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SULTAN IDRIS EDUCATION UNIVERSITY

MTN3013 | COMPUTER ARCHITECTURE AND ORGANIZATION

GROUP ASSIGNMENT

(Group G)

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1.0 Hardware and software are considered the main components of computer technologies. Conduct a research over the last two year on the computer technologies focusing on 5 hardware components and 5 operating systems.

Hardware is the components of the computer system which you can touch. They are interconnected with cables of various shapes and sizes tofacilitate data flow. An operating system (OS) is a set of programs that control the execution of application programs and act as an intermediary between a user of a computer and the computer hardware. OS is software that manages the computer hardware a well as providing an environment for application programs to run. The hardware and operating system (OS) described in this document are organized as a comprehensive references and arranged by task.

1.1 Hardware

1.1.1 Motherboard

A riser card with a corresponding interface on a motherboard can reduce the overall cost of an electronic system as well as simplify upgrading the features provided by the riser. Implementation costs can be reduced, for example, for audio components that may otherwise require shielding in order to prevent electromagnetic interference if the audio component were located on the motherboard. This is the research over the last two year on computer motherboard.

A riser card coupled with the motherboard, the riser card having a circuit there on that interacts with a corresponding portion of the chipset to provide a functionality to the system, the circuit including a hardware component that has a corresponding driver, the riser card also having a memory to store one or more indications of the functionality, where in the riser card operates as a logical extension of the motherboard and a memory to store a sequence of instructions, the memory coupled with the motherboard, the sequence of instructions to cause the driver to be loaded based, at least in part, on the one or more indications of the functionality.

1.1.2 Central Processing Unit (CPU)

Due to the limited space and power available in computers or electronics devices, heat pipes are ideally suited for cooling the high power chips. The thermal management system of computer with CPU cooling with short heat pipe cooling system has been investigated. Effects of inclination angle of heat pipe and working fluid types of CPU temperature are considered.

The effect of inclination angle of heat pipe is the measured data are performed to verify with those obtained from the conventional cooling system (copper block embedded with heat sink unit) which have been performed in the air conditioning room with constant temperature of 25 °C. The conventional cooling system, heat is transferred from the CPU to the copper block embedded with heat sink unit via conduction process.

1.1.3 Grafic Processing Unit (GPU)

Memory capacity in GPU is a major challenge for data-intensive applications with their ever increasing memory requirement. To fit a workload into the limited GPU memory space, a programmer needs to manually divide the workload by tiling the working set and perform user-level data migration. To relieve the programmer from this burden, Unified Virtual Memory (UVM) was developed to support on-demand paging and migration, transparent to the user. It further takes care of the memory over-subscription issue by automatically performing page replacement in an oversubscribed GPU memory situation.

1.1.4 Random Access Memory (RAM)

Random access memory also differs from long term storage in that it is volatile. This means that it can only store data (or program code) while the computer is powered on. As soon as the power is cut all the data contained in random access memory is lost.

The function of RAM is to provide fast temporary storage and workspace for data and program code, which includes both applications and the system's operating system along with hardware drivers for each hardware device, such as hard disk controllers, keyboards and printers. But because random access memory works very quickly compared to longer term storage, it is also used in other ways which take advantage of this speed.

1.1.5 Hard Disk Drive (HDD) and Solid State Drive (SSD)

The feature or the characteristic of the hard disk drive is the hard disk provide more large of storage capacity. It is the primary media for storing data and programs and the main features of HDD will be compared with the floppy disk. The HDD is more faster, more realible, and more safety compare to floppy disk.

Therefore, the features of solid state drive is have 100 times greater through put and instantaneous access times for quicker boot ups, faster file transfers, and overall snappier performance than hard disk drives. HDD can only access data faster the closer

it is from the read/write heads, while all parts of the SSD can be accessed at once. With no moving parts, SSD are able to run quieter in ultra-light weight mobile. Solid state drives feature a non-mechanical design of NAND flash mounted to circuit boards, shock resistant up to 1500g. Hard drives consist of various moving parts making them susceptible to shock and damage.

1.2 Operating System (OS)

1.2.1 Windows

On this list, Windows is the most popular and familiar operating system. It was the go-to operating software from Windows 95, all the way to Windows 10, which fuels computing systems worldwide. It is user-friendly, and it easily begins & resumes operations. To keep you and your data secure, the new versions have more built-in protection.

The program for Windows is simply the best because of how it has developed over time. Its protection framework is state-of-the-art, and its user interface makes it easy to use regardless of the computer on which you are using it. Its price is the only thing that can pinch some. The futures of this Widows is the task view feature lets the users switch between multiple workspaces at once, by displaying all the open Windows. Multifactor authentication technology for higher security like BIN, PIN, Fingerprint recognition, etc. Last one is, Automatically compress system files to reduce the storage footprint

1.2.2 Mac OS

The Mac OS has been the staple of almost all Apple products. It has grown over time to include the characteristics that characterize creativity. With the occasional free update by its creators, the MAC operating systems have been fully free in recent years. There is no other solution for Apple users but the MAC OS.

The greatest achievement for Mac is how dynamic the look and design of its interface appears. It is probably one of today's best-looking OS. Apple is now enabling its customers to get their hands on this OS and all its updates for free. The new dark mode gives your desktop interface a more dramatic look which is easier on the eyes. The futures of this Mac OS is have a dynamic desktop which helps to automatically organize your desktop files by kind, date or tag. Next, continuity camera that scans or photographs a document nearby your iPhone and automatically appears on your mac. Lastly, prevent websites from tracking your Mac by making your profile more anonymous online.

1.2.3 Linux/Ubuntu

Ubuntu is a Linux-based OS that comes with everything in an operating system that you are looking for. Downloading, using, and sharing is free and that alone should be worth trying out this program. It is funded by a multinational software firm, Canonical, and now by the leading Ubuntu service providers.

Ubuntu is a perfect alternative for those with pocket gaps. Its open-source function is sufficiently appealing to attract many users. But, by offering a stable interface and security features that are too difficult to pass on, it also compensates for consistency. Futures that this OS have is it comes with a built-in firewall and virus protection software, by making it the most secure OS around. Next, you get five years of security patches and updates and Ubuntu also is fully translated into 50 different languages. Final finally, it works and is compatible with all the latest laptops, desktops and touch screen devices.

1.2.4 Fedora

Another Linux-based framework that offers the open-source features of Ubuntu a run for money is Fedora. Fedora is stable, user-friendly, and makes every laptop and desktop computer a powerful operating system. Fedora is a casual user operating system that caters to beginners, hobbyists, and professionals working in corporate environments.

Fedora fits well for developers in the business world, even though it is also ideal for personal use. It has all the software and services that a developer requires for their projects to work on and is cost-free. The futures of Fedora is offers a complete open-source toolbox with languages, tools, and utilities in all just a click or commands away. Allows digging into powerful virtualization tools to get virtual machines up and running. Therefore, containerize the own applications or deploy applications out of the box with OCI (Open Container Initiative) image support.

1.2.5 Chrome OS

Another operating systems developed by Google is Chrome OS. It uses the Google Chrome web browser as its key user interface, as it is derived from the free Chromium OS. This OS supports web applications mainly. Chrome OS is a well-functioning operating software, but there is still a lot of commitment to what it will ultimately become. It is fine for multi-media, Linux and Android apps for the time being. For the other functionality, access to remote software and virtual desktop access. Chrome OS is designed to be compatible with all the applications on Android and it is possible to run Linux applications using Chrome OS.

Hardware and Software are mutually dependent on each other. Both of them must work together to make a computer produce a useful output. A driver software component provides a software interface to hardware devices, enabling operation system and other computer programs to access hardware function without needing to know pecise details about the hardware being used. Software cannot be utilized without supporting hardware and vice versa.

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2.0 Discuss the impact of computer evolution on data processing, human-interface, education, and artificial intelligence.

Before 1970, computers were big machines requiring thousands of separate transistors. They were operated by specialized technicians, who often dressed in white lab coats and were commonly referred to as a computer priesthood. The machines were expensive and difficult to use. The revolution of computer made this machine easier to use and more compact. In 2021 almost all people have their own computer because the hardware is smaller and easier to bring to anywhere and the operation system is more sophisticated.

2.1 Data Processing

Data processing is generally the collection and manipulation of items of data to produce meaningful information. In conclusion, we can conclude that data processing can be considered a subset of information processing (the change processing of information) in any manner detectable by an observer. Data processing has been evolving from then until now. The united states census bureau history illustrates the evolving of data processing along the computer evolving from manual through electronic procedures.

One is manual data processing. Although the widespread use of the term "data processing" dates back only to 1950, data processing functions have been performed manually for thousands of years. . Manual processing refers to data processing that requires manual management and processing of data throughout its existence. Manual data processing uses non-technical tools, including paper, writing utensils, and physical file cabinets. For example, accounting involves functions such as posting transactions and generating reports such as balance sheets and cash flow statements. Through the use of mechanical or electronic calculators, it can be operated manually. A person whose work is performed manually or calculated using a calculator is called a "computer".

Next, the influence of computer development brought data processing to another stage. It is automatic data processing. The purpose of automated data processing is to process large amounts of information quickly and effectively with minimal manual intervention and share it with specific audiences. The term automatic data processing is used for operations performed by the unit recording equipment of the "1890 U.S. Census".

. After that, computer data processing or electronic data processing represented later developments, and computers replaced several independent sets of equipment. Computerized data processing or electronic data processing represents a later development, with computers replacing several sets of independent equipment. The

purpose of automated data processing is to process large amounts of information quickly and effectively with minimal manual intervention and share it with specific audiences. Typically, this uses relatively simple repetitive activities to process large amounts of similar information. For example, inventory updates are applied to inventory, banking and ticket transactions to airline reservation systems, billing for utility services

In conclusion, we can conclude that computer evolution have make the data processing evolving too from manual to electronic.

2.2 Human-Interface

Evolution from computer also bring impact to human interface. Human interact with computer in many ways. The interface between human and computer is crucial to facilitate this interaction. For example, the desktop application, internet browser and many more. Human computer interface studies the way in which human make or do not make use computational artifacts, systems and infrastructures. Much of the research do is to improve human computer interaction by improving the usability of computer interface with human.

Evolution from computer has also affecting human inteface. For example, new user interface software. Before the 1960s, the notion of "user interface" was completely unarticulated. The focus of computing was literally on computations, not on intelligibly presenting the results of computations. This is why the early visions of personal, desktop access to massive information stores (Bush 1945), graphical and gestural user interfaces (Sutherland 1963), and synchronous collaboration through direct pointing and shared windows (Engelbart and English 1968) are historically so significant. Through the 1970s, advances in workstation computers and bit-mapped displays allowed these early visions to be consolidated. A prominent example is work at the Xerox Palo Alto Research Center on the Alto computer and the Smalltalk-72 environment. It is striking that the essential concepts of desktop computing that guided the next 20 years of research and development emerged during this early period.

Next, the evolution of computer software psychology and human factors. The software crisis has increased people's interest in programming as a human activity. This has increased the demand for more programmers, well-trained programmers, and more productive programmers. The development of time sharing and interactive computing allows the adoption of new programming methods and makes the dynamics of individual programmer activities more prominent. Programming is considered to be the field of psychology involving problem solving and symbol manipulation (Weinberg 1971). In the 1970s, a behavioral method for understanding software design, programming, and the use of interactive systems developed rapidly. This work solves a variety of problems related to what people encounter when interacting with computers and how they perform.

Study how system response time affects productivity. How do people specify and perfect queries; how difficult is the grammatical structure in programming languages; how mnemonic variable names, inline program comments and flowcharts and other auxiliary tools support programming. By the end of that decade, a software psychology research community had formed (Shneiderman 1980). This work has inspired many industrial human factors groups to expand their responsibilities to support programming groups and software availability. In the late 1970s, several extensive research-based guide compilations appeared, and most computer manufacturers (there were no dedicated software companies at the time) established usability laboratories, and their scope of responsibility steadily expanded.

In conclusion, we can conclude that computer evolving is impact in human interface.

2.3 Education

The history of educational computers has been described variously as an "accidental revolution" or "unthinking man and his thinking machines." Some have said that the computer revolution has modified the adage that "necessity is the mother of invention" to "in a computer world, invention is the mother of necessity". It is evident, however, that innovators in this area have established some of the most controversial and exciting concepts in the history of education.

In terms of human education, technology has always been at the forefront. Technology continues to drive educational capabilities to new heights, from the days of carving figures on rock walls to today, where most students are equipped with multiple portable technical devices at any given time. In looking at where instructional approaches and instruments have come from to where they are heading in the future, the value of technology in the classroom is now more than ever evident.

Broadly speaking, the two major functions of education are to transmit the culture, values, and lessons of the past to the current generation; and to prepare our children for the world in which they will live. Preparing children for the world in which they will live is becoming more difficult than ever. In retrospect, there has been a confluence of changes that have significantly impacted the direction of modern education.

Computer technology advancements and the modern educational age in that the information revolution wants to make our lives more detailed and in-depth. According to Tengku Azman (1998), computers are required in education for 3 main reasons. First, for humans themselves, a lot of knowledge that can be used by a machine is not impossible. The second are the ability to gather and store information and only a computer can

effectively process knowledge. The last is, the key to striving in human life, especially in the students themselves, is information and knowledge.

A teaching aid is instructional equipment which should not be used to replace teaching. It is used to help teachers more effectively teach a subject. It must be used for teaching and not for amusement and a waste of time in three steps, namely at the pre-use level, where its use must be designed to plan how to apply it to the subject of teaching. Its use can schedule assessments and highlight important factors that can assist learning and can plan more activities such as questions, findings, and evaluations after its use.

Computers help educators, if used systematically, because it's can achieve successful teaching and learning goals. Teaching with the latest teaching aids can raise the interest of students in learning a subject. Furthermore, it can solve any teaching and learning problems if the machine can be used routinely and efficiently by teachers.

The influence of the use of technology in education can make the process of teaching and learning more active and create a fun environment for learning. Teachers can diversify the teaching and learning process with the availability of technology in education, not only focusing on teaching techniques, but also improving the quality of teaching and using the different ICT facilities available. The use of the web is a tool for obtaining the latest information on the world of education. The ability to use the internet allows teachers and students to obtain the latest information and knowledge quicker and more efficiently without having to wait a long time.

Science and technology have a profound impact on all of humanity's activities. The wide variety of technologies and science discoveries produced by humanity has led to the building and development of the civilizations of each age, stimulated economic growth, raised people's standards of living, encouraged cultural development, and had a tremendous impact on religion, thought, and many other human activities. The impact of science and technology on modern society is broad and wide-ranging, influencing such areas as politics, diplomacy, defense, the economy, medicine, transportation, agriculture, social capital improvement, especially education. The fruits of science and technology fill every corner of our lives.

2.4 Artificial Intelligence

The name behind the idea of AI is John McCarthy, who began research on the subject in 1955 and assumed that each aspect of learning and other domains of intelligence can be described so precisely that they can be simulated by a machine. Artificial intelligence describes the work processes of machines that would require intelligence if performed by humans. The term 'artificial intelligence' thus means

‘investigating intelligent problem-solving behaviour and creating intelligent computer systems’.

This AI have a two kind of artificial intelegence because of the revolution of the computer, first is the Weak artificial intelligence that means The computer is merely an instrument for investigating cognitive processes, the computer simulates intelligence. The second one is Strong artificial intelligence that means The processes in the computer are intellectual, self-learning processes. Computers can ‘understand’ by means of the right software/programming and are able to optimise their own behaviour on the basis of their former behaviour and their experience. This includes automatic networking with other machines, which leads to a dramatic scaling effect. This not just the revolution on computer but the revolution on computer hardware and computer operating system/software. The AI have a lot of diffrent type and way to used it, for example AI used in Industrial production such as the car production or in your mobile phone itself such as the face recognition, SIRI, etc. So this affecting the AI software you’r used. There is the some example type of AI software;

- Artificial Intelligence Platforms, This will provide the platform for developing an application from scratch. Many built-in algorithms are provided in this. Drag and drop facility makes it easy to use.
- Chatbots, This software will give the effect that a human or person is doing in a conversation.
- Deep Learning Software, It includes speech recognition, image recognition etc.
- Machine Learning Software, Machine learning is the technique which will make the computer to learn through data.

This is the positive impact of revolution computer on artificial intelligence (AI) The phrase “human error” was born because humans make mistakes from time to time. Computers, however, do not make these mistakes if they are programmed properly. With Artificial intelligence, the decisions are taken from the previously gathered information applying a certain set of algorithms. So errors are reduced and the chance of reaching accuracy with a greater degree of precision is a possibility. Then take risk instead of human, This is one of the biggest advantages of Artificial intelligence. We can overcome many risky limitations of humans by developing an AI Robot which in turn can do the risky things for us. Let it be going to mars, defuse a bomb, explore the deepest parts of oceans, mining for coal and oil, it can be used effectively in any kind of natural or man-made disasters.

Furthermore, Available on 24hours, an Average human will work for 4–6 hours a day excluding the breaks. Humans are built in such a way to get some time out for refreshing themselves and get ready for a new day of work and they even have weekly

offed to stay intact with their work-life and personal life. But using AI we can make machines work 24x7 without any breaks and they don't even get bored, unlike humans. Next helping in repetitive jobs, In our day-to-day work, we will be performing many repetitive works like sending a thanking mail, verifying certain documents for errors and many more things. Using artificial intelligence we can productively automate these mundane tasks and can even remove "boring" tasks for humans and free them up to be increasingly creative.

Subsequently, AI also can be a digital assistance. Some of the highly advanced organizations use digital assistants to interact with users which saves the need for human resources. The digital assistants also used in many websites to provide things that users want. We can chat with them about what we are looking for. Some chatbots are designed in such a way that it's become hard to determine that we're chatting with a chatbot or a human being. Moreover, AI is a faster decision, using AI alongside other technologies we can make machines take decisions faster than a human and carry out actions quicker. While taking a decision human will analyze many factors both emotionally and practically but AI-powered machine works on what it is programmed and delivers the results in a faster way.

As every bright side has a darker version in it. Artificial Intelligence also has some disadvantages. Let's see some of this artificial intelligence, first is high coast of creation, As AI is updating every day the hardware and software need to get updated with time to meet the latest requirements. Machines need repairing and maintenance which need plenty of costs. It' s creation requires huge costs as they are very complex machines. Second disadvantages of AI is making human lazy, AI is making humans lazy with it's applications automating the majority of the work. Humans tend to get addicted to these inventions which can cause a problem to future generations.

Final finally, is unemployment, as AI is replacing the majority of the repetitive tasks and other works with robots,human interference is becoming less which will cause a major problem in the employment standards. Every organization is looking to replace the minimum qualified individuals with AI robots which can do similar work with more efficiency.

Progress in many of the basic computing and information technologies has been rapid in recent years, and the committee does not expect the pace of change to slow down in the foreseeable future. While some technologies are reaching maturity now, many important technologies have enormous future potential.

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