

# INTRODUCTION TO COMPUTING

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## FOREWORD

Introduction to Computing serves as a guide to the course and provides summary of topics that the authors believe to be necessary in taking this course for it will be the foothold of becoming an aspirant information technology professional in this age. Introduction to Computing will be the opener for the readers as when they will walk to the process of advancing to the Technology Era. In conjunction with the course outline and discussions, this book wishes to impart to the reader how and what are the things needed to become proficient in the field of Information Technology and urges students to re-evaluate what it means.

This will be a pamphlet or a journal to have to learn about computing- the authors have tried to make the writings fit for the learners and readers by integrating topics with the most suitable in the in this field. This book can be read as a reference on important technological milestones of the past, advancements in the current age, professions to consider in the future, understanding the computer works, ways to protect yourself in attacks, how computer works- the World Wide Web, in particular , as well as Html and CSS and its various implications. The importance of this book lies on the topics pertaining to the behavior one assumes when walking the path to become an IT Professional and guiding in interaction of computing tools and media. A portion covers the dangers of modern technology –its impact when used inappropriately, and the thoughtful ways one can use to mitigate these threats. To conclude your learning, you will be exposed to the different tools of media communication you can use for your individual fields and specializations, and as per the course requirement; demonstrate the application of such tools through a synthesis of your perceptions in this course.

As each topic requires a dedicated reference to thoroughly represent the material, the authors have decided to point out essential resources in the form of short-form domain Uniform Resource Links (URLs), and search strings one can use when doing (or asked to do) in-depth research on the given topics.

It is assumed that the reader has some knowledge or background on the history of computers, as well as their basic capabilities and uses; and has learned the fundamentals of computers – including but not limited to, use of programming tools and slideshow presentations. Worry not, however, if these concepts seem foreign; as your instructors will help you review or learn such prerequisites as outlined in your syllabus, before continuing with your discussions.

Welcome to the Introduction of Computing.

Introduction to Computing Textbook  
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# CHAPTER 1: WHAT IS COMPUTING?



## COURSE OUTCOMES

Describe the principles of the computing and describe its application to the different fields of specializations.

## LEARNING OUTCOMES

- Define terms in computing
- Identify major changes made on computers, its different fields and career opportunities

Most individuals use some form of computing every day. Either swiping a debit card, sending an email, or using a cell phone can all be considered forms of computing? As stated in the *Computing Curricula 2005: The Overview Report prepared by a joint committee of ACM, IEEE, and AIS* the term computing are any goal-oriented activity requiring, benefiting from, or creating computers". Computer is a programmable device that stores, retrieves, and processes data. The term "computer" was originally given to humans (human computers) who performed numerical calculations using mechanical calculators, such as the abacus and slide rule. The term was later given to a mechanical device as they began replacing the human computers. Today's computers are electronic devices that accept data (input), process that data, produce output, and store (storage) the results. Computing may involve from designing the physical components to designing massive systems that use computing principles.

A screenshot of a video player interface. The main title is "WHAT IS A COMPUTER?" Below it, there is a smaller title "HOW COMPUTERS WORK". At the bottom of the screen, the logo for CODE.org is visible, which consists of four squares arranged in a 2x2 grid with the letters C, O, D, and E inside them.

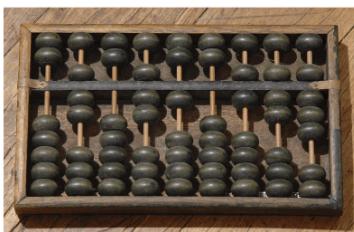
Watch the video what is computer from [www.youtube.com](https://www.youtube.com) and try to understand how computers work and why computers are important.

What is computer by CODE.org retrieved from <https://youtu.be/rRSD128KWIM>

## ZEROTH GENERATION: MECHANICAL ERA (1642- 1934)

Computing machines invented on this generation are entirely mechanical. Early mechanical tools to help humans with digital calculations, like the abacus, were called "calculating machines", called by proprietary names, or referred to as calculators. The machine operator was called the computer.

### **ABACUS**



Probably of Babylonian origin, an abacus is a calculating instrument that uses beads that slide along a series of wires or rods set in a frame to represent the decimal places. It is the ancestor of the modern digital calculator. Used by merchants in the middle Ages throughout Europe and the Arabic world, it was gradually replaced by arithmetic based on Hindu-Arabic numerals. Though rarely used in Europe past the 18th century, it is still used in the Middle East, China, and Japan.

### **PASCALINE**



Pascaline, also called Arithmetic Machine, the first calculator or adding machine to be produced in any quantity and actually used. The Pascaline was designed and built by the French mathematician-philosopher Blaise Pascal between 1642 and 1644. It could only do addition and subtraction, with numbers being entered by manipulating its dials. Pascal invented the machine for his father, a tax collector, so it was the first business machine too (if one does not count the abacus). He built 50 of them over the next 10 years.

### **STEPPED RECKONER**



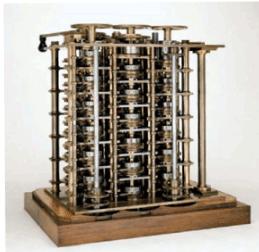
Could add, subtract, multiply, divide, and evaluate square roots  
First attempt to create a machine that could be used not only for addition and subtraction but would utilize a moveable carriage to enable long multiplication and division.

### **LOOMS**



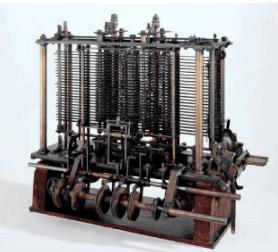
Could add, subtract, multiply, divide, and evaluate square roots  
First attempt to create a machine that could be used not only for addition and subtraction but would utilize a moveable carriage to enable long multiplication and division.

## DIFFERENCE ENGINE



It is an early calculating machine, verging on being the first computer, designed and partially built during the 1820s and '30s by Charles Babbage. Babbage was an English mathematician and inventor; he invented the cowcatcher, reformed the British postal system, and was a pioneer in the fields of operations research and actuarial science. It was Babbage who first suggested that the weather of years past could be read from tree rings. He also had a lifelong fascination with keys, ciphers, and mechanical dolls (automatons).

## ANALYTICAL ENGINE



Analytical Engine, generally considered the first computer, designed and partly built by the English inventor Charles Babbage in the 19th century (he worked on it until his death in 1871). While working on the Difference Engine, a simpler calculating machine commissioned by the British government, Babbage began to imagine ways to improve it. Chiefly he thought about generalizing its operation so that it could perform other kinds of calculations. By the time funding ran out for his Difference Engine in 1833, he had conceived of something far more revolutionary: a general-purpose computing machine called the Analytical Engine.

## ASSESSMENT

Instruction: Read the following questions and write your answer in the worksheet.

- How these inventions help the development of the technology nowadays?

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- What is the importance's of this technology that contributes to the society?

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- If you are given a chance to come up with an invention what would you name it? And why?

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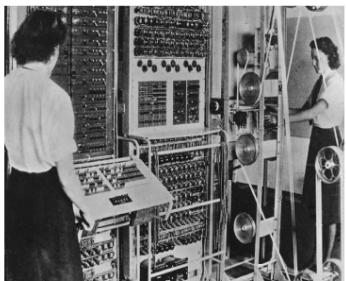
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## FIRST GENERATION: VACUUM TUBES ERA (1935-1946)

Electron tube, also called vacuum tube, device usually consisting of a sealed glass or metal-ceramic enclosure that is used in electronic circuitry to control a flow of electrons. Among the common applications of vacuum tubes are amplification of a weak current, rectification of an alternating current (AC) to direct current (DC), generation of oscillating radio-frequency (RF) power for radio and radar, and creation of images on a television screen or computer monitor. Common types of electron tubes include magnetrons, klystrons, gyrotrons, cathode-ray tubes (such as the thyratron), photoelectric cells (also known as phototubes), and neon and fluorescent lamps.

These machines used electronic switches, in the form of vacuum tubes, instead of electromechanical relays. In principle the electronic switches would be more reliable, since they would have no moving parts that would wear out, but the technology was still new at that time and the tubes were comparable to relays in reliability. Electronic components had one major benefit, however: they could "open" and "close" about 1,000 times faster than mechanical switches.

### COLLOSSUS



Colossus, the first large-scale electronic computer, which went into operation in 1944 at Britain's wartime code-breaking headquarters at Bletchley Park.

*Colossus computer. The Colossus computer at Bletchley Park, Buckinghamshire, England, c. 1943. Funding for this code-breaking machine came from the Ultra project.*  
Geoff Robinson Photography/Shutterstock.com

### ENIAC



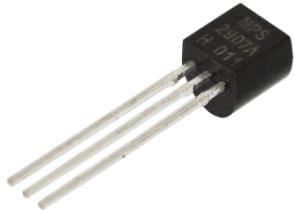
ENIAC, in full Electronic Numerical Integrator and Computer, the first programmable general-purpose electronic digital computer, built during World War II by the United States. American physicist John Mauchly, American engineer J. Presper Eckert, Jr., and their colleagues at the Moore School of Electrical Engineering at the University of Pennsylvania led a government-funded project to build an all-electronic computer. Under contract to the army and under the direction of Herman Goldstine, work began in early 1943 on ENIAC. The next year, mathematician John von Neumann began frequent consultations with the group.

### CATHODE RAY TUBE



Cathode-ray tube (CRT), Vacuum tube that produces images when its phosphorescent surface is struck by electron beams. In a colour-television tube, three electron guns (one each for red, green, and blue) fire electrons toward the phosphor-coated screen. The electrons are directed to a specific spot (pixel) on the screen by magnetic fields, induced by the deflection coils. To prevent "spillage" to adjacent pixels, a grille or shadow mask is used. When the electrons strike the phosphor screen, the pixel glows. Every pixel is scanned about 30 times per second

## TRANSISTORS



Transistor, semiconductor device for amplifying, controlling, and generating electrical signals. Transistors are the active components of integrated circuits, or "microchips," which often contain billions of these minuscule devices etched into their shiny surfaces. Deeply embedded in almost everything electronic, transistors have become the nerve cells of the Information Age.

## SECOND GENERATION: TRANSISTORS ERA (1947-1962)

The second generation saw several important developments at all levels of computer system design, from the technology used to build the basic circuits to the programming languages used to write scientific applications. Electronic switches in this era were based on discrete diode and transistor technology with a switching time of approximately 0.3 microseconds.

During this second generation many high level programming languages were introduced, including FORTRAN (1956), ALGOL (1958), and COBOL (1959).

The second generation also saw the first two supercomputers designed specifically for numeric processing in scientific applications. The term "supercomputer" is generally reserved for a machine that is an order of magnitude more powerful than other machines of its era.

## DOUGLAS ENGELBART



Douglas Engelbart, (born January 30, 1925, Portland, Oregon, U.S.—died July 2, 2013, Atherton, California), American inventor whose work beginning in the 1950s led to his patent for the computer mouse, the development of the basic graphical user interface (GUI), and groupware. Engelbart won the 1997 A.M. Turing Award, the highest honour in computer science, for his "inspiring vision of the future of interactive computing and the invention of key technologies to help realize this vision."

## IBM 701 (1953)



The first IBM large-scale electronic computer manufactured in quantity; IBM's first commercially available scientific computer; The first IBM machine in which programs were stored in an internal, addressable, electronic memory; Developed and produced in record time --less than two years from "first pencil on paper" to installation; Key to IBM's transition from punched-card machines to electronic computers; and The first of the pioneering line of IBM 700 series computers, including the 702, 704, 705 and 709.

**TX-O BELL LABS (1955)**

The TX-o was the first programmable, general-purpose computer to dispense with vacuum tubes and rely on transistors and the first to test the use of a large magnetic core memory. More important, it was the first fully interactive computer available for wide use, one that inspired creativity that spawned some of the century's most important technological advances: computer graphics, Smalltalk, the Internet -- all were developed by TX-o alumni.

**SPACEWAR (1962)**

Spacewar! was conceived in 1961 by Martin Graetz, Stephen Russell, and Wayne Wiitanen. It was first realized on the PDP-1 in 1962 by Stephen Russell, Peter Samson, Dan Edwards, and Martin Graetz, together with Alan Kotok, Steve Piner, and Robert A Saunders. – Spacewar! is in the public domain, but this credit paragraph must accompany all distributed versions of the program.

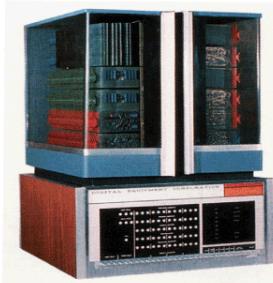
**THIRD GENERATION: INTEGRATED CIRCUIT ERA (1963-1972)**

The third generation brought huge gains in computational power. Innovations in this era include the use of integrated circuits, or ICs (semiconductor devices with several transistors built into one physical component), semiconductor memories starting to be used instead of magnetic cores, microprogramming as a technique for efficiently designing complex processors, the coming of age of pipelining and other forms of parallel processing (described in detail in Chapter CA), and the introduction of operating systems and time-sharing.

The first ICs were based on small-scale integration (SSI) circuits, which had around 10 devices per circuit (or ``chip''), and evolved to the use of medium-scale integrated (MSI) circuits, which had up to 100 devices per chip.

**IBM 360 (1964)**

In 1964, IBM made what Thomas Watson Jr. called “the most important product announcement in company history.” It was the IBM ® System/360, and it represented a revolution in computers, affording unprecedented power, speed and compatibility to thousands of businesses around the globe. Fortune magazine dubbed the System/360 “IBM’s \$5 billion gamble.”

**PDP-8 DEC (1965)**

The PDP-8 family of minicomputers were built by Digital Equipment Corporation (DEC) between 1965 and 1990. It was the follow on to the PDP-5 computer with some instruction set changes. By late 1973, the PDP-8 family was the best selling computer in the world. The PDP-8 has been described as the model-T of the computer industry because it was the first computer to be mass produced at a cost that just about anyone could afford(at least with company money).

**PDP-11 DEC (1970)**

The PDP-11 (Programmed Data Processor) was one the (if not the) most successful computers of all times. It began its career as a minicomputer, and ended up as a micro or supermicro/supermini. It was manufactured from 1970 since the early 1990s. Members of its line were sold in very high numbers, more than 600000 computers were sold, thanks to the growing OEM industry.

**MACINTOSH**

The Apple Macintosh revolutionized the entire computer industry by the year of 1984. Steve Jobs and his ingenious Macintosh team arranged for the computer to be used by the normal “person in the street” – and not only by experts. “Insanely great” – Steve Jobs could hardly put into words his enthusiasm by the launch of the Macintosh. On the legendary annual general meeting of January 24th, 1984, in the Flint Center not far from the Apple Campus in Cupertino, the Apple co-founder initially quote Bob Dylan’s “The Times They Are A-Changin” in order to then polemicize against an imminent predominance of the young computer industry by IBM.

**FOURTH GENERATION: PC & VLSI ERA (1972-PRESENT)**

The next generation of computer systems saw the use of large scale integration (LSI - 1000 devices per chip) and very large scale integration (VLSI - 100,000 devices per chip) in the construction of computing elements. At this scale entire processors will fit onto a single chip, and for simple systems the entire computer (processor, main memory, and I/O controllers) can fit on one chip. Gate delays dropped to about 1ns per gate.

Semiconductor memories replaced core memories as the main memory in most systems; until this time the use of semiconductor memory in most systems was limited to registers and cache. During this period, high speed vector processors, such as the CRAY 1, CRAY X-MP and CYBER 205 dominated the high performance computing scene. Computers with large main memory, such as the CRAY 2, began to emerge. A variety of parallel architectures began to appear; however, during this period the parallel computing efforts were of a mostly experimental nature and most computational science was carried out on vector processors.

**CRAY 1**

Seymour Cray, father of supercomputing, was a quiet man from Wisconsin who lived where he wanted to live, worked how he needed to work, challenged bureaucracy when it hindered progress, and, when necessary, humbly started over. His dogged persistence and staggering genius resulted in the fastest computers on earth. Featuring a central column surrounded by a padded, circular seat, the Cray-1 looked like no other computer. And performed like no other computer. It reigned as the world's fastest from 1976 to 1982.

**CYBER 205**

The CYBER 205 is a new computer systems produced by Control Data Corporation at Arden Hills, Minnesota. The CYBER 205 is a large scale vector processor with substantial capabilities in scalar processing, one-to-four million words of main memory and concurrent I/O facilities.

The CYBER 205 is available to potential users now in the last half of 1981.

**CRAY XMP**

Is a supercomputer designed, manufactured and marketed by Cray Research Inc., announced in 1982 as successor of the Cray-1. It was the world's fastest computer from 1983 to 1985. Its principal designer was Steve Chen. The X-MP's main improvement over the Cray-1 was a shared-memory, parallel vector processor, housing two CPUs in a mainframe that was nearly identical in outside appearance to the Cray-1.

**CRAY 2**

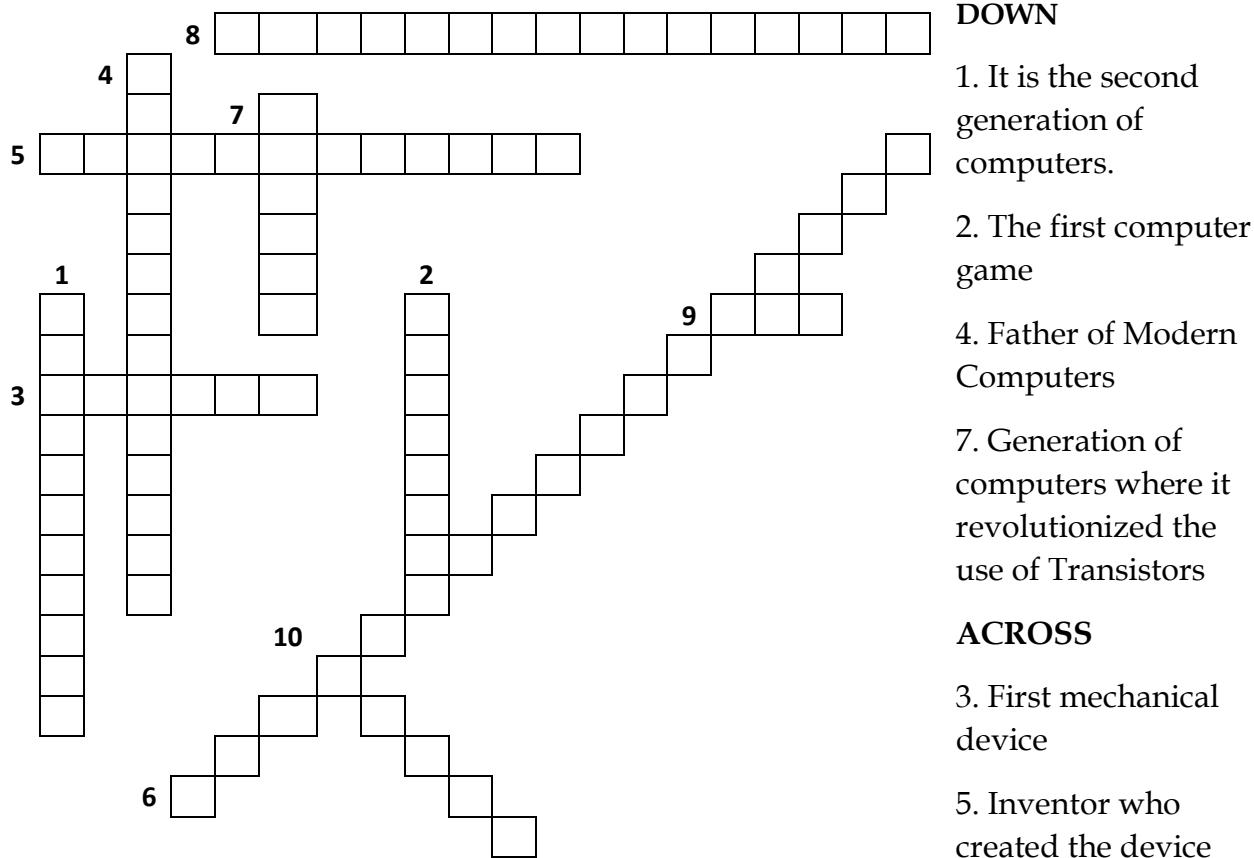
The Cray-2 system appeared in 1985, providing a tenfold increase in performance over the Cray-1. The Cray-2 was the first of Seymour Cray's designs to successfully use multiple CPUs. This had been attempted in the CDC 8600 in the early 1970s, but the emitter-coupled logic (ECL) transistors of the era were too difficult to package into a working machine.

**Did you know?**

*"The term BUG was popularized by Grace Morris Hopper when a moth got stuck inside the computer "*

## ASSESSMENT

Instruction: Answer the questions given and write your answer in the worksheet.



called Pascaline

8. Theorises on interactive computing with keyboard and screen display instead of on punch cards
9. Random Access Memory

### DIAGONAL

6. Third Generation of computers
10. Device created by J. Presper Eckert and John Mauchly

## USES & APPLICATIONS OF COMPUTING

As noted above, computing is defined as anything that involves computer in some way. In other words computing is a massive field that touches almost every corner of the modern society. So where do we start? What are computer systems? It is defined as a systematic interaction between entities, processes and operations that utilizes an electronic device known as the *computer*. Computer systems are being used in almost every field in human endeavour. The areas that benefited the most are those that require massive data processing and data warehousing. Many organizations and disciplines have been greatly improved through the use of computers and the implementation of computer systems.

## EDUCATION

The computer helps in providing a lot of facilities in the education system.

The computer provides a tool in the education system known as CBE (Computer Based Education). CBE involves control, delivery, and evaluation of learning.

Computer education is rapidly increasing the graph of number of computer students.

There are a number of methods in which educational institutions can use a computer to educate the students.

It is used to prepare a database about performance of a student and analysis is carried out on this basis.



In an increasingly technological society, computers pervade many aspects of our culture and daily lives. In the case of education, the National Center for Education Statistics (NCES) found that 97 percent of our teachers had a computer in the classroom every day in 2009, evidence of the rapid transformation of education through computer technology. On the path to personalizing learning, technology empowers students by giving them ownership of how they learn, making education relevant to their digital lives and preparing them for their futures. With technology and access to resources beyond classroom walls, students are inspired to become problem-solvers, critical thinkers, collaborators, and creators. Where technology has been successfully integrated into classrooms, students develop a lifelong love of learning. Educators are always striving to personalize learning for students. Technology can help them reach new levels with access to real-time student data, longitudinal information, content, apps, and more. Technology can help educators create blended learning environments and leverage digital tools for formative and summative assessments, bringing new models for learning and teaching to classrooms. Technology in education and the right devices in students' hands helps prepare them with the career and technical skills they need to be successful today and in tomorrow's workforce. Relevant learning experiences in STEAM can inspire creativity, help students apply meaning to their learning, and prepare them for future career opportunities and jobs that haven't even been created yet. Specific skills in coding, programming, physical computing, and computational thinking have become common requirements in the workforce. Though making, students can gain these skills and hone their problem-solving and critical thinking skills for the 21st century. Learning by doing with maker mindsets and environments can be very engaging when designed and integrated with the right technology.

# BUSINESS



A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which has made it an integrated part in all business organizations.

Computer is used in business organizations for –

- Payroll calculations
- Budgeting
- Sales analysis
- Financial forecasting
- Managing employee database
- Maintenance of stocks, etc.

*Computers help in research, production, distribution, marketing, banking, team management, business automation, data storage, employees management and very helpful to increase the productivity in lower cost, less time with high quality.*

Technology in business is a growing necessity. As the years go by, the business world is leaning more and more toward it, making it almost impossible to separate the two from each other. Innovation breeds business, and since technology paves the way for it, it can be gathered here that business needs technology to be sustained.

Business has always existed since the early times of man. Even though it only began with the simplistic barter system, business would not be the same as it is today without the advancements in technology. All the major industries would fall into a catastrophic collapse if one were to take away technology from business, since majority of business operations and transactions somehow involve the use of technology.

# MARKETING



In marketing, uses of the computer are following –

**Advertising** – With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.

**Home Shopping** – Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

Technology such as the web, mobile phones, social media, and customer relationship management systems greatly affect modern marketing. Tech helps businesses grow and prosper, create relationships, strengthen the effectiveness of organizations, allow people to learn about one another, and greatly affects the way companies communicate with prospective customers. Every marketer is starting to view technology as an important factor when it comes to development and growth.

Technology is definitely an important and strategic tool to increase your overall efficiency and stay on top of the competitors. Though the role of marketing has not changed due to technology, which is the dynamic power in buyer seller relationships, the corporate attitudes toward the marketing function and marketing approaches have all been impossible to separate save for the change brought about by rapid evolution of technology.

## MILITARY

Computers are largely used in defence. Modern tanks, missiles, weapons, etc. Military also employs computerized control systems. Some military areas where a computer has been used are –

- Missile Control
- Military Communication
- Military Operation and Planning
- Smart Weapons



Military technology advances frequently pave the way for advances that benefit society during periods of peace. Perhaps one of the most iconic examples can be found in the U.S. and Soviet space programs of the 1950s and 1960s. The same V2 rockets that Nazi Germany had used to terrorize London during World War II became the basis of both the U.S. and Soviet space programs.

Neil Armstrong would not have been the first man to land on the moon if it had not been for the V2 rocket technology. In fact, the chief architect of NASA's Apollo Saturn V rocket was Wernher von Braun, inventor of the V2.

## HEALTHCARE

**Diagnostic System** – Computers are used to collect data and identify the cause of illness.

**Lab-diagnostic System** – All tests can be done and the reports are prepared by computer.

**Patient Monitoring System** – These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.

**Pharma Information System** – Computer is used to check drug labels, expiry dates, harmful side effects, etc.

**Surgery** – Nowadays, computers are also used in performing surgery.



Computers have become an important part in hospitals, labs, and dispensaries. They are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, ultrasounds and CT scans, etc. are also done by computerized machines.

# COMMUNICATION

Communication is a way to convey a message, an idea, a picture, or speech that is received and understood clearly and correctly by the person for whom it is meant. Some main areas in this category are –

- E-mail
- Chatting
- Usenet
- FTP
- Telnet
- Video-conferencing



In the 21st century, technology plays a huge role in all facets of life, we always turn to computers to access information, create and express ourselves, communicate and collaborate, and track the achievement of learning outcomes.

- **Information Access**
- **Creativity and Self-Expression**
- **Communication and Collaboration**

For as long as humans have been on this planet, we've invented forms of communication – from smoke signals and messenger pigeons to the telephone and email – that have constantly evolved how we interact with each other.

One of the biggest developments in communication came in 1831 when the electric telegraph was invented. While post existed as a form of communication before this date, it was electrical engineering in the 19th century which had a revolutionary impact.

Now, digital methods have superseded almost all other forms of communication, especially in business. I can't remember the last time I hand wrote a letter, rather than an email at work, even my signature is digital these days. Picking up the phone is a rare occurrence too – instead, FaceTime, Zoom, or join a Google Hangout is the new trend.

## ASSESSMENT

Instructions: Read and answer the following questions below.

1. Why computing/technology important on the different fields of society?
2. What biggest changes does the Technology brought to the different fields of specializations?
3. Site some examples of what are the effects of technology to Health, Education, Military, Marketing, Business, and Communication? (include photo if available)
4. What part of your daily life that has been greatly affected by the trend of

## ASSESSMENT

Identify what are the uses, advantages, disadvantages and functionalities of the Generation of Computers from Zeroth to Fourth Generation. You can browse the internet or any materials you can found to answer.

Generations	Uses	Advantages	Disadvantages	Functionalities (capabilities)
1 <sup>st</sup> Generation				
2 <sup>nd</sup> Generation				
3 <sup>rd</sup> Generation				
4 <sup>th</sup> Generation				

## CHAPTER II: PROFESSIONS & CAREERS IN COMPUTING



Computers have become a ubiquitous part of modern life, and new applications are introduced every day. The use of computer technologies is also commonplace in all types of organizations, in academia, research, industry, government, private and business organizations. As computers become even more pervasive, the potential for computer-related careers will continue to grow and the career paths in computer-related fields will become more diverse.

The career opportunities for the graduates of computer-related courses can be classified into seven categories: programming and software development, information systems operation and management, telecommunications and networking, computer science research, web and Internet, graphics and multimedia, training and support, and computer industry specialists.



*Watch the video “2020 Future Technology That May Change the World” retrieved from <https://youtu.be/s-N88MuKGk> and “NEW TECHNOLOGIES THAT WILL BLOW YOUR MIND” retrieve from <https://youtu.be/h924kiLlvA0>*

# PROGRAMMING & SOFTWARE DEVELOPMENT



## SYSTEM ANALYST

Determines an organization's needs and designs programs to meet them. Acts as a problem solver who specializes in how information flows from information sources to computers. Supervise lower-level programmers.



## SYSTEM CONSULTANT

Works under contract to install or configure hardware or software, write or customize programs, or otherwise help solve information processing problems for an organization. Business-related courses are helpful.



## SOFTWARE ENGINEER

Designs and writes complex computer programs as part of a software development team. Applies principles of computer science to solve practical problem



## SYSTEM PROGRAMMER

Designs and writes programs that interface with a computer's low-level operating system, such as device drivers and utilities.



## DATABASE ANALYST

Designs and creates programs used to collect, maintain, and analyze data needed by business, government, or other institutions. Adapt programs to changing business needs.



## ARTIFICIAL INTELLIGENCE PROGRAMMER

Applies principles of artificial intelligence to design and implement systems that perform complex tasks. Applications include: expert systems that apply rules to making decisions, such as scheduling freight shipments or diagnosing disease; pattern recognition systems that give robots the ability to see and understand objects in their environment; neural network programs that can learn to perform tasks by constantly re-evaluating their performance.



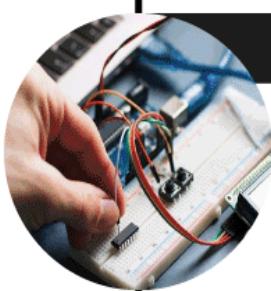
## SCIENTIFIC APPLICATION PROGRAMMER

Works closely with scientists and engineers to write programs that simulate natural phenomena or analyze experimental results, or apply scientific or engineering principles to research or manufacturing.



## USER INTERFACE DESIGNER

Designs the menu, icon, and other features that people will use to interact with a computer program or operating system. Needs to have empathy with computer users and artistic sense of composition.



## EMBEDDED SYSTEMS APPLICATIONS PROGRAMMER

Designs and develops applications for appliances and entertainment products such as PDA, mobile phone, mp3 player.

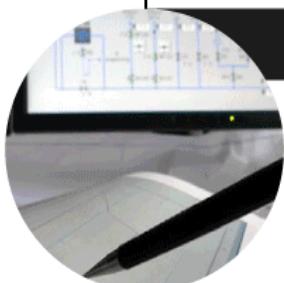
## ASSESSMENT

Watch the video "Why programming is important?"

<https://youtu.be/Dv7gLpW91DM> and answer the following questions.

1. What is the significance of Programming and Software Development professionals in our society?
2. Choose one of the Professions above and explain why did you choose it?

# INFORMATION SYSTEMS OPERATION & MANAGEMENT



## ELECTRONIC DATA PROCESSING AUDITOR

Closely examines data processing operations to guard against loss through mistakes, carelessness, or fraud. Often work in banks, insurance companies, accounting firms, and other organizations that use a large amount of financial data.



## DATABASE ADMINISTRATOR

Takes overall responsibility for the usage, accuracy, efficiency, security, maintenance of an organization's database systems. Coordinates development and use of data resources.



## SYSTEM ADMINISTRATOR

Responsible for managing the operation of a multi-user computer system or network so that it runs reliably and meets user's needs; updates and configures software and hardware; provides assistance to users and managers.



## COMPUTER SECURITY SPECIALIST

Protects computer systems from illegal intrusions, viruses, data theft, fraud, or other forms of tampering



## MANAGEMENT/IT CONSULTANTS

Uses problem solving skills and computer knowledge to solve business and management problems for organizations and foster improvement in areas such as organization structure, business communication, and productivity. Defines and analyzes problem, interviews employees, develops possible solutions, and presents options to client.



## INFORMATION SYSTEMS MANAGER

Oversees all operations in an organization's information system department, including technical support, training, network, and database operations. Ensures that everyone in the organization has timely, reliable access to the computer system and its databases and other resources.



## CHIEF INFORMATION OFFICER

Serves as the highest information services executive for a major corporation. Responsible for long-term planning and setting organization-wide policy and standards relating to all computer-related activities.

### ASSESSMENT

Instruction: Read the following question and write your answer on the worksheet

1. Choose one of the Information Systems Operation and Management Professions and explain why did you it?
2. If you become a profession of your choice in the future what can you do to help your company and society?

# TELECOMMUNICATIONS & NETWORKING



## NETWORK ENGINEER/CONSULTANT

Plans for the installation or expansion of local or wide-area computer networks. Performs complex configuration of servers, hubs, routers, and other network communications equipment. Writes scripts or programs to automate network operations.



## NETWORK ADMINISTRATOR

Takes overall responsibility for the operation and planning for a local or wide-area computer network. Plans expansion; selects appropriate network operating system and software tools; configures major features; deals with connection between local network and Internet; establish procedures for support staff and users

# COMPUTER SCIENCE RESEARCH



## COMPUTER SCIENTIST/RESEARCHER

Applies theoretical expertise to complex problems and develop innovative ideas necessary for the application or creation of new technology. They usually work in research labs or academic institutions.



## COMPUTER SCIENCE PROFESSOR

Teaches college courses in computer science theory, performs research and supervises student research. May serve as consultant to government or business.



## ARTIFICIAL INTELLIGENCE RESEARCHER

Develops programs to imitate the thinking and reasoning processes of the human brain; for example, recognize voices and objects, speak in a humanlike voice.



## DATA MINER

Analyzes databases in business, government, or scientific applications in order to extract additional information or find useful patterns. Needs familiarity with major database and statistical packages.



## BIOINFORMATICS SPECIALIST

Organizes and manipulates information relating to genetic sequences, molecular structure, and other data relevant to the biological sciences. Should be familiar with genetics and biochemistry.



## MEDICAL IMAGING SPECIALIST

Develops image processing and pattern recognition algorithms for analyzing medical images to diagnose disease.

## ASSESSMENT

*Instruction:* Watch the video “AI: What is Machine Learning?” from <https://youtu.be/OeU5m6vRyCk> and answer the following questions

1. Do you think AI (artificial intelligence) will become a significant field in the future? If yes Why? And if no Why is that so?
2. If you came up with a AI program what would it be and why?

# TELECOMMUNICATIONS & NETWORKING



## INTERNET APPLICATIONS PROGRAMMER

Develops programs that add features such as forms and animation to Web sites or that provide tools to help users get the most out of Internet.



## INTERNET CONSULTANT

Uses some combination of analysis, design, programming, and support skills to help clients with the design of Internet sites and configuration of Internet software and connections.



## WEB MASTER

Creates or maintains a Web site. Provides content and programming or supervises writers and programmers. Monitors the performance and popularity of the site. Provides secure forms and transactions for Internet-based businesses.



## INTERNET ADVERTISING DESIGNER

Creates effective advertising features for Web sites, including animation, sound, and text.

## ASSESSMENT

*Instruction:* Watch the video on YouTube which is "What is the Internet?" from <https://youtu.be/Dxcc6ycZ73M> and answer the following questions.

1. Why web and internet professionals are important in the society?
2. If you are a web and internet professionals and encounter a problem what would be your course of action to minimize the damage and came up with a solution?

# GRAPHICS & MULTIMEDIA



## ANIMATIONS/SPECIAL EFFECTS DEVELOPER

Develops software programs for creating sequences of computer images for games or movies.



## MULTIMEDIA DEVELOPER

Uses design and programming skills to create interactive multimedia products that combine sound, images, and text.



## WEB MASTER

Creates or maintains a Web site. Provides content and programming or supervises writers and programmers. Monitors the performance and popularity of the site. Provides secure forms and transactions for Internet-based businesses.



## INTERNET ADVERTISING DESIGNER

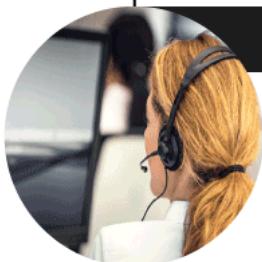
Creates effective advertising features for Web sites, including animation, sound, and text.

## ASSESSMENT

Watch the game video on YouTube which is “Graphic and Multimedia Design Program at SUNY Canton” from <https://youtu.be/mXi-XxDEqD8> and answer the following questions. Minimum of 3 sentences.

1. Why graphics and multimedia professionals are important in the society?
2. If the application or game doesn't have graphics and multimedia professionals does the video become user friendly? Explain.

# TRAINING & SUPPORT



## TECHNICAL SUPPORT REPRESENTATIVE

Answers questions from computer users and solves problems with the installation or operation of software. Researches problems using manuals, help files, and online knowledge bases.



## TRAINER/SOFTWARE APPLICATIONS

Teaches specific courses in computer software or operating systems. May work within a corporation or at a school.



## TECHNICAL WRITER

Writes instructional guides and other materials that explains how to use computer systems, software, operating systems, or programming tools. Researches and writes reviews and feature articles suited to specific reader profiles.

## ASSESSMENT

Watch the video how important is technical and support professionals in Computing and answer the following questions: "Introduction to IT Support - What does an IT Support Specialist do" from <https://youtu.be/P4PdzhElaDg>. Minimum of 3 sentences.

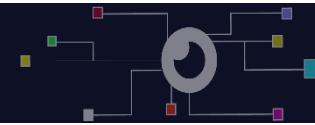
1. Why technical and support professionals are important?
2. Have you experienced either of the following support roles above? If yes, what are your roles and describe your learning insights about it. If no, where area of professions you want to be the support if given a chance?

## FINAL ASSESSMENT

Instruction: Create a conceptual matrix on the different kind of Professions in Computing Field and identify the specifications in the table.

<i>PROFESSIONS</i>	<i>FUNCTIONALITIES</i>	<i>SPECIALIZATIONS</i>	<i>ADVANTAGES &amp; DISADVANTAGES</i>	<i>IMPORTANCE TO THE COMMUNITY</i>
1. Programming and Software Development				
2. Information Systems Operation and Management				
3. Telecommunications and Networking				
4. Computer Science Research				
5. Web and Internet				
6. Graphics and Multimedia				
7. Training and Support				

# CHAPTER III: INFORMATION PROCESSING CYCLE



## COURSE OUTCOMES

Demonstrate the basic operations of computer hardware and classify computer software.

## LEARNING OUTCOMES

- Differentiate types of number systems as they relate to computers.
- Identify different functions of the 4 Computer System components.
- Compare primary and secondary storage operations and distinguish various types of secondary storage devices used by computers;
- Classify computer software as System software, application software and utility software.
- Perform the basic operations of computer

In a world where information is rampant, data is everywhere. The recent years have seen the growth and expansion of an economy highly reliant to in the way data is used. The creation, transformation, retention and application of data is a fundamental aspect in a digital world. With the dominance of technology, harnessing the power of data has become a necessity in the different fields of society. It is thus important for us to know how we can form meaning from data by processing and analyzing the knowledge it holds. After all, Data has become part of future with technology.

The information processing cycle refers to the order of events that go into processing information, including input, processing, storage and output. Input consists of acquiring, entering and validating the data, while output consists of interactive queries and the running of reports.

Data processing is an essential part of information processing. Making use of processed information in various decision making process remains the main purpose of information processing. Processing of complex data obtained from various data sources requires sorting and filtering of data. It might also be merged with existing sources of data so as to receive a new data set. Further analysis of these data sets helps in decision making and subsequent decisions pertaining to other aspects in a decision making process. The information being used may form a part of short term memory or long term memory of overall process.

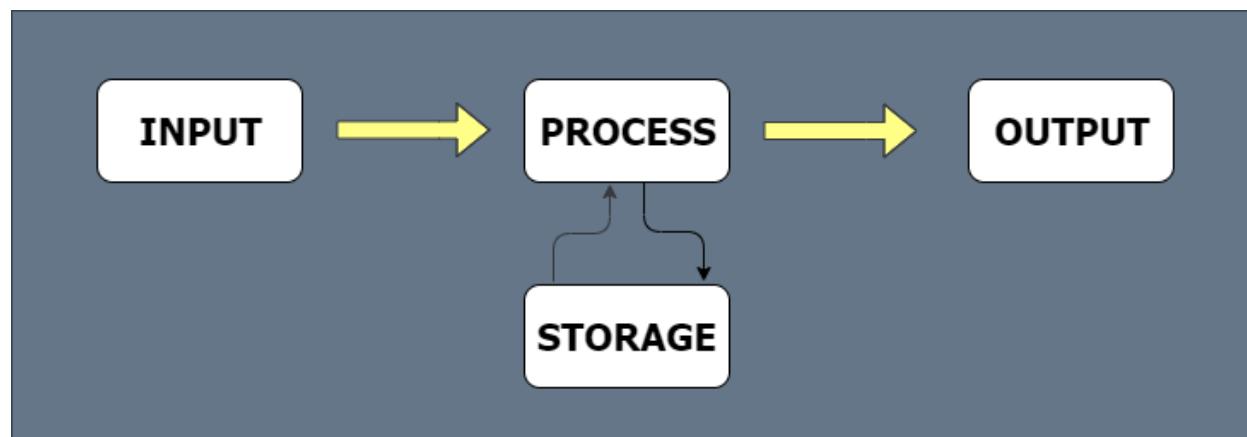
## DATA VS INFORMATION

**Data** is representation of facts, concepts, or instructions in a formalized manner, which should be suitable for communication, interpretation, or processing by human or electronic machine. It is represented with the help of characters such as alphabets (A-Z, a-z), digits (0-9) or special characters (+,-,/,\*,<,>,= etc.)

**Information** is an organized or classified data, which has some meaningful values for the receiver. It is processed data on which decisions and actions are based.

## INFORMATION PROCESSING CYCLE

**Information processing cycle** is a sequence of events consisting of **Input**, **Processing**, and **Storage & Output**. To understand more about what is information processing cycle it is a good idea to study about data processing cycle also. These events are similar as in case of [data processing cycle](#). For a computer to perform useful work, the computer has to receive instructions and data from the outside world. The computer receives data and instructions during the **INPUT** stage of the information processing cycle. Useful information results are obtained when appropriate inputs are applied to data. Applying instructions to data takes place during the **PROCESSING** stage of the information processing cycle. To avoid having to re-enter data and instructions or reprocess information, computers can save information. Saving information on a computer occurs during the **STORAGE** phase of the information processing cycle. This is followed by the result in the **OUTPUT** stage. Computer Processing Cycle is a similar process with similar steps by which data is fed to a computer.

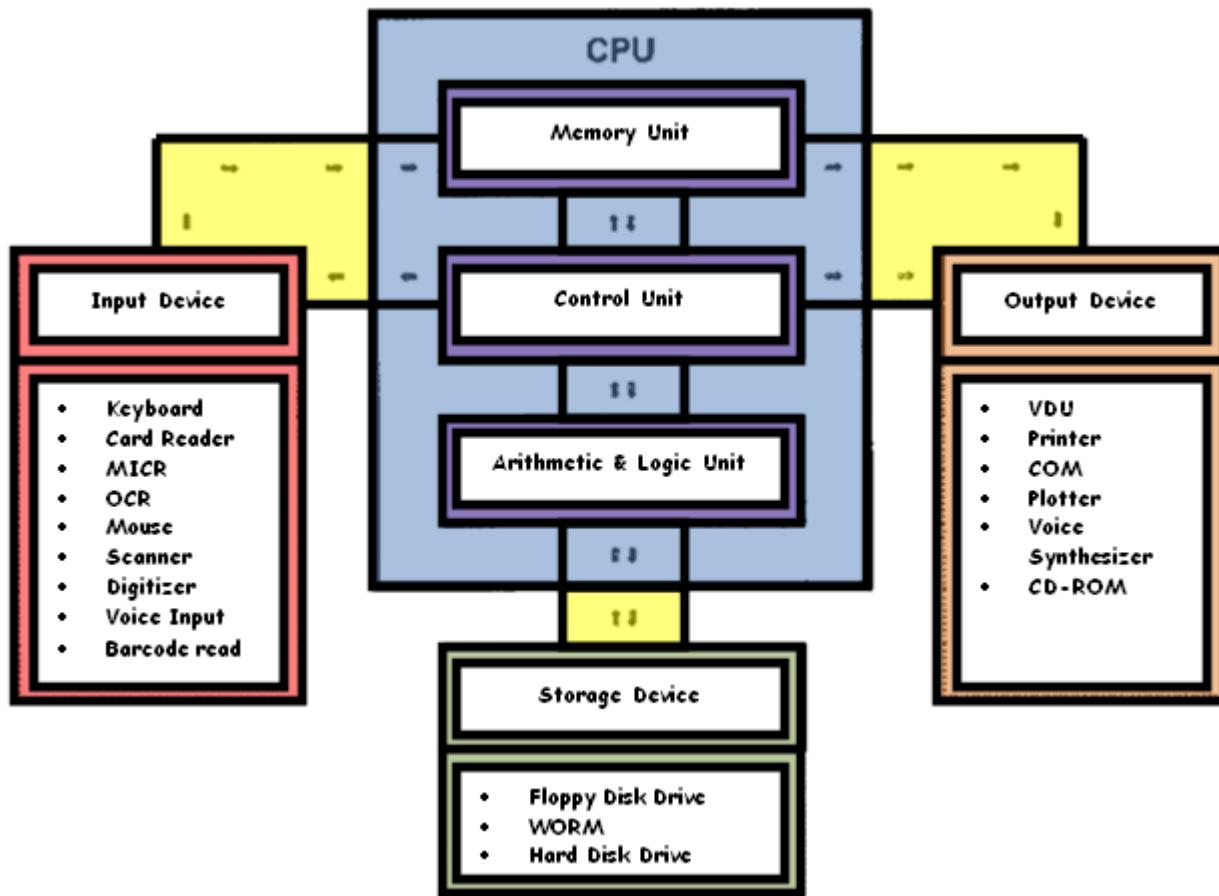


### Four phases of the Cycle to Process Information

1. Input: Computer receives data and instructions.
2. Process: Computer applies instructions to data to produce information (organized Data).
3. Storage: Saving the information for a subsequent use or use in future.
4. Output: Computer sends information to people in a usable format.

When it comes to data input, typical devices include mice, keyboards, bar code readers, flatbed scanners, digital tablets, electronic cash registers and joysticks. Some examples include surveying customer opinion cards using a reader, using an interactive online form to collect user information or gathering time sheets.

For processing, the CPU (or the processor) is the most important part of a digital computer that can carry out a program. It takes the instructions from the program and processes the data. CPUs are necessary to any machine that has the capacity for input/output and memory.



Typical output devices include printers and monitors. Monitors use pixels to create images, and printers bond different types of toner to paper, whether laser or ink. Storage has to do with keeping information on hand for when you need it. The first devices for storage were punched cards, but cloud storage has revolutionized the entire system for managing data.

## 1. INPUT - Entering data into the computer

- Feeding the collected raw data or data entry in the cycle for processing. This is the raw data which is supplied for processing & obtaining information.

- b. Input can be done by utilizing various devices such as keyboards, mice, flatbed scanners, barcode readers, joysticks, digital data tablets (for graphics drawing), electronic cash registers, etc.

## 2. PROCESSING - Performing operations on the data

- a. Once the input is provided the raw data is processed by a suitable or selected processing method. This is the most crucial step as it allows the processed data in the form of output which will be used further.
- b. Processing is usually done by CPU (Central Processing Unit) in a computer. CPU is the crucial component for getting the operations done. The speed of processing depends on the computing power of the processor.

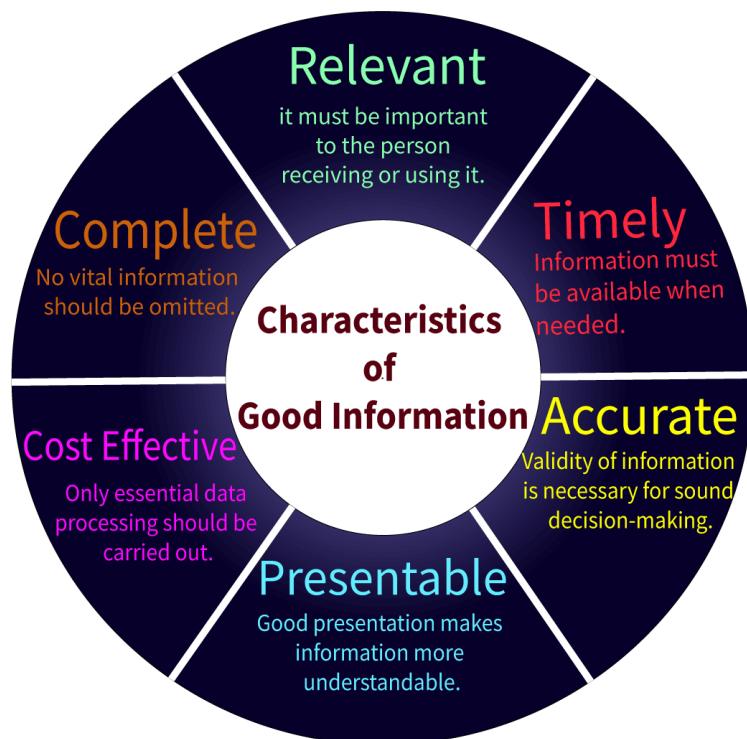
## 3. STORAGE - Saving data in a soft/physical form

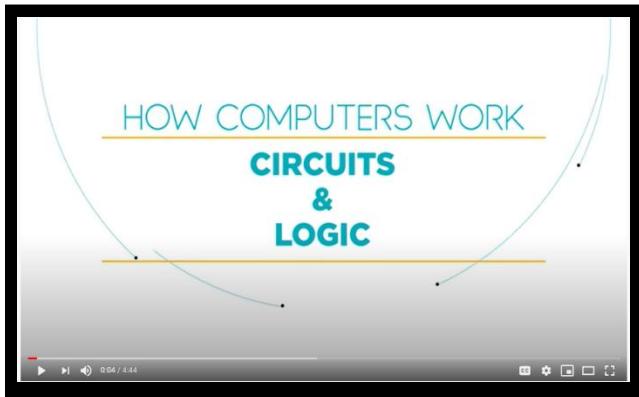
- a. This is the outcome, and the raw data provided in the first stage is now "processed," and the data is useful and provides information and no longer called data.
- b. Storage can be done on various storage devices such as external hard disk, inbuilt hard disk, pen drives, micro SD cards, compact disks or even in registers.

## 4. OUTPUT - Results obtained, i.e., information

- a. This is the outcome, and the raw data provided in the first stage is now "processed," and the data is useful and provides information and no longer called Data. This might be further used for [data visualisation](#).
- b. This can be used as it is or used for further processing along with more data. Output device can be a paper or in form of display screen such as monitors or phone screen.

## CHARACTERISTIC OF GOOD INFORMATION





Watch the video "How Computers Work: CPU, Memory, Input & Output" retrieve at <https://youtu.be/DKGZlaPIVLY> and "How Computers Work: Circuits and Logic" <https://youtu.be/ZoqMiFKspAA> and write an essay about how it works and why is it important. See Rubrics Below

## ASSESSMENT

Instruction: Identify what phase in the Information Processing Cycle is applicable by playing Rags to Riches game. To start the game, type the link below on the address bar of the web browser:

<https://bit.ly/2GSgzet>

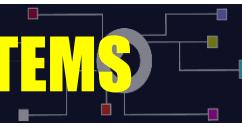
Example questions:

1. During which phase of the information processing cycle would the computer perform a calculation?
2. During which phase of the information processing cycle would you type a research paper?
3. Deciding which of two numbers is smaller takes place during which phase of the information processing cycle?

## RUBRICS

Score Level	Technical Knowledge and Understanding	Strategy or Problem Solving Plan	Explanation of Technical Communication
5 (Exemplary mastery of the problem)	Demonstrates exemplary understanding of concepts	Exemplary clear evidence of complete, systematic process to solve problem	Exemplary clear, effective explanation detailing what was done and why it was done
4 (Mastery of the problem)	Demonstrates complete understanding of concepts	Clear evidence of complete, systematic process to solve problem	Clear, effective explanation detailing what was done and why it was done
3 (Requires short note from instructor)	Demonstrates general understanding of problem  Minor computational errors	Uses appropriate strategy  Solution lacks evidence or is missing minor steps	Clear explanation that addresses what was done  Use of diagram as part of explanation
2 Requires instructor intervention)	Solution is not complete  Major computational or procedural errors	Appears to have a strategy  Strategy does not lead to a solution	Gives some written explanation  Explanation is missing steps or rationale
1 (requires re-teaching)	No solution  Solution shows no understanding of mathematical concepts involved in task	No evidence of a strategy or strategy is incorrect	No explanation  Explanation is vague or unrelated to the problem

# CHAPTER IV: INTRODUCTION TO COMPUTER SYSTEMS



As a result of the various improvements to the development of computing technology, we have seen computer devices being used in different aspects of modern living. It has become vital tool that continues to evolve with the passage of time. Today, we carry more computing power on our smartphones than what was available in earlier models. However, the fundamental aspects of a typical computer system have not changed as much even with its continued evolution. Let us take a look at these components.

Computer System is defined as the systematic interaction between entities, processes and operations utilizing an electronic device known as the computer. There are 4 computer components in a Computer System that are designed to work together.

1. Hardware
2. Software
3. People ware
4. Data ware

## ASSESSMENT

### A. Classification: Before we begin lets test your knowledge about computing.

Classify the following as: **A. Hardware, B. Software, C. Peopleware. D. Dataware**

Write only the corresponding letter of your choice before the number.

- |   |  |
|---|--|
| <input type="text"/> 1. Mobile Legends    | <input type="text"/> 11. Flash Drive           |
| <input type="text"/> 2. Programmer        | <input type="text"/> 12. Hard Disk Drive       |
| <input type="text"/> 3. Windows           | <input type="text"/> 13. Printer               |
| <input type="text"/> 4. Monitor           | <input type="text"/> 14. iTunes                |
| <input type="text"/> 5. Website Designer  | <input type="text"/> 15. MacOS                 |
| <input type="text"/> 6. Photoshop         | <input type="text"/> 16. Apple OS X            |
| <input type="text"/> 7. Disk Defragmenter | <input type="text"/> 17. Network Administrator |
| <input type="text"/> 8. Speaker's         | <input type="text"/> 18. Analytics             |
| <input type="text"/> 9. Student Record    | <input type="text"/> 19. Barangay Records      |
| <input type="text"/> 10. Inventory        | <input type="text"/> 20. Cashier               |

Classify the following devices as **A. Input, B. Output, C. Storage.**

Write only the corresponding letter of your choice before the number.

- |   |  |
|---|--|
| <input type="text"/> 16. Mouse                | <input type="text"/> 21. Joystick            |
| <input type="text"/> 17. Random Access Memory | <input type="text"/> 22. Flash Drive         |
| <input type="text"/> 18. Microphone           | <input type="text"/> 23. External Hard Drive |
| <input type="text"/> 19. Printer              | <input type="text"/> 24. Speakers            |
| <input type="text"/> 20. Stylus Pen           | <input type="text"/> 25. LED Monitor         |

Classify the following as to when it was made. **A.** Mechanical Era, **B.** Vacuum

Tube Era, **C.** Transistors Era, **D.** Integrated Circuit Era, **E.** VLSI Era

Write only the corresponding letter of your choice before the number.

26. IC

27. Electricity

28. Steam Engine

29. Computer

30. Petroleum

31. Cotton Gin

32. Morse Code

33. DRAM

34. Spinning Jenny

35. Fuel

## HARDWARE

Hardware refers to the physical component that makes up a computer system and can be classified into as:

1. Input devices
2. Output devices,
3. Storage devices
4. Memory
5. Processors
6. Scanning Devices

### INPUT DEVICE



Components which are used to input raw data are categorized under input devices. They aid in feeding data such as text, images, and audiovisual recordings. They even aid in file transfers between computers.

The keyboard is probably the most commonly used input device. Below are just some other types of input devices.

# ASSESSMENT

*Identify all the input device below and write down which column they belong. You may add additional rows.*

Mouse      touchpad      touchscreen      multi-touch screen      pen input      midi keyboard.

Motion-sensor      Joystick      gamepad      steering wheel      Microphone

Keyboard      mouse      headset      gamepad      printer.

Webcam      digital camcorder      biometric scanner      barcode reader.

Ethernet hardware      Bluetooth/wireless hardware.

DEVICES	Pointing Device	Game Controller	Audio Input Device	Bluetooth Peripheral	Visual and Imaging Device	Network Device

## OUTPUT DEVICE



Output devices are peripheral devices that enable us to view or hear the computer's processed data.

## ASSESSMENT

*Instructions:* Identify all the output device below and write down which column they belong. You may add additional rows.

Monitor

Printers (laser, Inkjet)

Projection Display

Interactive (electronic) smart board

Touchscreen monitors

Plotter

Speaker

Headphones

Earphones

Device	Visual (Text, graphic, video)	Audio (Sounds, Music)

## STORAGE & MEMORY DEVICE

Storage Devices Serves as the storage area of data and information. Has two types: Primary Memory and Secondary Memory

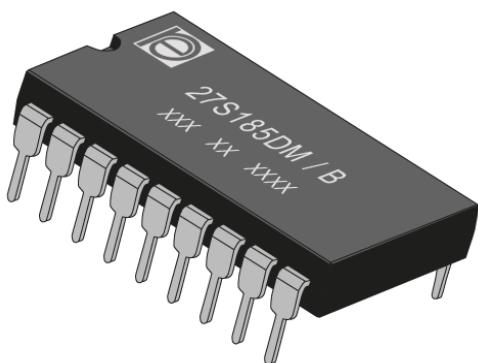
### PRIMARY MEMORY

Primary memory is computer memory that a processor or computer accesses first or directly. It allows a processor to access running execution applications and services that are temporarily stored in a specific memory location. Primary memory is also known as primary storage or main memory, are different of types.



Random Access Memory (RAM): The primary storage is referred to as random access memory (RAM) because it is possible to randomly select and use any location of the memory to directly store and retrieve data. It takes same time to any address of the memory as the first address, it is also called read/write memory. The storage of data and instructions inside the primary storage is temporary. It disappears from RAM as soon as the power to the computer is switched off. The memories, which lose their content on failure of power supply, are known as volatile memories.

So now we can say that RAM is volatile memory.



Read Only Memory (ROM): There is another memory in computer, which is called Read Only Memory (ROM). Again it is the ICs inside the PC that form the ROM. The storage of program and data in the ROM is permanent. The ROM stores some standard processing programs supplied by the manufacturers to operate the personal computer. The ROM can only be read by the CPU but it cannot be changed. The basic input/output program is stored in the ROM that examines and initializes various

equipment attached to the PC when the switch is made ON. The memories, which do not loose their content on failure of power supply, are known as non-volatile memories. ROM is non-volatile memory.

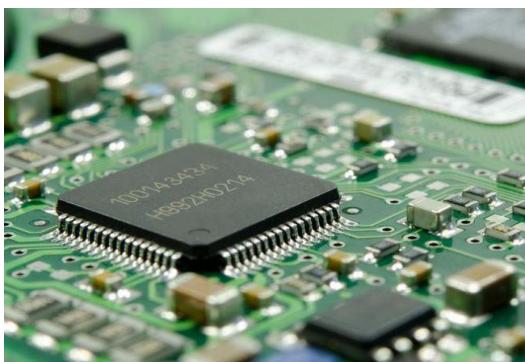


PROM: There is another type of primary memory in computer, which is called Programmable Read Only Memory (PROM). You know that it is not possible to modify or erase programs stored in ROM, but it is possible for you to store your program in PROM chip. Once the programmes are written it cannot be changed and remain intact even if power is switched off. Therefore

programs or instructions written in PROM or ROM cannot be erased or changed.



EPROM: This stands for Erasable Programmable Read Only Memory, which over come the problem of PROM & ROM. EPROM chip can be programmed time and again by erasing the information stored earlier in it. Information stored in EPROM can be erased by exposing the chip for some time to ultraviolet light the chip is reprogrammed using a special programming facility. When the EPROM is in use, information can only be read.



Cache Memory: The speed of CPU is extremely high compared to the access time of main memory. Therefore the performance of CPU decreases due to the slow speed of main memory. To decrease the mismatch in operating speed, a small memory chip is attached between CPU and Main memory whose access time is very close to the processing speed of CPU. It is called CACHE memory. CACHE memories are accessed much faster than conventional RAM. It is used to store

programs or data currently being executed or temporary data frequently used by the CPU. So each memory makes main memory to be faster and larger than it really is. It is also very expensive to have bigger size of cache memory and its size is normally kept small.



Registers: The CPU processes data and instructions with high speed, there is also movement of data between various Chapters of computer. It is necessary to transfer the processed data with high speed. So the computer uses a number of special memory Chapters called *registers*. They are not part of the main memory but they store data or information temporarily and pass it on as directed by the control Chapter

## SECONDARY MEMORY

This type of memory is also known as external memory or non-volatile. It is slower than the main memory. These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines. The contents of secondary memories are first transferred to the main memory, and then the CPU can access it. For example, disk, CD-ROM, DVD, etc.

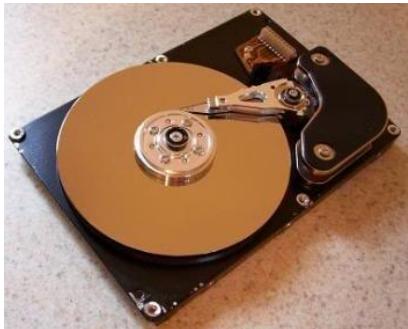
### Characteristics of Secondary Memory

- These are magnetic and optical memories.
- It is known as the backup memory.
- It is a non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without the secondary memory.
- Slower than primary memories.

Different types of Secondary Memory in Computers are as follows:



**Magnetic Tape:** are used for large computers like mainframe computers where large volume of data is stored for a longer time. In PC also you can use tapes in the form of cassettes. The cost of storing data in tapes is inexpensive. Tapes consist of magnetic materials that store data permanently. It can be 12.5 mm to 25 mm wide plastic film-type and 500 meter to 1200 meter long which is coated with magnetic material. The deck is connected to the central processor and information is fed into or read from the tape through the processor. It is similar to cassette tape recorder.



**Magnetic Disk:** You might have seen the gramophone record, which is circular like a disk and coated with magnetic material. Magnetic disks used in computer are made on the same principle. It rotates with very high speed inside the computer drive. Data is stored on both the surface of the disk. Magnetic disks are most popular for *direct access storage device*. Each disk consists of a number of invisible *concentric circles* called *tracks*. Information is recorded on tracks of a disk surface in the form

of tiny magnetic spots. The presence of a magnetic spot represents *one bit* and its absence represents zero bit. The information stored in a disk can be read many times without affecting the stored data. So the reading operation is non-destructive. But if you want to write a new data, then the existing data is erased from the disk and new data is recorded.



**Floppy Disk:** It is similar to magnetic disk discussed above. They are 5.25 inch or 3.5 inch in diameter. They come in single or double density and recorded on one or both surface of the diskette. The capacity of a 5.25-inch floppy is 1.2 megabytes whereas for 3.5 inch floppy it is 1.44 megabytes. It is cheaper than any other storage devices and is portable. The floppy is a low cost device particularly suitable for personal computer system.



**Optical Disk:** With every new application and software there is greater demand for memory capacity. It is the necessity to store large volume of data that has led to the development of optical disk storage medium.

## TYPES OF DISK DRIVE

Hard disk drive – contains a non-removable disk that is built into your system

CD-ROM Drive – holds a removable CD-ROM disc, which has a more storage capacity

USB hub – to connect external flash drives and other peripherals

## MEMORY SYSTEM IN A COMPUTER

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one. For example, if the computer has 64k words, then this memory Chapter has  $64 * 1024 = 65536$  memory locations. The address of these locations varies from 0 to 65535.

### Bytes Conversion Guide

The following table shows the prefixes/multipliers of BYTES Increases are in Chapters of approximately 1000 (actually 1024).

1 bit ( <a href="#">binary digit*</a> )	the value of 0 or 1
8 bits	1 byte
1024 bytes	1 kilobyte
1024 kilobytes	1 megabyte
1024 megabytes	1 gigabyte
1024 gigabytes	1 terabyte
1024 terabytes	1 petabyte

#### Abbreviations

1 kilobyte	1 k
1 megabyte	1 MB
1 gigabyte	1 GB
1 terabyte	1 TB
1 petabyte	1 PB

#### Size in "bytes"

Kilobyte (KB)	1,024
Megabyte (MB)	1,048,576
Gigabyte (GB)	1,073,741,824
Terabyte (TB)	1,099,511,627,776
Petabyte (PB)	1,125,899,906,842,624

# ASSESSMENT

*Instruction: Solve and get the byte conversion of the following:*

Bytes	Kilobyte	Megabyte	Gigabyte	Terabyte
67,003,324,746				
56,000,567,345				
100,234,890,210				
10,001,234,312				
98,102,320,123				
3,000,000,000				
34,000,000,00				
32,000,000				
100,000,000				
154,000,234				

## SOFTWARE

Is a collection of electronic instructions that programmers write using a programming language and that a computer's CPU can interpret to carry out a specific task

### 2 Types of Software:

1. *System software* refers to the files and programs that make up your computer's operating system. System files include libraries of functions, system services, drivers for printers and other hardware, system preferences, and other configuration files. The programs that are part of the system software include assemblers, compilers, file management tools, system utilites, and debuggers, which includes the operating system or OS and all the utilities that makes the computer functional or working.

Example:

Operating System provides a software platform on top of which other programs, called APPLICATION PROGRAMS, to run. The most important program.

### Classifications of System Software:

- a. Multi-user allows two or more users to run programs at the same time.
- b. Multi-processing supports running a program on more than one CPU.
- c. Multi-tasking allows more than one program to run currently.
- d. Multi-threading allows different parts of a single program to run concurrently.
- e. Real-time responds to input instantly.

2. *Application Software* includes all programs that do real work for users.

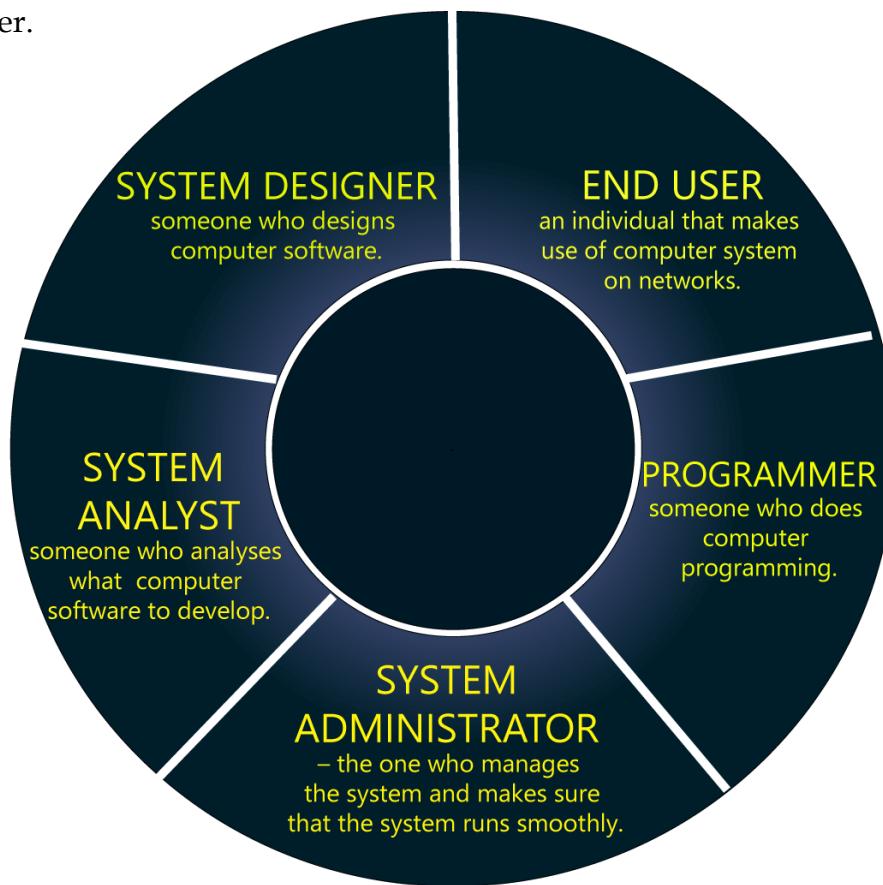
- A. *Business Application* – software dedicated for business use. These are canned software that has been designed in accordance with the great principles of business concepts. (ex. Word processors, Spreadsheets)
- B. *Personal Application* – is designed to take away drudgery out of your personal chores and even make these chores fun. (ex. Email, reminders, phone book)
- C. *Entertainment Application* – is designed for entertainment purposes, embedded with educational objectives and goals. (ex. Computer games, media player, movie apps)
- D. *Utility Application* – helps you manage and maintain your own computer.

Example of utility application:

- 1. Disk defragmenter – makes sure your computer is using its disk optimally so you need to defragment disk once in a while.
- 2. Antivirus – examines RAM for viruses, parasitic programs that can delete or scramble files or replicate.

## PEOPLE WARE

People ware refers to people who work with the computer so that it can be used to find solutions to problems and also refers to the person who uses the information generated by the computer.



## DATAWARE

Data-atomic level pieces of information that by themselves have little meaning to humans (words, numbers, images, sounds).

Information – a collection of data that is understandable to humans.

Data is a collection of values. Those values can be characters, numbers, or any other data type. If those values are not processed, they have little meaning to a human. Information is data that was processed so a human can read, understand, and use it.

The "P" in CPU stands for "processing," specifically, data processing. Processing data into information is the fundamental purpose of a computer.

The following is an example of raw data, and how that data can be assembled into information.

### **Example of Data**

UT, 1234, Joe, Circle, SLC, 8015553211, 84084, Smith

In this example, the original data appears to be a set of random words and numbers, separated by commas.

### **Example of Information**

Joe Smith  
1234 Circle  
Salt Lake City, UT 84084  
[\(801\) 555-3211](#)

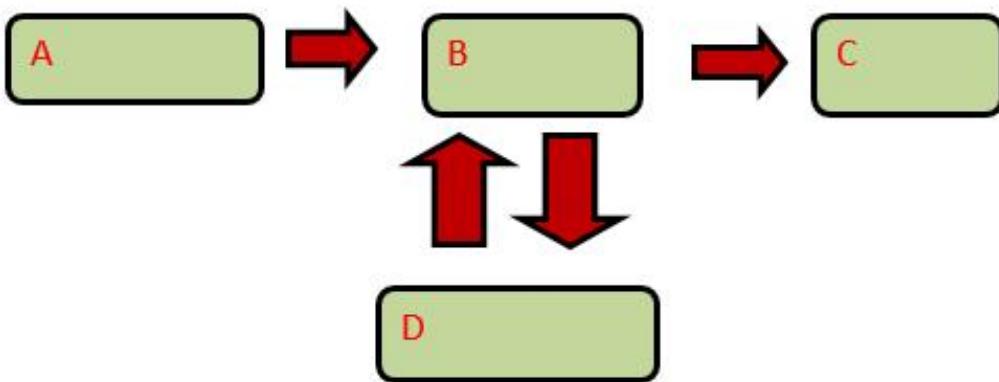
See the table below for better understanding:

## DATA vs INFORMATION

	Data	Information
Definition (Oxford Dictionaries)	Facts and statistics collected together for reference or analysis	Facts provided or learned about something or someone  Data as processed, stored or transmitted by a computer
Refers to	Raw Data	Analysed Data
Description	Qualitative Or Quantitative Variables that can be used to make ideas or conclusions	A group of data which carries news and meaning
In the form of	Numbers, letters, or a set of characters.	Ideas and inferences
Collected via	Measurements, experiments, etc.	Linking data and making inferences
Represented in	A structure, such as tabular data, a data tree, a data graph, etc.	Language, ideas, and thoughts based on the data
Analysis	Not analyzed	Always analyzed
Meaning	Carries no specific meaning	Carries meaning that has been assigned by interpreting data
Interrelation	Information that is collected	Data that has been processed

## ASSESSMENT

Instruction: Identify each images of various Computer System components and arrange them based on the phases of Information Processing Cycle. Explain how the data is being processed based on the diagram given.



## ASSESSMENT

Instruction: Write the letter that corresponds to the correct answer on the space provided before each item.

\_\_\_1. What programmable electronic data processing device is designed to accept data and instructions, and then transform it into useful information?

- A. Flash Drive
- B. Computer
- C. Hard disk
- D. DVD Drive

\_\_\_2. What devices displays the information processed by the computer?

- A. Input device
- B. Peripheral device
- C. Storage device
- D. Output device

\_\_\_3. This term refers to the intangible part of the computer system that consists of routines and programs, procedures and specialized aids (for example, compilers and library routines) that make the hardware components perform their functions.

- A. Computer System
- B. Operation System
- C. Software
- D. System Software

\_\_\_4. This unit controls the operation of all parts of the computer but does not carry out any actual data processing operations.

- A. Arithmetic and Logic Unit
- B. Control Unit
- C. Memory Unit
- D. Power Supply Unit

\_\_\_5. The smallest unit of measure a computer can process is called what?

- A. Binary
- B. Bit
- C. Byte
- D. Digit

\_\_\_ 6. What is the C: drive?

- A. Back up memory drive
- B. Floppy Disk Drive
- C. DVD-ROM drive
- D. Hard drive contains all the information used by the computer.

\_\_\_ 7. Which of the following are examples of a storage device?

- A. Monitor
- B. Printer
- C. Hard drive
- D. Speaker

\_\_\_ 8. The fastest memory used in a computer.

- A. Cache
- B. Main Memory
- C. RAM
- D. Secondary Memory

\_\_\_ 9. What is the permanent memory built into your computer called?

- A.RAM
- B.CPU
- C.ROM
- D.CD-ROM

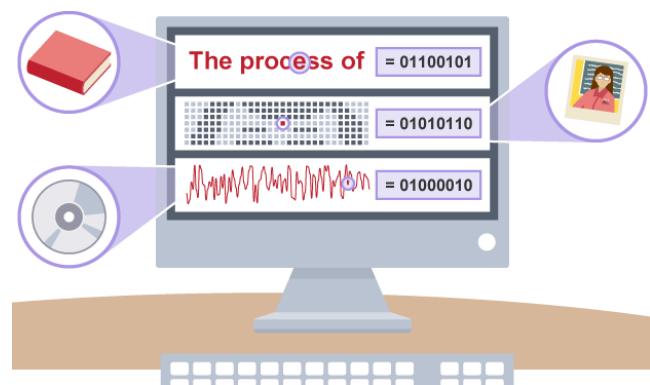
\_\_\_ 10. What is the difference between RAM and ROM?

- A. A RAM randomly selects and use any location of the memory to directly store and retrieve data while ROM can only be read by the CPU but it cannot be changed.
- B. A ROM randomly selects and use any location of the memory to directly store and retrieve data while RAM can only be read by the CPU but it cannot be changed.
- C. A RAM can be erased by exposing the chip for some time to ultraviolet light while ROM once the programmes are written it cannot be changed and remain intact even if power is switched off.
- D. A ROM can be erased by exposing the chip for some time to ultraviolet light while RAM once the programmes are written it cannot be changed and remain intact even if power is switch off.

# CHAPTER V: NUMBER SYSTEMS



When we type some letters or words, the computer translates them in numbers as computers can understand only numbers. A computer can understand the positional number system where there are only a few symbols called digits and these symbols represent different values depending on the position they occupy in the number.



All data inside a computer is transmitted as a series of electrical signals that are either on or off. Therefore, in order for a computer to be able to process any kind of data, including text, images and sound, they must be converted into binary form. If the data is not converted into binary – a series of 1s and 0s – the computer will simply not understand it or be able to process it.

The value of each digit in a number can be determined using

- The digit
- The position of the digit in the number
- The base of the number system (where the base is defined as the total number of digits available in the number system)

## DECIMAL NUMBER SYSTEM

The number system we use every day, based on 10 digits (0,1,2,3,4,5,6,7,8,9).

Position is important, with the first position being units, then next on the left being tens, then hundreds and so on.

Q: How do we interpret the decimal number 1921?  $1000 \ 100 \ 10 \ 1$

$10^3 \ 10^2 \ 10^1 \ 10^0$

$1 \ 9 \ 2 \ 1$

$$1920 = 1 * 10^3 + 9 * 10^2 + 2 * 10^1 + 1 * 10^0$$

Ans: Weigh each digit by its position

## BINARY NUMBER SYSTEM

What is Binary Number System?

- ✓ The binary number system is a numbering system that represents numeric values using two unique digits (0 and 1).
- ✓ This is also known as the base-2 number system, or the binary numbering system.

Example:

Most computing devices use binary numbering to represent electronic circuit voltage state, (i.e., on/off switch), which considers 0 voltage input as off and 1 input as on.

How do Binary Numbers work?

- ✓ Binary numbers use the same rules as decimal - the value of any digit always depends on its position in the whole number. It all gets down to bases. Decimal uses base ten, so that every time a number moves one position to the left in a figure, it increases by a power of ten (eg. 1, 10, 100 etc).

We saw above that in the decimal number system, the weight of each digit from right to left increases by a factor of 10. In the binary number system, the weight of each digit increases by a factor of 2 as shown. Then the first digit has a weight of 1 ( $2^0$ ), the second digit has a weight of 2 ( $2^1$ ), the third a weight of 4 ( $2^2$ ), the fourth a weight of 8 ( $2^3$ ) and so on.

MSB	Binary Digit								LSB
$2^8$	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$	
256	128	64	32	16	8	4	2	1	

Decimal vs. Binary equivalent values:

Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Binary	0	1	10	11	100	101	110	111	1000	1001	1010	1011	1100	1101

### HOW COMPUTERS WORK

#### DATA & BINARY



Watch the video “How Computers Work: Data & Binary” and answer the questions below:

1. How does computer works?
2. Why is it important to understand how binary work?

To show that a number is a *binary* number, follow it with a little 2 like this:

$101_2$

This way people won't think it is the decimal number "101" (one hundred and one).

This way people won't think it is the decimal number "101" (one hundred and one).

## BINARY TO DECIMAL COVERSION

Convert  $(357)_{10}$  to Binary number system.

Decimal Digit Value	256	128	64	32	16	8	4	2	1
Binary Digit Value	1	0	1	1	0	0	1	0	1

By adding together ALL the decimal number values from right to left at the positions that are represented by a "1" gives us:  $(256) + (64) + (32) + (4) + (1) = 357_{10}$  or three hundred and fifty seven as a decimal number.

Then, we can convert binary to decimal by finding the decimal equivalent of the binary array of digits  $101100101_2$  and expanding the binary digits into a series with a base of giving an equivalent of  $357_{10}$  in decimal or denary. Note that in number conversion systems "subscripts" are used to indicate the relevant base numbering system,  $1001_2 = 9_{10}$ . If no subscript is used after a number, then it is generally assumed to be decimal.

## DECIMAL TO BINARY COVERSION

### Repeated Division-by-2 Method

We have seen above how to convert binary to decimal numbers, but how do we convert a decimal number into a binary number. An easy method of converting decimal to binary number equivalents is to write down the decimal number and to continually divide-by-2 (two) to give a result and a remainder of either a "1" or a "0" until the final result equals zero.

For example. Convert the decimal number  $294_{10}$  into its binary number equivalent.

This divide-by-2 decimal to binary conversion technique gives the decimal number  $294_{10}$  an equivalent of  $100100110_2$  in binary, reading from right to left. This divide-by-2 method will also work for conversion to other number bases.

## How to convert Decimal to Binary

Then we can see that the main characteristics of a Binary Numbering System is that each “binary digit” or “bit” has a value of either “1” or “0” with each bit having a weight or value double that of its previous bit starting from the lowest or least significant bit (LSB) and this is called the “sum-of-weights” method.

So we can convert a decimal number into a binary number either by using the sum-of-weights method or by using the repeated division-by-2 method, and convert binary to decimal by finding its sum-of-weights.

Number 294			
divide by 2			
result	147	remainder	0 (LSB)
divide by 2			
result	73	remainder	1
divide by 2			
result	36	remainder	1
divide by 2			
result	18	remainder	0
divide by 2			
result	9	remainder	0
divide by 2			
result	4	remainder	1
divide by 2			
result	2	remainder	0
divide by 2			
result	1	remainder	0
divide by 2			
result	0	remainder	1 (MSB)

Dividing each decimal number by “2” as shown will give a result plus a remainder.

If the decimal number being divided is even then the result will be whole and the remainder will be equal to “0”. If the decimal number is odd then the result will not divide completely and the remainder will be a “1”.

The binary result is obtained by placing all the remainders in order with the least significant bit (LSB) being at the top and the most significant bit (MSB) being at the bottom.

## ASSESSMENT

Answer the following to their designated conversions:

### CONVERT THE FOLLOWING TO BINARY

1.  $789_{10}$
2.  $56_{10}$
3.  $70_{10}$
4.  $103_{10}$
5.  $1092_{10}$

### CONVERT THE FOLLOWING TO DECIMAL

1.  $01000111$
2.  $10111101$
3.  $11111011$
4.  $1011$
5.  $1011111011$

B. Complete the table below:

Decimal	Binary
	10011
87	
	111101
602	
2019	

## OCTAL NUMBER SYSTEM

Octal number system is another type of computer and digital numbering system which uses the Base-8 system.

Octal Number System							
0	1	2	3	4	5	6	7

Then the main characteristics of an Octal Numbering System is that there are only 8 distinct counting digits from 0 to 7 with each digit having a weight or value of just 8 starting from the least significant bit (LSB). In the earlier days of computing, octal numbers and the octal numbering system was very popular for counting inputs and outputs because as it works in counts of eight, inputs and outputs were in counts of eight, a byte at a time.

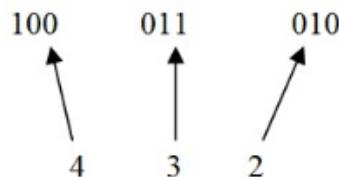
## BINARY TO OCTAL CONVERSION

Convert the Binary number  $(100011011)_2$  to its octal equivalent.

1. Separate the digits of a given binary number into groups from right to left side, each containing 3 bits, with each group or set of bits having distinct value..

**100 011 010**

2. Find the equivalent octal number for each group



3. Write all the group's numbers together, maintaining the group order.

432

*Result*

$$100011011_2 = 432_8$$

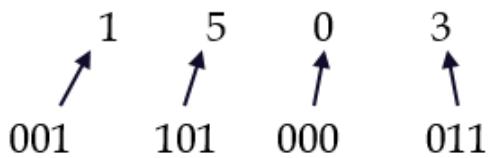
## Octal to Binary Conversion

Convert the Octal number  $(1503)_8$  to its binary equivalent.

- Separate the digits of the given octal number, if it contains more than 1 digit.

1 5 0 3

- Find the equivalent binary number for each digit of octal number. Add 0's to the left if any of the binary equivalent is shorter than 3 bits.



- Write all the group's binary numbers together, maintaining the same group order provides equivalent binary for the given octal number.

001101000011

Result

$1503_8 = 001101000011_2$

Decimal	Binary	Octal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	10
9	1001	11
10	1010	12
11	1011	13
12	1100	14
13	1101	15
14	1110	16
15	1111	17

Numbers Conversion Table

## ASSESSMENT

Answer the following to their designated conversions:

### CONVERT THE FOLLOWING TO BINARY

- $789_8$
- $56_8$
- $150_8$
- $103_8$
- $1092_8$
- 010001111
- 101111010
- 111110110
- 101111
- 101111101101

### CONVERT THE FOLLOWING TO OCTAL

B.

Decimal	Binary	Octal
		355
	100110001	
	101	
610		
		734

## HEXADECIMAL NUMBER SYSTEM

- ✓ Hexadecimal describes a base-16 number system.
- ✓ The hexadecimal numbers are 0-9 and then use the letters A-F.

A37E

$$\begin{aligned}
 & 14 * 16^0 = 14 \\
 & 7 * 16^1 = 112 \\
 & 3 * 16^2 = 768 \\
 & 10 * 16^3 = 40960 \\
 \hline
 & \text{Result} = 41854
 \end{aligned}$$

## HEXADECIMAL BINARY CONVERSION

Each Hexadecimal digit is multiplied by weighted positions, and sum of product is equal to decimal value. Example:

$$\begin{array}{ccc}
 & A & B & 1 \\
 \uparrow & & \uparrow & \uparrow \\
 1010 & 1011 & 0001
 \end{array}$$

Decimal	Binary	Octal	Hex
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

## BINARY TO HEXADECIMAL CONVERSION

Convert the binary  $(111100011)_2$  to its hexadecimal equivalent.

1. Separate the digits into groups from right to left side; each group contains 4 bits of binary number.

1 1110 0011

2. Find the equivalent hexadecimal number for each group. You may refer to the Hexadecimal Number Conversion Table for the equivalent value.

$\begin{array}{ccccccccc}
 & 8 & 4 & 2 & 1 & 8 & 4 & 2 & 1 & 8 & 4 & 2 & 1 \\
 & \downarrow & \downarrow & \downarrow & & \downarrow & \downarrow & \downarrow & & \downarrow & \downarrow & \downarrow \\
 0001 & 1110 & 0011 & & & & & & & & & & 
 \end{array}$

3. Write all the groups hexadecimal numbers together, maintaining the group order provided the equivalent hex number for the given number.

1E3

Result

$111100011_2 = 1E3_{16}$

## HEXADECIMAL TO BINARY CONVERSION

Convert the hexadecimal AB1<sub>16</sub> to binary number.

1. Separate the digits of the given hexadecimal, if more than 1 digit.

A B 1

2. Find the equivalent binary number for each digit of hex number, add 0's to the left if any of the binary number is shorter than 4 bits.
3. Write all the binary groups together, maintaining the same group order provided the equivalent binary for the given hexadecimal.

A      B      1  
 ↑      ↑      ↑  
 1010    1011   0001

101010110001

Result

AB1<sub>16</sub> = 101010110001<sub>2</sub>

### ASSESSMENT

- A. Instruction: Complete the Table below by converting the given numbers to its specific Number System.

	DECIMAL	BINARY	OCTAL	HEXADECIMAL
1.	101			
2.		1110 0111		
3.				E5A
4.			371	
5.				4CD

- B. Convert the following data to its specified unit.

	DECIMAL	BINARY	OCTAL	HEXADECIMAL
1.			571	
2.	296			
3.				CDE
4.		1100 1111 1101		
5.				BF4

- C. Solve the following questions.

1.  $10001111 + 11101$  = \_\_\_\_\_
2.  $1010111 - 1110$  = \_\_\_\_\_
3.  $1111 + 101$  = \_\_\_\_\_
4.  $10111 * 1001$  = \_\_\_\_\_
5.  $11111101 / 110$  = \_\_\_\_\_

## FINAL ASSESSMENT

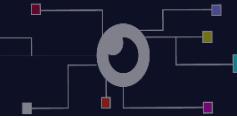
Choose one the following options and create a video presentation on the chosen topic. You can based your output on the given rubrics below. The video must show the speakers face as if he/she is explaining it to a lot of listeners.

1. Different type of Computer Components and explain their functionalities, importance and uses.
2. Binary Conversion System (How to convert)
3. Types of Input Devices and Output Devices
4. Types of Software's
5. How information processing cycle works.
6. Data and Information

## RUBRICS FOR VIDEO PRESENTATION

Score Level	Technical Knowledge and Understanding	Confidence in Delivering and Speaking	Explanation of Technical Communication	Video quality and Audio Quality
5 (Exemplary mastery of the problem)	Demonstrates exemplary understanding of concepts	The presenter displays exemplary skills in delivering the topic	Exemplary clear, effective explanation detailing what was done and why it was done	The overall quality is exemplary
4 (Mastery of the problem)	Demonstrates complete understanding of concepts	The presenter displays satisfactory skills in delivering the topic	Clear, effective explanation detailing what was done and why it was done	The overall quality is satisfactory
3 (Requires short note from instructor)	Demonstrates general understanding of problem  Minor computational errors	The presenter displays good skills in delivering the topic	Clear explanation that addresses what was done  Use of diagram as part of explanation	The overall quality is Good
2 Requires instructor intervention)	Solution is not complete  Major computational or procedural errors	The presenter displays unsatisfactory skills in delivering the topic	Gives some written explanation  Explanation is missing steps or rationale	The overall quality is unsatisfactory
1 (requires teaching) re-	No solution  Solution shows no understanding of mathematical concepts involved in task	The presenter displays poor skills in delivering the topic	No explanation  Explanation is vague or unrelated to the problem	The overall quality is poor

# CHAPTER VI: BASIC CONCEPT OF COMPUTER SECURITY



## COURSE OUTCOMES

Apply basic cybersecurity principles

## LEARNING OUTCOMES

- Define Cybersecurity Principles and issues
- Perform cybersecurity measures on personal data

With all the conveniences provided through this digital world, it becomes easy for us to relax and immerse ourselves fully in this daily lifestyle with technology. We often forget the daunting tasks and difficulties our predecessors have faced due to the luxury provided by our modern methods. Yet, we must stay cautious in the fact that technology not only serves as a road to comfort, but also as a gateway to shady dealings and unacceptable practices. The evolution of technology has brought with it the progression of a new breed of outlaws and new methods to crime. This chapter serves to open your mind to the dangers of this Information Age—where Cybercrime, Cybercriminals and Cyber-attacks are rampant. Know that you are not safe, and as long as you are a native of this digital culture, you may become a potential victim.



Observe the four pictures. By connecting their association with each other, find out the resulting word that is being depicted. What does this term mean? How do these images tie in with the terms?

## CYBERSECURITY

The body of technologies, processes and practice designed to protect networks, computers, programs and data from attack, damage or unauthorized access, scam and etc. in a computing context, security includes both cyber security and physical security. Ensuring cyber security requires coordinated efforts throughout an information system.

## PERSONAL DATA

Any information that relates to an identified or identifiable living individual. Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data.

There are two classification of Personal Data: **Online** and **Offline** Identity

## What is Personal Data?



Online Identity	Offline Identity
Name (Social Networking Sites)	Name
Birthday	Birthday
Email Address	Physical Address
Etc.	Etc.

### Personal Data as a Target

How do the criminals get your money?	Why do they want your identity?
Online credentials	Long-term profits
Creative schemes	Medical benefits

# ASSESSMENT

**A.** Despite how prominent technology nowadays Data Security is still the number one problem which a lot of company, organizations and individual faces. In order to have a good security measures when using technology, on your opinion list all the security measures you can think of and provide an explanation?

Example:

## **Put passwords on your devices.**

Cell phones, laptops, and tablets are easily lost or stolen. If you don't require a password to log in, then a thief has instant access to all your data. In order to make your gadgets secured put a password like Patterns, Numbers etc.

**B. Read and understand the following scenarios. Explain which practices is best applied to protect your data.**

### **1. DATA SECURITY**

Sayo's partners have asked for some project related data that is contained in a confidential report. They need the data immediately and have asked Sayo to e-mail it to them. Sayo has already taken steps to ensure that no personal data is involved, so the data protection rules are not applicable.

**Does Sayo need to do anything else before emailing the report?**

- Yes. She must encrypt the report using the approved encryption tools before she sends it.
- No. She's already labelled and marked the report as confidential, so she can go ahead and e-mail it to the supplier.
- Yes. She must send the report to the IT security team so that they can encrypt it and return it to her before she sends it.

### **2. CLASSIFYING INFORMATION**

Arthur is working on a new project and needs to share company information with a marketing consultant. He knows he needs to classify the information before sharing it, but he's not sure what classification he needs to assign to the information. The information he needs to share relates to an upcoming marketing plan.

**How should Arthur classify the information?**

- Public – Information that can be freely shared with any individual or group.
- Internal – Potentially sensitive information that should not be shared outside our organization.
- Confidential – Information that may adversely affect employees, individuals, or our business if disclosed to unauthorized parties.

- Restricted – Information that we have a regulatory or legal obligation to maintain and protect.
3. ENSURING SECURITY OF PERSONAL INFORMATION

Imran needs to create a spreadsheet for the marketing department with details of customer purchasing trends.

What must he do to ensure the security of any personal information?

- Print out the spreadsheet and hand-deliver it to his contact in the marketing department.
- Make anonymous any personal information before emailing it to the marketing department.
- Send the spreadsheet as an attachment in an email to the marketing department.

As technology advances, so do the types of cybercrimes that criminals can commit – more being added to the list. Cybersecurity experts assert that cyber criminals are using more ruthless methods to achieve their objectives and the proficiency of attacks is expected to advance as they continue to develop new methods for cyberattacks. The comprehensive list on the next page highlights the more common types of cybercrimes.

- **Identity Theft.** Identity theft is the most common cybercrime today and is done by a perpetrator to commit fraud for financial gains through fake credentials and by purporting to be someone else. Sources of identity information come from the breach of government or federal records, including private sites which contain important and even sensitive information such as credit information, home address, and email, among others. To prevent identity theft, be careful not to post your personal information on the internet, especially on social media. Provide only the necessary information in legitimate online transactions.
- **Hacking.** Hacking has become more sophisticated over the years; it has broken into numerous sites, affected government websites, businesses and private computers – leading to disastrous effects. Hackers use computer systems to gain access to business trade secrets and personal information for malicious and exploitative purposes. The perpetrator uses a variety of software to do this, allowing him to take personal and important information while the owner may be unaware that his files are being accessed from a remote location. Hackers are extremely difficult to identify on both an individual and group level due to their various security measures – such as the use of proxies and anonymity networks, which distort and protect their identity.



- **Theft.** Another common cybercrime which some internet users are not even aware of is piracy. Have you ever downloaded software, games, music or movies from questionable sites or using shady means? Illegal downloading is a cybercrime, as downloading pirated content violates copyright laws. Sites that encourage software piracy are constantly being monitored and targeted by relevant authorities, as law-making bodies investigate this cybercrime in order to address it.

○ Search *Software Piracy in the Philippines*

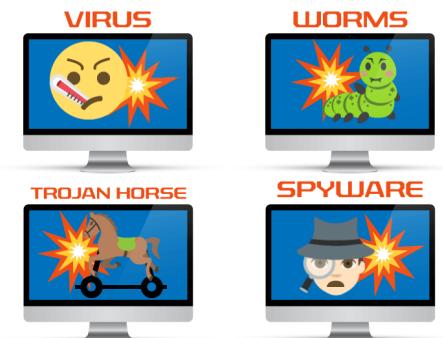


- **Cyber Bullying and Stalking.** Cyber Bullying is a kind of online harassment which involves the barrage of messages, emails and other forms of online communication, sometimes with the perpetrator using a hidden or fake online identity. In this case, the goal may be the defamation of a victim on a public or private media outlet due to contempt or out of entertainment. Perpetrators also use the internet to stalk potential victims—and combine these with offline stalking and blackmail for a personal gain.



- **Malicious software.** More commonly known as Malware—malicious software aims to damage or disrupt a computer system, device or computer network. Typical examples include computer viruses, trojan horses and worms, among others. Malware has a malicious intent, acting against the interest of a computer user. The most common strategy for protecting against malware is to prevent the harmful software from gaining access to the target computer by using antivirus software and firewalls, in addition to checking for the presence of malware and malicious activity and recovering from attacks.
- **Child soliciting and abuse.** This is a crime wherein children are solicited on the internet, usually in chat rooms, for child pornography purposes. Many child pornography dens have ceased operations due to the pursuit of government agencies, but many more remain undiscovered and continue to operate.

○ Search *Child Pornography in the Philippines*



To make it worse, cyberattacks are usually done in a different location, using a remote computer.

Due to the increased opportunity for financial incentives, the cybercriminal network has grown to an unprecedented scale and has created several different types of cyber criminals—many of which pose a major threat to governments and corporations. The following are the more common types of cybercriminals:

- **Hackers.** A security hacker is someone who explores methods for breaching defenses and exploiting weaknesses in a computer system or network. Hacker groups often create tools for hacking and distribute these through questionable sites and channels. Hackers are generally classified according to their attitudes and methods:
  - **Script Kiddies** - a hacker who breaks into computer systems by using automated tools written by others, and thus lack the technical expertise. Usually, they are only able to hack sites with poor security.
  - **Crackers** - gain unauthorized access to a computer in order to commit another crime such as destroying information contained in that system
  - **White Hats** - called ethical hackers, white hat hackers break security to test security systems, perform penetration tests, or vulnerability assessments for a client, or while working for a security company which makes security software.
  - **Black Hats** - the stereotypical illegal hacking groups portrayed as villains or anti-heroes in movies and popular culture. Black hats are known to violate computer security for little reason beyond maliciousness or for personal gain.
  - **Grey Hats** - lies between a white hat and black hat hacker; Grey hat hackers sometimes find the defect of a system and publish the facts to the world instead of a group of people. For example, a grey hat hacker may surf the Internet and hack into a computer system for the sole purpose of notifying the administrator that their system has a security defect, then offer to correct the defect for a fee. Even though grey hat hackers may not necessarily perform hacking for their personal gain, unauthorized access to a system can be considered unethical and illegal.
  - **Hacktivists.** These groups develop malware for political reasons and are not interested in financial gains. A well-known example is Anonymous—an international network of hacktivists that started out by hacking corporate and government sites, implementing denial-of-service on these sites—all well-publicized. They currently have localized networks in different countries.
  - **Red Hat Hackers** - this are hackers who target Linux Systems, they are characterized as Vigilantes.
- **Identity Thieves** - Identity thieves are cyber criminals who try to gain access to their victims' personal information and use it to make financial transactions while impersonating their victims. Identity theft is one of the oldest cybercrimes, gaining prominence during the early years of the Internet. Initially, these cyber criminals leveraged basic hacking techniques, such as modifying data and leveraging basic identity fraud to uncover the desired information. Today, the practice has progressed in scope and technique due to advances in computing, with many identity thieves hacking into a government or corporate database to steal high volumes of identities and personal information.
- **Internet Stalkers** - Internet stalkers are individuals who maliciously monitor the online activity of their victims to terrorize and/or acquire personal information. This form of cybercrime is conducted using social networking platforms and malware, which can track an individual's computer activity with very little detection. The motives for such attacks

can differ depending on the cybercriminal, but many internet stalkers seek to acquire important information that they can use for bribery and/or slander.

- **Cyber Terrorists** - Cyber terrorism is a well-developed, politically inspired cyberattack in which the cybercriminal attempts to steal data and/or corrupt corporate or government computer systems and networks, resulting in harm to countries, businesses, organizations, and even individuals. The key difference between an act of cyberterrorism and a regular cyberattack is that within an act of cyber terrorism, hackers are politically motivated, as opposed to just seeking financial gain.
- **Scammers and Phishers.** Scammers are confidence artists that attempt to defraud a person or group after first gaining their confidence through an online outlet like social media. Personal ads, dating ads, even discount promotions received through emails are some creative schemes employed by these perpetrators. Phishers obtain important information from victims by sending e-mails or messages by posing as legitimate organizations or institutions, such as your bank. Replying or clicking through certain links usually redirect the target to fake sites that ask for personal information or credentials. Such sites can tarnish the company's reputation and brand, which could potentially lead to a decrease in earnings.
- **Insiders.** These attackers reside within an organization and are considered a very high risk. Malicious threat to an organization that comes from people within the organization, such as employees, former employees, contractors or business associates, who have inside information concerning the organization's security practices, data and computer systems. The threat may involve fraud, the theft of confidential or commercially valuable information, the theft of intellectual property, or the sabotage of computer systems. The insider threat comes in three categories:
  - **Malicious insiders**, which are people who take advantage of their access to inflict harm on an organization;
  - **Negligent insiders**, which are people who make errors and disregard policies, which place their organizations at risk; and
  - **Infiltrators**, who are external actors that obtain legitimate access credentials without authorization.

## SIGNS YOU HAVE BEEN ATTACKED

SIGNS	WHAT TO DO
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<p>You get a ransomware message One of the worst messages anyone can see on their computer is a sudden screen take-over telling them all their data is encrypted and asking for a payment to unlock it.</p>	<p>First, if you've got a good, recent, tested data backup of the impacted systems, all you have to do is restore the involved systems and fully verify (officially called unit testing) to make sure the recovery was 100%. Sadly, most companies don't have the great backups that they thought they had. Test your backups! Don't let ransomware be the first time your company's critical backups are being tested.</p>
<p>You get a fake antivirus message You get a popup message on your computer or mobile device that it is infected. The pop-up message pretends to be an antivirus scanning product and is purporting to have found a dozen or more malware infections on your computer. Although this isn't near as popular as it used to be, fake antivirus warning messages are still a situation that has to be dealt with in the right way.</p>	<p>If you get lucky, you can close the tab and restart the browser and everything is fine. The fake message doesn't show back up. It was a one-time fluke. Most of the time you'll be forced to kill the browser. Restarting it sometimes reloads the original page that forced the fake ad onto you, so you get the fake AV ad again. If this happens, restart your browser in incognito or inprivate mode, and you can browse to a different page and stop the fake AV message from appearing.</p>
<p>You have unwanted browser toolbars This is a common sign of exploitation: Your browser has multiple new toolbars with names that seem to indicate the toolbar is supposed to help you. Unless you recognize the toolbar as coming from a well-known vendor, it's time to dump the bogus toolbar.</p>	<p>What to do: Most browsers allow you to review installed and active toolbars. Remove any you didn't want to install. When in doubt, remove it. If the bogus toolbar isn't listed there or you can't easily remove it, see if your browser has an option to reset the browser back to its default settings. If this doesn't work, follow the instructions listed above for fake antivirus messages.</p>
<p>. Your internet searches are redirected Many hackers make their living by redirecting your browser somewhere you don't want to go. The hacker gets paid by getting your clicks to appear on someone else's website. They often don't know that the clicks to their site are from malicious redirection.</p>	<p>You can often spot this type of malware by typing a few related, very common words (for example, "puppy" or "goldfish") into internet search engines and checking to see whether the same websites appear in the results — almost always with no relevance to your terms. Unfortunately, many of today's redirected internet searches are well hidden from the user through use of additional proxies, so the bogus results are never returned to alert the user.</p>
<p>You see frequent, random popups This popular sign that you've been hacked is also one of the more annoying ones. When you're getting random browser pop-ups from websites that don't normally generate them, your system has been compromised. I'm constantly amazed by which websites, legitimate and otherwise, can bypass your browser's anti-pop-up mechanisms. It's like battling email spam, but worse.</p>	<p>What to do: Not to sound like a broken record, but typically random pop-ups are generated by one of the three previous malicious mechanisms noted above. You'll need to get rid of bogus toolbars and other programs if you even hope to get rid of the pop-ups.</p>

<p>Your friends receive social media invitations from you that you didn't send We've all seen this one before. Either you or your friends receive invitations to "be a friend" when you are already connected friends on that social media site. Usually, you're thinking, "Why are they inviting me again? Did they unfriend me and I didn't notice, and now they are re-inviting me." Then you notice the new friend's social media site is devoid of other recognizable friends (or maybe just a few) and none of the older posts. Or your friend is contacting you to find out why you are sending out new friend requests. In either case, the hacker either controls your social media site, has created a second near-look-alike bogus page, or you or the friend has installed a rogue social media application.</p>	<p><b>What to do:</b> First, warn other friends not to accept the unexpected friend request. Say something like, "Don't accept that new invitation from Bridget. I think she's hacked!". Then contact Bridget some other way to confirm. Spread the news in your common social media circles. Next, if not first, contact the social media site and report the site or request as bogus. Each site has its own method for reporting bogus requests, which you can find by searching through their online help. It's often as easy as clicking on a reporting button. If your social media site is truly hacked (and it isn't a second bogus look-alike page), you'll need to change your password (refer to the help information on how to do this if you don't).</p>
<p>Your online password isn't working If you are typing in your online password correctly, for sure, and it isn't working, then you might be hacked. I usually try again in 10 to 30 minutes, because I've had sites experiencing technical difficulties not accept my valid password for a short period of time. Once you know for sure that your current password is no longer working, it's likely that a rogue hacker has logged in using your password and changed it to keep you out.</p>	<p><b>What to do:</b> If the scam is widespread and many of your acquaintances have been contacted, immediately notify all your close contacts about your compromised account. This will minimize the damage being done to others by your mistake. Second, contact the online service to report the compromised account. Most online services now have easy methods or email contact addresses to report compromised accounts. If you report your account as compromised, usually the service will do the rest to help you restore your legitimate access. Also, consider enacting MFA.</p>
<p>You observe unexpected software installs Unwanted and unexpected software installs are a big sign that your computer has been hacked. In the early days of malware, most programs were computer viruses, which work by modifying other legitimate programs. They did this to better hide themselves. Most malware programs these days are Trojans and worms, and they typically install themselves like legitimate programs. This may be because their creators are trying to walk a very thin line when the courts catch up to them. They can attempt to say something like, "But we are a legitimate software company."</p>	<p><b>What to do:</b> There are many programs that will show you all your installed programs and let you selectively disable them. My favorite checkers for Microsoft Windows are Microsoft's free programs, Autoruns or Process Explorer. They don't show you every program installed but they will tell you the ones that automatically start themselves when your PC is restarted (Autoruns) or the ones currently running (Process Explorer).</p>

<p>Your mouse moves between programs and makes selections</p> <p>If your mouse pointer moves itself while making selections that work (this is the important part), you've definitely been hacked. Mouse pointers often move randomly, usually due to hardware problems. If the movements involve making choices to run particular programs, malicious humans are somewhere involved.</p>	<p>What to do: If your computer "comes alive" one night, take a minute before turning it off to determine what the intruders are interested in. Don't let them rob you, but it will be useful to see what they are looking at and trying to compromise. Take a few pictures to document their tasks. When it makes sense, power off the computer. Unhook it from the network (or disable the wireless router) and call in the professionals. This is the one time that you're going to need expert help.</p>
<p>Antimalware, Task Manager or Registry Editor is disabled</p> <p>This is a huge sign of malicious compromise. If you notice that your antivirus software is disabled and you didn't do it, you're probably exploited – especially if you try to start Task Manager or Registry Editor and they won't start, start and disappear, or start in a reduced state.</p>	<p>What to do: Perform a complete restore because there is no telling what has happened. If you want to try something less drastic first, if on a Windows computer, try running Microsoft Autoruns or Process Explorer (or similar programs) root out the malicious program causing the problems. They will usually identify your problem program, which you can then uninstall or delete.</p>
<p>Your online account is missing money</p> <p>I mean lots of money. Online bad guys don't usually steal a little money. They like to transfer everything or nearly everything, often to a foreign exchange or bank. Usually it begins by your computer being compromised or from you responding to a fake phish from your bank or stock trading company. The bad guys log on to your account, change your contact information, and transfer large sums of money to themselves.</p>	<p>What to do: In most cases you are in luck because most financial institutions will replace the stolen funds (especially if they can stop the transaction before the damage is truly done). However, there have been cases where the courts have ruled it was the customer's responsibility not to be hacked, and it's up to the financial institution to decide whether they will make restitution to you.</p>
<p>You've been notified by someone you've been hacked</p> <p>One of the top ways that any organization finds out they have been successfully compromised is notification by an unrelated third party. This has been the case since the beginning of computers and continues to be true. Verizon's respected Data Breach Investigations Report has revealed that more companies were notified that they were hacked by unrelated third parties than organizations that recognized their own compromises. In July 2019, Microsoft revealed that it had detected nation-state</p>	<p>What to do: First, figure out if you have truly been hacked. Make sure everyone slows down until you confirm that you have been successfully compromised. If confirmed, follow your predefined incident response plan. You have one, right? If not, make one now and practice with stakeholders. Make sure that everyone knows that your IR plan is a thoughtful plan that must be followed. You don't want anyone going off on their own hunting parties or anyone inviting more people "to the party" before it's decided who needs to be involved. Your biggest challenge is going to be actually having people follow the plan in an emergency. Communicate and practice, ahead of time.</p>

attacks against over 10,000 of its customers since the beginning of the year.	
Confidential data has been leaked Nothing confirms you've been hacked like your organization's confidential data sitting out on the internet or dark web. If you didn't notice it first, then likely the media and other interested stakeholders will be contacting your organization to confirm or find out what you are doing about it.	What to do: Like the previous sign, first find out if it's true that it is really your confidential data out there. In more than a few cases, hackers have claimed to compromise a company's data but didn't have anything confidential. Either they made up the claim and data, only had publicly available data, or they had some other company's data. So, first confirm.
Your credentials are in a password dump Literally billions of valid (at least at one time) logon credentials are on the internet and dark web. They have usually been compromised by phishing, malware or website database breaches. You will not usually be notified by third parties as is the case with other types of data leaks. You have to proactively look out for this sort of threat. The sooner you know this sort of thing has happened the better.	What to do: After first confirming whether the dump contains any currently used credentials, reset all your logon credentials. Start an IR process to see if you can figure out how your organization's logon credentials ended up outside the company. Also, implement MFA.
You observe strange network traffic patterns  Many a compromise was first noticed by strange, unexpected network traffic patterns. It could have been a bad distributed denial of service (DDoS) attack against your company's web servers or large, expected file transfers to sites in countries you do not do business with. If more companies understood their legitimate network traffic patterns there would less need for a third party to tell them they are compromised. It's good know that most of the servers in your company don't talk to other servers in your company. Most servers in your company don't talk to every workstation in your company and vice-versa. Most workstations in your company should not be using non-HTTP/non-HTTPS protocols to talk directly to other places on the internet.	What to do: If you see unexpected, strange traffic that you cannot explain, it's probably best to kill the network connection and start an IR investigation. Years ago, we probably would have said to err on the side of operational caution. Today, you can't take any chances. Kill any suspicious transfers until they are proven legitimate.

To help protect their organization from cyber-attacks, there are several countermeasures that information security professionals can implement. While the best strategy is to take a holistic approach, some common individual countermeasures include:



- **Network Encryption** – a security protocol implemented at the network level which encrypts data, so network access is limited to authorized computers.
- **Proxies** – a security strategy which connects users to a remote location so that their data and information is encrypted. Proxies can allow users the ability to manipulate their shared information so a potential hacker would acquire wrong or misleading data.
- **Firewalls** – a network wall which helps users prevent access from dangerous parties.
- **Cyber Liability Insurance** – legal protection that can protect a business or organization from liability during a data breach. Cyber liability insurance has become important with the increasing number of social security and credit card numbers stolen.

Cybercrime has been established as one of the downsides of technological advancement and is quickly becoming one of the fastest rising forms of modern crime. Cyber criminals increasingly use top-notch tools and strategies to carry out well-coordinated attacks on the web. According to Cyber experts, approximately 1 million potential cyber-attacks are attempted per day, and this number is likely to increase with the evolution of mobile and cloud technologies.

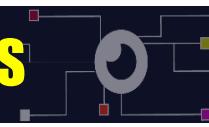
To help mitigate this growth, businesses and corporations have been expanding their cybersecurity teams and efforts. Yet, in order to accurately identify potential hackers and attacks, cyber security teams should have a secure understanding of who cybercriminals are, what techniques they use and what counter-initiatives can be implemented in order to protect the organization and prevent future cybercrimes. Information security professionals should have a holistic approach to protect their infrastructure, incorporating countermeasures such as network encryption, proxies, firewalls, and cyber liability insurance. Regular users are not an exemption – we should remain proactive in educating ourselves on the latest techniques and technologies within the industry for managing cyber-attacks.

## ASSESSMENT

Do research on a famous cybercrime case—look for details from different news sites, wiki pages, videos and other materials in the internet. Depending on how popular or significant the case is, you should have found different sources for the event. Synthesize these and write your exposition with the following questions as your guide:

- What is the event about? What type of cybercrime was identified? How did this differ to other cases?
- When did the attack happen? Where the attack was first discovered, and how far did it spread? When it was finally contained? Is the threat ongoing?
- What type of attacker(s) was/were involved? How did they perform the attack? Were the perpetrators caught?
- Who, or what entities were affected by the attack? How much damage did it cause?
- How did the necessary authorities react to the attack? What countermeasures were used stop/prevent the attack?
- In your opinion, what could be done to improve the situation and prevent similar attacks from happening in the future?

Feel free to express your opinions or hypotheses based on what knowledge you have in case the answers to some questions aren't found in your references.



# CHAPTER VII: PROTECTING YOURSELF AGAINST CYBER ATTACKS

With the rise of cybercrime and persistence of criminals, it is important for us to protect ourselves from the threats and attacks capable of intruding devices, taking personal information and causing harm to our organizations. In this chapter, we will outline the common threats related to the cyber world, the vulnerabilities that these cyber-attacks aim to exploit, the risks that come once something has been compromised, and the ways we could potentially prevent or protect ourselves from such attacks.

Asset	Threat	Vulnerability	Risk
Library of Alexandria	Fire	Neighboring building proximity	High - Destruction of archives and knowledge
Hospital Room	Deadly Pathogen	Lost page in cleaning checklist	High - Spread of disease potentially leading to death
Hollywood Archives	Insider Leak	Uncontrolled video media storage	High - Spread of sensitive material leading to reputation loss
Computer-aided Emergency Dispatch	Software Crash caused by Denial of Service	Unpatched Software Bug	High - Dispatch Failure leading to death

In Cybersecurity terms, **threats** refer to a new or newly discovered incidents that have the capability damage a system or organization. These may be natural, unintentional, or intentional. A **vulnerability** points to an existing flaw of an asset or resource that can be exploited by one or more attackers. **Risks** are defined as the potential for loss or damage when a threat exploits a vulnerability – financial losses, business disruption, breach of privacy, damage to reputation damage, legal consequences, and even loss of life.

The following cyberattacks are reported to be the most common threats that exploit vulnerabilities and have potentially high risks on individuals and organizations. Read on to find out more about them.

## CYBER SECURITY THREATS

### PHISHING

Phishing is a type of security attack that attempts to trick or coerce targets into divulging sensitive/valuable information like users' login credentials, financial information, company data, and anything that could potentially be of value. Phishing Attacks are the primary vector for malware and are usually comprised of a malicious e-mail attachment or an e-mail with an embedded, malicious link. These e-mails falsely claim to be an established or legitimate enterprise.

- *Search Recent Phishing Case NATO*

## SPEAR-PHISHING ATTACKS



Spear phishing is a derivative from Phishing in which attackers take a narrow focus and craft targeted email messages to a specific recipient or group. These typically target decision makers within a company – requiring attackers investigate important details that can give make their messages believable. They may target one organization at a time, or even specific teams within one organization. Enterprises are especially vulnerable to spear phishing attacks, as so much of their company data is usually freely available online for attackers to mine organization-specific technical details and jargon, key company personnel, customers, events, or even the names of internal software tools.

- *Search Yahoo breaches started with spear-phishing*

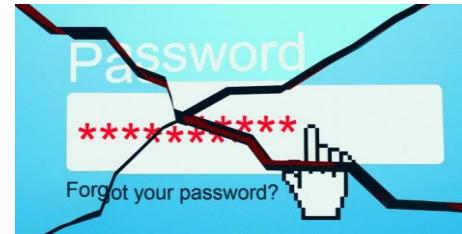
## NETWORK PROBING

A Network Probe is a network monitor and protocol analyzer that gives you an instant picture of the traffic situation on your network and enables you to identify and isolate traffic problems. Probing a network is generally an attempt to gain access to a computer and its files through a known or likely weak point in the computer system. Though not an immediate threat, they do indicate that someone is casing your system for possible entry points for attack.

- *Search Russian Parliament probing U.S. media outlets in Moscow*

## BRUTE-FORCE CRACKING

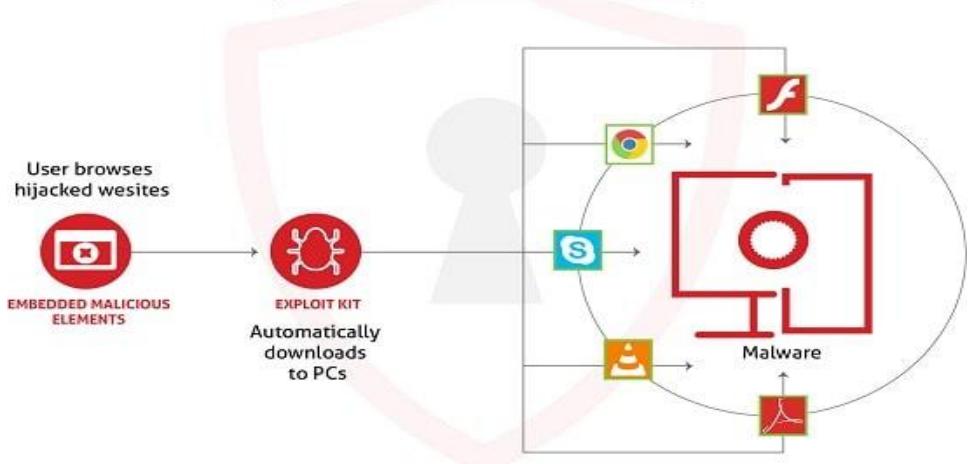
Brute-force cracking is a type of cybersecurity attack in which an attacker tries to log in to a user's account by systematically checking and attempting all possible passwords and passphrases until the correct one is found using trial and error. It basically resorts to continually guessing a password until the correct one allows entry to a site. The length of time required to crack a short, four-digit PIN with numbers might be under a minute. Increasing the number of characters to six and making it alphanumeric yields more combinations and takes longer.



## DRIVE-BY DOWNLOAD

Drive-by Download Attacks are set off simply by having a target click a link which injects malicious software onto their computer or device. Without their knowledge or consent, a program is automatically downloaded to your computer and runs in the background. Trojan Horses are most frequently used in Drive-by Download attacks

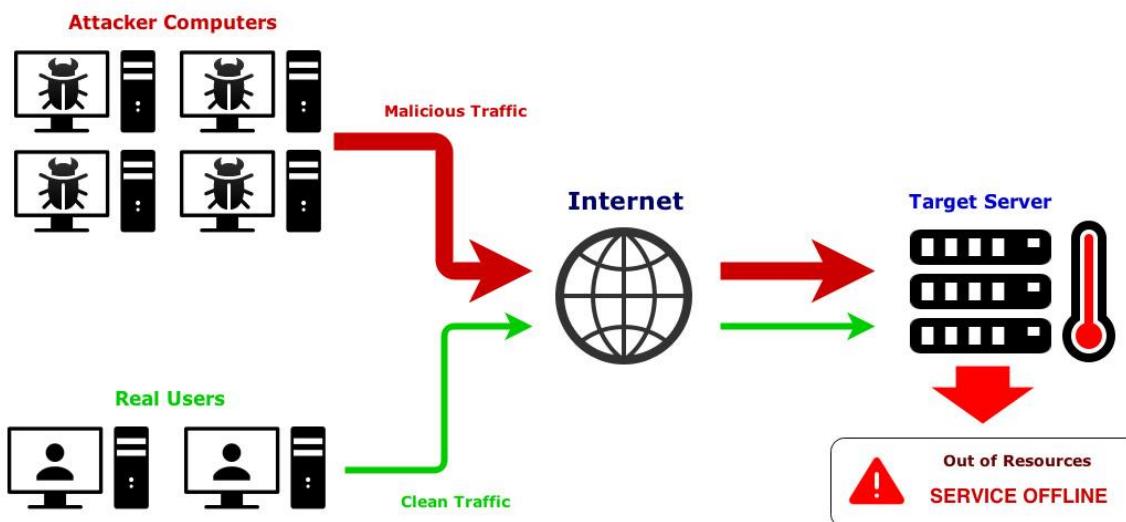
## DRIVE-BY ATTACK



## DENIAL OF SERVICE

Denial-of-service (DoS) attacks are emphasized on disrupting or preventing legitimate users from accessing

### Operation of a DDoS attack



certain websites, applications, services, or other resources. These attacks are often used by activist groups for a political motive, by criminal organizations to extort money, and by state actors to punish their rivals.

With the connectivity of networked systems, DoS attacks remain a big threat to many businesses, organizations, and governments around the world. The impact and costs associated with DoS attacks have a wide range – while sending a text bomb to trigger an unexpected reboot of a victim's smartphone might be considered a mild inconvenience, a large-scale attack can prevent an online business from serving its customers and lose profit as well as trust.

### ADVANCED PERSISTENT THREAT ATTACK [APT]

An Advanced Persistent Threat Attack is a network attack in which an unauthorized person gains access to a network and stays there undetected for a long period. As seen in popular culture involving hackers, the goal of an advanced persistent threat attack is to maintain covert, ongoing access to a network. This allows attackers to continuously gather valid user credentials and access to more, and more, valuable information. An advanced persistent threat attack aims to gather information rather than shut down a network, requiring continual code rewrites and sophisticated evasion techniques.

- *Search Ukraine power grid APTs*

## MALWARE

Malicious Software or Malware are designed to secretly operate on a compromised system without the knowledge or consent of the victim. Cybercriminals are known to deploy malware as part of their cyberattack schemes. Malware is created with a particular focus to deliver intended results.

The attacker might intend to steal credentials, payment information, data; disrupt operations to cripple computer systems costly to a person, company, or government target that falls victim, gain access to a system in order to carry out unauthorized administrator level commands, and even extort money from the target. The possibilities vary, but they all have to potential to give devastating results.



- **Virus:** A virus is a contagious program or code that attaches itself to another piece of software, and then reproduces itself when that software is run. Most often this is spread by sharing software or files between computers.
- **Worm:** A program that replicates itself and destroys data and files on the computer. Worms work to “eat” the system operating files and data files until the drive is empty.
- **Trojan Horse:** Trojans are malicious computer program which misleads users of its true intent, written with the purpose of discovering your financial information, taking over your computer’s system resources, or creating a Denial-of-service attack.
- **Rootkit:** Rootkits are relatively hard Malware to detect and remove, designed to hide and permit the other Malware in to get the identity information from your computer without you realizing anything is going on.
- **Backdoors:** Backdoors are much the same as Trojans or worms, except that they open a “backdoor” onto a computer, providing a network connection for hackers or other Malware to enter or for viruses or SPAM to be sent.
- **Keyloggers:** Records everything you type on your PC in order to collect your log-in names, passwords, and other sensitive information, and send it on to the source of the keylogging program.
- **Adware:** One of the least dangerous and most lucrative Malware. Adware displays ads on your computer. These ads may end up bogging down computer performance, or act to let other malware in.
- **Spyware:** Spyware is software that spies on you, monitors your internet activities in order to send Adware back to your system.
- **Rogue security software:** Pretends to be an Antivirus or Virus Removal Toolkit that often turns off the real Anti-Virus software.
- **Ransomware:** A type of malicious software designed to block access to a computer system until a sum of money is paid. Ransomware is getting popular and hackers are increasingly

recognizing the financial benefits of employing such tactics. Ransomware shuts down computer systems or encrypt important files, then demanding a ransom in return for their systems/files. A Famous example is 2017's WannaCry Ransomware attack,

- **Browser Hijacker:** When your homepage changes to one that looks like those in the images inserted next, you may have been infected with one form or another of a Browser Hijacker. This dangerous Malware will redirect your normal search activity and give you the results the developers want you to see. These homepages can look harmless, but they allow more malware to propagate in the system.

## ASSESSMENT

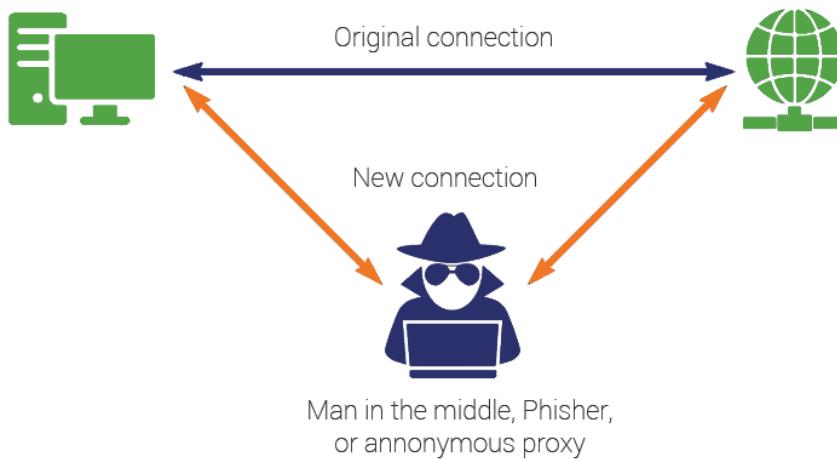
Instruction: The variety of malware make it a daunting threat; but like all cyber-attacks, they can be prevented, and damage can be mitigated if they do compromise your system. List all the ways to prevent Malware to infiltrate into your system and how it helps to make your personal data's secured?

Example: Use trusted Applications

Downloading and installing trusted software can make your device protected in a way which you can be sure that there are no unwanted applications or extensions being installed.

### MAN-IN-THE-MIDDLE (MITM) ATTACKS

Man-in-the-middle attacks allow attackers to spy on the communication between two targets. The attack takes place between two legitimately communicating hosts, letting the perpetrator to eavesdrop on a conversation they should normally not be able to listen to. To help you visualize the attack, take this analogy: A and B are having a conversation; C wants to listen in on the conversation but also remain undetected. C

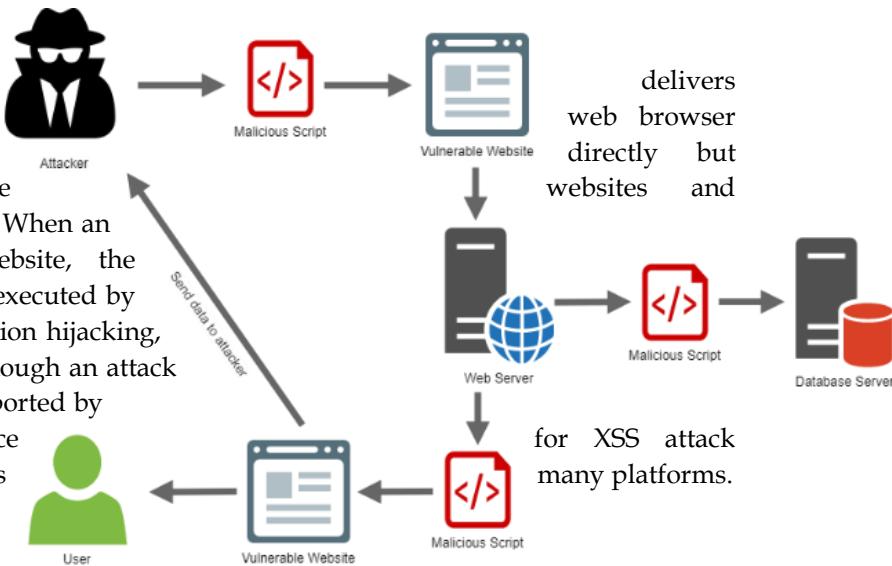


could tell A that he is B, and conversely act as B to A. A would then believe she is communicating with B and reveal the

conversation to C. C in turn would get A's information and pass an altered response to an unsuspecting B. C can hijack the communication of A and B as a result.

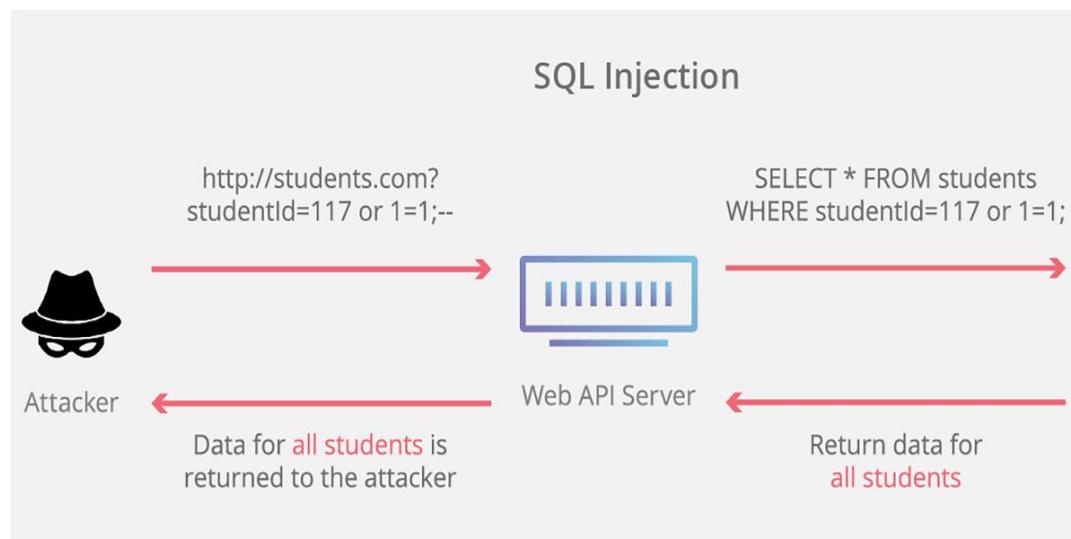
### CROSS-SITE SCRIPTING (XSS)

XSS is a code injection security attack which injects malicious, client-side scripts to a target's web application for execution. Targets are not attacked directly but websites and web applications when they interact with it. When an unwary user visits a compromised website, the perpetrator's malicious script is loaded and executed by the user's browser. This often results to session hijacking, and theft of sensitive data, among others. Though an attack can be crafted with any language that is supported by browsers, JavaScript has been a popular choice among authors because of its wide support across many platforms.



### SQL INJECTION ATTACKS (SQLI)

Structured Query Language (SQL) is a language designed to manipulate and manage data in a database and is used in many commercial and open source databases. SQL injection (SQLi) is a type of cybersecurity attack that targets these databases, using specifically crafted SQL statements to trick the systems into doing unexpected and undesired things. Databases are commonly targeted for injection through an application such as a website, which requests user input and then does a lookup in a database – this takes advantage of poor database and backend design, which lead the system to accept user input with devastating results. Databases may also be targeted directly. Attackers can bypass authentication, exfiltrate data, modify or corrupt, and delete data, run arbitrary code, or gain root access to the system itself once a system is compromised.



## ASSESSMENT

1. Which of the following is best described as interactive web applications and technologies that manage user-generated content and facilitate the sharing of such information through a virtual community of user profiles?
  - a. Cybersecurity
  - b. Cyberspace
  - c. Digital ethics
  - d. Social Media
2. Which of these is a password protect measure?
  - a. Making all information private
  - b. Tagging friends less often
  - c. Setting strong passwords
  - d. Using multiple accounts
3. It is a way of finding out the right credentials by repetitively trying all the permutations and combinations of possible credentials.
  - a. Brute Force Cracking
  - b. Identify Thief
  - c. Hacking
  - d. Phishing
4. Which of the following malicious individual who attempt to defraud a person or group of people by first gaining confidence through an online outlet like social media?.
  - a. Hacker
  - b. Scammers
  - c. Phisher
  - d. Stalker
5. Which is the best thing to protect yourself to stop or block hackers to access your system or able to access your credentials in your social media account?
  - a. Enable 2 Factor Authentication
  - b. Keeps Tabs On Credit
  - c. Utilize a Password Manager
  - d. All of the above
6. Which of the following is best described as the customary code of polite behavior in society or among members of a particular profession or group?
  - a. Ethics
  - b. Etiquette
  - c. Security
  - d. Responsibility

7. When a computer is blocked to access its computer system a malware has already infiltrated with the system that can't be accessible if a large of money is given or paid.
- Adware
  - Ransomware
  - Moneyware
  - Spyware
8. The CEO ordered his team to create a business proposal for a new project. Mr. Cruz has more profound knowledge about creating a proposal and Mr. Perez is at disadvantage. Mr. Perez is good with computers and decided to hack and snoops Mr. Cruz's laptop by using various tool to copy and plagiarize it. Mr. Perez violates a sin against?
- Ethics
  - Government
  - Individual
  - Security
9. This hackers or security specialist are specialized in penetration testing and they protect the information system of an organization.
- |                     |                     |
|---------------------|---------------------|
| a. Black Hat Hacker | c. Grey Hat Hacker  |
| b. Dim Hat Hacker   | d. White Hat Hacker |
10. They are well experienced computer programmers with knowledge of computer security, however they took advantage of their skill to find and exploits the weakness in computer systems, smartphones, tablets, or networks to gain access.
- |                        |           |
|------------------------|-----------|
| a. Computer Specialist | c. Hacker |
| b. Developer           | d. IT     |
11. Cyber-crime is the form of any criminal activity that involves a computer and a network. Which one is a cybercrime?
- Installing Virtual Private Network for your protection
  - Keeping your tabs in credit regarding on new activities that happen
  - Getting information of people to gain their trust for malicious intent
  - Installing software that you purchase online with full activation
12. Ms. Cruz uses fake credentials to target his victims with the use of social media platform for financial gains. Which of the following best describe Ms. Cruz?
- |                       |                  |
|-----------------------|------------------|
| a. Cyber Bully        | c. Cyber Scammer |
| b. Cyber Investigator | d. Cyber Stalker |
13. In terms of cyber security using social media, everyone is at risk because accordingly, social media platforms can get hacked from time to time despite having solid security measures. Why?
- Because some users sends inappropriate data using social media.
  - Because social media like facebook is a website that is vulnerable for any digital attack.
  - Because social media fake accounts can be registered but not protected by cybercrime law.
  - Because some networking sites are not registered online and need constant updates..
14. How would you advise/inform people nowadays who post their whereabouts details through gadgets and gizmos, so they will be protected at all times? Choose the best answer.
- Stop posting information regarding your travels online
  - Allow other people to use your phone
  - Always put a password on your phone

- d. Make sure you logout your accounts on social media
15. Which of the following isn't a cybercrime?
- Cracking down the computer security in order to improve the weaknesses
  - Stealing PINS at the ATM
  - Spoofing and stealing information
  - Buying credit card information and extracting the money
- below. (2 points each)

Test II. Read the sentence carefully and identify the cybercrime violated for each situation given below. Write only the letter of your choice on the sheet provided. Refer your answer to the box given

- |                                |               |
|--------------------------------|---------------|
| a. Child soliciting and abuse  | f. Phishing   |
| b. Cyber bullying and stalking | g. Theft      |
| c. Hacking                     | h. Scam       |
| d. Identity Theft              | i. Ransomware |
| e. Malicious software          |               |

1. A man sells copies of movies and music he had downloaded from streaming and torrent sites.
2. A student downloads and installs a music player app, but suddenly discovers that the phone hangs up and locked the files on his mobile phone along with a message that demands money in exchange for unlocking.
3. A student receives a message on her FB account with a hyperlink about a supposed promo from a well-known business entity and promised a big amount of discounts but later, discovers that the link was from an unfamiliar website and the site looks legitimate and official.
4. A woman kept receiving messages from someone. The messages revealed that she had been constantly observed and watched in all her activities.
5. An online shop owner received a message from a customer who complained that he did not receive his ordered item. Upon checking, the online shop owner discovered that there were no records of such order. Then the customer realized that he had contacted an impostor who took their money and disappeared.
6. Cyberterrorists illegally accessed and locked government websites in protest about a new cybersecurity bill that they feel will affect freedom of speech and fair use.
7. The mother of a young girl sells nude photos and videos of her child online.
8. An attempt to defraud a person or group of people by gaining their confidence. This type of attack could be a phone call after a devastating natural disaster asking you to donate to the victims.
9. Is an attack where your personal data is effectively held hostage by a hacker. The hacker will then demand a specific amount of money in exchange of your uninfected/working files.
10. Children are usually the victims of attack due to their lack of understanding on risks when it comes to posting on social media.

## WAYS TO PROTECT YOURSELF AGAINST CYBER ATTACKS

### 1. Make it harder for other people to get credit in your name.

One of the biggest risks of identity theft is that someone will take out loans or credit cards in your name and then never pay them. You may not find out until you're ready to buy a car or house, and by then your credit may have been ruined. Credit bureaus offer three ways to guard against this:

- A fraud alert means a lender is supposed to verify your identity before extending credit. Fraud alerts are free but must be renewed every 90 days.
- A credit freeze prohibits third parties from accessing your credit report. If a lender can't pull up a credit report, a thief usually can't get a loan or credit card in your name. There may be fees for placing freezes, and you'll need to ask the credit bureau to lift the freeze if you later want to apply for credit.

A credit lock is similar to a freeze, but you can lift it yourself electronically. Credit locks may also have fees. Lenders may check any or all of the credit bureaus. To be safe, you must put alerts, freezes, or locks in place with all three: Equifax, Experian, and TransUnion.

### 2. Put passwords on your devices.

Cell phones, laptops, and tablets are easily lost or stolen. If you don't require a password to log in, then a thief has instant access to all your data.

### 3. Use stronger passwords.

Many of us are guilty of using the same, easy-to-remember password over and over. This is risky behavior, because if identity thieves figure out one password, it's not hard to get into more of your accounts. The strongest passwords are long and random. Consider using a password management app to create and keep track of them.

### 4. Set up two-factor authentication on your financial and email accounts.

Your bank probably requires this already – when you log in from a new location, you must type in a code that's texted to your cell phone. Check your account settings to make sure this is enabled on all your accounts.

### 5. Don't do your online shopping and banking at the local cafe.

When you use a shared computer or a business's WiFi connection, you don't know how secure the network really is. Use your own device and secured network instead.

### 6. Update your software regularly.

This includes antivirus software, your operating system, and anything else you use. Cyber threats change frequently, and many updates address security issues.

7. Don't give out personal information on the phone or through email or text.

If you get a call, email, or text from a retailer, charity, the government, or your long-lost cousin asking for personal information, there's a good chance it's a phishing scam—no matter how real it seems. Don't give out your info. If you think the request may be legitimate, separately look up the organization's phone number and follow up by phone.

8. Be careful about opening email attachments or clicking links.

Either of these actions can infect your computer with malware.

You don't have to be an IT expert to protect your personal data. Just be cautious when communicating or shopping online, and set up some simple security measures to protect yourself in the event your personal data is breached.

## ASSESSMENT

Answer the puzzle and find the hidden word for additional 10 points. PS. If you find it, don't share it.

**DOWN**

1 A software that spies on you, monitors your internet activities in order to send Adware back to your system.

2 A program that replicates itself and destroys data and files on the computer. Worms work to "eat" the system operating files and data files until the drive is empty.

3 a type of cyber security attack in which an attacker tries to log in to a user's account by systematically checking and attempting all possible passwords and passphrases until the correct one is found using trial and error.

8 These attackers reside within an organization and are considered a very high risk.

9 These groups develop malware for political reasons and are not interested in financial gains. A well-known example is Anonymous—an international network of hackers that started out by hacking corporate and government sites, implementing denial-of-service on these sites—all well-publicized.

15 a security strategy which connects users to a remote location so that their data and information is encrypted. Proxies can allow users the ability to manipulate their shared information so a potential hacker would acquire wrong or misleading data.

**ACROSS**

5 theft is the most common cybercrime today and is done by a perpetrator to commit fraud for financial gains through fake credentials and by purporting to be someone else.

7 One of the least dangerous and most lucrative Malware. It displays ads on your computer. These ads may end up bogging down computer performance, or act to let other malware in.

10 has become more sophisticated over the years; it has broken into numerous sites, affected government websites, businesses and private computers—leading to disastrous effects.

11 type of security attack that attempts to trick or coerce targets into divulging sensitive/valuable information like users' login credentials, financial information, company data, and anything that could potentially be of value.

13 the stereotypical illegal hacking groups portrayed as villains or anti-heroes in movies and popular culture. Black hats are known to violate computer security for little reason beyond maliciousness or for personal gain.

14 cross site scripting

**DIAGONAL**

4 this are hackers who target Linux Systems, they are characterized as Vigilantes.

6 allow attackers to spy on the communication between two targets. The attack takes place between two legitimately communicating hosts, letting the perpetrator to eavesdrop on a conversation they should normally not be able to listen to.

12 a network wall which helps users prevent access from dangerous parties.

**FINAL ASSESSMENT**

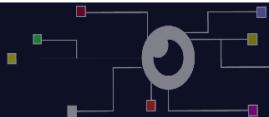
*Instruction:* Now that you have sufficient knowledge on the types of cyber-attacks and the methods of protecting against them, you will be synthesizing everything that you have learned into an informative visual presentation.

- Create an informative presentation about the different cyber security measures applications that you use to be secured when using the internet. Include your screenshots or images to add a visual element to your paper.
- Choose a template, theme and design your presentation according to what suits your taste. Feel free to bring creative twists to your presentation. Just remember to stick to the general guidelines of slide constructions, text length and color contrast to make your presentation more readable and appealing to potential audiences. Your instructor may be assigning you to give a sample Presentation in front of the class after the activity.
- Your Presentation should have a maximum of twenty (20) slides only. Digital Presentation Scoring Rubric to see the point breakdown for the activity.

## Grading Rubric for Digital Presentation

	5 pts	4 pts	3 pts	2 pts	1 pt
<b>Content</b>	Content is accurate and all required information is presented in a logical order.	Content is accurate but some required information is missing and/or not presented in a logical order, but is still generally easy to follow.	Content is accurate but some required information is missing and/or not presented in a logical order, making it difficult to follow.	Content is questionable. Information is not presented in a logical order, making it difficult to follow.	Content is inaccurate. Information is not presented in a logical order, making it difficult to follow.
<b>Slide Creation</b>	Presentation flows well and logically. Presentation reflects extensive use of tools in a creative way.	Presentation flows well. Tools are used correctly. Overall presentation is interesting.	Presentation flows well. Some tools are used to show acceptable understanding.	Presentation is unorganized. Tools are not used in a relevant manner.	Presentation has no flow. No tools used.
<b>Slide Transitions</b>	Transitions are smooth. Transitions enhance the presentation.	Smooth transitions are used on most slides.	Smooth transitions are used on some slides	Very few transitions are used and/or they distract from the presentation.	No transitions are used.
<b>Pictures, Clip Art Background</b>	Images are appropriate. Layout is pleasing to the eye.	Images are appropriate. Layout is cluttered.	Most images are appropriate	Images are inappropriate.	No images
<b>Mechanics</b>	No spelling errors. No grammar errors. Text is in authors' own words.	Few spelling errors. Few grammar errors. Text is in authors' own words.	Some spelling errors. Some grammar errors. Text is in authors' own words.	Some spelling errors. Some grammar errors. Most of text is in authors' own words.	Many spelling and or grammar errors. Text is copied.

<b>Presentation Skills</b>	Well rehearsed. No pronunciation errors or other mistakes.	General level of rehearsal. Few pronunciation errors or other mistakes.	Acceptable level of rehearsal. Some pronunciation errors or other mistakes.	Low level of rehearsal. Numerous pronunciation errors or other mistakes.	No rehearsal indicated. Too many pronunciation errors or other mistakes.
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# MODULE IV: THE INTERNET & WORLD WIDE WEB

## COURSE OUTCOMES

Utilize the internet resources in learning

## LEARNING OUTCOMES

- Identify Internet resources in learning
- Use the Internet resources in learning

The Internet was created only a few decades ago; it is still considered a relatively young technology, yet its impact on the world today makes it hard to imagine life without it. Even now, new innovators are designing new devices and software that they can assimilate into the Internet to make the world a better place. Every now and then, this huge network continues to extend and overlap across the earth, and even towards space. Today, what applications have been derived from its brilliance, and integrated into our daily routines? Tomorrow, what does the evolution of the Internet bring?

## WHAT IS INTERNET?

Before we begin the discussion, it is important for you to be able to visualize how and why the Internet works. As the specifics might become too technical to explain to some, you may opt to watch informative videos on the topic to save time. Enter the following search strings and look for the named videos. Alternatively, you can check the references section of the book to see the video URLs.

- *How does the Internet work?* by Code.org
- *What is the Internet?* by Code.org
- *The Internet: IP Addresses & DNS* by Code.org
- *The Internet: Wires, Cables & Wifi* by Code.org
- *The Internet: HTTP & HTML* by Code.org

WHAT IS  
THE INTERNET?



The Internet, or simply the Net, is the publicly available worldwide system of interconnected computer networks that transmit data by packet switching using a standardized Internet Protocol (IP) and many other protocols. It is made up of thousands of smaller commercial, academic, and government networks. It carries various information and services, such as electronic mail, online

chat and the interlinked web pages and other documents of the World Wide Web. Because this is by far the largest, most extensive internet in the world, it is simply called the Internet.

## ASSESSMENT

Instruction: Based on your own opinion write 5-10 sentences on “What is Internet?”

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Although people routinely use “Internet” when talking about the “World Wide Web”, the two are not synonymous. The Internet includes the World Wide Web, e-mail, chat rooms or Internet Relay Chat, message boards, list serves, Usenet newsgroups, Telnet and file transfer protocols (FTP). Just from this list of areas of the Internet, some potential uses are suggested.

## CLOUD COMPUTING

The ubiquitous nature of the Internet means that it is accessible anytime, anywhere and through many means; it is quite literally everywhere nowadays. Now, it's even possible to store something—a huge media file or program, for example—and access it later at a different place, using a different device through the internet. Cloud computing enables users to do away with the physical aspect of your computer's local storage and access it instead in the internet. Everything you need becomes physically closer to you, which means retrieving data is fast and easy, not just for one, but for multiple devices. With cloud technology, small businesses don't necessarily have to go out of their way to create personal data centers and gigantic server-farm infrastructures to deliver information; the cloud does that for you without the hassle of maintaining hardware and dealing with network security.

From a business perspective, companies choose to implement cloud-based solutions through Software-as-a-Service (SaaS) when they subscribe to an application over the Internet. For those who want to create their own custom applications for use, Platform-as-a-Service (PaaS) is an option.

Then, there's Infrastructure-as-a-Service (IaaS), where the entire backbone of your scaled-up and out data center is rented out by big players like Amazon, Google, and Microsoft, among others.

## MACHINE LEARNING & NEURAL NETWORKS

What would you do if your computer did something it wasn't programmed to do—not because of an error or bug, or even because it was hacked—but because it had the knowledge to do it? More precisely, it was able to make predictions and deliver results based on existing patterns that were not explicitly programmed into it. Confused? Think Terminator—of robots moving and acting as if they had the will.

Yes—Artificial Intelligence. Research on AI has yielded significant results over the years, with many applications especially in the industry and in the cyberspace. While news of human-sized androids bent on killing and world domination have yet to surface, AI has seen continued development and new concepts and algorithms have been thoroughly investigated and attempted to further improve its performance. Most notable about these is Machine learning—the ability for a computer to do something that it wasn't originally instructed or programmed to do. While traditional Artificial Intelligence typically focuses on programming computers to make decisions, Machine Learning places an emphasis on making predictions about the future. Basically, it's another way to Artificial Intelligence; one that replicates almost human-like behavior, it can be artificial intelligence. What's important here is the concept of *training* the machine, so that it would *learn* what to do based on existing data.

Tied with Machine Learning is the concept of Artificial Neural Networks (ANN), aimed to build predictive models dedicated for solving complex tasks through exposure to huge amounts of data. With the information given, the system *learns* how to make the best predictions on its own. Neural networks function quite similarly to the human brain—the system maps out patterns and makes decisions by stimulating the correct nodes patterned like brain cells. By combining the systematic power of a computer and the densely interconnected cells of the human brain, you get the best of both worlds.



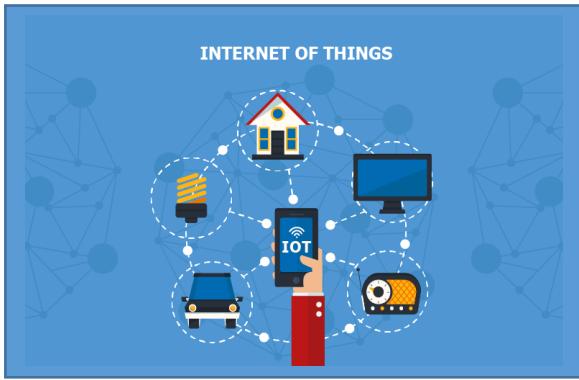
Chappie (stylized as CHAPPiE) 2015. Deon creates a prototype artificial intelligence that mimics a human mind to the point of feeling emotions and having opinions, but Tetravaal CEO Michelle Bradley refuses to let him test the A.I. on a police robot.

Machine learning—the ability for a computer to do something that it wasn't originally instructed or programmed to do. While traditional Artificial Intelligence typically focuses on programming computers to make decisions, Machine Learning places an emphasis on making predictions about the future. Basically, it's another way to Artificial Intelligence; one that replicates almost human-like behavior, it can be artificial intelligence. What's important here is the concept of *training* the machine, so that it would *learn* what to do based on existing data.



## THE INTERNET OF THINGS

Now, what do we do with intelligent machines?



As broadband connection becomes more widely available, the cost of connecting to the Internet decreases and more devices are being created with embedded Wi-Fi capabilities and sensors. Now that smartphones have almost become daily commodities, an increasing trend has become the topic of workplace and personal conversations. This trend, though surrounded by technical and legal complexities, has a growing potential to truly change how we live and how we work.

The Internet of Things or IoT is the concept of connecting any device capable of connecting to the Internet to each other, and includes everything from smartphones, refrigerators, washing machines, automatic lights and the entirety of your wearable technology. The Internet of Things, like its namesake, is a giant network of things connected to other things or even people. Like something from science fiction, anything that can be connected will eventually be, and they will stay connected to each other.

## ASSESSMENT

Instruction: Watch the video “The Internet of Things” and answer the following questions.

1. How Internet of Things affects productivity when it comes to learning?

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2. If you will come up with a system or application that will help you in learning what is it? And how will it help not just you but the school?

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## COMMON USES OF INTERNET

The Internet is a practical tool that is used in three main areas: **Communication, Research, Publishing.**

### COMMUNICATIONS

#### E-mail

The primary Internet communication tool is electronic mail. E-mail is nothing more than sending and/or receiving messages through your computer. It combines the immediacy of the telephone with the word processing power of the computer. Use e-mail for business, to keep in touch with friends and relatives, and to work on a project with someone a hundred kilometres away.



E-mail is an extremely low-cost form of communication. Unlike telephone or standard postal services, there are no volume or long distance surcharges for sending e-mail. You can send one e-mail message across the city or 10,000 messages to the other side of the world for the same fee.

If you are hooked up to the Internet through an Internet Service Provider (ISP) or Commercial On-Line Service, e-mail is part of the service.

Alternatively, you can get a stand-alone e-mail account that allows you to send and receive your messages without ever seeing the rest of the Internet. For people who do not have their own account, or who will want to access their e-mail remotely, Web e-mail accounts are also available. These accounts are hosted entirely on a Web site and your mail is protected by a login name and password. Many of these accounts are free. Anytime you have access to the World Wide Web, you will have access to your e-mail. Web e-mail accounts are particularly appealing to people who anticipate moving frequently because their address would stay the same even as they changed ISPs. Some people prefer the relative anonymity of Web e-mail or wish to avoid the unsolicited bulk e-mail, or spam, that may result if users participate in a newsgroup that is subsequently "harvested" for addresses by bulk e-mail companies. With the advent of pre-paid usage cards, Web e-mail accounts may become more popular yet.

To a lesser extent, the Internet is also used for communicating in chat rooms, newsgroups, list serves and through telephony.

### RESEARCH

A growing number of people are using the Internet for research. Business people are assessing new markets, students and writers are looking for information and concerned parents are searching for the latest facts on nutrition. The Internet is the library not only of today, but also of the future.

The quality of information on the Internet ranges from stunningly poor to excellent. Thankfully, there are a large number of quality sites on the Net, and with a little experience, it is fairly easy to differentiate the good from the bad.

## INTERNET INFORMATION SERVICES

### Newsgroups

Special interest Usenet newsgroups are excellent places to locate expertise in a given field. Newsgroups act as electronic bulletin boards through which people exchange information, ask technical questions, offer solutions, gather leads and forge new contacts. You log into a newsgroup, check any or all of the messages that have been posted, add your own message if you wish, or simply leave. Anyone on the Net can participate, and it's free. With ten of thousands of newsgroups in existence, it is difficult to imagine a subject matter that is not covered.



### List Serves

List serves, or mailing lists, are useful tools for gathering information. They are similar to newsgroups in that individuals post messages to a centralized location, and everyone on the list gets the message. The biggest difference between newsgroups and list serves is that newsgroups require active monitoring, whereas list serves are passively monitored. If you subscribe to a list serve, every message posted to that list by other users will wind up in your e-mail in-box. List serves are good for individuals who do not have the time to actively monitor a range of newsgroups, but who still want to remain current on a specific topic.

### Information Services

Other types of information-gathering services are available on the Internet, including commercial information services and research companies. Also, thousands of libraries are connected to the Internet, permitting even casual users to access their catalogues and request loans through inter-library programs.

In addition to those information services, the number of on-line journals, newspapers and trade magazines increases each month. Much of the information in these publications is free, although some are accessible only to paid subscribers.

### Government, Corporate and Educational Internet sites

One of the best ways to locate meaningful information is through any of the public and private sector organizations that have established an Internet presence. Government departments and agencies, private corporations, law firms, retailers, trade associations and educational institutions publish a tremendously rich and diverse collection of information. And as more organizations develop their own Internet sites, the value of the Net as a research tool will only increase.

## PUBLISHING



In 1995, the World Wide Web emerged as the most popular part of the Internet. The multi-media Web allows for the display of still images, moving video, audio and text in any combination, and its growth is phenomenal.

A site on the WWW is open 24 hours a day, seven days a week. Sites can be as simple as a one-screen greeting designed by a hobbyist, or as complicated as an interactive catalogue designed for a major corporation. Anyone can design and maintain a site for whatever legal purpose they wish. How many Web sites are there? No one knows – but best estimates put the number of sites added to the World Wide Web every day in the thousands. The information on World Wide Web sites is not restricted to technology issues. You are just as likely to find a site describing handicrafts, ideas on how to remodel the kitchen or a site dedicated to supporting the families of cancer patients.

The WWW will almost certainly become a major part of the infrastructure of the increasingly interconnected world economy. In the near future, using the Web to conduct business will become as commonplace as using a bank card is today. The Web will allow customers to search catalogues, place orders, submit requests, send “digital cash”, and more. Companies large and small can do business in their own neighbourhood, or with customers in other countries.

## SOCIAL MEDIA

Social media refers to interactive web applications and technologies that manage user-generated content, and facilitate the sharing of such information—messages, posts, comments, pictures, music, videos and others, throughout a virtual community of users having their own service-specific profiles.

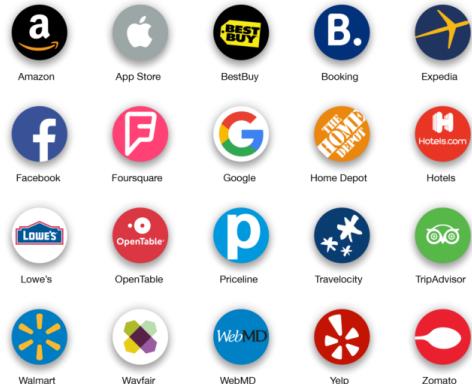
### TYPES OF SOCIAL MEDIAS

- Social networking sites** - These platforms help us connect with friends, family, and brands. They encourage knowledge-sharing and are all about personal, human-to-human interaction. It is a center of all trades. Users can share thoughts, curate content, upload photos and videos, form groups based on interests, and participate in lively



discussions. They're built around the user and everything that's important to them and their social circles.

- **Social review sites** - What's one of the first things you do when planning a trip or buying a new product? If you're anything like us, you'll head straight to the reviews. Review sites display reviews from community members for all sorts of locations and experiences. This eliminates a lot of the guesswork that goes into booking a restaurant or hotel.



- **Image sharing sites** - Visual content like images, infographics, and illustrations capture our hearts, eyes and imaginations. Social media platforms are designed to amplify the power of image sharing.
- **Video hosting sites** - revolutionized the way we watch, create, and think about



video. It transformed the medium into something accessible. Recent improvements in tech and connectivity helped video go the rest of the way. Video hosting platforms help creators put together content and share it to a platform optimized for streaming.



- **Community blogs** - Sometimes an image or post isn't complex enough for the message you've got to share, but not everyone on the internet wants to run a blog from a self-hosted website. That's a lot of work. Shared blogging platforms give people a space to express their thoughts and help connect them with readers.
- **Discussion sites** - While most of us have seen many a heated discussion happen on Facebook, discussion sites are specifically designed to spark a conversation. Anyone is free to ask a question or make a statement, and this attracts people with shared interests and curiosities.
- **Sharing economy networks** -Sharing economy networks bring people who've got something they want to share together with the people who need it. These



communities provide opportunities that won't exist otherwise by pooling resources on a large scale that wouldn't be possible without tech.

## ASSESSMENT

- A. Identify the following website on what Social Media does it belong and write your answer in the Column provided below.

YouTube	Qoura	Trivago	Snapchat	LinkedIn	Flickr
AirBnB	Rover	Medium	Facebook	Stack Overflow	DoSplash
Vimeo	Facebook	Reddit	Instagram	Uber	Wistia
Yelp	TripAdvisor	Tumblr	Imgur	Dropbox	WeChat

Social Networking sites	Social Review Sites	Image Sharing Sites	Video Hosting sites	Community Blogs	Discussion Sites	Sharing Economy Network

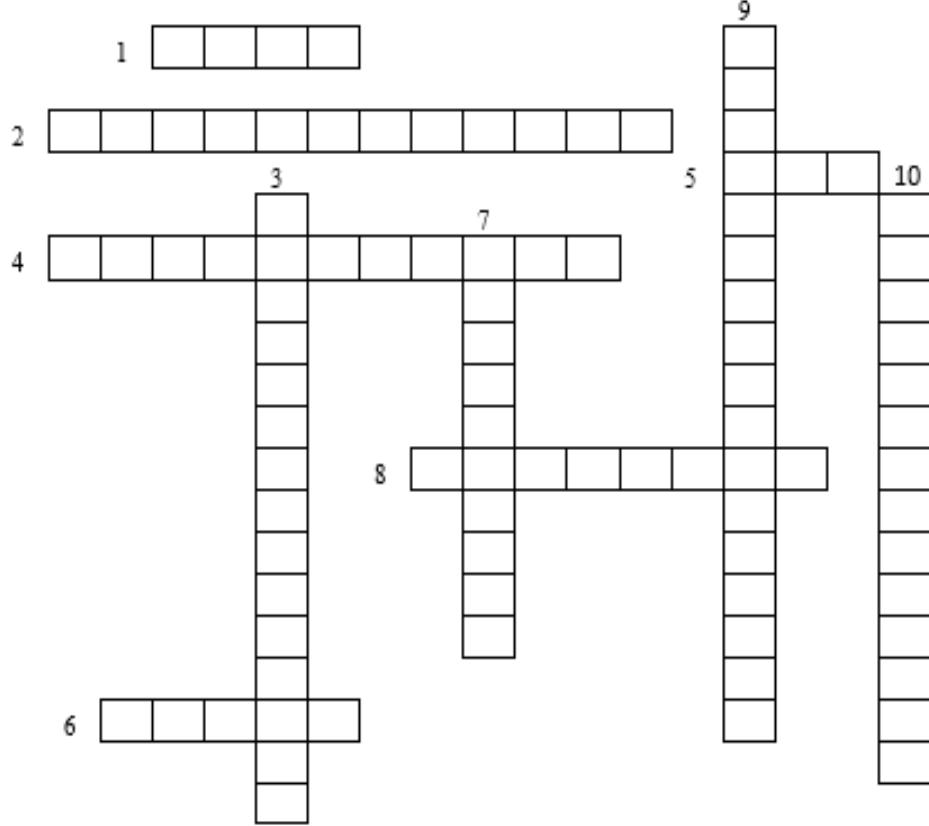
- B. Begin by arranging three Social Media sites in the order of your most preferred, to your least favorite. For each one, write an exposition detailing your experience with the site. These questions will serve as your guide:

- How long have you been using it? How did you discover the app or who introduced it to you?
- What device do you access it with? How often do you use it?
- What do you use it for?
- When you open the site/app, what do you open/check first?
- What features do you use?
- What is your favorite thing about the site/app?
- What do you dislike about the site/app?
- How do you think can the site/app be improved?
- What makes it better/worse compared to the other sites/apps you chose and why?

# ASSESSMENT

Instruction: Read and answer the questions. Write your answer to the puzzle below

Answer Sheet:



## QUESTIONS:

1. Hypertext Mark-up Language
2. is a collection of information, resources, pictures, sounds, multimedia on the internet that are linked and connected together.
3. the ability for a computer to do something that it wasn't originally instructed or programmed to do
4. refers to interactive web applications and technologies that manage user-generated content, and facilitate the sharing of such information—messages, posts, comments, pictures, music, videos and others, throughout a virtual community of users having their own service-specific profiles.
5. The concept of connecting any device with capable of connecting to Internet to each other, and includes everything from smartphones, refrigerators, washing machines, automatic lights and the entirety of your wearable technology.
6. The primary Internet communication tool
7. Is a description or representation of a computer's location on the Internet.
8. Is the publicly available worldwide system of interconnected computer networks that transmit data by packet switching using a standardized Internet Protocol (IP) and many other protocols.
9. Display reviews from community members for all sorts of locations and experiences.
10. The ubiquitous nature of the Internet means that it is accessible anytime, anywhere and through many means; it is quite literally everywhere nowadays

# FINAL ASSESSMENT

Instruction: Create an account in different Social Medias (if you don't have one yet) that help you when it comes to learning, and take a screenshot with header photo, display photo and Description about yourself. Minimum of 5 Social Medias Accounts.

## Research Gate

A screenshot of a ResearchGate profile page for Björn Hammarfelt. The profile shows a circular photo of a man with a beard, his name, a green 'RG' icon, a 'PHD' badge, and a 'Senior Lecturer' title from 'Högskolan i Borås'. Below the profile are tabs for 'OVERVIEW', 'CONTRIBUTIONS', 'INFO', 'STATS', and 'RG SCORE'. A call-to-action button 'Add a new Article' is visible. A sidebar on the right displays the institution 'Högskolan i Borås' and its location 'Borås, Sweden'.

## LinkedIn

A screenshot of a LinkedIn profile for Garrett Ive. The profile features a large photo of a smiling man, his name, and his title 'Account Director at Airfoil Public Relations'. It also lists his 'San Francisco Bay Area | Public Relations and Communications' location, previous experience at 'John Bailey & Associates Public Relations', and education at 'Aquinas College'. Below the profile are buttons for 'Connect' and 'Send InMail'. To the right, there's a sidebar titled 'MORE SEARCH RESULTS' showing profiles for 'Julie Barker' and 'John Bailey & Associates Public Relations'. A banner at the top of the LinkedIn page promotes 'Study Art & Design Online'.

## Facebook

A screenshot of a Facebook profile for Dorne McLoughlin. The profile includes a photo of a woman, her name, and a link to her page. Below the photo are tabs for 'Timeline' (highlighted with a red box), 'About', 'Friends 682', 'Photos', and 'More'. The 'About' tab is expanded, showing her role as 'Founder and CEO at Ribbit Media Solutions' and her past experience as 'Get A Digital Education'. To the right, there's a sidebar for a sponsored post from 'THERE ARE NO STYLES' and another for 'Build Your Store on FB!'.

## **Terms used in the Internet**

(<https://www.comentum.com/internet-terms.html>)

World Wide Web

Also called web or www, it is a collection of information, resources, pictures, sounds, multimedia on the internet that are linked and connected together. Using a software product such as Netscape makes accessing and linking to web pages containing information, easy. The world wide web was invented by Tim Bernes-lee in the CERN Laboratory in March 1989.

Host

A computer that is used to transfer data on the Internet.

## *Web Hosting*

To store and make web pages available and ready for inquiries, or a computer that has a consistent connection to the Internet.

*Domain Name*

A domain name is a description or representation of a computer's location on the Internet. It is usually separated by a dot.

For example:  
www.comentum.com  
sales.comentum.com  
joespizza.comentum.com

DNS

DNS (Domain Name System) is a large database of domain names and their correspondent Internet (IP Addresses) for example: www.widget.com corresponds to its unique number 207.168.6.12

### *IP address*

An IP (Internet Protocol) address is a unique number used to identify a computer on the Internet. If you are connected to the Internet, you must have a unique network number, which is an IP address. An example of an IP address is: 207.168.6.12

There are four numbers separated by a dot, and are between 0 and 255.

HTML

Hypertext Markup Language is a coding language used to tell a browser how to place pictures, text, multimedia and links to create a web page. When a user clicks on a link within a web page, that link, which is coded with HTML, links the user to a specific linked web page.

### *Hypertext*

Hypertext is text on a webpage that links to another document or webpage. The hypertext link can be as small as a letter or word, or as big as all the text on the page.

### *FTP*

File Transfer Protocol is a method of transferring files between two computers on the Internet. To access, upload or download information on a server computer (or a computer that accesses a server computer), FTP software makes the information access or transfer possible.

### *Home Page*

A home Page is the main or index page of a web site. For example, if a user opens Netscape or Internet Explorer and types the URL, <http://www.commentum.com>, that would open the home Page of the Commentum Communications company.

### *URL*

Uniform Resource Locator is a web address used to connect to a remote resource on the WorldWideWeb.

For-example:

<https://www.commentum.com>

<ftp://ftp.commentum.com>

<telnet://info.commentum.com>

In the above example, http:// is a type of Protocol (communication rules and methods) followed by www.commentum.com, which a host address. A port number could also be added after the host address (example: <https://www.commentum.com:80>).

### *Port*

In relationship to the Internet, a Port is a channel that a server software would listen to, for any inquiries, there are certain standard default channels set for certain server software. For example, a web server software by default will listen to port 80 for any inquiry. Web server software can also listen to any other port, for example: <http://www.commentum.com:5000>

### *Server*

A server is a computer with a software program set up for serving web pages to a user on the same computer or another computer. The server computer coupled with server software, listens for inquiries from a client computer (a computer other than the server).

### *Upload*

To upload is to transfer data from your computer to another computer.

### *Download*

To download is to transfer data from another computer to your computer.

## Review

- Social Media refer to interactive web applications and technologies that manage user-generated content and facilitate the sharing of information throughout a virtual community of users having their own service-specific profiles.
- Most businesses nowadays are maintaining a Facebook page or account to market their products or services or generate brand awareness. And while Facebook is popular across most demographics, different Social Media platforms are widely available depending on one's use and personal taste.
- When combined with Big Data analytics, companies can monitor, track and even analyze web content about products or brands comparable to theirs, which can be useful for advertising and networking, as well as give insight on competitors in the market. The use of new media enable consumers to spread opinions and share their experiences, thereby shifting power from business to the buyers.
- Aside from business, Social Media is used as platform to vocalize ideals and ask people to vote for politicians. Social media also uses Data Mining to choose the type of advertisements shown to the user through customer information for targeted advertising. It is also used to look for jobs and employees, with company staff looking over potential interviewees and existing staff to monitor Social Media behavior.
- A lot of problems on Social Media platforms continue to exist despite efforts to relegate them. Some are known to breach ethics and can be classified as cybercrime; these include Fake news, Cyberbullying and Stalking, Spam, Stereotyping, Addiction, and Effects on communication. Concerns on Security, Privacy and Confidentiality are also prevalent.



# MODULE V: BASIC HTML & CSS

## COURSE OUTCOMES

Develop a simple web page using HTML and CSS basics.

## LEARNING OUTCOMES

- Identify the basic concept of HTML and CSS
- Create a simple web page using HTML and CSS basics.

Throughout this course, you'll learn about the underlying structure of the web – HTML or Hypertext Markup Language. You'll learn how to use this tree-like structure to create websites. You'll also learn how to apply styling to a website through CSS or Cascading Style Sheet. You'll learn about CSS syntax, selectors, and units. Along the way, you'll also learn how to code editors and a browser's developers tools.

## HTML

HTML is the standard markup language for creating Web pages.

- HTML stands for Hyper Text Markup Language
- HTML describes the structure of Web pages using markup
- HTML elements are the building blocks of HTML pages
- HTML elements are represented by tags
- HTML tags label pieces of content such as "heading", "paragraph", "table", and so on
- Browsers do not display the HTML tags, but use them to render the content of the page

## A Simple HTML Document

```
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
</head>
<body>

<h1>My First Heading</h1>
<p>My first paragraph.</p>

</body>
</html>
```

### Example Explained

- The `<!DOCTYPE html>` declaration defines this document to be HTML5
- The `<html>` element is the root element of an HTML page
- The `<head>` element contains meta information about the document
- The `<title>` element specifies a title for the document
- The `<body>` element contains the visible page content
- The `<h1>` element defines a large heading
- The `<p>` element defines a paragraph

## HTML TAGS

HTML tags are keywords (tag names) surrounded by angle brackets:

`<tagname>content</tagname>`

Start tag      in pairs      End tag

Example:

`<p>My First Paragraph.</p>`

- HTML tags normally come in pairs like `<p>` and `</p>`
- The first tag in a pair is the start tag, the second tag is the end tag
- The end tag is written like the start tag, but with a forward slash inserted before the tag name

Four basic HTML tags:

1. `<HTML>`
2. `<HEAD>`
3. `<TITLE>`
4. `<BODY>`

## Web Browsers

The purpose of a web browser (Chrome, IE, Firefox, and Safari) is to read HTML documents and display them.

The browser does not display the HTML tags, but uses them to determine how to display the document:



## HTML PAGE STRUCTURE

---

Below is a visualization of an HTML page structure:

```
<html>

<head>
    <title>Page title</title>
</head>

<body>
    <h1>This is a heading</h1>
    <p>This is a paragraph.</p>
    <p>This is another paragraph.</p>
</body>

</html>
```

Only the `<body>` area (the white area) is displayed by the browser.

### The `<!DOCTYPE>` Declaration

The `<!DOCTYPE>` declaration represents the document type, and helps browsers to display web pages correctly.

It must only appear once, at the top of the page (before any HTML tags).

The `<!DOCTYPE>` declaration is not case sensitive.

The `<!DOCTYPE>` declaration for HTML5 is:

```
<!DOCTYPE html>
```

### HTML Versions

Since the early days of the web, there have been many versions of HTML:

Version	Year
HTML	1991
HTML 2.0	1995
HTML 3.2	1997
HTML 4.01	1999
XHTML	2000
HTML5	2014

## ASSESSMENT

*Instructions: Create your first HTML file follow the instructions and screenshot your first HTML file in a web browser.*

Step 1: Open Notepad/TextEdit or any text editor available in your computer.

Step 2: Write/Copy some HTML into notepad

```
<!DOCTYPE html>
<html>
<body>

<h1>My First Heading</h1>

<p>My first paragraph.</p>

</body>
</html>
```

Step 3: Save the HTML Page (.html, .htm)

Step 4: Open the saved HTML file in your favorite browser (double click on the file, or right-click - and choose "Open with").

The result will look much like this:



## ASSESSMENT

*Instruction: Create a simple web page that will display the following:*

Name

Birthday

Address

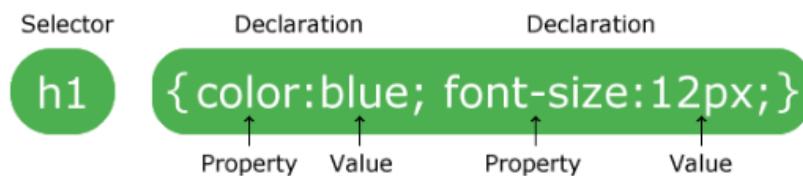
*Save your file as lastname-act1.html*

# CSS

CSS or Cascading Style Sheet is simple design language that describes the style of an HTML document. Through CSS, each element in the HTML document can be modified according to its color, size, backgrounds, layout, etc. CSS saves a lot of work. It can control the layout of multiple web pages all at once. External stylesheets are stored in CSS files.

## CSS Syntax

A CSS rule-set consists of a selector and a declaration block:



The selector points to the HTML element you want to style.

The declaration block contains one or more declarations separated by semicolons.

Each declaration includes a CSS property name and a value, separated by a colon.

A CSS declaration always ends with a semicolon, and declaration blocks are surrounded by curly braces.

In the following example all <p> elements will be center-aligned, with a red text color:

```
p {  
    color: red;  
    text-align: center;  
}
```

Example:

HTML document with CSS	OUTPUT
<pre>&lt;!DOCTYPE html&gt; &lt;html&gt; &lt;head&gt; &lt;style&gt; p {   color: red;   text-align: center; } &lt;/style&gt; &lt;/head&gt; &lt;body&gt;  &lt;p&gt;Hello World!&lt;/p&gt; &lt;p&gt;These paragraphs are styled with CSS.&lt;/p&gt;  &lt;/body&gt; &lt;/html&gt;</pre>	<p>Hello World!</p> <p>These paragraphs are styled with CSS.</p>

## CSS Selectors

CSS selectors are used to "find" (or select) HTML elements based on their element name, id, class, attribute, and more.

### The element Selector

The element selector selects elements based on the element name.

You can select all `<p>` elements on a page like this (in this case, all `<p>` elements will be center-aligned, with a red text color):

```
p {
  text-align: center;
  color: red;
}
```

### The id Selector

The id selector uses the id attribute of an HTML element to select a specific element.

The id of an element should be unique within a page, so the id selector is used to select one unique element!

To select an element with a specific id, write a hash (#) character, followed by the id of the element.

The style rule below will be applied to the HTML element with id="para1":

```
#para1 {  
    text-align: center;  
    color: red;  
}
```

**Note:** An id name cannot start with a number!

### The class Selector

The class selector selects elements with a specific class attribute.

To select elements with a specific class, write a period (.) character, followed by the name of the class.

In the example below, all HTML elements with class="center" will be red and center-aligned:

```
.center {  
    text-align: center;  
    color: red;  
}
```

You can also specify that only specific HTML elements should be affected by a class.

In the example below, only <p> elements with class="center" will be center-aligned:

```
p.center {  
    text-align: center;  
    color: red;  
}
```

HTML elements can also refer to more than one class.

In the example below, the <p> element will be styled according to class="center" and to class="large":

```
<p class="center large">This paragraph refers to two classes.</p>
```

**Note:** A class name cannot start with a number!

## Grouping Selectors

If you have elements with the same style definitions, like this:

```
h1 {  
    text-align: center;  
    color: red;  
}  
  
h2 {  
    text-align: center;  
    color: red;  
}  
  
p {  
    text-align: center;  
    color: red;  
}
```

It will be better to group the selectors, to minimize the code.

To group selectors, separate each selector with a comma.

In the example below we have grouped the selectors from the code above:

```
h1, h2, p {  
    text-align: center;  
    color: red;  
}
```

## CSS Comments

Comments are used to explain the code, and may help when you edit the source code at a later date.

Comments are ignored by browsers.

A CSS comment starts with /\* and ends with \*/. Comments can also span multiple lines:

```
p {  
    color: red;  
    /* This is a single-line comment */  
    text-align: center;  
}  
  
/* This is  
a multi-line  
comment */
```

## Three Ways to Insert CSS

There are three ways of inserting a style sheet:

- External style sheet
- Internal style sheet
- Inline style

### External Style Sheet

With an external style sheet, you can change the look of an entire website by changing just one file!

Each page must include a reference to the external style sheet file inside the `<link>` element. The `<link>` element goes inside the `<head>` section:

```
<head>  
<link rel="stylesheet" type="text/css" href="mystyle.css">  
</head>
```

An external style sheet can be written in any text editor. The file should not contain any html tags. The style sheet file must be saved with a .css extension.

Here is how the "mystyle.css" looks:

```
body {  
    background-color: lightblue;  
}  
  
h1 {  
    color: navy;  
    margin-left: 20px;  
}
```

Note: Do not add a space between the property value and the unit (such as margin-left:20px). The correct way is: margin-left:20px;

## Internal Style Sheet

An internal style sheet may be used if one single page has a unique style.

Internal styles are defined within the `<style>` element, inside the `<head>` section of an HTML page:

```
<head>  
<style>  
body {  
    background-color: linen;  
}  
  
h1 {  
    color: maroon;  
    margin-left: 40px;  
}  
</style>  
</head>
```

## Inline Styles

An inline style may be used to apply a unique style for a single element.

To use inline styles, add the `style` attribute to the relevant element. The `style` attribute can contain any CSS property.

The example below shows how to change the color and the left margin of a `<h1>` element:

```
<h1 style="color:blue; margin-left:30px;">This is a heading</h1>
```

Tip: An inline style loses many of the advantages of a style sheet (by mixing content with the presentation). Use this method sparingly.

## Multiple Style Sheets

If some properties have been defined for the same selector (element) in different style sheets, the value from the last read style sheet will be used.

Example

Assume that an external style sheet has the following style for the <h1> element:

```
h1 {  
    color: navy;  
}
```

then, assume that an internal style sheet also has the following style for the <h1> element:

```
h1 {  
    color: orange;  
}
```

If the internal style is defined after the link to the external style sheet, the <h1> elements will be "orange":

```
<head>  
<link rel="stylesheet" type="text/css" href="mystyle.css">  
<style>  
h1 {  
    color: orange;  
}  
</style>  
</head>
```

However, if the internal style is defined before the link to the external style sheet, the <h1> elements will be "navy":

```
<head>  
<style>  
h1 {  
    color: orange;  
}  
</style>  
<link rel="stylesheet" type="text/css" href="mystyle.css">  
</head>
```

## Cascading Order

What style will be used when there is more than one style specified for an HTML element?

All the styles in a page will "cascade" into a new "virtual" style sheet by the following rules, where number one has the highest priority:

1. Inline style (inside an HTML element)
2. External and internal style sheets (in the head section)
3. Browser default

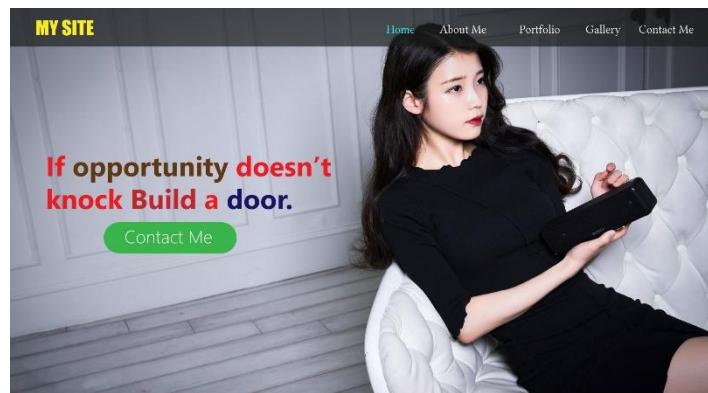
So, an inline style has the highest priority, and will override external and internal styles and browser defaults.

## ASSESSMENT

*Instruction: Open your previous HMTL activity and add color, style, alignment, pictures, or anything that will aesthetically improve your webpage.*

## FINAL ASSESSMENT

*Instruction: Create a web page with a 5 menus: Home, About Me, Portfolio, Gallery, and Contact. See picture (Not necessarily you need to copy it or come up exactly look like it, but if you have the skills then go for it). See the rubrics below for guidance.*



### ABOUT ME

Description Description Description Description Description  
 Description Description Description Description Description Description  
 Description Description Description Description Description Description

Birthday: May 15, 1997 E-Mail: gilcagande@buksu.edu.ph  
 Age: 23 Phone: 09210392130  
 Residence: Philippines Skype: gilnicholas  
 Address: Brgy.07, Malaybalay City Bukidnon



### PORTFOLIO



### GALLERY



### CONTACT ME

#### Drop us a line

We are always here for you



Your Comment

Submit



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## Rubrics for Web Design

Score Level	Design & Layout	Navigation	Completion
<b>5 (Extraordinary)</b>	The website has an exceptionally attractive layout It is easy to locate important elements	Links are clearly labelled, consistency placed, allow reader to easily move.	100% Complete
<b>4 Satisfactory</b>	The website has an attractive layout It is easy to locate important elements	Links are labelled, and allow reader to easily move.	75% Complete
<b>3 Average</b>	The website has usable layout but may appear busy or boring	Links reader to easily move. Some links seem to be missing	50% Complete
<b>2 Unsatisfactory</b>	The website has a cluttered or confusing layout.	Links seem to be missing and don't allow the ready to easily navigate	25% Complete
<b>1 Poor</b>	The website has unusable layout	Links don't take	Less than 10% complete

References:

Appendices