



CS 355 –Fall 2023

Assignment for Midterm, Total Mark 20

Deadline: Friday, September 29, (11:59 pm) in e-campus

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Question 1: Explain impacts of Embedded GPS chip and accelerometers in mobile operating system or mobile device. (2 point)

I will start with the impact and uses of Embedded GPS. GPS stands for global positioning system, so when this is embedded into operating systems and mobile devices it provides many location-based services. These include things such as navigation/mapping services, the ability to track the location of devices whether it is for location history of specific devices or alerting emergency services to someone's location when needed, and the ability to provide location based metadata on things such as images. GPS can also be used for fitness apps on mobile devices in things like running routes and distance traveled.

Next, accelerometers are sensors that measure tilt, acceleration, and movement along axes. In mobile devices accelerometers are used to detect whether to display the contents onto the screen in portrait or landscape mode based on which way the device is tilted in relation to the ground. They are also used to detect motion within the device for things such as measuring steps for fitness apps, and gestures by the user of the devices for things such as tapping the device to pay with a credit card. They are also used for gaming, specifically things like AR (augmented reality) in order to print objects onto the landscape. Another large use of accelerometers is battery management in which they help determine when the device is not in use and can adjust the system into a low power mode.

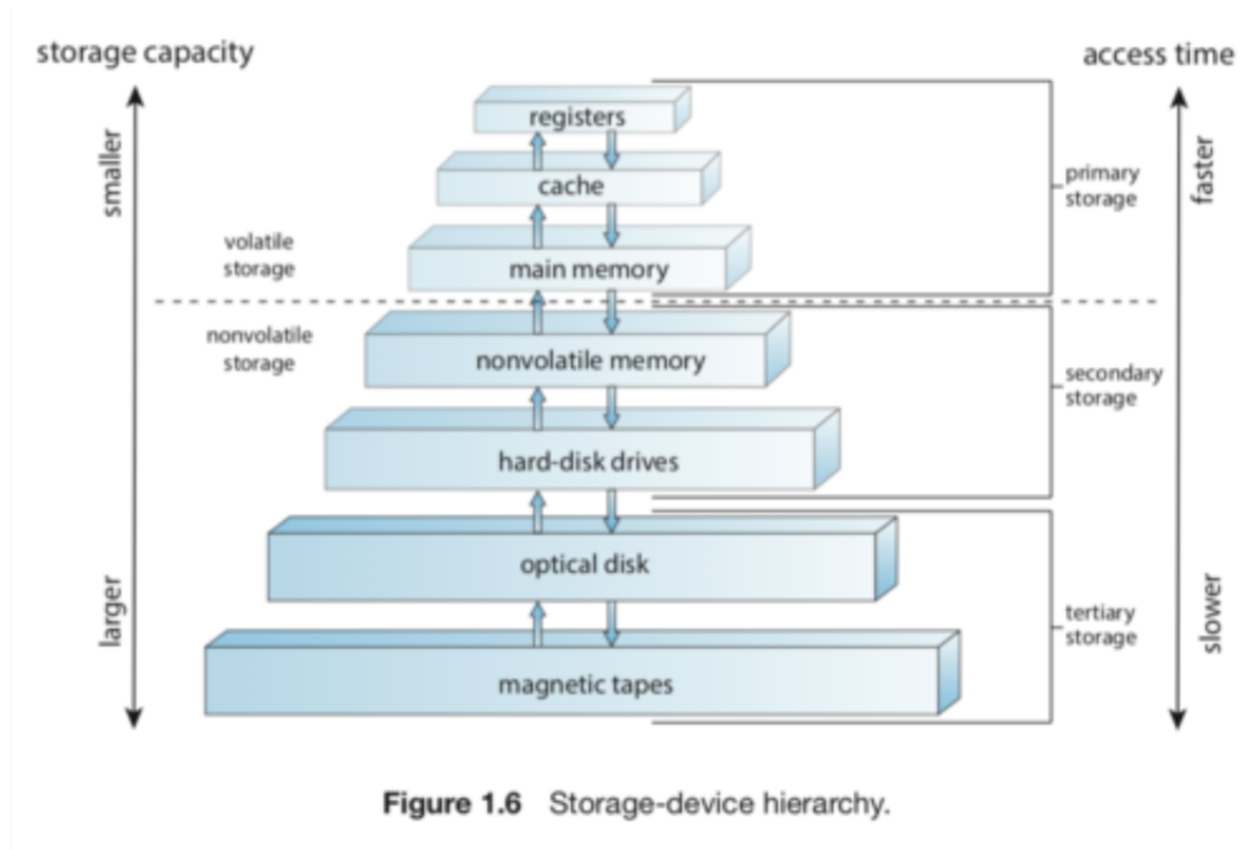
Question 2: Rank the following storage systems from smaller to larger. (2 point)

- a. Cache
- b. Magnetic tape
- c. Hard disk
- d. Register
- e. Optical disk

f. Main memory

Ranked smallest to largest:

1. Register
2. Cache
3. Main memory
4. Hard disk
5. Optical disk
6. Magnetic tape



Question 3: Write the difference between System Program and Application Program. (2 point)

System programs and application programs are two distinct categories of software in a computer system. System programs, such as the operating system and device drivers, are responsible for managing hardware resources, ensuring system stability, and providing a platform for application programs. They operate in the background and are not directly visible to users.

Application programs, on the other hand, are designed for specific user tasks, such as word processing or gaming, and have graphical interfaces for user interaction. They rely on system services and resources but do not directly manage hardware. In essence,

system programs maintain the computer's core functionality, while application programs deliver user-facing functionality.

Question 4: Write two factors which cause the difference among various storage systems. (2 point)

Access time and storage capacity are the two main factors, as stated in the diagram I attached above

Question 5: How do clustered systems differ from other multiprocessor systems? (2 point)

Clustered systems and other multiprocessor systems differ primarily in their connection to the operating system. Clustered systems function by having separate instances of the OS for each cluster, so that if one of them fails the remaining clusters do not go down with it. Other multiprocessor systems differ in the way that they handle the OS, as it is not fragmented and if one part of the system's OS goes down, the entire system goes down with it.

Question 6: Which network configuration (LAN WAN, MAN, PAN) would best suit the following environments and briefly explain why? (2 point)

- a. A classroom
- b. Several campus locations across a state-wide university system
- c. A building
- d. buildings within a city
- e. A campus student union
- f. A neighborhood
- g. A Phone and a headset

Answers:

- a. LAN benefits high speed in a small area like a classroom
- b. WAN since several remote locations across a wide geographic area are best connected by WAN
- c. LAN for reasons similar to why a classroom benefits from LAN. A singular building still falls within optimal LAN range
- d. MAN (metropolitan area networks) are designed for this specific purpose, and since buildings within a city are too spread out to use LAN but too close to justify WAN, MANs are perfect
- e. I am going to guess LAN here under the assumption that the student union is within one building and in a fairly small area, but if it is something that is spread out all across the campus an MAN would be better
- f. I am going to assume an MAN since a neighborhood is definitely too spread out to use a LAN but seemingly too small for a WAN

- g. PAN (personal access network) is best for close range connectivity between devices like this for things such as Bluetooth

Question 7: Explain the difference between Command Line Interface, GUI or Touch Screen. (2 point)

Command Line Interface (CLI) is a text-based interface where users interact with a computer or software by typing commands. It requires knowledge of specific commands and syntax, offering precise control and automation capabilities but often has a steeper learning curve, since the commands are typically only used by people with advanced knowledge of the technology and specific needs from the system.

Graphical User Interface (GUI) is a visual interface where users interact with a computer or software through graphical elements like windows, icons, and buttons. It's user-friendly, intuitive, and suitable for most users but may offer limited automation compared to CLI. Opposed to navigating through the system with text and commands entered into a terminal like in a CLI, GUIs make it possible for users to navigate with a mouse, clicking, and a minimal amount of far less complicated typing.

A touch screen is a hardware input device that allows users to interact with a computer or software by directly touching the screen. It provides an intuitive and tactile interface commonly used in smartphones, tablets, and some computers, offering a hands-on and interactive experience. It is much more like a GUI than a CLI, and is essentially a GUI evolved work without the use of hardware like a mouse or keyboard.

Question 8: Explain Methods for Passing Parameters in Operating System. (2 point)

There are three general methods for passing parameters in OS. The simplest approach is to pass parameters via registers. There are cases in which there are too many parameters to be passed via register, however, in which case the parameters will be stored in memory via a block or a table, and then the address of the block/table within memory is passed to the register as a single parameter. In Linux, registers are used for five or fewer parameters, and the block approach is used for anything over five parameters.

Question 9: Explain differences between macOS, iOS, Android. (2 point)

macOS and iOS are both operating systems created by Apple. macOS is the counterpart designed for their laptops and desktops, whereas iOS is the OS used for their mobile devices. macOS is designed to compile on Intel based architectures and iOS is designed to compile on ARM-based architectures. Apple started out by creating macOS and then made alterations to iOS with mobile usage in mind by centering it around touchscreen devices and modifying the kernel somewhat in order to address mobile specific issues and functionality.

Android is more similar to iOS than macOS in that it was designed with mobile usage for things like phones and tablets in mind. A major difference between the two is that Android is open source while iOS remains close-source which results in a much more restricted experience to developers working with iOS than Android. This results in increased security and robustness against attacks within iOS but at the cost of less documentation and ease of development than with Android. Android uses Java for most app development but it is not standard Java and is instead an API developed for the purpose of creating Android applications.

Question 10: Explain difference between system calls and system programs. (2 point)

System calls are interfaces provided by an operating system to allow user programs to request privileged services, like file operations or process management. They basically serve as entry points to the kernel and accessing

it.

System programs are complete software applications that run on a computer and utilize system calls and other services provided by the operating system to perform specific tasks/functions, like text editors, web browsers, or games. They are distinct from the operating system itself but rely on its services for their operation.