FACULTY OF COMPUTING

SECP1513 TECHNOLOGY AND INFORMATION SYSTEM

SEMESTER 2 2024/2025

LECTURER'S NAME

DR NOOR HIDAYAH BINTI ZAKARIA

ASSIGNMENT:

OPEN-ENDED QUESTIONS

(BASED ON THE LECTURE NOTE)

NAME:

SYAHIDATUL NAJWA BINTI ZAMRI

SX241889ECJHF01

OPEN-ENDED QUESTIONS (CHAPTER 3)

Open-Ended Questions (Page 1 of 2)

1. Describe system software. Discuss each of the four types of system programs.

Describe system software.

System software is a collection of programs designed to manage and control computer hardware while providing a platform for other software to run. It acts as a bridge between the user, application software, and the physical components of the computer. Its primary purpose is to ensure the smooth operation of the system by handling core functions such as memory management, device control, and security.

Discuss each of the four types of system programs.

System software can be categorized into four main types. Each plays a specific role in ensuring the computer operates efficiently:

a) Operating Systems (OS)

An operating system (OS) is a fundamental collection of programs that serves as the backbone of a computer, managing hardware resources and providing essential services for applications. It acts as an intermediary between users and hardware, ensuring seamless interaction. Key functions of an OS include resource management, where it allocates critical components like the CPU, memory, storage, and peripherals to optimize performance. It also provides a user interface, which can be graphical (GUI), such as in Windows or macOS, or command-based (CLI), like the Linux terminal. Additionally, the OS handles file management, organizing data into files and folders for efficient storage and retrieval. Security is another vital role, as the OS controls user access and safeguards against unauthorized activities. Furthermore, modern OSs support multitasking, allowing multiple applications to run simultaneously without interference. Operating systems are categorized into three main types: embedded OS, designed for specialized devices like smartphones (e.g., Android, iOS); stand-alone OS, used in personal computers (e.g., Windows 11, macOS); and network OS, which manages interconnected computers in environments like servers (e.g., Windows Server, Linux). Popular examples of operating systems include Windows, macOS, Linux, and Android, each tailored to meet specific computing needs.

b) Utility Programs

Utilities are specialized programs designed to optimize, maintain, and secure a computer system, ensuring it runs efficiently and reliably. These tools perform critical behind-the-scenes tasks to enhance performance and prevent issues. Among the most essential utilities are troubleshooting tools, such as Windows Activity Monitor, which diagnose and resolve hardware or software problems. Antivirus software, like Norton or Bitdefender, plays a vital role in protecting the system from malware and cyber threats. Backup tools, such as File History in Windows, create copies of important data to safeguard against loss due to hardware failure or accidental deletion. Additionally, disk cleanup and defragmenter tools help free up storage space and reorganize fragmented files, improving overall system speed and efficiency. For comprehensive maintenance, utility suites like Norton Utilities bundle multiple tools into a single package, offering a convenient solution for system optimization and security. Together, these utilities ensure a smooth and secure computing experience.

c) Device Drivers

Device drivers are specialized programs that serve as intermediaries between the operating system and hardware components, enabling seamless communication and control. These small but critical software modules translate generic OS instructions into device-specific commands that hardware like printers, graphics cards, and audio devices can understand. By doing so, they ensure that peripherals function correctly and efficiently with the computer system. Device drivers also facilitate plug-and-play functionality, allowing the OS to automatically recognize and configure newly connected hardware without manual intervention. For example, a printer driver ensures that print commands from the OS are correctly executed by the printer, while a graphics card driver (such as those from NVIDIA or AMD) optimizes display performance for gaming or video editing. Similarly, an audio driver enables the OS to output sound through speakers or headphones. Without these drivers, hardware devices would be unable to perform their intended functions, highlighting their essential role in system operation.

d) Programming software

Programming software encompasses a suite of specialized tools that empower developers to create, debug, and maintain software applications. These tools include compilers, such as GCC for C, which translate high-level programming code into machine-readable instructions, and interpreters, like the Python interpreter, which execute code line-by-line for dynamic testing. Debuggers, such as GDB, play a crucial role in identifying and resolving errors within the code, ensuring functionality and efficiency. Integrated Development Environments (IDEs), such as Visual Studio and Eclipse, provide comprehensive platforms that combine editing, debugging, and compilation features into a single workflow, streamlining the development process. Examples of programming software include languages like C, Java, and Python, each supported by tailored tools that cater to specific development needs, making them indispensable for modern software engineering**.**

2. Define operating systems. Describe the basic features and the three categories of operating systems.

Define operating systems.

An operating system (OS) is a collection of programs that manages computer hardware resources, provides essential services for applications, and acts as an intermediary between users and hardware. It ensures efficient operation of the computer system by coordinating tasks like memory allocation, file management, and device communication.

Describe the basic features and the three categories of operating systems.

An operating system (OS) is fundamental software that manages computer hardware resources and provides essential services for applications, acting as an intermediary between users and hardware. Its basic features include resource management (allocating CPU, memory, and peripherals), user interfaces (GUI like Windows/macOS or CLI like Linux), file management (organizing data storage), security (authentication and access control), multitasking (running multiple apps simultaneously), and booting (starting/restarting the system). Operating systems are categorized into three types: embedded OS (e.g., Android, iOS, RTOS for smart devices), stand-alone/desktop

OS (e.g., Windows, macOS, Linux for PCs), and network OS (e.g., Windows Server, Linux/Unix for servers), each optimized for specific devices and environments.

3. What are mobile operating systems? Describe leading mobile operating systems.

What are mobile operating systems?

Mobile operating systems are specialized embedded operating systems designed for portable devices like smartphones, tablets, and smartwatches, offering optimized performance for wireless connectivity and touch interfaces. Unlike desktop OSs, they prioritize power efficiency, compact design, and app ecosystems, with leading examples including Android (open-source, used by various manufacturers), iOS (Apple's exclusive, secure platform), and HarmonyOS (Huawei's cross-device system). These OSs provide features like touchscreen controls, app stores, cloud integration, and biometric security, catering to on-the-go usage while maintaining seamless connectivity across devices.

Describe leading mobile operating systems.

The leading mobile operating systems are Android, iOS, and HarmonyOS, each powering modern smartphones with distinct features. Android, developed by Google, dominates the global market with its open-source flexibility, allowing customization by manufacturers like Samsung and offering vast app availability through Google Play. Apple's iOS, exclusive to iPhones and iPads, prioritizes security, privacy, and seamless integration with Apple's ecosystem, supported by a curated App Store and long-term software updates. Huawei's HarmonyOS, created as an alternative to Android, focuses on cross-device compatibility, connecting smartphones with IoT devices through its lightweight, efficient design. While Android leads in customization and affordability, iOS excels in premium user experience and security, and HarmonyOS bridges multiple smart devices, reflecting the evolving demands for connectivity and performance in mobile technology.

Open-Ended Questions (Page 2 of 2)

1. What are desktop operating systems? Compare Windows, Mac OS, Linux and Chrome OS. Discuss virtualization.

What are desktop operating systems?

Desktop operating systems are stand-alone operating systems designed for personal computers and workstations, providing a platform for running applications, managing files, and interacting with hardware. Unlike mobile or embedded systems, they prioritize multitasking, hardware versatility, and user productivity. The main desktop OSs include Windows (the most widely used, with versions like Windows 10/11 offering broad software compatibility), macOS (Apple's intuitive, high-performance system for Mac computers), and Linux (an open-source, customizable OS popular among developers and enterprises). These systems support complex tasks like gaming, content creation, and software development, featuring graphical interfaces (GUI), file management tools, and robust security.

Compare Windows, Mac OS, Linux and Chrome OS.

The Compare Windows, Mac OS, Linux and Chrome OS:

	Windows	**Mac OS**	**Linux**	**Chrome OS**
Developer	Microsoft	Apple	Open-Source Community	Google
Target Users	General users, gamers, businesses	Creative professionals, Apple users	Developers, IT professionals	Students, educators, casual users
Cost	Paid (licensed)	Free (with Apple hardware)	Free (open source)	Free (on Chromebooks)
Hardware	Runs on most PCs	Exclusive to Apple devices	Running on most PCs (wide compatibility)	Optimized for Chromebooks

Software	Largest app library (e.g., Office)	Curated App Store (optimized for Mac)	Open-source repos (e.g., apt, Snap)	Web/Android apps (limited native)
Security	Targeted by malware (needs antivirus)	Strong sandboxing, Gatekeeper	Highly secure (open-source audits)	Sandboxed, auto-updates
Customization	Moderate	Limited (Apple-controlled)	Extreme (desktop environments, CLI)	Minimal (web-focused)
Performance	Versatile, supports heavy workloads	Optimized for Apple hardware	Lightweight, efficient on old hardware	Fast boot, cloud-dependent
Updates	Monthly patches, major version upgrades	Annual updates, long-term support	Rolling/versioned (depends on distro)	Automatic, seamless
Ecosystem	Integrates with Microsoft services	Seamless Apple ecosystem (iPhone, iPad)	Flexible, CLI-driven	Google Cloud/Android integration

Discuss virtualization.

Virtualization is a technology that enables multiple operating systems to run simultaneously on a single physical machine, optimizing hardware resources and improving efficiency. The slide outlines three main types: Operating System Virtualization, where a hardware platform hosts multiple OS environments; Application Virtualization, which allows programs to run on thin clients without full installation; and Service Virtualization, which simulates component behavior in complex systems. Tools like Parallels enable cross-platform functionality (e.g., running Windows on Mac OS). Virtualization enhances flexibility, reduces costs, and supports testing across diverse environments without needing separate physical devices.

2. Discuss utilities. What are the most essential utilities? What is a utility suite?

Discuss utilities.

Utilities are specialized system software programs designed to optimize, maintain, and secure computer systems.

As outlined in the slide, key utilities include:

I. Troubleshooting/diagnostic tools (e.g., Mac OS X Activity Monitor) that identify and resolve system issues.
II. Antivirus programs that protect against malware.
III. Backup utilities (e.g., Windows File History) that safeguard data.
IV. Disk management tools like Disk Cleanup (removes unnecessary files) and Disk Defragmenter (optimizes file storage).

The slide also highlights utility suites (e.g., Norton Utilities) that bundle multiple maintenance tools into one package for comprehensive system care. These utilities work behind the scenes to enhance performance, ensure data security, and extend hardware lifespan.

What are the most essential utilities?

The most essential utilities are specialized programs that maintain, optimize, and protect computer systems, as highlighted in the slide. These include:

I. Troubleshooting Tools to diagnose and fix system errors.
II. Antivirus Software to block malware and cyber threats.
III. Backup Utilities to safeguard data against loss.
IV. Disk Cleanup Tools to delete temporary files and free up storage space.
V. Disk Defragmenters to reorganize fragmented data for faster performance.
VI. Utility Suites that bundle multiple tools for comprehensive system maintenance.
VII. These utilities ensure smooth operation, security, and longevity of the system by automating critical maintenance tasks.

What is a utility suite?

A utility suite is an all-in-one software package that combines essential system maintenance and optimization tools into a single integrated solution, as described in the slide. These suites consolidate critical utilities like antivirus protection, disk cleanup, defragmentation, backup tools, and diagnostic programs to provide comprehensive computer care. By bundling these functions together, as seen in popular examples like *Norton Utilities*, *Bitdefender*, and *Kaspersky,* utility suites offer a cost-effective and user-friendly alternative to managing multiple standalone programs. They automate tasks such as malware scanning, storage optimization, and data backup through a centralized interface, ensuring peak system performance, enhanced security, and streamlined maintenance for both casual users and professionals.