Question 01

1. Typical machine does not have a memory. But a computer does have a memory. Computer can do multitasking, but the typical machine can only do one process and one at a time. The computer can change the frequency (speed) of the CPU. But a typical machine cannot change of the CPU.

A screenshot of a computer

Description automatically generated with low confidence

1. Similarities

Both are software. Intangible.

Differences

|  |  |
| --- | --- |
| System software | Application Software |
| System software is combining all the hardware and run as a one single unit | Application software is used to do some specific task |
| System software is always running the top of the Hardware | Application software is running the top of the System Software |
| System software are designed to manage system resources | Application software are designed to do some specific task |

Examples

**System Software:** Operating System (OS), utility software

**Application Software:** Teams, Google Chrome, Steam, Origin

1. Dual core processors have 2 cores. And quad core processors have 4 cores. Because of that dual core processors can do 2 processes at a one single time. But quad core processors can do 4 processes at a one single time. Dual core processors speed is lower than quad core processors. The energy consumption is high in Quad core processors when comparing to Dual core processors.
2. The processor is the brain of the computer. Because every arithmetic, logic, controlling and input/output operations are performed by the processor. and the contribution of the RAM is when we need to use a software, the HDD will transfer the files to the RAM. Because the ram is quite fast component. if we upgrade the CPU, we can run many processes at a one time. Because now we have many cores than the previous CPU and the speed of processing is greater. And if we upgrade out RAM, we can load multiple software to the RAM at a one time. Because of that we can do multitasking if we have a good CPU and good RAM.

Question 02

1. Similarities

Both are number systems.

Differences

|  |  |
| --- | --- |
| **Octal Number system** | **Hexa Decimal Number system** |
| Use symbols 0 up to 7 | Use Symbols 0 up to 9 and use characters A to F |
| The base is 8 | The base is 16 |
|  |  |

1. NSBM ID – 23136

Octal number of NSBM ID – 551408

* 1. 1d7516
  2. 97316
  3. 11101011
  4. F9CD9
  5. B83

Question 03

1. The computer can understand only machine code. That means 0s and 1s. because of that we need a representation to represent numbers. And when we use calculator like software, we need to store numbers to do some arithmetic operations. Because of that we need a unique representation to represent numbers. Because of that we use number representation represent numbers.
2. The computer store characters like D as ASCII representation. In this representation the computer store character values using binary images. But while we are storing numbers, we use number representation to store numbers.
3. Similarities

Both are number representation system. Use 0s and 1s to represent values. Use 4 digits to represent a one number.

Differences

|  |  |
| --- | --- |
| Binary Coded Decimal | Zone Decimal |
| Cannot Represent the sign of the value | Can Represent the sign of the value |
| There is only 0s and 1s | We use Z special keyword to represent values |
| The memory consumption is low | The memory consumption is higher than BCD. |

Represent Negative numbers in once complement:

First, we write the positive value of the given number and adding 0s to the front until the digits get 8. Then we convert the 0s to 1s and 1s to 0s. then we will get the negative number of the given positive number.

Ex: -7

7 🡺111  
+7 🡺 00000111  
-7 🡺 11111000

Represent Negative numbers in twos complement:

Again, we write the positive value of the given number and adding 0s to the front until the digits get 8. After that we convert the 0s to 1s and 1s to 0s. next we add 1 to the LSB. Then we can get the negative number of the given positive number.

Ex: -7  
7 🡺 111  
+7 🡺 00000111  
-7 🡺 11111000

34 🡺 00100010  
65 🡺 01000001  
  
-65 🡺 10111110  
 1+  
 10111111

34 🡺 00100010  
-65 🡺10111111+  
-31 🡺11100001

Similarities

Both are used to store data. Tangible

Differences

|  |  |
| --- | --- |
| Primary Storage Devices | Secondary Storage Devices |
| Can communicate with the CPU directly | Cannot Contact with the CPU directly |
| Cannot store large amount of data permanently | Can store large amount of data permanently |
| CPU can directly use data in a Primary Storage Device | Need to transfer data to the primary memory to use used by the CPU |

Primary Storage Devices: RAM, ROM, Cache Memory

Secondary Storage Devices: HDD, Flash Memory, CD

Every optical device stores data in a binary system. That is, as 1 and 0. When we ask a computer to copy a file to a CD. First the computer converts the file to binary numbers. Then when the file is burned inside the CD, the CD is rotated at a certain RPM. Then the laser beam in the CD writer starts burning the Dye Layer on the CD at a temperature of around 600 degrees Celsius. Due to that temperature the Dye layer burns, and the burned areas become dark spots. Those dark spots represent binary 0 and the other light spots represent binary 1. This will burn the file to CD. Since these dark spots cannot be recovered, the data on the CD-R can only be stored once.

when the CD-RW is rotated at a certain RPM, this time the laser beam pierces the surface of the CD-RW. This perforation causes pits and land areas to form on the surface of the CD-RW. pits represent binary 0 and land areas represent binary 1. This is how the data storage process of CD-RW works.

Capacity of a track = 3KB \* 36 = 108KB

Capacity of a surface = 108KB \* 360 = 38880KB

Capacity of a cylinder = 108KB \* 24 = 2592KB

Capacity of total HDD = 38880KB \* 24 = 933120KB

We use pixels to represent images and videos. A pixel likes a dot. Inside the pixel there is a small light. The combination of pixels we can see images and videos. A single pixel has one byte information. Pixel is an element of 2D array. Every element has a unique pixel value. The outline of the 2D array is 0. When storing a pixel in the computer they actually happen is storing these pixel arrays inside the computer.

Similarities

Both are digital image types.  
The range is 0 to 255.  
Both are work with pixel value.

Differences

|  |  |
| --- | --- |
| Grayscale Image | Color Image |
| Only have black & white colors | Have Red, Green, Blue colors |
| Can store inside a one byte | Need 3 bytes to store image. |

Screen with 560x780 has clear footages. Because Total resolution of the 560x780 screen is 436,800 and the Total resolution of the 200x350 screen is 70,000. The total pixel of the 560x780 screen is greater than the total pixel of the 200x350 screen. Because of that Screen with 560x780 has clear footages.

Total resolution of the image = 240 \* 860 = 206400 pixels / bytes

Memory consumption of that image as binary image = 206400 / 8 = 25800 bytes

Similarities

Both are network topologies.  
Can transfer data to both sides.

Differences

|  |  |
| --- | --- |
| Star network topology | Bus network topology |
| The network architecture is like a star | The network architecture is like, passengers in a bus |
| All the devices are centralized to a one point | A backbone runs through linking all the devices. |

Internet means the collection of networks or the connectivity of number of devices. With using the internet, we can connect a network to another network.

In covid 19 pandemic situation, everything we did on a daily basis went online. Because of that people had to use this internet for almost every work. As a result, the number of people using the Internet at one time increased rapidly. So, this network traffic has increased a lot. Therefore, one person has to wait longer to access some websites. Therefore, this internet speed will decrease during that time.