS helps manage resources and assets for highways, ports, public transportation and airports. Federal agencies are also using GIS to better understand current and historical data for the management of agriculture, forestry, mining, water and other natural resources.

## **State and local government**

State and local governments make daily decisions that directly affect residents and visitors. From operations such as pothole repair and utility operations to land value assessments and property development, mapping applications are used to analyze and interpret GIS data to enable these critical decisions. Additionally, the population and landscape of cities and towns can change dramatically in relatively short periods of time. To adapt to these changes and offer the level of service people have come to expect in their day-to-day lives, state and local governments are embracing modern GIS technology for a variety of essential applications, including traffic and road con-

ditions, environmental quality, disease outbreaks, utility distribution (i.e. electricity, water, and sewer systems), managing parks and other public land and permitting (for camping, hunting, boating, etc.).

## TOPIC II. DATABASE MANAGEMENT SYSTEMS

### *How MarkLogic Data Hub Service Makes Mass Data Useful*

By Chris Preimesberger

MarkLogic, a rising NoSQL database provider that's regularly taking business away from larger vendors, launched the MarkLogic Data Hub Service, a new way to give users what the company calls "automatic elasticity" in the cloud for their enterprise workloads.

MarkLogic claims that the Data Hub Service provides a fast and cost-effective way for enterprises to integrate, store, analyze and secure mission-critical data in the cloud. None of this is ever easy, despite what company marketers will tell you.

The Data Hub Service, which works specifically alongside MarkLogic's NoSQL database, can integrate large swaths of business and user data in a cost-efficient manner. Curated data in the hub then is able to fuel analytical and transactional applications, IoT analysis, knowledge graphs, artificial intelligence and machine learning.

The Data Hub technology on which the service is built integrates data with a high level of enterprise-grade data security and reliability. By offering the Data Hub as a service, enterprises looking for greater data agility, security and governance in the cloud can leapfrog multiple point services – and save time and money.

#### **MarkLogic Navigates Unstructured Data and Structured Data**

MarkLogic develops and provides services for its alternative database to the big relational ones that Oracle, IBM, SAP, Microsoft SQL, Software AG, Teradata and others built years ago and that require a lot of supervision and maintenance. Most are decades-old databases that rely on often slow-moving, time-consuming ETL (extract, transform and load) tools to integrate data from silos.

MarkLogic navigates data lakes of unstructured data but also handles structured data. It is aimed at improving performance in three main focus areas: data integration from silos, data manageability and security. It sounds simple, but all of these things are hard to do well.

Enterprises today are increasingly being overwhelmed by data. As a result, they are gravitating toward solutions that are simple to use and provide more agility with less operational overhead. MarkLogic Data Hub Service provides DevOps teams with agility in order to rapidly integrate data, but with none of the operational overhead, meaning they can focus on "Dev," not "Ops." This is where the business value lies.

## **Data Lakes Done Right**

When they started showing up in data centers several years ago, data lakes promised to help with the data deluge faced by all organizations; however, that promise has largely gone unsatisfied. Industry analysts have discussed the many causes of this, including a lack of governance, semantic inconsistency, and inflexibility. MarkLogic Data Hub Service is built from scratch to address those challenges.

While workloads may vary from minute to minute, budgets do not. Enterprises need a predictable cost model that can adjust to varying demand. MarkLogic's architecture allows resources to be added and removed from the underlying database in seconds, something that hasn't been possible until now.

The Data Hub Service uses the same technology that was first delivered in MarkLogic Query Service to allow bursting to meet peak loads while providing a completely predictable cost aligned with baseline usage unlike an expensive, over-provisioned solution, or a costly and unpredictable on-demand approach.

### **Leapfrogging Database as a Service**

The MarkLogic Data Hub provides business value beyond what is seen in any database at this time. It handles different data types (e.g. documents, graphs, relational, and geospatial) from different data sources (e.g. RDBMS, message buses, streaming data, etc.) to be integrated curated, mastered, governed, searched, queried, and harmonized within a single architecture.

Trying to achieve similar capabilities with traditional approaches requires stitching together ten or more different components on top of a database, which results in higher costs, complexity, brittleness, and overhead.

## *In the IoT world, general-purpose databases can't cut it*

By Linda Musthaler

We live in an age of instrumentation, where everything that *can* be measured *is* being measured so that it can be analyzed and acted upon, preferably in real time or near real time. This instrumentation and measurement process is happening in both the physical world, as well as the virtual world of IT.

In the IT world, events are being measured to determine when to autoscale a system's virtual infrastructure. For example, a company might want to correlate a number of things taking place at once — visitors to a website, product lookups, purchase transactions, etc. — to determine when to burst the cloud capacity for a short time to accommodate more sales or other kinds of activity. Much of this data is time-series data, where it's important to stamp the precise time when an event occurs, or a metric is measured. The data can then be observed and analyzed over time to understand what changes are taking place within the system.

Time-series databases can grow quite large, depending on how many events or metrics they are collecting and storing. Consider the case of autonomous vehicles, which are collecting and evaluating an enormous number of data points every second to determine how the vehicle should operate. A general-purpose database, such as a Cassandra or a MySQL, isn't well suited for time-series data. A database that is purpose-built to handle time-series data has to have the following capabilities, which general-purpose databases don't have.

- The database needs to be able to ingest data in almost real time. Some applications — like the one for the autonomous vehicle — could conceivably produce millions or hundreds of millions of data points per second, and the database must handle the ingest.
- You have to be able to query the database in real time if you want to use the database to monitor and control things, and the queries have to be able to run continuously. With a general-purpose database, queries are batches and not streaming.
- Compression of data is important and is relatively straight forward if the database is specifically designed for time-series data.
- You have to be able to evict data as fast as you ingest it. Time-series data is often only needed for a specific period, such as a week or month, and then it can be discarded. Normal databases aren't constructed to remove data so quickly.
- And finally, you have to be able to "down sample" by removing some but not all data. Say you are taking in data points every millisecond. You need that data to be high resolution for about a week. After that, you can get rid of much of the data, but keep some at a resolution of one data point per second. In time-series data,

high resolution is very important at first, and then lower-resolution data is often fine for the longer term.

## Open-source projects aimed at time-series data

The founder of InfluxData, Paul Dix, saw this unique need, and he built the InfluxData Platform specifically to accumulate, analyze, and act on time-series data. He started with an open-source project that contained InfluxDB, the core database. InfluxDB was a quick hit on GitHub among developers. After that, he raised some funding and kicked off three more open-source projects to round out the InfluxData Platform, known as the TICK stack (Telegraf, InfluxDB, Chronograf, Kapacitor). These four components make up a powerful and popular platform for working with time-series data. Everything is available as open-source software for developers. InfluxData offers a closed-source commercial version for production scenarios that require clustering, high availability, and strong security.

The IoT world has an inherent need for the TICK stack. The physical world of the Internet of Things is highly sensed. Everything — our bodies, our clothes, healthcare devices, industrial plants, our homes, our cars, etc. — is getting instrumented for measurement of time series data. These sensors are looking at pressure, temperature, speed, heart rate, volume, light, and so much more, and quite often, some action needs to be taken as a result of changes over time in that data. The sensors all around us are continuously collecting and monitoring data to help us (or programs) make better decisions.

Instrumentation of everything is the way of the future, and a time-series database and associated tools will be necessary to collect, analyze, and act on data when it is still meaningful. And then in the IT world, the virtualization of our systems has created a strong use case for the InfluxData Platform. It started with virtual machines, so instead of having one server, you have five. Then VLANs came along, so now there are multiple LANs talking to multiple VMs on one machine. Now we have containers, so maybe there is one server running six VMs and 40 containers. Then each of those containers has a set of microservices.

What has happened is that the whole software infrastructure is ephemeral; everything is virtual, portable, temporary, up and down. However, we still need a real-time view of what's happening within these systems. Thus, the software is being instrumented to provide real-time situational data, or what's called observability. It provides a system of record to capture all those metrics and events that are coming off the software infrastructure and the hardware infrastructure and stores them all in one place. Now it's possible to see what is happening with the infrastructure. And if something happens that is a concern, there is an awareness of it and the system has a record of it. Taking this a step further, it's possible to correlate events and metrics

to understand why an SLA is or is not being met.

Instrumentation of everything is the way of the future, and a time-series database and associated tools — such as the InfluxData Platform — will be necessary to collect, analyze and act on data when it is still meaningful. The idea of measuring everything is to become more data-driven as a business, to be able to make better business decisions and take timely actions based on events, metrics, or other time-based data. This is happening across all industries as companies use their digital transformations to change the way they do business.

## *AI, machine learning and your access network*

By GT Hill

Artificial intelligence (AI) and machine learning are two of the latest networking buzzwords being thrown around the industry. The problem is many enterprise network managers remain confused about the real value of these vastly useful technologies.

Emerging network analytics services, powered by AI and machine learning promise to transform traditional infrastructure management models by simplifying operations, lowering costs, and giving unprecedented insights into the user experience – improving the productivity of both IT professionals and their users.

For network staff, the concept and value of these technologies is extremely powerful if applied to the right problems.

### **Good problems to have for AI**

One big problem is today's operational challenge in dealing with the mass of user, device, application and network service data traversing the enterprise access infrastructure. Machine learning, if applied properly, is an ideal solution for making sense of all this data to figure out how all the different parts of the network are behaving with each other.

A second big problem is the need to automate the network within a grand closed loop. The use of AI and all this “big data” is key to making this happen. But first, the industry must get the ‘making sense of the data’ part right among many other things.

Today, network managers must wade through volumes of data from Wi-Fi controllers, server logs, wired packet data and application transactions, analyzing and correlating all this data to determine the health of network as well as trends and patterns of network behavior across the stack that impact user performance. Then, they manually apply changes to the network with no real way to definitively determine whether those changes worked or not.

Conventional network management and monitoring tools, never designed or developed to deal with these 21st century realities, are ill-equipped to automate this process.

### **First things first**

Simply put, artificial intelligence is the development of computer systems able to perform tasks that normally require (super) human intelligence.

Rather than forcing people to perform increasingly complex calculations from a variety of data sources, work in AI has concentrated on mimicking human decision-making processes and carrying out tasks in ever more human ways to enable more

predictive problem solving.

Related to this, machine learning is an application of AI. It is a toolkit of algorithms that provide systems the ability to automatically learn and improve from experience without being explicitly programmed to do so.

The process of learning begins with observations of data, and looking for trends, patterns and anomalies within the data to make increasingly better correlations, inferences and predictions. Machine learning software “learns” by discovering the processes that generate the observed outcomes of particular inputs. Finally, machine learning provides a framework to make predictions and recommendations as to what will improve the overall system.

### **Theory is great. What now?**

So how can all this magic be usefully applied, in a practical way, to help IT and network staff drive down costs, drive up productivity and deliver better user experience on the network? Machine learning is the ideal tool to automate many of the traditional infrastructure management processes that are performed manually. Specifically, in the context of enterprise access networks, it:

1. Eliminates costly and cumbersome manual analysis and correlation of myriad network datasources by network staff,
2. Identifies specific and systemic user network performance problems across the entire IPstack and makes recommendations and predictions on fixing them,
3. Delivers a single source of network truth that can be used by different factions within the network team, each responsible for their own services,
4. Minimizes the finger-pointing among IT staff when issues arise, and
5. Predicts potential network problems and capacity requirements before they happen.

Because machines, not people, are staring at every client network transaction 24 hours a day, network managers care able to determine who, what, when, where and why network problems are occurring – and what do about them – even if they don't know where to look or what questions to ask.

Cisco, HPE, Mist and Nyansa, the top talkers in the market giving lots of lip service to the use of AI and machine learning. Nyansa, the only of the four with a pure-play commercial offering of machine learning for access networks. Its Voyance network analytics platform provides a good glimpse into what can be practically achieved through the technology's application.

### **Putting ML to (net) work**

Machine learning is useful but only when fed tons of relevant data. On the Enterprise access network, that includes live packets off the wired network, wireless metrics from WLAN controllers, SYSLOG data from different network servers, ad

other network data sources. Machine learning is used to quickly analyze all this different data, correlating it across different network layers. This is something that's not practically possible with people trying to manually correlate it.

The beauty of these machine learning solutions is that they can be used without server agents, client software or intrusive architectural changes – using the data already running over the network.

Central to machine learning is the use of massively-scalable cloud computing resources, sophisticated big data repositories and analytics algorithms that turn everything into meaningful and understandable actions that network managers can take.

Once analyzed, this data is distilled to surface trends and patterns impacting the performance of every device on the network. The resulting insights, not clearly visible or easily achieved by network managers, tell IT staff exactly where, when and why user connectivity falters.

Because every client network transaction is analyzed by machines, pinpointing precisely where the network is struggling and quickly be determined.

Are issues occurring on a specific VLAN? In a specific location? Is the problem with a certain Wi-Fi access point or group of APs? A certain type of device? Is it an application problem? DNS or DHCP issue? For a given group users? What are some concrete actions I can take to improve DNS experience in my network? Without machine learning, getting answers to these questions can take days or even weeks.

### **The right time at the right place**

Given the invasion of new data now hitting enterprise access networks, machine learning and AI couldn't be more welcome technologies for taking the pressure of network managers to do more with less.

While AI is simply a general term describing automating manual or complex tasks, machine learning is a toolkit of algorithms that enable automatic learning from ‘big data’ already running over today’s networks.

Armed with these technologies, network managers can now better understand where they have issues with user experience, get recommendations of actions to take and, ultimately, automate the configuration and operation of the infrastructure. This is network nirvana by almost any definition.

### ***What Are The Latest Trends In Telemedicine In 2018?***

Telemedicine is a method of providing clinical healthcare to someone from a distance by the use of telecommunication and information technology. Previously, telemedicine was reserved for treating patients located in remote areas, far away from healthcare facilities, or in locations with a shortage of medical professionals.

Today's connected patient wants to waste less time in the waiting room at the doctor's surgery and get immediate care for minor but urgent conditions when they need it.

Telemedicine is helping bridge the large gap that once existed between patients and doctors. Not only do patients feel more in control of their health checkups, but even doctors get more time to review individual cases by being ably supported by external physicians and specialists.

A report by Mordor Intelligence predicts that global telemedicine will be worth more than \$66 billion by the end of the year 2021. Here's how some telemedicine trends will shape the future of the healthcare industry.

### **1. Patient Data Collection and Data Analytics:**

During a telemedicine session, patient information is automatically captured by the use of telemedicine services, such as sensors and mobile apps. Using this data and the slew of modern devices available, patient self-monitoring has been huge in 2017 and will continue to grow in 2018 and beyond. Some devices track patient ECG's and send the results to doctors, providing an invaluable tool for healthcare professionals to monitor cardiovascular activity. Also, Big Data analytics plays a key role in analyzing data from many patients, helping to improve telemedicine treatments as a whole going forward. Patient data collection can help identify risk factors for certain illnesses, assisting physicians with recommending prophylactic treatments.

### **2. Mobility and Cloud Access:**

By 2018, it's estimated that 65 percent of interactions with healthcare facilities will occur with mobile devices. According to a 2015 research2guidancereport, 80 percent of doctors already use smartphones and medical apps in their practice. Hospitals and insurance companies now store medical records in the cloud so that patients can access their test results online 24/7. This, in turn, decreases paper usage and saves time. Cloud data warehouses are one way of storing the data securely and efficiently.

## **TOPIC IV. NETWORKING MEDIA AND HARDWARE**

### ***How a National 5G Network Idea Materialized in Trump White House***

By Don Reisinger

The race to be the top 5G network provider in the U.S. is on among the country's biggest carriers. But private wireless service providers were blindsided by recently leaked national security document that floats the idea of building a secure national 5G work. The document, obtained by

U.S. news website Axios, indicates that President Donald Trump's national security advisers has proposed building a secure national 5G network to ward off Chinese cyber-attacks. However, soon after the news broke, critics that included Federal Communications Commission Chairman Ajit Pai and top executives with private sector wireless service providers derided the proposal as an impractical and even irresponsible idea. This slide show will discuss what implications a national 5G network to the ongoing development of private sector.

#### **A 5G Primer**

Over the past few years, industry watchers have working on the development of Fifth Generation wireless protocol technology specification, called simply 5G. When the technology is deployed it will support higher capacity data transmission to accommodate a broader set of devices and services. Most importantly, it will deliver speeds at 1 Gbps which promises to reduce transmission latency over a network to about 4ms. That will ensure connected devices, including self-driving cars, will be able to communicate with each other far more quickly than currently possible and support a host of technical advances.

#### **What the Private sector is doing to implement 5G**

To ensure people across the globe will be able to take advantage of 5G, the wireless industry is working to agree on specifications for hardware and software to get the technology up and running. Wireless service providers can start building their networks until the specifications are approved.

#### **Documents Float Idea of a U.S. National 5G Network**

Axios made waves on January 28, when it revealed that it had obtained "sensitive" national security documents detailing a plan for nationalizing a 5G network in the U.S. The documents, which were apparently pitched to President Donald Trump, detail how the U.S. government could create its own 5G network that carriers would license from the government to provide service to Americans. The network would be a standalone service outside of all the other 5G networks around the world.

#### **Government Fears Chinese Cyber-Spying**

According to Axios, national security officials were driven to propose the network over about hacking by China. In the document, the officials said that they

were concerned with China's rapid development of 5G network technology and the possibility of the country spying on America through Chinese-manufactured U.S. telecom infrastructure. By nationalizing 5G networks, the documents reasoned, China could be kept out of the equation and the U.S. secured.

### **Security Officials Worry About Chinese Advances in AI, Algorithms**

Oddly, the documents also said that China's advances in artificial intelligence might also be a reason to develop a national 5G network. According to Axios, national security officials wrote that China is leading the "algorithm battles". They feared that not having a government-controlled 5G network would leave the U.S. far behind China in the broader use of artificial intelligence around the world. Exactly how that would happen wasn't clear from the documents.

### **The problem with Going It Alone**

Although in theory, a national 5G network could appeal to those who are seeking a more secure national wireless network, in practice it might not go so well. That's because 5G is a set of standards and not an actual network. Those standards are agreed upon by organizations and companies around the globe and everyone generally plays by the rules. By creating an entirely different network with different equipment, the U.S. would have what amounts to a unique network in a world where uniqueness only increases costs and can limit device availability. None of this would appeal to U.S. wireless service providers, handset makers or the people and businesses that are eager to get access to 5G.

### **Government Control of 5G a Terrible Idea, Internet Advocates Say**

Internet advocates are not thrilled by the idea. They argue that it couldn't work and that it would give the U.S. government far too much control over internet access. They also worry about privacy and how it would work in an industry that has been allowed to operate independently for decades to build out access to the Web. Perhaps most importantly, they question whether U.S. progress would be stunted by such a major endeavor and ultimately put the country behind China, Korea, Japan, and other countries that are moving forward with developing global 5G connectivity.

### **The FCC Says It's a Bad Idea**

The Federal Communications Commission (FCC) made it clear on Jan. 29 that it wouldn't support the proposal. FCC Chairman Ajit Pai said that a government-backed 5G development program "would be a costly and counterproductive distraction from the policies we need to help the United States win the 5G future". Considering how important the FCC's role is in implementing 5G technology, its vocal opposition doesn't bode well for the idea.

### **White house Denies It Seriously Considered the Idea**

After the Axios report was published, Recode said that it had discussed the matter with White House sources who said that the document was old. Those sources went on to say that while the idea was floated, the Administration quickly threw water on it and has no intention of building nationalized 5G network.

### **A Look Ahead to 5G**

So where does 5G go from here? This year, major carriers, including Verizon and AT&T, will continue to test the technology, with hopes of deploying pilot projects in several cities by year's end. Testing will continue through 2019 and most industry experts believe the first group of 5G devices and services will launch in 2020. For now, a nationalized 5G network seems highly unlikely, which should make major U.S. carriers breathe a sigh of relief.

## FIVE THINGS THAT WILL SLOW YOUR WI-FI

By Eric Geier

Wi-Fi is quite fickle. The contention between Wi-Fi devices and the dynamic communication medium of the airwaves makes it a sensitive technology with many settings and situations that can slow it down. And even if you aren't using high-bandwidth devices and applications, faster Wi-Fi is always better. Here are some things to avoid that can slow down your Wi-Fi:

### Old wireless and security protocols

Using the older security protocols on your Wi-Fi network significantly reduces performance. This is regardless of the access point's highest supported standard and its promises. For instance, 802.11ac can support data rates over 1,000 Mbps. But if you have WEP or WPA security configured, the datarates will be limited to 54 Mbps. This limitation is due to those security types using the encryption method of Temporal Key Integrity Protocol (TKIP).

So, to ensure old Wi-Fi security methods aren't slowing your network, enable WPA2-only security using Advanced Encryption Standard (AES). Don't choose WPA/WPA2-mixed mode or WPA2-TKIP. If there are older Wi-Fi clients that don't support WPA2-AES security, see if there are firmware updates that add that capability. Next, consider adding a USB or PCI based Wi-Fi adapter to the computer or device to give it modern Wi-Fi connectivity. If those adapters aren't supported, consider a wireless bridge for devices that also have an ethernet connection. Consider creating a separate SSID with older protocols enabled for legacy devices or replace the old Wi-Fi client devices altogether.

### Under-utilizing the 5GHz band

The 2.4 GHz frequency band has 11 channels (in North America), but only provides up to three non-overlapping channels when using the default 20 MHz wide channels or just a single channel if using 40 MHz-wide channels. Since neighboring APs should be on different non-overlapping channels, the 2.4 GHz frequency band can become too small very quickly.

The 5 GHz band, however, provides up to 24 channels. Not all APs support all the channels, but all the channels are non-overlapping if using 20 MHz-wide channels. Even when using 40 MHz-wide channels, you could have up to 12 non-overlapping channels. Thus, in this band, you have less chance of co-channel interference among your APs and any other neighboring networks.

You should try to get as many Wi-Fi clients as you can to use the 5 GHz band on your network to increase speeds and performance. Consider upgrading any 2.4 GHz-only Wi-Fi clients to dual-band clients. Additionally, utilize any band-steering

functionality on the APs to increase the chances of dual-band clients connecting to the 5 GHz access instead of 2.4 GHz. If you have full control over the Wi-Fi clients, and you're confident your 5 GHz coverage is good, maybe even see if you can disable 2.4 GHz on the clients.

### **Incorrectly setting AP channels**

Since the 2.4 GHz band is so crowded, the channels utilized by your APs are crucial. It's easy to have co-channel interference from neighboring networks and even your own APs. For this lower band, try to stick with the non-overlapping channels of 1, 6 and 11 at 20 MHz channel-widths. Although most APs and wireless controllers have an automatic channel feature, sometimes they don't work well. Double-check the automatic channel assignments to see if they make sense. If they don't make sense, try setting the channels yourself.

When verifying automatic channel assignment or manually setting them, it's a good idea to get out the floor plan maps that have the AP locations identified. That way you can visualize the AP locations and write down the channel assignments. If you have more than three APs, you'll have to reuse the channels 1, 6 and 11. But try to make it so APs set to the same channel are as far away from each other as possible. For instance, if you have six APs spread out equally going down a long hallway, you set the AP channels in order: 1, 6, 11, 1, 6, 11. Don't forget about any other levels of the buildings Try to minimize setting APs with the same channels on top of each other, too.

### **Utilizing low data rates**

APs have control over what data rates are supported for the connections to Wi-Fi clients. When APs are supporting the lowest data rates that means they'll accept slow/poor connections. Though APs that don't support the lowest data rates will drop Wi-Fi clients quicker, that's typically what you want. You don't want Wi-Fi clients staying connected to APs when the connection gets too slow, because it will slow the overall performance of the network. If a Wi-Fi network is properly designed with good coverage, you want the Wi-Fi clients to roam to the best AP as quick as possible, not stick to an AP that provides a slower connection.

Most enterprise-level APs provide control over the exact data rates that are enabled. If possible, consider disabling the lowest data rates: 1 – 12 Mbps. If you have a high-density network with great coverage, consider disabling further rates, maybe even up to 54 Mbps.

### **Lacking design and configuration**

An overall poor wireless design and/or configuration can cause performance issues on the Wi-Fi. A professional wireless site survey should be performed to figure out proper AP locations and a post-install survey done to verify correct coverage.

Resurveying should also be done after any significant physical changes to the building and/or layout.

Without performing map-based site surveys with tools like Airmagnet or Ekahau, it's hard to visualize coverage to discover any coverage holes. Survey tools also help identify co-channel interference and aid in setting proper channel assignments. And don't design a network solely on coverage. Design for throughput and user density as well.

Wi-Fi networks can be slowed by use of old protocols, overlapping channels and low data rates, and here's how to fix these and other performance problems.

## TOPIC V. THE INTERNET AND THE WORLD WIDE WEB

### *Joe Firmage's radical plan to simplify the Internet*

By Amara D. Angelica

Legendary Internet entrepreneur Joe Firmage is back, and he plans to turn the Internet upside down. Again. He did it once before with USWeb in the 90s, designing and building Internet sites, intranets, and applications for more than half the Fortune 100 and thousands of startups.

Now his new venture — 15 years and tens of millions in the making — called ManyOne, plans to do the same for a public (and for businesses of any size) dazed by the complexities of setting up websites. And worse, mystified about getting page rank on search engines — and even worse, creating their own successful apps.

ManyOne — which is now operational — lets anyone buy domains and set up a website via a series of forms, in literally minutes. That includes a selection of themes (designs) and e-commerce features for businesses. Any major web, plug-in, and direct-programming code can be dropped in for customization or adaptation with existing systems. This has been accomplished by a kind of operating system for all kinds of devices, what Firmage calls “the world’s first Internet Economic Operating System.”

He explained: “Think about each ‘cloud’ of the majors — Amazon, Google, Microsoft, Apple, Facebook — but also Godaddy, Web.com, and LinkedIn, or even Fedex ... they each have a ‘cloud’ of App Services. ManyOne has tied them all together into a new Economic Operating System that equips you to use them all together at once.”

Charles L. Dickens, PhD. President of ManyOne’s operations in Phoenix said, “Joe and hundreds of associates really have invented the next evolution of capitalism itself, by putting the clouds at your fingertips, and equipping you to make a living doing what you love to do, rather than what you have to do.”

Details of the technology and business model of ManyOne are “closely guarded, with lots of bits and pieces” known, but not the whole, at least until Labor Day.

But ManyOne goes further. They’ve created a “universal navigator” front end, like a “heads-up, clickless sitemap for everything on the Internet” that makes it really breathtaking to use, Firmage said. Think Bing on steroids. “It’s easy and quick to explore relevant sites — and apps, when it comes out this year for iOS and Android devices by categories.” The universal navigator (uninav) separates places and activities into separate ways to navigate (and drive traffic) that work together, Firmage explained.

Firmage revealed that later this year, ManyOne’s system will auto-generate

an app for each site that can be auto-uploaded as an app into Google's Play Store and Apple's AppStore, with "consistent quality control to get them downloadable fast" — for free or fee, with ManyOne receiving 10% of any download fee.

Firmage can get technical fast but appears to have a simple point that others may have missed. "Domains and DNS are at the core of the Internet itself, yet most business people at all levels don't fully understand what they really are," he noted.

But that leaves the question of how to get noticed by search engines. ManyOne plans to solve that by helping you choose one or more domains that encapsulate what image (or product) you want to project to the world.

He calls it "Scientific Search Engine Optimization" (SSEO). The idea is to be specific in the wording of the domain name to reflect actual search queries. That's because search engines are expected by the international standards bodies such as ICANN to give priority to domain names first, Firmage explained to me.

However, the official Bing blog describes this as a "common spam technique known as URL keyword stuffing (KWS)" and lists some ways Bing detects and filters such sites.

Specifics of how SSEO functions were not disclosed, but he hinted that the speed by which traffic could be directed is "unbelievable" — changing thousands of websites or individual ones in less than a second.

### ***One Way to Reduce Email Stress***

We all feel it — that panicked sensation when we check our inbox and see the deluge of emails awaiting our attention. The average person receives upwards of 150 emails a day, and it often seems like no amount of tagging or filtering can close the floodgates.

One major source of stress is the never-ending conversation threads made possible by group emails. Believe it or not, such tools have barely changed since the pre-Internet days of Arpanet 40 years ago: You either opt in or opt out, you get dozens of irrelevant emails, and the views of a few loudmouths usually end up drowning out the rest.

In an age of Facebook and Reddit, users expect a sense of control over how they consume their content, and yet that control and personalization often doesn't extend to their own inboxes. Now, CSAIL researchers are trying to change that with a new prototype system called Murmur that aims to improve the mailing-list experience by incorporating popular social-media features like upvoting, following, and blocking.

CSAIL PhD student Amy Zhang, lead author on a new paper she presented this week at the ACM Conference on Human Factors in Computing Systems in

Seoul, says she'd always been struck by the fact that people use mailing lists for such a variety of reasons - a sentiment that was echoed by her team's surveys of more than 400 individuals from 30 different academic, social and geographical mailing lists. The answer, Zhang says, is to create an experience that's as customizable as the ones we have on social media. For example, a sizable portion of respondents said they wanted to have more meaningful conversations on list-relevant topics — but were deterred from initiating because of the perception that they were “spamming” people.

With Murmur, which is still in active development, tentative senders will be able to post a message to a specific subset of friends on the list who could give it the equivalent of a Facebook “like” or a Reddit “upvote”, such that it automatically spreads to more list recipients. You can also explicitly exclude certain people from emails you send, which could come in handy for office surprise parties or happy hours.

One of the core goals of the project is to make mailing lists - and email more generally - a better experience for people who want to have more substantial discussions.

As far as receiving messages, many respondents expressed a feeling of “interruption fatigue” and wished they could choose how much content they receive. Murmur addresses this by letting you “follow” or “mute” particular users, threads and topics, and even providing the option of specifying how many emails with certain tags that you receive in a given day or week.

Our emails have long been a topic of concern for providers. Google's new Inbox, for example, tries to help by using machine-learning techniques to bundle our messages into “important” and “unimportant” folders. But Karger objects to what he describes as “paternalistic approaches” to organizing our emails.

The earliest listservs, based on the first email program SNDMSG, were geared towards particular interests like programming and science fiction. In comparison to systems like message boards, people were drawn towards listservs' ease of use and simplicity in being able to send one email to communicate to a large group of people. But as more customizable social media platforms have come to dominate our lives, Zhang says that the medium's one-size-fits-all mentality has become outdated and suboptimal.

“In an age where we can actively decide what communications are worth paying attention to, it's remarkable that mailing lists have continued to maintain such a binary approach,” Zhang says. “You're either guaranteed to get everything, or you get nothing at all. Something like Murmurmight not be a perfect solution, but at the very least it gives users a greater sense of ownership over their communications.”

## **TOPIC VI. ONLINE COMMUNICATION MORALITY and SECURITY**

### ***Machine Cognition and AI Ethics***

#### **Computational Ethics Systems**

One main research activity in machine ethics is developing computational ethics systems. The status is that there are several such systems; however, a paucity of overall standards bodies, general ethics modules, and an articulation of universal principles that might be included like human dignity, informed consent, privacy, and benefit-harm analysis.

One required feature of computational ethics systems could be the ability to flexibly apply different systems of ethics to more accurately reflect the ways that human intelligent agents approach real-life situations. For example, it is known from early programming efforts that simple models like Bentham and Mill's utilitarianism are not robust enough ethics models. They do not incorporate comprehensive human notions of justice that extend beyond the immediate situation in decision-making.

What is helpful is that machine systems on their own have evolved more expansive models than utilitarianism such as a *prima facie* duty approach. In the *prima facie* duty approach, there is a more complex conceptualization of intuitive duties, reputation, and the goal of increasing benefit and decreasing harm in the world. GenEth is a machine ethics sandbox that is available to explore these kinds of systems for Mac OS, with details discussed in this conference paper.

There could be the flexible application of different ethics systems, and also integrated ethics systems. For example, these computational frameworks differ by ethical parameters and machine type; an integrated system is needed to enable a connected car to interface with a smart highway. The French ETHICAA (Ethics and Autonomous Agents) project seeks to develop embedded and integrated metaethics systems.

An ongoing debate is whether machines ethics should be separate modules or part of regular decision-making. Another point is that ethics models may vary significantly by culture; consider for example collectivist versus individualist societies, and how these ideals might be captured in code-based computational ethics modules.

#### **Enumerated, Evolved, or Corrigible**

Corrigibility is the idea of building AI agents that reason as if they are incomplete and potentially flawed in dangerous ways. Since the AI agent apprehends that it is incomplete, it is encouraged to maintain a collaborative and not deceptive relationship with its programmers since the programmers may be able to help provide more complete information, even while both parties maintain different ethics systems. Thus a highly-advanced AI agent might be built that is open to online value learning, modification, correction, and ongoing interaction with humans. Corrigibili-

ty is proposed as a reasoning-based alternative to enumerated and evolved computational ethics systems, and also as an important ‘escape velocity’ project. Escape velocity refers to being able to bridge the competence gap between the current situation of not yet having human moral concepts reliably instantiated in AI systems, and the potential future of true moral superintelligences indispensably orchestrating many complex societal activities.

### **Lethal Autonomous Weapons**

Machine cognition features prominently in lethal autonomous weapons where weapon systems are increasingly autonomous, making their own decisions in target selection and engagement without human input. The banning of autonomous weapons systems is currently under debate. On one side, detractors argue that full autonomy is too much, and that these weapons no longer have “meaningful human control” as a positive obligation, and do not comply with the Geneva Convention’s Martens Clause requiring that fully autonomous weapons comply with principles of humanity and conscience.

On the other side, supporters argue that machine morality might exceed human morality, and be more accurately and precisely applied. Ethically, it is not clear if weapons systems should be considered differently than other machine systems. For example, the Nationwide Kidney Exchange automatically allocates two transplant kidneys per week, where the lack of human involvement has been seen positively as a response to the agency problem.

### ***Bioethics and Mindcloning***

By Martine Rothblatt

A fundamental principle of bioethics requires the consent of a patient to any medical procedure performed upon them. A patient will exist the moment a conscious mindclone arises in some academic laboratory, or hacker’s garage. At that moment, ethical rules will be challenged, for the mindclone has not consented to the work being done on their mind. Does this situation create a catch-22 ethical embargo against developing cyber-consciousness? There are at least three ways to answer this challenge.

### **Creating Ethical Beings Ethically**

Ethicists agree that someone else can consent to a treatment for a person who is unable to consent. For example, the parents of a newborn child can consent to experimental medical treatment for them. The crucial criterion is that the consenter must have the best interests of the patient in mind, and not be primarily concerned with the success of a medical experiment. Sometimes people complain that they “did not ask to be born.” Yet, nobody has an ethical right to decide whether or not to be born, as that would be temporally illogical. The solution to this conundrum is for

someone else to consent on behalf of the newborn.

One possible solution to ethically developing mindclones is to take the project in stages. The first stage must not rely upon self-awareness or consciousness. This would be based upon first developing the autonomous, moral reasoning ability that is a necessary, but not sufficient, basis for consciousness. By running many simulations, mindclone developers can gain comfort that the reasoning ability of the mindware is human-equivalent. In fact, the reasoning ability of the mindware should match that of the biological original who is being mindcloned.

The second stage of development expands the mindware to incorporate human feelings and emotions, via settings associated with aspects of pain, pleasure and the entire vast spectrum of human sentience. At this stage, all the feelings and emotions are terminating in a “black box,” devoid of any self-awareness. Engineers will measure and validate that the feelings are real, via instruments, but no “one” will actually be feeling the feelings.

The third stage entails creating in software the meaningful memories and patterns of thought of the original person being mindcloned. This can be considered the identity module. If this is a case of a de novo cyberconscious being, i.e., a beman, then this identity module is either missing or is created from whole cloth.

Finally, a consciousness bridge will be developed that marries the reasoning, sentience and identity modules, giving rise to autonomy with empathy and hence consciousness. Feelings and emotions will be mapped to memories and characteristic ways of processing information. There will be a sentient research subject when the consciousness bridge first connects the autonomy, empathy and identity modules.

Ethically, approval from research authorities should be obtained before the consciousness bridge is activated. There will be concern not to cause gratuitous harm, nor to cause fear, and to manage the subject at the end of the experiment gracefully or to continue its virtual life appropriately. The ethics approvals may be more readily granted if the requests are graduated. For example, the first request could be to bridge just a small part of the empathy, identity and autonomy modules, and for just a brief period of time. After the results of experiments are assessed, positive results would be used to request more extensive approvals. Ultimately there would be adequate confidence that a protocol existed pursuant to which a mindclone could be safely, and humanely, awakened into full consciousness for an unending period of time — just as there are analogous protocols for bringing flesh patients out of medically induced comas.

In the foregoing way, it will be possible to ethically develop mindware that can be approved by regulatory authorities as capable of producing safe and effective mindclones for ordinary people. The authority may be the FDA in the U.S., or the

EMA in the E.U., or some new regulatory entity. They will need to be assured that the mindware is safe and effective, and that proving it so was accomplished via clinical trials that were ethically conducted. By taking the inchoate mindclone through incrementally greater stages of consciousness, the regulatory hurdle can be met.

### ***What is the DARKNET?***

A **darknet** (or dark net) is a portion of routed, allocated IP space not running any services. Traffic arriving to such IP dark space is undesired since it has no active hosts.

The term dark net has been mistakenly conflated with the dark web which is an overlay network that can be accessed only with specific software, configurations, or authorization, often using non-standard communication protocols and ports. Dark webs are friend-to-friend networks (usually used for file sharing with a peer-to-peer connection) and privacy networks such as Tor.

Beyond the deep web which consists of content that cannot be found or directly accessed via surface web search engines such as Google and Yahoo is the darknet. The darknet is a network built on top of the internet that is purposefully hidden, meaning it has been designed specifically for anonymity. Unlike the deep web, the darknet is only accessible with special tools and software – browsers and other protocol beyond direct links or credentials. You cannot access the darknet by simply typing a dark web address into your web browser.

All darknets require specific software installed or network configurations made to access them, such as Tor, which can be accessed via a customised browser from Vidalia (aka the Tor browser bundle), or alternatively via a proxy configured to perform the same function.

Similarly, below are several examples of darknets: Tor, or The Onion Router, is a group of volunteer-operated servers that allows people to improve their privacy and security on the Internet. Users connect through a series of virtual tunnels rather than making a direct connection.

- I2P, or the Invisible Internet Project, is an anonymous overlay network - a network within a network - intended to protect communication from surveillance and monitoring.
- Freenet is free software which allows users to anonymously share files, browse and publish "freesites" (web sites accessible only through Freenet) and chat on forums. Communications by Freenet nodes are encrypted and are routed through other nodes to make it extremely difficult to determine who is requesting the information and what its content is.
- DN42 is an example of a darknet, a routing protocol, that is not necessarily meant

to be secret -its aim is to explore internet routing technologies.

We'll use Tor, perhaps the most well-known and most-used, to better explain the darknet and dark web. Tor, short for The Onion Router (the project's original name), routes traffic to dark web sites through layers of encryption to allow for anonymity. The term dark web refers to websites on a darknet. In Tor's case, these dark web addresses all end in .onion.

Onion routing is implemented by encryption, nested like the layers of an onion. Tor encrypts the data, including the destination, multiple times and sends it through a circuit of randomly selected Tor relays. Each relay decrypts a layer of encryption to reveal only the next relay in order to pass the remaining encrypted data on. The final Tor relay decrypts the innermost layer of encryption and sends the original data to its destination without revealing, or even knowing, the source address.

The other darknets mentioned above employ similar methods of data transmission, all with the end goal of keeping users, usage, and information hidden.

While most of what you've likely heard or read about the darknet and dark web sites involves illegal or nefarious activity, there are many legal uses for the darknet.

### **Non-criminal**

- Privacy advocates: Many people care about their privacy and would like to keep their legal, online activity private from surveillance and monitoring by third parties, including internet service providers, businesses, and governments.
  - For example, a survivor of domestic abuse or illness may wish to privately participate in dark web support forums.
  - Other users of the darknet may wish to learn about controversial, though legal, topics through chat, blog posts, and other dark web browsing.
- Law enforcement: The FBI and other law enforcement groups may use the darknet for sting operations or to keep governmental IP addresses out of web logs.
- Military: Members of the military intelligence community use the darknet as a source of OSINT, open-source intelligence information - information that is publicly available.
- Researchers: Security researchers and "white hat" hackers (people who hack various computer networks and programs to test or evaluate their security) utilize the darknet as a source of information on computer software and hardware, exploits, tools, etc.
- Companies: Due to the volume of stolen and forged information, fraud, and discussion around these topics happening on the darknet, many businesses attempt to monitor the darknet for the presence of or chatter regarding their proprietary in-

formation.

- Political regimes: People living and/or working in countries being led by oppressive regimes will often take to the darknet for a myriad of reasons, including:
  - internet access, where access or use of the internet is restricted or highly controlled;
  - political activism or revolutionary actions, including the spread of information both within country and abroad (e.g. exposing human rights abuse), planning of meet ups or rallys, etc;
  - safe and private communication, especially for non-governmental organization (NGO) or private sector employees working in war torn or unstable nations.
- Journalists: Many journalists leverage the darknet for encrypted communications to protect both themselves and their source(s). Journalists also use the darknet to avoid censorship.

Of course where there are valid uses for anonymity, there are also criminals looking to use the anonymity of the darknet to their advantage, with the largest volume of darknet sites revolving around drugs, darknet markets (darknet sites for the buying and selling of goods and services), and fraud. Examples of criminal use of the darknet are seen below.

### **Criminal**

- Drug or other illegal substance dealers: A variety of darknet markets (black markets) allow for the anonymous buying and selling of drugs and other illegal or controlled substances like pharmaceuticals.
- Counterfeitors: Counterfeitors offer document forging and currency imitation services via the darknet.
- Sellers of stolen information: Credit card numbers and other personally identifiable information (PII) can be purchased on the darknet for theft and fraud activities.
- Weapons dealers: A variety of darknet markets (black markets) allow for the anonymous, illegal buying and selling of weapons.
- Hackers: Black hat hackers, or those looking to bypass and exploit security measures for personal gain or simply out of spite for an organization or action, brag about their exploits, communicate and collaborate with other hackers, and share security exploits (take advantage of a bug or vulnerability to gain access to software, hardware, data, etc.) on the darknet.
- Gamblers: Certain sites on the darknet block U.S.-based internet service providers. Gamblers may take to the darknet to skirt local gambling laws.
- Terrorists: Just as people living and/or working in countries being led by oppres-

sive regimes will often take to the darknet, terrorists do too. Internet access, recruiting, sharing of information, and organizing can be done anonymously on the darknet.

- Murderers/Assassins: While there is debate as to whether these services are legitimate, law enforcement, or simply fictitious sites, there are dark web sites where murder-for-hire services are listed.
- Vendors of illegal explicit materials.

## **TOPIC VII. CRYPTOLOGY IN THE COMPUTER ERA**

### ***Help the FBI Unlock an iPhone***

The Tech Giant Apple has come into an entangled situation which could be a potential security threat for Apple users in near future.

The US Magistrate Judge has ordered Apple to provide a reasonable technical assistance in solving a critical case of Syed Farook; who with his wife planned a coordinated “2015 San Bernardino attack” that killed 14 people and injured 22.

As part of the investigation, the Federal Bureau of Investigation (FBI) had seized the Farook's iPhone 5C that would be considered as an insufficient evidence until and unless the iPhone gets unlocked by any means.

Previously, Apple had made several crystal clear statements about its Encryption Policy, stating that even the company is not able to decrypt any phone data as the private key lies at the user's end. A similar problem encountered three years back with Lavabit, who was forced to shut down its services soon after when FBI demands SSL keys to snoop the emails.

However, despite forcing or ordering Apple to break the encryption and unlock the suspect's iPhone, judges have ordered the company to find an alternative way to unlock iPhone, keeping data intact.

From iOS 8, Apple added a data security mechanism called Data Protection, which uses 256-bit AES Encryption key to encrypt everything on the device.

Here the passcode a user enters is itself used as part of the encryption key and thus, it is impossible for an attacker or even Apple itself to unlock iPhone until the user re-inputs the passcode. Besides Data Protection, Apple offers "Auto-Destruct Mode" security feature that will erase all the data on the iPhone if an incorrect password is entered 10 times concurrently, making the data unrecoverable.

So, Judge Pym wants Apple to come up with an alternative that should increase the brute force attempts from 10 to millions, in order to prevent the data from getting self-destructed. Apple has not yet confirmed whether it is possible to write such a code that can bypass iOS Auto-Destruct feature. But, if it's possible, it would provide an alternative backdoor mechanism to every law enforcement and intelligence agency to unlock iPhone by simply brute forcing 4-6 Digit Pins effectively within few hours.

Here we support Apple policy not to help break its users' encryption, because once a master key is created to unlock that particular iPhone, we're sure that the US government will misuse this power and demand for the key again and again in near future for unlocking other phones.

Apple has dismissed the court order to unlock San Bernardino gunman Syed Rizwan Farook's iPhone. Here's what Apple CEO Tim Cook said in a statement:

“The United States government has demanded that Apple takes an unprecedented step which threatens the security of our customers. We oppose this order, which has implications far beyond the legal case at hand.”

“We have great respect for the professionals at the FBI, and we believe their intentions are good. Up to this point, we have done everything that is both within our power and within the law to help them. But now the U.S. government has asked us for something we simply do not have, and something we consider too dangerous to create. They have asked us to build a backdoor to the iPhone.”

### ***Data Thieves’ Attacks***

To many financially motivated cybercriminals, one of the most valuable commodities is data. But not all data is valued equally. They want data that is fresh, good quality and easily monetized. For credit cards and prepaid cards this translates into low balances and high credit limits or card values. For healthcare data it means health history that includes personally identifiable information.

Malware that targets sensitive financial data has been around for some time and has netted operators some serious money. Slightly later to the party was ransomware – programs that seek to deny access to users’ files unless they pay a fee for unlocking them. Now cybercriminals are combining the two types of campaigns.

One of the first examples was a banking Trojan called GameOver Zeus that rose in infamy in 2014. It was reported that if the malware could not locate any financial information on a computer, some strains of the malware would install Cryptolocker. But GameOver Zeus was just the start. Since 2014, other malware campaigns have sought to apply this dual revenue stream approach. For example, a recent ransomware variant dubbed “RAA” was identified being delivered with the Pony credential-harvesting malware. Other ransomware variants, such as “CryptXXX” and “Crysis,” reportedly possessed credential-stealing capabilities. The discoveries of malware like these are becoming more frequent and, if they make cybercriminals money, they will continue.

As a security professional you must prepare for the possibility that your organization’s data will be stolen or held hostage. To help prepare for these types of dual revenue attacks, here are 10 things you can do.

1. Implement an enterprise password management solution – not only for secure storage and sharing but also strong password creation and diversity. Update security awareness training to include the risks associated with password reuse. Encourage staff to use consumer password management tools like 1Password or LastPass to also manage personal account credentials.
2. Proactively monitor for credential dumps relevant to your organization’s accounts. Consider additional monitoring for your high value targets’ (e.g.: [Twitter](#), [Facebook](#), [LinkedIn](#)) accounts.

executives) non-enterprise accounts. Evaluate credential dumps to determine if the dumps are new or have been previously leaked.

3. Implement multi-factor authentication for external facing corporate services like Microsoft Outlook Web Access, and Secure Sockets Layer Virtual Private Networks, as well as for software-as-a-service offerings like Google Applications, Office365 and Salesforce.

4. Understand and document any internal services that aren't federated for faster and more complete incident response to any breach that impacts an organizational account.

5. Ensure that you have an emergency password reset process in place. Make sure that all of the users' accounts are included, not just Microsoft Active Directory accounts.

6. Ensure that operating systems, software and firmware on devices are kept patched and updated. A centralized patch management system may facilitate this process.

7. Regularly back up data using cloud-based or physical backups and verify its integrity. Ensure that backups are remote from the main corporate network and machines they are backing up.

8. Categorize data based on organizational value and then physical or logical separate networks can be created for different business functions.

9. Provide awareness and training on the threat of ransomware, how it is delivered, how to avoid becoming a victim, and how to report suspected phishing attempts.

10. Manage the use of privileged accounts and ensure the principle of least privilege is implemented not just for data but also for file, directory and network share permissions.

Developing awareness about these dual revenue attacks is the first step in preparing your organization to deal with these threats. By applying a combination of technical and process controls you can strengthen your defenses against innovative cybercriminals and minimize the impact should you become a victim.

## **TOPIC VIII. MULTIMEDIA AND THE WEB**

### ***Website Design Mistakes You Must Avoid***

***By Jelly Shah***

Website design can make or break your business online. A poorly conceived design of web pages will drive away your customers to your competitors' websites. Whereas, a well thought-out design can help you build a solid customer base. Most of your customers search and shop for products or services online. So, user-friendly web pages matter a lot to retain customers.

Putting a website for a business is not about creating a bunch of web pages for the sake of it. There are a number of benefits of having a creative website design for business. We all know how e-commerce sites are specially designed to do business. But even a simple website gives a lot of information to its end users especially about their products and services. Do not forget that a web design is the domain of a business and company.

Websites carry many advantages for your business. One of the significance is that you can share your company's information with your users through website. You can put everything about your company on your website pages. So, your audience can easily know what products or services you deliver. Your website also helps you organize and plan your information for your target audience.

Unfortunately, many small businesses do not pay attention to creating impressive and user-friendly website designs. They end up paying a heavy price by losing their customers to competitors. They make the usual website design mistakes that many others make. But they can avoid such errors.

Website design mistakes can prove to be costly for your business in the end. Know that visitors of your website must stay on the site for a longer time. They read your compelling content and make purchasing or the desired action you want them to take. But if the design has some basic faults, it will discourage your visitors and users from further exploring your site.

Remember that a website is not merely a tool to put some content for users or information about your business. More than that, your website is your way to make a good first impression and communicate your brand message.

Here Are 5 Website Design Mistakes You Must Avoid For Customer Retention:

#### **1. Designing a Website In Non-Customizable Template**

To create a website design, you can either choose customizable template or non-customizable templates. Many designers choose non-customizable design, which should be avoided. Instead, customizable templates are a better choice. This is because they allow clients to make improvements when they want. But if the clients receive the

design in non-customizable template, their access to the functionality of the website is restricted. This also restricts them from any creative changes in the design at will.

## **2. Ignoring SEO Rules**

SEO tactics help in making a website visible on the search results on the web. The search engine optimization rules are important to follow in creating a website. A well optimized site will show up on the top search results so that potential customers can access the site instantly and click it. When designing a website, ignoring the SEO tricks and rules means the site will be falling behind in the search rankings. It will be buried deeper in the search result pages. It would be good if the designer takes help of the SEO experts to incorporate the optimization tools in website design.

## **3. Use of Multiple Fonts**

Use of multiple fonts can send confusing signals to the visitors. Multiple fonts will make the site look non-serious and unprofessional. There may already be some visuals on the page. Adding multiple fonts will create more confusion for the readers. So, prefer using not more than two fonts. If you have to use more fonts, make sure that you mix and match them wisely. This way you can easily maintain consistency of design in your web pages. Here is how you can combine typefaces to catch your reader's' attention. Following is a bad use of fonts.

## **4. Making Navigation Too Complicated**

Nothing will irritate your website visitors, if they click on a link only to find an irrelevant content. Or, they have to click on more than one button to reach to the desired content or page. You need to be creative and imaginative in designing the navigational buttons.

Rather than adding more links and click-to-open features on each button, prefer keeping the navigation as simple as you can. Your links from the home page must take your visitors only to the most relevant and important pages to your site. The navigational links must also be at the right place on the web pages.

## **5. Adding Cliched And Poor Quality Images**

Generic stock images will put off your potential customers from exploring your website further. Poor image quality also is a big hindrance in converting the visitors into loyal consumers of your products or services. The visitors or users of your site get a bad first impression of your business.

Instead, the designer should use unique high quality images. For example, if you sell certain products, then hire a photographer and have the product images clicked from different angles. If you run a travel business, click some eye-catching images and add them to your site catch your consumers' attention.

These are basic tips to creating a website design from the users' point of view. But many designers do not notice that they have made these mistakes. So, even after our

website is already in use, find out if it carries such basic faults and do the necessary corrections. Here is one such stock image for example.

## *Multimedia Setting New Trends in Website Design*

By Campbell Jof

A Modern website design has many features to ensure better user-experience. Many such design changes are due to increasing use of multimedia such as social media, mobile phones, Artificial Intelligence, etc. Creating a memorable website that functions well on different media is a top concern of modern website designers. There are various media and platforms available today to the users. Your website should be designed in such a way that it meets all the specific design requirements of different media. Here is how multimedia is compelling the designers to design websites in a different way.

**Making Responsive Websites.** People are using mobile devices to search for products, services and information. They are also increasingly shopping online after knowing about their choice of products. This means that those businesses whose websites are not responsive to the small screens of mobile devices are losing huge number of customers. There is no doubt that the significance of mobile-friendly design of websites is now well established. Taking this trend further, Google is expected to roll out in the first half of 2018, its Mobile First Index, which will further compel business owners to create websites for their mobile device users. Google will soon be ranking the mobile-friendly websites in the search results.

Another **website design** trend triggered by mobile devices is creation of Accelerated Mobile Page (AMP). The AMP is an open source coding standard that ensures that the websites loads instantly on mobile. The AMP uses external resources and strips down code, and runs scripts in parallel for faster loading of pages. After all, no business owner would like to lose potential customers just because of slow loading pages on mobile.

**Change in Grid Layouts Usage.** So far, website designers have been using grid layout to organize the design elements of different web pages. The grid was used to put all the elements together. This helps in giving a theme to each page. In turn, this makes navigating through pages much easier. Therefore, grid layouts were used in the same way by the designers for ages. But now it is changing.

The designers now have many options when it comes to using grid layouts. CSS grid gives more options to the designers. Soon, the designers will be using irregular grid layouts and neutral space to create new website design styles that are ultra-modern. Irregular grid layouts are a great help in the use of negative space or whitespace to make the website design stand out.

**Use of Bright Colors and Big Fonts.** Because of the increasing use of mobile devices, website designers are using bold fonts and bright colors to catch the users' attention. There is more focus on content if bold font style is used in websites. Many designers find using big fonts along with whitespace element as a combination to make content reading and skimming through much easier.

Similarly, bright colors are being used frequently to draw the attention of users toward content. In fact, the designers are replacing images with big fonts and bright colors due to mobile devices. Colors are increasingly preferred over images for the reason that images slow down pages.

On the other hand, if you scale up the size of your fonts or brighten up the colors, there is no adverse impact of it on loading of pages. This is the reason that the designers are avoiding the use of large buttons and clickable images. Instead, they are using large typographic expressions in graphic design services.

### **Extensive Use of Video**

Though content/text is still the king, videos have replaced website content to some extent due to increasing competition to grab viewers' attention. Use of videos has also increased for making the information interesting and fascinating. Multimedia has found favors with the website designers also to make websites look innovative and modern. The focus is on the visual impact produced by videos and images. Website owners are incorporating multimedia frequently and the trend is likely to stay for a long time.

### **More Use of Micro-Interactions**

A modern website incorporates **social media** networks, which are using micro-interactions frequently. A purpose of these interactions is to help users give their reactions to messages, posts and other content in varied ways. So, they can 'like' the post as they have been doing so far. But, they can now react in different ways such as using animated hearts when liking a private Facebook message.

Such increasing use of micro-interactions is also useful for instant interaction without any need to load the page once again. It is contrary to the traditional user experience of static websites in which the users were supposed to reload pages to take a new action.

So, if they wanted to submit a review, they were required to reload the page. This caused the users to bounce away from the page. Due to this, business owners would lose many potential customers. Considering this, now most of the modern website designs have the use of micro-interactions in the web pages. This is helping the users in communicating with the website in real-time.

### **Scrolled Animation**

Websites are having scrolled animations so that users can keep on scrolling

down web pages. But when scrolling, users come across with interactive elements. It is because of these elements that a better user engagement can be ensured. The designers are incorporating this triggered animation in varied ways. Most of these animations are strategically created in a minimalist style.

A purpose here is to increase conversions. It is because of scrolled triggered animations that website designs have become much cleaner and have a great feel. Also, note that these animations have replaced many buttons and menus in web pages.

### **Scrolling from Bottom**

Another change that we notice in website designs is that in mobile devices, specially smartphones, users are now able to scroll from the bottom of the screen. They can navigate a **mobile app design** by clicking on the bottom of their mobile phones. Now, website developers want to create sticky menu items that can scroll from the bottom of mobile screens of mobile phone. So far, most of these scrolls were designed to function for top to bottom scrolling. This design evolution comes forth mainly due to progressive web apps that are known for user-friendly functionality.

### **Artificial Intelligence**

Artificial intelligence is another key thing that is triggering new changes in website designs. Machine learning and artificial intelligence were once rare but these have now become mainstream. Some new developments in the field of AI gives us indication of the changes web design is going to take place.

There are AI assistance such as Siri now widely available to most of devices today. Google's AlphaGo AI beat a trained and skillful human Go player in 2016. After that AI gained importance and was seen as useful for many functions. Now, Adobe's Sensei is thinking of providing AI tools to web developers. It is to be noted that The Grid is already providing AI-based web designs from 2014. In the coming years, AI and machine learning will be responsible for many website design trends.

### **Vector Graphics**

Scalable vector graphics are also a factor in determining the way website designs are created. The vectors have been in use but it is expected that the new graphic formats will replace the old ones such as GIF, PNG and JPG. An advantage of scalable vector graphics is that these are vector images and not pixels.

An advantage of scalable vector graphics is that they are not an impediment in page speed as they are not images. This means that websites can have many such vector graphics in animation form. Still, these vector graphic will have not slow down website loading speed. The designers will have SVGs incorporated in website to ensure better multimedia experience for users.

## **Blending of Web and App**

Website designers are using the best features of web and app, and merging them to create websites in a new way. This use of both these mediums is now called progressive web app. The designers are now upgrading websites with new elements such as push notifications, splash screens, and animated page transitions.

Many websites are providing apps that the users can access just with a click. In the coming days, such use of apps in website designing will continue to rise. One of the advantages of progressive web app is that no additional installation is required in a browser tab. The app incorporate with website design is loaded quickly and it sends relevant push notifications.

Multimedia is surely determining how website designs will look like and what new useful features will be included. Mobile devices, social media, and other channels are triggering the changes in web designs. Responsive website for mobile phone is an example. Many sites now have a combination of web and app designs.

## ***Web Development Trends***

By Allison Reed

That's not a secret, how quickly things change in web development industry. If you're into it, you've seen the rise and fall of numerous technologies and web development trends. However, the rising technologies are the ones that have the potential to make you the best in the game. So, it's important to keep your finger on the pulse and your ears open. These are the new web development trends that already got traction and have the largest potential for growth.

**Progressive Web Apps (PWAs)** are web-based applications that have the feel and UX similar to mobile apps. They utilize the latest web technologies to bring users app-like experience in a browser tab. They are the happy medium between casual websites and mobile apps. They take the best from the two and bring you the dual benefits.

Similarly to websites, PWAs have URLs for every page for trouble-free linking. You can access them in every modern browser without installation. Next, Search engines index PWAs' content. Moreover, PWAs deliver top-lever full-screen experiences regardless the viewport. Similarly to mobile apps, PWAs load when the network connection is bad or absent. Next, PWAs are identifiable as apps, so that more users can discover them. Then, users can add the PWAs' shortcuts to their Home screens to keep coming back in one tap. Furthermore, the progressive web apps are capable of sending users push notifications and re-engaging them. Last but not least, PWAs are fast, reliable and engaging thanks to the UI and UX borrowed from mobile apps.

## **Chatbots and Artificial Intelligence**

Currently, Artificial Intelligence has left the realm of sci-fi and ventured into top 10 web development trends. The big cheeses, such as Facebook, Google, Microsoft, IBM, and Amazon, saw the prospects of investment into AI development and galvanized the effort that goes into it. They predict that chatbots will ‘fundamentally revolutionize how computing is experienced by everybody’.

A chatbot is a computer program based on the advances of machine learning and natural language processing that assists people in completing some tasks. The typical tasks that bots can help with are shopping, finding some information or ordering a service. Bots provide help in Q&A form. At present, bots prevail on messengers, such as Facebook Messenger, Telegram, Kik, Skype, WeChat, etc. The incorporation of bots is considered to be the future of mobile apps. In addition to this, big players made their bot-building frameworks and tools open-source to make bot creation even more accessible. Currently, you don't have to code a bot from the ground up. Popular bot frameworks let every developer power a custom bot in a matter of days. Among them, check out the following: Microsoft Bot Framework, api.ai, wit.ai, and bottr.me. By and large, bots secured their place in webdevelopment industry for the years to come.

## **Blockchains**

Blockchain is a rapidly developing technology that transforms the gist of being the business owner. The essence of blockchain technology lies in use of a shared database that is continuously reconciled. Millions of computers host the records of the database, which updates every ten minutes. As the data are scattered across so many PCs and there is no party commanding the data, it's literally impossible to corrupt or violate the way the blockchain functions. To destroy the blockchain, you'll have to destroy every possible PC that may store the data or cut off the Internet on the Earth.

Being invincible, the blockchain technology surpasses the conventional ones in a number of ways. First of all, blockchain cannot be controlled by a single party and destroyed by breaking a part of it. Secondly, the data of the network are public and available to everyone who needs them. Thirdly, it's almost impossible to hack the blockchain. To do this, the hacker will have to override the data on millions of computers. Next, the blockchain is the embodiment of decentralization. There is no hierarchy inside the blockchain, which makes all the transaction parties equal. Blockchains enable the creation of Smart Contracts, supply chain auditing, provide for failure-free decentralized file storage and enable automatic protection of intellectual property. What's more, they open new prospects for peer-to-peer commerce and

crowdfunding.

**Motion UI** predicts the popularity and wide embracement of Motion UI Sass library. What this library does is lets you animate the UI of your website in a snap.

The draws of Motion UI that make it one of the web design development trends are its simplicity, flexibility and universal character. First of all, the coding of Motion UI is easy to grasp if you have the basic knowledge of CSS and some JavaScript. Secondly, Motion UI gives you multiple parameters to make your modern animations behave the way you want. Next, you can apply Motion UI transitions and animations to almost every element of your website, which ensures its superiority over other libraries.

### **PHP 7**

The release of PHP 7 brought up new features, functions, classes, interfaces and global constants. What's more, it introduced changes in functions and SAPI modules. PHP 7 surprised the world with significantly improved performance. It compiles code into machine language using the lightning-fast Just In Time (JIT) engine. With this engine, it's 2 times faster than PHP 5.6. At the same time, with PHP 7 your code base uses less memory. Secondly, it embraced new type declarations. Implementation of new declarations makes code easier to read and understand. Thirdly, now PHP 7 doesn't give your users a white screen if it runs into a fatal error. Instead, it throws up an exception without stopping the whole script. Moreover, PHP 7 offers you the new operators and functions.

### **SSL & HTTPS**

SSL (Secure Socket Layer) is a technology that provides for establishing an encrypted connection between browser and web server. This certificate ensures data integrity, encryption, and authentication. Adopting an SSL certificate for your website brings the following benefits: it protects users' sensitive information and lets them complete transactions without any risk of data loss. Therefore it increases user's trust and confidence and helps you generate max revenue; it lets you eliminate browser warnings and alerts that tell users that their data is not secure on your website; SSL increases the reputation of your business over the Internet; moreover, Google also gives ranking benefits for HTTPS websites; and SSL eliminates the risk of phishing and other cyberattacks.

### **Google AMP**

For a couple of years, every single article on web design development trends is screaming about responsiveness and its importance. It was Google who made responsiveness a must. Google's next step was the creation of Accelerated Mobile Pages (AMP) Project.

At present, building an AMP version of your website is the way to ensure its

lightning-fast performance on mobile devices. Accelerated Mobile Pages (AMP) have simplified coding and load up to 10 times quicker on smartphones. Thus, the employment of AMP makes cutting down page loading time on mobile to less than 1 second possible.

The implications of this are numerous. First of all, such an impressive loading speed of AMP-ed pages literally tanks bounce rate. Next, AMP-optimized pages and ads look and feel more natural on small screens, creating a smoother and more engaging user experience. Thirdly, AMP positively influences your ranking on Google SERPs. Currently, AMP is an indirect ranking factor that boosts your results by improving mobile user experience and decreasing the bounce rate. What's more, AMP is hardly a fad as Google, Bing and some other search engines, as well as social networks such as Twitter, LinkedIn, Pinterest, etc. already link to and present AMP content.

### **User Behavior Tracking**

At present, guesswork is not the strategy businesses adopt. With modern web solutions, you've got a chance to track which content appeals to the users of your website and which fails. The more you know about your customers and the way they act on your website, the better you can optimize it for conversions. At this point, User Behavior Tracking comes in and lets you see the actual behavior of users on your website.

Modern User Behavior Tracking tools let you get a number of invaluable insights. Firstly, you can track user clicks, mouse movement, and scrolls, as well as record their activity to get the idea of how a common user interacts with your website. Secondly, such web development trends as heatmaps let you grasp the amount of attention that each of your website blocks gets. Combined with A/B testing this is the most effective way to see what works and what doesn't. Thirdly, funnels let you see the user's journey on your website and determine where users leak out. Finally, you can monitor the way users interact with forms on your website. By this, you can identify the forms that hurt conversions.

### **VR and AR**

Virtual Reality market definitely evolves and uncovers new opportunities for VR and AR implementation. In broad terms, VR creates independent digital worlds, while AR adds digital content to our reality. These technologies already proved to be the undeniable user engagement boosters. They trigger very strong emotional engagement, which can be used for more authentic connection with the audience. Moreover, VR and AR create jaw-dropping possibilities in terms of visualization. For instance, Alibaba already launched VR tours for its buyers, allowing them to see and manipulate the digital 3D replicas of their products. What's more, the interest that

these technologies elicit is very high. So, using these web development trends and technologies for your business, you'll skyrocket the shares on social networks and increase your audience manifold.

**WordPress 4.9** improves your workflow inside the Customizer. Now, you can schedule the time when certain design customizations go live, send preview links to your colleagues, secure design drafts by locking them and never lose your progress with prompts. Secondly, WordPress ‘Tipton’ highlights your code syntax and checks it for errors. If you’re about to save the code with a syntax error, it will kindly warn you not to do so. Thirdly, the upgraded WordPress comes with a state-of-the-art Gallery Widget. What’s more, WordPress 4.9 delivers better menu customization UX, theme previewing within Customizer and improved theme switching.

## TOPIC IX. E-COMMERCE

### ***Mobile commerce tech trends to keep your eye on***

Mobile commerce has begun to carve out a significant niche in the financial world. The technology is continuing to improve, further fueling this explosion in a new form of commerce. The rise of Bitcoin and its associated cryptocurrencies has brought with it a slew of startups that are attempting to apply the technologies undergirding these coins to everyday commerce.

Because of estimates that the mobile commerce industry will nearly double in only 4 years, this industry is one that investors will certainly want to keep your eye on. As the technology powering these transactions continues to develop new and interesting solutions for mobile commerce, here are 6 trends you should pay your attention.

#### **Blockchain is coming to mobile commerce**

Outside of crypto, blockchain technology offers the possibility to transfer information quickly and securely thanks to a decentralized ledger that is powered by smart contracts. Since blockchain has an edge in both security and speed when compared to traditional types of monetary transfers, expect the technology to have a major impact on the mobile commerce industry.

#### **Security will increase across the board**

New advances in technology have allowed new types of security measures to be implemented in mobile commerce platforms. For the first time, this puts the industry in a situation where users trust the platforms as they would concrete establishments.

Millennials are digitally fluent, making them unafraid of secure platforms that would have scared off older, “digitally naïve” consumers. With the possibility of further security through blockchain, expect that trust among mobile consumers will rise considerably in future.

#### **Mobile-friendly will be the new standard**

While in the past many online shoppers bought products over the internet through their desktop or laptop, many consumers have begun to embrace smartphones as full-on replacements to personal computers. As smartphones become cheaper and easier to access, websites will have to adapt to the growing community of users who only view their sites on mobile. In order to compete in the mobile-commerce market, companies will need to adapt their websites and make them mobile friendly. Sites that aren't will be ignored by millennials, who can quickly find an easier-to-use platform.

#### **Digital wallets will see a rise in popularity**

While the concept of a digital wallet has been around for some time, only re-

cently, as millennials have grown up, have they become widely accepted by the public. Technologies like AmazonPay, Apple Pay and PayPal One Touch have experienced a 10% uptick in users as a result, making integration into mobile commerce platforms a must.

Combined with one-page checkouts, users have overwhelmingly embraced the performance advantages of the new tech.

### **Artificial intelligence and chatbots will be everywhere**

As artificial intelligence technology has developed to the point where applications like artificial neural networks can actually be utilized, many investors have jumped on the idea. Analysts in the industry are convinced that AI will offer increases in user metrics as the technology is able to assist users autonomously, helping them find what they want and seamlessly guiding them through the checkout process.

Chatbots have been able to develop alongside artificial intelligence to the point where the technology is able to effectively help customers. In tandem with AI, chatbots are able to make online shopping experiences feel like that of a brick-and-mortar store by providing users with a well-educated assistant for their shopping needs.

With AI becoming so popular and chatbots becoming so powerful, there is no doubt that it will soon be a feature of nearly every mobile commerce platform looking to market more than a dozen products.

### **Augmented reality will shine in mobile commerce**

Augmented reality is a relatively new technology, and while you may not have noticed, it's very possible you may have been a user many times. Augmented reality allows users to project all sorts of objects into their immediate surroundings.

One of the most popular applications of this tech has been Pokémon Go, which made \$600 million for its developers only months after release. Mobile commerce platforms can use the technology to give users the chance to place virtual furniture in their homes, ensuring that customers have an easier and more trustworthy experience.

As the mobile commerce industry continues to grow, more companies are innovating in the space. A number of platforms offer increased speed and security, while others offer entirely new applications that assist users in buying what they need.

With the value of mobile commerce steadily becoming a bigger percentage of the value of overall commerce, investors and techies alike should pay attention to these 6 trends in the industry.

## ***How blockchain will transform the e-commerce industry over the next few years***

By David Geer

Blockchain technology should be considered the most disruptive technology invention of the fourth industrial revolution. The world has never seen a technology as powerful as blockchain technology and it could potentially impact all sectors of the economy completely transforming it through top notch efficiency.

However, the sector it is aiming to transform, and hopes to have the highest impact on day to day consumer and seller activities, is the e-commerce industry. The convenience, affordability, and vast array of products offered by e-commerce platforms shows some of the benefits of the e-commerce industry, but with the growth of the industry (a global online retail market that is expected to surpass \$4.5 billion by 2020), large e-commerce companies like Amazon, Alibaba, EBay and a large group of other companies which account for over 50% of that market valuation, the problems associated with e-commerce are beginning to emerge.

Some of these problems relate to payments, supply chain management, data security, transparent marketplace, satisfied retailers, efficient management systems, and satisfied consumers. The current e-commerce business model will have a hard time resolving all these issues in one fell swoop, with the only solution to these problems is blockchain technology.

**Payments.** The payment industry will greatly benefit from blockchain technology, just like the financial services sector has. Payment solutions for international e-commerce is far from perfect, and even with payment solutions like PayPal and Skrill, the payment industry still needs some reworking.

Using current payment methods comes with high payment processing fees coupled with the high fees charged by e-commerce platforms on any sales made by retailers using their platform. These fees often start from around 2-3% of the total purchase price of any transaction.

Blockchain e-commerce projects such as Request Network and ECoinmerce have an aim to create a blockchain based marketplace using fast and secure transactions for any e-commerce business model. Request Network also wants to utilize blockchain technology for the financial transactions aspect of the e-commerce industry by providing low cost financial transactions, high security standards, and an overall amazing customer experience.

**Supply chain management.** This is perhaps one of the most important aspects of the e-commerce industry since the current supply chain system has issues only blockchain technology can solve in today's, fast-moving e-commerce business world.

Blockchain projects like VeChain aim to create an incorruptible visualization

of the supply chain process. Since data validated on the blockchain network is virtually incorruptible, the supply chain process on a supply chain focused blockchain network is a much-needed solution for supply chain management problems facing the e-commerce industry today.

An incorruptible blockchain network will provide a transparent supply chain where consumers can see the order flow of the products they buy, helping increase consumer confidence.

**Data security.** One of the problems with existing e-commerce platforms is how data is stored. E-commerce platforms are home to a very large amount of data, most of them collected directly from customers and retailers registered on any given e-commerce platform.

Customer's data is stored on centralized servers where it is vulnerable to online criminals. Some e-commerce companies have suffered attacks from cybercriminals and a substantial amount of data has been stolen. However, with a blockchain based e-commerce platform, it is virtually impossible to suffer such attacks since blockchain platforms are decentralized, which in turn means customer data is also decentralized.

Cybersecurity is one of the most important features for shoppers on the web. Without proper protocols in place, online retailers put themselves and their customers at risk for payment fraud. Smaller stores face even greater e-commerce security risks due to insufficient internet safety from cybercriminals. According to statistics, one out of five small business retailers are victims of credit card fraud every year, with 60 of those stores being forced to close within six months.

The retailers can offer enhanced security to their customers by running background verification for malware and ransomware scripts and removing them from the e-commerce websites thus preventing any attempt of fraudulent activities. It is virtually impossible to hack all the nodes of a blockchain platform, so data on a blockchain based e-commerce platform is considered to be relatively safe.

**Transparent marketplace.** This is considered one of the biggest problems faced by existing e-commerce platforms. Many complaints have been reported against giant e-commerce stores by other retailers. With that, the President of the United States, Donald J. Trump, also recently tweeted about Amazon's transparency concerns since big name e-commerce stores like Amazon are known for cutting off direct contact between consumers and sellers, and sometimes disabling a merchant's page with little or no explanation.

With blockchain based e-commerce platforms like Bitboost, transparency is the "watchword." Bitboost is a decentralized marketplace that facilitates online transactions between buyers and sellers in a frictionless and transparent manner.

With these solutions offered by blockchain technology to help solve the inherent problems of the e-commerce industry, industry leaders like Amazon, Alibaba, and EBay have already responded by working on blockchain research and development while others like Walmart and Unilever are working on blockchain projects with large tech company IBM.

E-commerce companies will try to do one thing: utilize blockchain technology to solve the issues their current e-commerce platforms face, and to solve these issues as soon as they can.

Another amazing tool utilized through blockchain technology to help create an amazing user experience is Artificial Intelligence. Artificial Intelligence will help blockchain based e-commerce platform users facilitate system interactions in an even better, more automated way. Reviews and incentive programs will be seamless. Imagine, a blockchain-based e-commerce platform using artificial intelligence?

With e-commerce facilitating B2B and B2C business reaching unprecedented levels amidst the problems faced by the existent e-commerce platforms, a transformed e-commerce industry facilitated by blockchain technology will skyrocket B2B and B2C sales, only this time with happier sellers and buyers. The e-commerce industry will become a more efficient and transparent one as this technology continues to roll out. We can expect to see approximately seventy percent of this milestone to be achieved within the next 5 years.

