XIAMEN UNIVERSITY MALAYSIA

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Feedback from Lecturer:

Mark:

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Signature:

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Date:

09/12/2020

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SOF102 Assignment

by Aofan Liu

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Task1: Introduction to computers

The computer system is a basic, complete and fully functional hardware and software setup with everything needed to achieve computing performance. It has penetrated into various fields of the national economy and society, and have become a huge productivity that promotes social development.

But no matter how the computer changes, all actions performed on the computer can be classified into 4 types (i.e., Input, Output, Processing, Storage). Input and output are the interaction between the computer system and the user. In addition, storage and processing are closely connected. Four functions coordinate with each other to help the computer complete tasks better (Information Systems, 2012).

Fig 1.1 four functions of computer system

- Input

The input function means that the computer can receive a variety of data, which can be Boolean numbers, Integers, or Floating-point numbers. Through the linear operation of these basic elements, sophisticated file types such as graphics and sounds can be stored. The input function is realized through the input devices which are bridges between the computer system and the user. With the help of input device, a computer can be used to type documents and e-mails. For example, Logitech K480 keyboard is a popular keyboard.

- Output

Output means that the computer displays the calculation result data or information after performing complex operations on various functions, variables, and characters.

The output device is used to receive and display the data output by the computer. Common output devices are monitors, printers, and speakers.

- Processing

In the processing stage, the computer system interprets the values into instructions according to the CPU's instruction set architecture (ISA) definition, and then the controller transfers the data to be processed or calculated into the arithmetic unit, and obtains the calculation results and sends them to the output device. Processing turns data into information. An example of processing can be that through some functions, we change the color picture into black and white picture.

- Storage

Both primary and secondary storage are very important. The primary storage interacts directly with the CPU and it is volatile. Secondary storage is relatively non-volatile. Storage equipment usually digitizes information and then stores it in electric, magnetic or optical media. Moreover, we all know that computers use 0 and 1 to store data. For example, when a hard disk writes data, the magnetic head uses an electromagnet to change the polarity of the magnetic material on the disk to record the data. The two polarities correspond to 0 and 1 respectively. The most common example of secondary storage is hard disk. Documents, photos, videos, and games accumulated by users over the years are all in storage devices.

In recent decades, the scale of information has increased at an incredible rate. In a society where everything is data, we need the help of information system to collect and process data. Generally speaking, we think information system (IS) consists of five parts.

- Software

Software is a series of instructions for processing data. It consists of system software and application software. The former refers to operating systems such as

Linux and Mac OS, and the latter refers to application software such as Office and electronic dictionary.

- Hardware

The hardware includes a variety of physical electronic devices such as a mouse, keyboard, touch ball, and hard disk. They are physical devices composed of electronic, mechanical, and optoelectronic components that can perform specific tasks on a computer. A kind of well-known hardware is the GTX3080 graphics card, which is known for its excellent performance.

- Data

Data is raw, unprocessed facts, including text, numbers, images, and sounds and it becomes information after processing. Normally we have document files (Word, Txt), worksheet files (Excel), database files (Access, SQL) and presentation files(slides).

- Procedure

At the same time, a procedure is a collective term for a series of rules that people should follow when operating. Each specific step of a project is recorded in detail in a procedure. These detailed instructions on operation are recorded in a tutorial written by a technician. For example, when purchasing Oracle series software, instructions and installation tutorials will be provided.

- People

People decide the direction of the implementation of the information system, which is the key role of this system. They dominate the information system and redefines the relationship between man and information. The system performs specific operations according to people's wishes and converts data into information. For example, a person who has a habit of sorting may choose to customize the information system to organize information according to his own habits

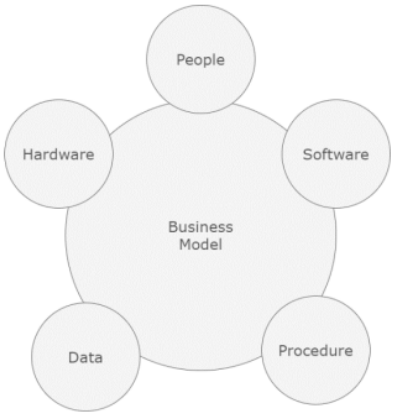

Fig 4.1 Five components of information system

Task2: Computer hardware

Computer hardware refers to a general term for various physical devices composed of electronic, mechanical, and optoelectronic components in a computer system. In short, the function of the hardware is to input and store programs and data, and execute the programs to include a data processor as a usable form.

In the early computer design, program and data are two different concepts. Data is stored in the memory, and the program is a part of the controller. But in Von Neumann structure, the program is treated as data, the program is encoded as data, and stored in the memory together with the data, so that the computer can call the program in the memory to process the data. It means that no matter what program, it will be converted into the form of data and stored in the memory. To execute the corresponding program, you only need to take the instructions from the memory in turn. Another important point is that the system uses binary.

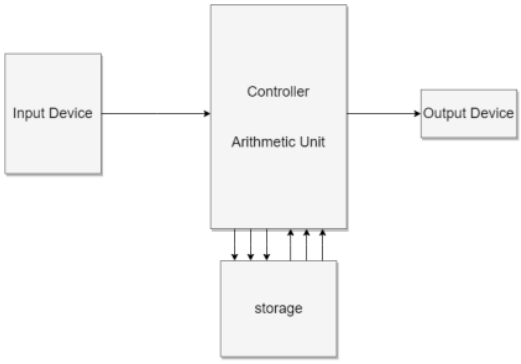

Fig 4.2 Von Neumann structure

Standard Von Neumann structure consists of the parts listed below.

- Arithmetic unit
- controller
- storage
- input device
- output device

Moreover, five registers are used in Von Neumann architecture. These five elements work together to better accomplish the task

MAR	Memory Address Register	The memory location where you want to access the data
MDR	Memory Data Register	Save the data being transferred from memory
AC	Accumulator	Storage location of intermediate arithmetic and logic results
PC	Program Counter	Contains the address of the next instruction to execute
CIR	Current Instruction Register	Contains the current instruction in the process

Fig 5.1 Five registers of Von Neumann architecture

The Von Neumann system is an important progress in the history of human computer, but it does not mean that the Von Neumann system is perfect in all aspects, it also has its own shortcomings.

Advantages:

- High memory utilization
- The program is stored in the form of data and can be reused

Disadvantages:

- Cannot be executed concurrently
- Compared with the present computer, it is inefficient
- There may be a risk of rewriting

When it comes to computer hardware, usually we have many components. It includes central processing unit, memory, motherboard, hard drive, optical drive, various expansion cards, power supply, mouse, keyboard, etc. And I will explain some information about motherboards, memory sticks, CPUs, hard drives.

To start with, the type of motherboards can be roughly divided into four parts according to the size (EATX>ATX>mATX>mini-ITX). Both of the mATX motherboards and ATX motherboards are of the same width. But, ATX motherboards are longer than mATX in height.

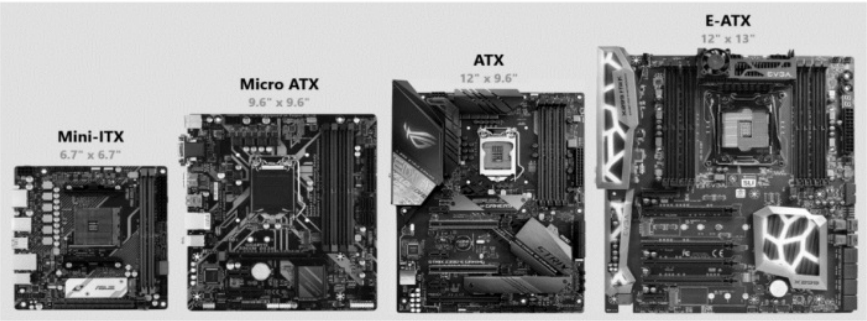

Fig6.1 Motherboards

The standard size of EATX is 305x330 which offering the richest set of features. As is often the case, most people will choose ATX which achieves the balance between features and size. Apart from that, it's better to use EATX or ATX motherboard if you are willing to upgrade your PC few years later instead of buying another new one. Moreover, mATX and ITX are designed for those who don't have enough space for their computer.

Type	Size(mm)	RAM Slot	Case	PCI-E slots	Expansibility
EATX	305x330	8/16 slots	Full Tower Case	16 slots	Very High
ATX	305x244	4 slots	Mid Tower Case	4 slots	High

mATX	244x244	2 slots	Mini Tower	3 slots	Low
ITX	170x170	2 slots	Small Form Factor	1 slot	Very Low

Table 7.1 Comparison of motherboards

CPU, also known as the central processing unit, is the core component of the entire computer. When executing all instructions such as data operation and transmission, it needs to be carried out under the guidance of the central processing unit, as the heart of the entire computer, controlling all processes of information processing of this computer. By the way, Core i9 is the latest generation of CPU. CPU can be divided into control unit (CU) and arithmetic control unit (ALU). The former analyzes instructions and sends corresponding control signals to control the whole CPU, while the latter is responsible for arithmetic calculation.

It is a hard disk that stores information. It is also an important warehouse in the entire computer. Hard disk drive has the characteristics of cheap price, harsh working environment, low vibration, and easy to produce bad tracks. Compared with hard disk drives, solid state disks have the characteristics of small size, low heat output, and fast transmission speed. The reading speed and writing speed are at least three times that of hard disks.

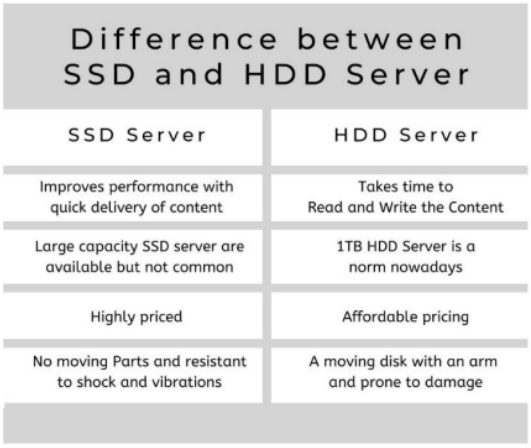

Fig 7.1 Difference between SSD and HDD

The memory stick in the computer can be read and written at any time and is very fast, and is usually used as a temporary data storage medium for operating systems or other running programs. The memory module consists of many versions, DDR2, DDR3 and DDR4. Different generations of memory modules have different interfaces. Memory modules of different generations are not compatible with each other. DDR4 is currently the mainstream. Common frequencies are 2666, 3000, 3200 and 3600. Generally speaking, the higher the frequency, the faster the speed.

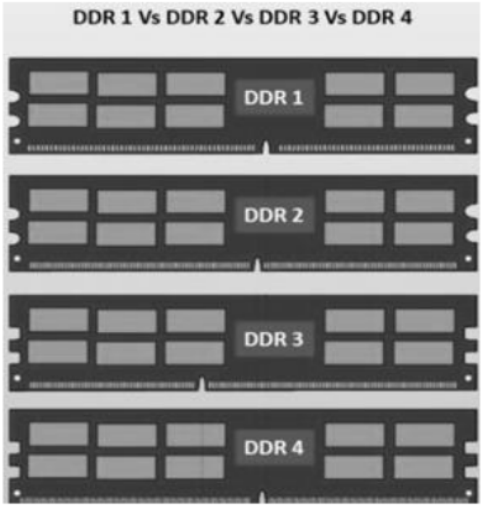

Fig 8.1 DDR1Vs DDR2 Vs DDR3 Vs DDR4

Task3: Computer Software

System software can be described as a set of programs that coordinates all activities among computer hardware and controls and manages the hardware and other software on a computer. At the same time, Application software is a tool to perform useful works or specific tasks.

The system software provides a platform for application software, mainly realizes the underlying control function, and provides help for the operation of each application software on the basis of coordinating the hardware. At the same time, the application software is installed by users according to their own needs. The system software is written in low-level language, which can interact with hardware to maximize the use of

hardware functions, while the application software is written in high-level language, which is convenient and fast. The disadvantage of written in low-level language is that the system application is difficult to understand and modify.

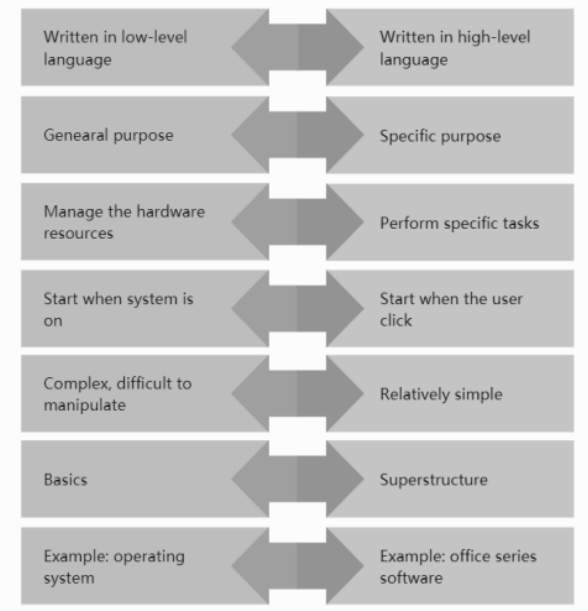

Fig 9.1 System software Vs Application software

Linux is a common operating system for developers. Most websites choose Linux as the server to build their own commercial applications. Linux connects hardware and software. Without Linux system and other system software, you can't even make any simple operation on computer hardware. Linux has memory manager, command line, diversified GUI interface and security management strategy, which are the basis for the normal operation of application software.

However, different from the system software as a general hardware control component, application software is not irreplaceable. It depends on system software and needs platform to run. The system software creates an application interface for the application software to call, including dynamic link library, memory management tool, thread control and other modules. The coordination and unification of these modules is the basis for the normal operation of the application software. Moreover, the system

software will start at the first moment of hardware operation, while application software will only be executed when the user requests to start.

Access is a lightweight relational database management system that includes a graphical interface and a database engine. Access is a part of Office suite, and it integrates well with Excel and Word. At the same time, Access supports the Visual Basic macro language. You can even develop simple systems directly in Access. Access needs the platform support provided by the system application and the corresponding Win32 API functions to realize its own complex and specific functions. It can also be seen that the application software depends on the system software to run normally.

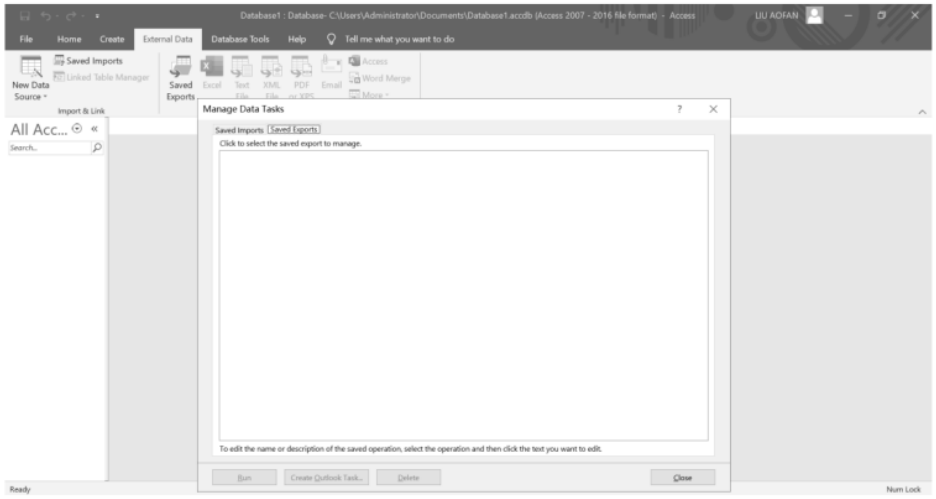

Fig 10.1 Access

The following functions are needed by the application software to get help from the system software:

- Function of calling system service
- Receive notification of system services
- Call the UI component of the system to generate the interface.
- Store and call hard disk data

Finally, the system application and software application work together to help users better complete the task. The former is responsible for the bottom layer, and the latter is responsible for the visual layer.

Task4: Computer Code

A programming language is a collection of grammatical rules that guide a computer system to perform specific tasks. They issue instructions to the computer and define precisely what actions should be taken in different situations. Hardware automation in the manufacturing industry just needs to accurately describe each step. Therefore, programming languages have been widely used in manufacturing.

The Internet of Things (IoT) is becoming a growing topic in both programming and manufacturing world. In fact, programming languages provide assistance in hardware and web application development for the Internet of Things (Constandinos X. Mavromoustakis). And it consists of three layers all of which are essential to The Internet of Things.

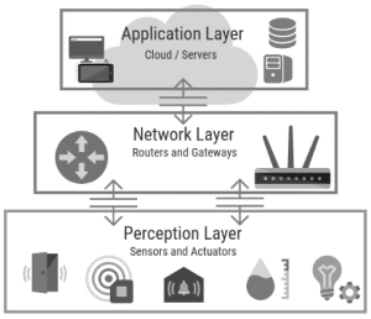

Fig 11.1 Three layers of Internet of Things

Through the hardware controlled by programming language, the information of the production line can be timely, and the safety is better. The Internet of Things can greatly reduce the cost of existing state monitoring and portable control solutions. Similarly,

through programming, sensors tend to be hardware oriented, and industrial IOT sensors will gradually develop to better adapt to single performance tasks.

Embedded programming, the key technology of Internet of Things, is widely used. In terms of industrial robots, the development of embedded chips will make robots more obvious in miniaturization and high intelligence. And they will greatly reduce the price of robots, making them more suitable in the industrial field. Through the combination of programming languages and physical devices, the overall collaboration capabilities are improved. Programming to specific hardware has greatly changed the world, and there is no doubt that we have entered a beautiful world made up by the Internet of things (IOT and Military, 2017). It's a revolution that changes the way we live.

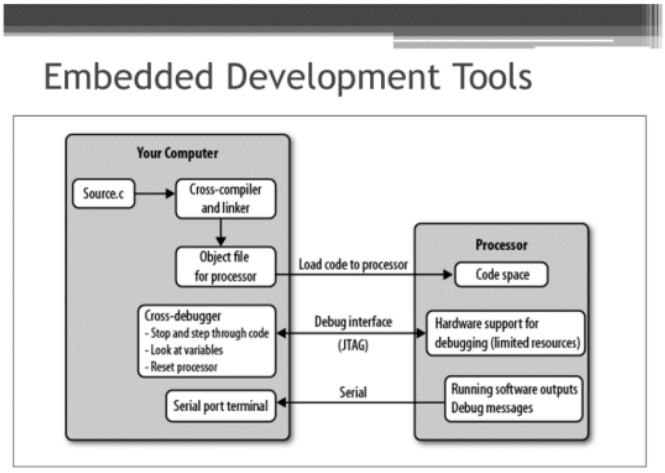

Fig12.1 Embedded developments tools

For example, C language is the preferred language for hardware interfaces, allowing the memory of computers or microcomputers to be accessed in bytes or bits. New device drivers are generally written in C language. In fact, C language is a high-level programming language standard for hardware interface, so it is often used for data acquisition and real-time control of embedded and mechatronics.

Moreover, CNC (Computer numerical control) programming is also one of the examples of programming languages related to manufacturing. CNC programming is used by manufacturers to create program instructions for computers to control machine tools. These programming languages help machines to achieve automation. A control system designed with a programming language logically processes the program with control codes or other symbolic instructions, and decodes them, and the CNC machine tool automatically processes the parts according to the shape and size required by the drawing. It is highly involved in the manufacturing process and has increased the degree of automation and size.

The impact of programming languages on manufacturing is profound. They changed the old face of the manufacturing industry and replaced it with new intelligent hardware facilities to give full play to the potential of the manufacturing industry. At the macro level, it promotes the development of manufacturers in a larger and stronger direction, and at the micro level, it promotes the development of manufacturing to sophisticated hardware programming.

Task5: Multimedia Technology Basics

Multimedia technology relies on computers, integrates sound, video, images, text and other elements, collects and integrates different information, and integrates the human computer interchange system, so that each element has a logical connection mode. The content includes data compression processing, information audio processing, image processing, etc. The objects of its processing involve important factors such as sound, video, image, and text, and these factors are processed and stored in digital form.

The display effect of multimedia technology is wonderful, very suitable for advertising and marketing. As a result, there is no denying that the multimedia technology is widely used in the advertisement area. Multimedia technology has the characteristics of real-time and synchronization, interactivity, integration and comprehensiveness. The following are some of the applications of some multimedia technologies in the

advertising industry. The shortcoming of text only message implies that multimedia technology will have a vital role in advertisement.

- Interstitial ads

  This page is a page that a user forcibly inserts without permission when using a computer normally. This ad uses streaming media technology as a platform to insert and broadcast video animation ads, and viewers can also use it. Interstitial ads often use Flash format to place them on the web page.

- Float advertising

  Floating map advertisements and banner advertisements have similar production principles, using Java Script or Java code to design and add to web pages and process image elements to control its movement path.

- Video advertising

  Video advertising is a major application of multimedia technology in advertising. Through the application of diversified elements, online video advertising is not only highly interactive, but also allows consumers to intuitively understand all the product information, plus some influential people will instantly increase the popularity of the product. At the same time, network video also has the advantages of accuracy and reliability. It can understand the basic information of users through the detection system on the video, so as to formulate a more targeted sales plan, which not only meets the purchase needs of consumers, but also improve the company's image and achieve a win-win effect.

- Banner advertising

  This mode is currently the most common form of online advertising, which can reflect the needs of users and customers, mainly interactive, dynamic, static and other types. Static banner ads use file formats such as GIP, PNG, JPG, etc. They are designed by effectively using multimedia technology, using Flash scripts and JAVA programs to improve the interaction of advertisements to deliver high-quality information. Interactive banner ads are compatible, small in size, and have lower requirements for browser network speed and version.

This mode can deliver online advertisements with interactive functions and complex visuals, and uses audiovisual, JAVA and other production tools to ensure delivery effects. Multimedia advertising is a fast-developing advertising model that can realize basic functions such as hyperlinks and online preliminary broadcasts.

Moreover, both linear representation and non-linear representation have many applications in advertising. The advertisements inserted on some websites follow a one-way structure and develop in chronological order to convey fixed information. On other sites (e.g., video ads website), the opposite is true, they allow free movement in all aspects of multimedia in any order. They also have many links on the website, customers can change between one page to another page.

If a slide is used as an example, then the difference between linear presentation and non-advanced presentation can be used as follows

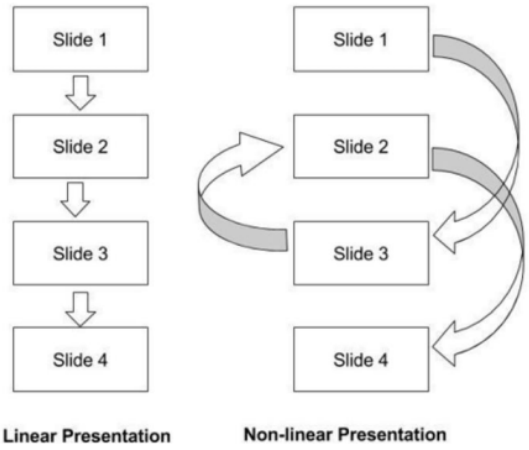

Fig 15.1 Linear presentation and Non-linear Presentation

Task6: Computer Security

As computer technology continues to promote the development of society in a better direction, the negative impact of technology is gradually increasing. Various computer

viruses are trying to steal our information and property. A computer virus can be described as a computer program that will tamper with other computer programs and inject its own code when running to realize self-replication during execution, or steal user information or encrypt user files. To be able to be called a computer virus, two conditions need to be met, one is to be able to execute itself, and the other is to be able to replicate itself (Computer virus, 2020).

Three more common computer viruses are Ransomware, Trojan and Worm. All of them have caused great damage to our society and Internet.

Ransomware is malicious software that hackers hijack user files by locking screens, encrypting files, etc., to blackmail users' money. Hackers use system vulnerabilities or through phishing to plant viruses on the victim's computer or server, to encrypt key files on the hard disk (such as ERP database files) and even the entire hard disk, and then ask the victim for a ransom of varying amounts to decrypt it. On the evening of May 12, 2017, the WannaCry Ransomware spread rapidly in a short period of time. Therefore, relatively many companies or companies were affected by the virus, including government departments, business units, and educational institutions. According to statistics, there have been more than one million computer virus attacks worldwide, covering many countries and regions in the world.

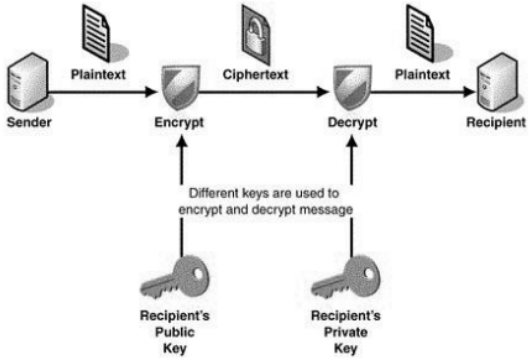

Fig 16.1 Ransomware

Trojan horses are malicious software that usually disguise as legitimate software. Hackers use Trojan horses to install the backdoor on the target computers. Once activated, the Trojan can allow cybercriminals to monitor you, steal your sensitive data, and open the back door to your system. Its operations may include delete data, freeze

data, change data, copy data, destroy computer performance or network. Unlike computer viruses and Worms, Trojan horses cannot replicate themselves. A Trojan horse that was once notorious is called Gh0st RAT, which replicates itself and spreads through extension codes on emails.

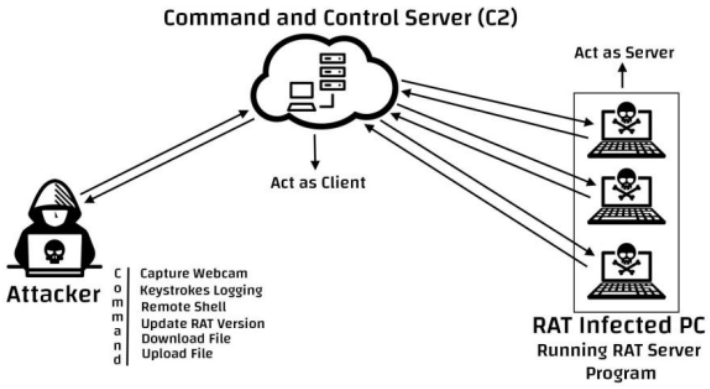

Fig 17.1 Trojan houses

The infection mechanism of Worms is to use the network to replicate and spread, and the way of infection is through the network, e-mail, and mobile storage. After a Worm invades a computer, it first obtains the IP addresses of other computers, and then sends copies of itself to these computers. The Worm also uses the information stored in the address book of the mail client on the infected computer to spread the program. Although there are Worm programs that generate files on the infected computer, in general, Worm programs only occupy internal resources. The attachment in the ILOVEYOU virus is a VBScript program. Open the program (for example, by double-clicking it with the mouse) to find the recipient's Outlook address book and resend the note to everyone in it. Then, it will overwrite (and therefore destroy) all files of the certain file types (e.g., JPEG, MP3, VPOS, JS).

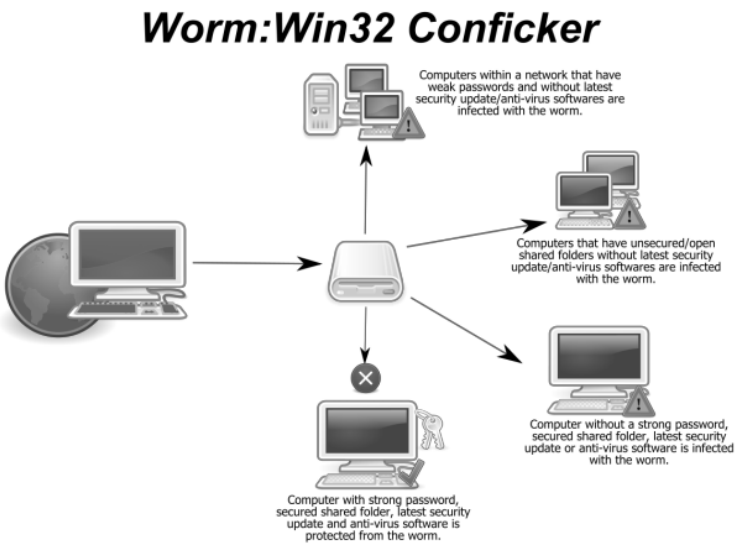

Fig 18.1 An example of worm

Ransomware encrypts important user information, which is very harmful to some business users or some students who are writing papers. Worms will increase exponentially, occupy a lot of resources and space, slow down the speed of the computer, and directly or indirectly cause the paralysis of the network system. Trojan horse viruses will be lurking in the computer for a long time, stealing important or private data, and causing troubles.

There are usually three reasons for making a computer virus. One is to make money, the other is to steal target information, and the last is to show off their skill level for vanity.

Therefore, the harm of computer viruses should also be considered from these three aspects. The first one may cause financial loss. For example, some viruses that target Bitcoin will secretly modify the receiving address to the hacker's account when the user sends Bitcoin. The theft of user information often causes the harassment of spam advertisements. It is often the case that you search for information about cars the day

before, all kinds of promotional advertisements will hit you the next day. Finally, they are pure hoaxes. These viruses will not cause huge losses, but will seriously delay work progress and cause physical and mental harm to the victim.

SOF102 Assignment

ORIGINALITY REPORT

2%	2%	0%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.computerscience.gcse.guru Internet Source	1%
2	www.classmate4u.com Internet Source	1%
3	docplayer.net Internet Source	<1%

Exclude quotes	On	Exclude matches	< 5 words
Exclude bibliography	On		

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Von Neumann System. (2020, 12 9). Retrieved from zhihu: https://zhuanlan.zhihu.com/p/85285644

APPENDIX 1

MARKING RUBRICS

Component Title	**Assignment**				**Percentage (%)**	**40%**	
Criteria	**Score and Descriptors**					**Weight (%)**	**Marks**
	Excellent (5)	**Good (4)**	**Average (3)**	**Need Improvement (2)**	**Poor (1)**		
Question 1 (15 Marks)							
Describe the functions of the computer system						5	
Explain five components of an information system with examples.						10	
Question 2 (15 Marks)							
Explain about Von Neumann architecture.						5	
Discuss any FOUR (4) types of computer hardware.						10	
Question 3 (20 Marks)							
Contrast the types of computer software with examples. (1)						10	
Contrast the types of computer software with examples. (2)						10	
Question 4 (15 Marks)							
How is these programming languages related to the industry? Your explanation must related to any ONE (1) of the industry listed below. • Manufacturing • Sales and marketing • Entertainment						15	

Criteria	Score and Descriptors					Weight (%)	Marks
	Excellent (5)	Good (4)	Average (3)	Need Improvement (2)	Poor (1)		
Question 5 (15 Marks)							
Discover how multimedia applications play roles in **ONE (1)** of the area listed below. • Agriculture • Transportation • Advertising • Healthcare • Broadcasting						15	
Question 6 (20 Marks)							
What is a computer virus?						5	
Classify any THREE (3) examples of a computer virus.						10	
How dangerous are these computer viruses?						5	
					TOTAL	**100**	