LONDON METROPOLITAN UNIVERSITY

FIRST-SIT QUESTION PAPER **Year Long 2021**

Module Code:	**CT4005NI**
Module Title:	**Computer Hardware and Software Architectures**
Module Leader:	**Puranjan Acharya (Islington College)**
Date:	**12 May 2021**
Day / Evening:	**Day**
Start Time:	**09:00 AM**
Duration:	**12 hours**
Test Type:	**SEEN TEST**
Materials supplied:	None
Materials permitted:	Writing equipment only
Warning:	Candidates are warned that possession of unauthorized materials in a test is a serious assessment offence.
Instructions to candidates:	This test accounts for **20%** of your total module grades. You are to **submit this test paper**, in the google classroom.

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Question A:

Answer the following in your own words. [10]

1. Explain what happens to the data after we remove it from the hard disk. How a file recovery software works.

Answer:

Hard disk or hard drives are complicated storage devices that store and retrieves data in sequential order. It uses magnetic medium to store data in its storage components that are divided into sectors and platters, which are accessed by a moving arm that reads and writes data on it. It is used as a permanent storage back up option. Having capacity of billions of bytes usually measured in GIGA BYTES (GB) or TERA BYTES (TB). They are the internal hardware component of a computing system. Data that is written can also be removed from the drive using the delete option. However, there are two factor deleting process that sends the deleted data to recycle bin in case user decides to recover the data. For users wanting to delete data permanently they would have to delete the data from the recycle bin either going in the recycle bin folder or right click empty recycle bin. Although the data might seem deleted but When the master file table reference is deleted, the portion of the drive where the data is stored is marked as free, ready to have new data overwritten. As long as no data is overwritten, data recovery is still possible.

Data recovery is the use of software and tools to recover deleted information and data from a storage medium where it was previously located. When the uses empty's the recycle bin it doesn't necessarily delete that information. The only thing eliminated when one empty's the recycle bin is the master record table reference, which only tells the operating system where the document was located, which is just eliminating the guide to the information—not the information itself—while additionally allowing the operating system to overwrite that space of the hard drive. The file recovery software uses metadata analysis where links to the deleted data with the presently stored data is highlighted and bought using principles this method allows data to be recoverable largely however once over written the data recovery chances are slim to none. This is the reason most information is still recoverable when the file location is left empty and only little or no data is recoverable when its file is overwritten even with exceptional programming or the correct arrangement of abilities.

2. Why SSDs are getting so much popular. What is the difference between HDD and SSD? Explain in detail. [10]

Answer:

The evolution of quality of photos files, videos, document demanded more storage space and fast data processing and storage. Hard-drives were the one of the finest data storage devices in the market; however, with the changing trends and demands the hard drives where not able to co-op with the needs of large business for its storage and processing. Still considering Hard-drives are reliable and cheap for its services of data-storage but the introduction of SSD to the market has brought about huge changes demand for devices for data storage. The fast data processing and reliability and less complication in hardware components needed to make up a SSD are the tipping point in use of SSD in the modern world. The ability to withstand harsh environmental conditions and lack of moving parts had provided SSD with the big advantage over hard drives.

Generally, SSDs are more durable than HDDs in extreme and brutal conditions since they do not have moving parts, for example, actuator arms. SSDs can withstand incidental drops and different stuns, vibration, outrageous temperatures, and magnetic fields better compared to HDDs. Add to that their small and lower power consumption gives SSD and edge over HDDs. SSD does not contains mechanical parts rather only electronic parts like ICs(integrated circuits). SSD has huge advantage over HDD in terms of R/W time (Read and Write) into its disk because it had no moving parts causing it to theoretically have no physical seek limits. SSD are considered to be around 10 times faster than HDD considering its max speed to be around 2500mb/s in compared to 200mb/s in hard drives. (https://www.enterprisestorageforum.com/hardware/ssd-vs-hdd)

Another beneficial upper hand is the power consumption between the two since SSD has no physical moving parts and integrated circuits to carry out data processing/read and write, making it consume very little power in compare to HDDs. The size of SDD in compared to HDD makes it easier to install and one can have more number of SSDs in a limited space where only one or two HDDs would fit. Data transfer methods are different in SSD, HDD like in HDD the use of sequential data transfer method takes place where the data are store in a sequence one after another, and the same process repeats itself while accessing data, making it slower and having slower read/write time. Whereas modern form of data storages such as

SSD comes equipped with sequential as well as random access data retrieval, where data are practically stored all over the disk and accessor method is random making it easier to access only the required data without having to go over whole of the database. Another factor that might drive people to getting into SSD rather than HDD would be the noise production due to its mechanical parts as people generally like to work in a peaceful environment to boost their concentration.

Considering these factors the SSDs clearly has an upper hand against HDDs and are being like and used by more people as of today. Due to its reliability and fast data accessibility.

3. What happens once you power on your computer. Explain all the booting process from pressing on power button to fully loaded OS. [5]

Answer:

Booting is a series of complicated process that is programmed to start up a computer.

- From the moment the power button is pressed power supply turns on, once the system receives Power good signal from the UPS. Once this is don't the BIOS starts up and starts interfacing with the hardware. ROM BIOS will then start feeding the instructions on booting up the computer

- Power on self-test(POST) process takes place which checks the system parts such as BOIS, RAM , Memory, Hard Drives, Ports, Input/output devices to identify potential hardware failure within the system by running different tests programmed in the BIOS, if error occurs BIOS will stop the boot process and produces beep codes that indicate the potential problem or failure that is affecting the boot process

- Once the CUP is initialized, the BIOs will instruct the system to boot and load. The system looks through the boot device and selects the OS to load and be used.

- Once the OS completed the loading, the OS will take the control from the BIOS and will execute necessary startup applications.

- Once this is do not the computer is ready for use. All this happens in few seconds to a minute or two. The speeds can vary depending on the storage medium where the Boot up file is stored

4. **Case Study**

Objectives

Build a custom PC for yourself.

Background

make a custom-made PC for your personal purpose. The requirements are:

1. Run all the office package
2. Run all basic multimedia package like adobe photo shops etc.
3. Run all the programming package like java and python.
4. Run all the Email/Internet package in a WIFI connection.

Give a detailed information on following topics:

- **Part1: Precautions and safety measures before building a PC [10]**

Answer:

Start by allocating a clean, clear workplace. The workplace should be in a well-controlled temperature. It should have plenty of light so that one can see the tools and tiny components. Place an anti-static mat on the floor or the table one is going to build his pc on. Anti-static mat will prevent any electrostatic discharges produced by human body and other tools one may use from damaging the sensitive components of pc.

Have necessary screwdrivers and pliers necessary to unscrew or hold screws and parts of different shape and sizes. Trying to install any components without the right tool can cause dents and damage to internal components of the part.

Having good gloves that are anti-static in nature. Latex gloves can create static charge that damage to computer parts. The best use would be white cotton gloves as the will not be able to create any electrostatic charge. Having an anti-static mat for one to stand in or sit along with non-conducting pair of foot-ware on would be necessary to prevent any flow of electrostatic charge to and from ones body.

Having components such as cotton cloth, compressed air is great as it helps clean any dust and small particles that may be present in the components.

Read and have well documented instruction manual for all the components and systems that one intend to use for pc. As this will help get more detailed knowledge of the computer parts and components.

Get a thermal paste for installing the cooler fan in the processor on motherboard

Having a fire extinguisher nearby of a necessary type would prevent any miss-hap.

Once all necessary tools are gathered and placed one can purchase necessary components required for a custom pc.

. **Part2: Parts purchased, their specifications and current cost in npr [10]**
Answer:

Components and their specifications-**BUDGET 3.5-4LAKHS**

Case(make sure all components are able to fit in it)
NZXT H510 Elite, Premium Mid-Tower ATX Case PC Gaming Case-Dual-Tempered Glass, Type C Port, RGB Lighting-Matte Black.
NPR 23,800

Motherboard (make sure motherboard matches the processor)
GIGABYTE B550M AORUS ELITE Motherboard
NPR 28,500.00

CPU (Processor)
AMD Ryzen 5 5600X 6-core, 12-Thread Unlocked Desktop Processor with Wraith Stealth Cooler
NPR 50,800.00

GPU (Graphics card)
GALAX GeForce GTX 1660 Super (1-Click OC) 6GB GDDR6
NPR 40,800.00

RAM(make sure the RAM matches the Mother board compatibility)
CORSAIR Vengeance RGB 16GB 3000Mhz *2
NPR.41, 000

Storage Device
SAMSUNG 980 PRO 1TB PCIe NVMe Gen4 Internal Gaming SSD M.2 (MZ-V8P1T0B) NPR 45,700

Cooling

NZXT Kraken X53 240mm AIO Liquid Cooler With Aer RGB Fans
NPR 25,800.00

PSU (Power Supply Unit)(make sure to look for the 80+ rating)

NZXT 750W 80+ Gold Fully-Modular Power Supply
NPR 20,800.00

Display/Monitor(more the refresh rate better quality)

BenQ GW2480 24″ Full HD IPS 120 hrz
NPR 23,800.00

OS

WINDOWS 10 PRO EDITION

Input/output Devices

MOUSE, KEYBOARD HEADSET/SPEAKER

TOTAL SPENT=NPR 310,000+ NPR 20000 miscellaneous

- **Part3: Build process [15]**

Answer:

Make sure to have all the components and tools as mentioned in the precaution section above.

- Disassemble the case-using screwdriver from the back and side.
- Clip the 20+4 pin connector into the PCU it should click right in, also clip in the 6/8 pin connector that also goes in PSU used to power the graphic card.
- Plug in the 4pins power connector also in the PSU which is used to power the processor.
- Once all pins are connected in the PSU align the PSU up in the case and screw it in. make sure the wires are free and easily accessible to be connected in motherboard and other components
- Unwrap on the Motherboard, make sure not grab it on the metal parts and place it in the anti-static mat.
- Unpin the retention in the processor slot. Take the CPU processor (do not touch the pins grab it from the sides) in order to install the CPU lineup the small golden arrow on the CPU with the one in the CPU slot, and just drop it in place(don't press) and keep the retention back in its place, that should tight it up.
- To install Ram check the notch that is present in RAM, RAM slot, align it in correct orientation, and press until the clip clips the ram in its place.
- Unlike HDDs SSDs go directly into the motherboard slots and do not need power cables. Match SSD key with the one on the mother board and screw it tight,(place the SSD cover on the top after removing any dust using a cotton cloth, if any)while using a HDD install the HDD in the case and connect the SATA(15pins) cable
- if one has NIC card. Place the NIC card in one of the PCIe slots available. The external Network card can be plugged in using the Ethernet connector in the front panel that connects to the motherboard
- Gently drop the motherboard into the STANDOFFs (small bumps on the case that prevent motherboard from touching the metal frame on the case) and screw it in.
- Once the motherboard is installed. Install the standoffs in the motherboard on around the processor slot. That is where fan goes, using thermal paste. (in my case install the fans on the radiator and screw it in, apply thermal paste on top of the processor and place the pump for liquid cooling (instead of the fans) on top of the processor and screw it)connect the cables for the fans into its respective slots using pins to identify (generally 3 pinned bumps with notches
- The 24pin power cable connector connects from PSU to the motherboard 24pin slot.
- Place the 6 pins and 4 pins connector into the corresponding slot in the motherboard (usually the two slots are together). They power the Graphic card (will install later) and the processor respectively.

- Since the graphic card is big and sophisticated, place it after one installs the motherboard into the case. Put the graphic card in the PCIe slot and gently press until it clicks in place. Connect the graphic card with the 6/8 pin connector previously connected in the motherboard
- Place all other input output connectors for the audio, mouse keyboard USB, Display, micro-USB in the motherboard and the other end into the front panel in the case.
- close the Case and screw it tight.
- Connect the HDMI to the graphic card, connect the Input/output peripherals such as mouse keyboard , headset/speaker.
- Plug in the PCU in an electric socket and boot it. Once it open up. The BIOS checks for all the components and visually presents the working conditions for each Hardware. Once the booting process it completed Use a licensed Windows ISO file to install the windows OS and PC is ready to go with pre-installed office packages
- Install the necessary files and packages for programming photo shop and get a stable internet connection

- **Part4: Future upgrades [10]**

  Answer:

  For the time being although one might be satisfied with what he has built he will still need to get future upgrades to constantly keep up with modern tech and games.

- perhaps 1 more SSD or a new HDD would be beneficial considering the storage taken by games and applications 1TB SSD that was previously kept might not be enough.

- Having the latest CPU processor for computer so that it can run countless tasks in in matter of seconds is always good for that reason AMD Ryzen 5 need to be upgraded to AMD Ryzen 7 or newer when it releases.

- A 32gb ram is very good amount for gaming in this generation but with latest games evolving with high quality one might need to get himself a new ram chip that he can keep in one of these remaining RAM slots that his choice of motherboard has.

- A GPUGTX 1660Ti is one of the finest of this generation however with improvement of graphic of games and applications he might need to upgrade his graphic card into more evolved and of the latest generation.

- Change and reapplication of thermal paste and cooling water that is being used in PC is necessary in order to prevent overheating the heatsink and processor..

- Remember to always open PC case and dust the internal peripherals with cotton cloth or compressed air as dust particles accumulated in it can damage the internal components.

- Check for constant software upgrades and driver updates is one way to maintain pc healthy for longer period.

- Make sure to have an anti-virus installed at the time of pc building and constantly update it in order to update its database and be familiar with ever evolving viruses &Trojans.

5. Write your Troubleshooting steps to carry out in the given cases. **[10 X 3 = 30]**

I. Internet is very slow in the PC.

Answer: Firstly, try re-starting the Internet device modem, router. Slow internets are often caused by high traffic in the area or latency and packet loss caused due to heavy load or bugs that take up memory. Check for firewall malfunctions. If present Ethernet cable try checking if the cable is in good condition. The next step one can take is to go to device manager in the computer and check for internet drivers in pc if they are installed/updated or not enabled at all; failure to update a driver causes the device to not be able to use the internet smoothly. Once driver is installed, try restarting the computer and things should work. . Further, one can test his computer driver conditions by connecting to other internet sources to check if the fault is within the computer or on the device providing the internet.. If not contact ISP for further information regarding troubleshooting as there may be problem in Internet device i.e. modem router.

II. Your Personal Computer is Overheating.

Answer: Firstly, read the pc documentation and manual for any relative information. Check if the fan is working properly or not, check for any blockages in the vents of the fans and PSU, Clean up the pc using Compresses air blower or Cotton cloth that removes dust particle from it. Check for Thermal paste and reapply thermal paste if needed. Check the Overclocking of pc this often leads to high Processor demand and heats the PC. Under clock the pc, speed up the fan, Run external graphics only while gaming or using demanding application else Use the integrated graphics this save a lot of pressure on pc and does not constantly overclock the pc. If the above-mentioned methods do not work, seek assistant from a trained professional

III. PC Blue screen of death

Answer:

Blue Screens of Death. Blue screens are generally caused by problems with the computer's hardware or issues with its hardware driver software…firstly try to restart the computer to fix any complications or bugs that have cause the computer driver to stop functioning. Scan for any computer virus or malware that might have caused changes in the system filed causing the BSOD to trigger. BSOD can occur when Ram isn't properly connected into the motherboard. These errors also occur as a sign that the hard drive might be faulty and are starting to ware out. If one has Installed new software or installed a new driver to the pc and this error comes try uninstalling it and checking is the new device or driver was faulty or the cause of it. Further refer to the Instruction manual or contact the manufacture

IV. Computer keeps restarting automatically frequently

Answer:

Computer could restart frequently and automatically due to multiple reason some of them are hardware failure, malware attack, corrupted driver, dust and debris or even a faulty windows update that might be causing frequent auto restarts.

Some ways to trouble shoot this are try to boot the pc in Safe mode

This can be done by restarting and as soon as the logo pops up pressing the documented key to boot in safe mode(f5 in my pc). Another option can be disabling automatic restart on system failure which can be done by going to control panel>System and security>system>Advance system settings>settings>and uncheck the automatically restart. One can also restart computer to last restore point which will remove any faulty software that might have been installed after. Further check for faulty cables or wire that power the computer, or its components, check for viruses consult a professional's help or read the user manual provided by the manufacture.

V. You cannot find 64-bit option in virtual box while installing Ubuntu 64-bit OS

Answer:

This error could be because the system is not built in a 64-bit environment but usually its the virtualization that might not be enabled in the BIOS. To check this go to task manager >performance and in the bottom, right there will be virtualization: enabled/disabled. to enable virtualization restart the system and press f10 as the logo come up.. this should take the user to BIOS system configuration. user shall will find visualization technology disabled. Enable that. F10 to save changes and exit this should do the job. If not try to reinstall the virtual machine as well as the Ubuntu ISO file

VI. HDMI Port is not working

Answer:

Most of the times the issue of HDMI port not working on Windows Laptop can be simply a hardware failure. Could be the improper boot of system. If its because of the Driver issue go to Setting>device manager> and select the HDMI device update/install driver and restart the system. Problems could arise from the display configuration where one might not have projected the screen to the connected device. If these doesn't work and one might have a hard ware problem i.e. port so he/she should laptop seek professional help.

VII. PC keeps disconnecting wi-fi

Answer:

Common problems could be with wifi or router modem. Other problems might be that ones system turns off wireless network adapter to save power try to change this in the settings menu and make sure to have power cable plugged in. try connecting to other another wifi to check is the problem is with the ISP or pc. Someties firewall prevents stable use of wifi make sure not to have firewall causing problems in the stable wifi connection. One could have his wifi driver software not installed yes in a new pc or not updated in an old one. driver might not be compatible to windows version try downloading the latest version of windows or driver and check again. Try to set the internet to private so minimum people use it and there is less traffic in the Ip. If problem still arise there might be some problem with the internal hardware. Check the manufactures manual to trouble shoot for ones specification pc or consult a professional.

VIII. Computer crashes before loading OS

Answer:

The crashes can occur because of multiple reasons. It can be due to faulty power supply, overheating, RAM or Hard Disk issues and motherboard or processor issues. Either this problem can arise from the software or hardware malfunctions. In order to trouble shoot this problem firstly one will need to back up all his data and filed as this is a sensitive issue and might cause ones data to be lost. Read documentations and manuals provided and try to boot up in safe mode. Also one can try to boot up his pc from other bootable devices to check if the problem is with hardware or not. If yes, The problem could arise from either faulty ROM programs that have gone corrupted, or the power supply that might be disconnecting time to time while on boot. If not, Viruses can also cause crashes in the boot process. One will need to check is the latest version of windows or OS is installed or not or restore previous version of windows when the problem was not noticeable. Problems with the motherboard could cause this problem to be frequent too. Try to remove the OS from computing device and reinstall it . If the problem still arises consult an IT professional or seek assistance from one.

IX. Graphical errors like those that your computer screen is jumbled

Answer:

This problem is mostly a hardware problem. Its either faulty graphic card or faulty display monitor or faulty HDMI port/cable. Make sure to check for internal driver faults as these can go un-noticed. To check that go to Setting>device manager> and select the device to check the driver….after that check the driver for the graphic card. try to uninstall and reinstall the drivers and restart the system. Try to download the software for graphic card and pc monitor and make configuration accordingly. If problem still arises there might be fault in the computer components. Dust particles can sometimes cause this type of problem so make sure to clean the internal components regularly.

X. Website is running when you give IP address but not working from domain name.

Answer:

- Make sure the network is connected, check the IP address and DNS servers are correct and in the right place, try pinging the server that you're trying to connect. Examine DNS suffix. The DHCP server IP address should be released and renewed on a regular basis, try restart and reloading the computing device along with the web browser. Restart DNS router at home contact ISP.

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