Operating systems

11.1A Computer system types

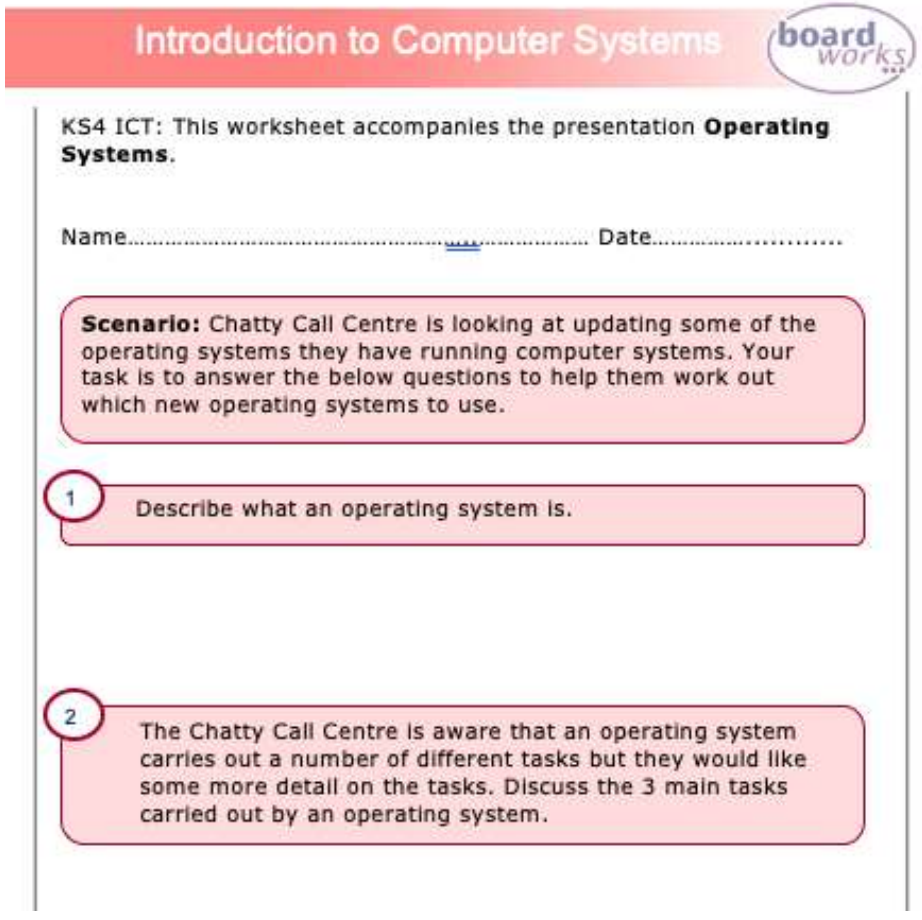
Formative assessment

describe the purpose and main functions of operating systems

able to choose the right OS

knows types of OS and provide examples

name at least 3 examples of OS functions



Introduction to Computer Systems

boardworks

KS4 ICT: This worksheet accompanies the presentation **Operating Systems**.

Name..... Date.....

Scenario: Chatty Call Centre is looking at updating some of the operating systems they have running computer systems. Your task is to answer the below questions to help them work out which new operating systems to use.

1 Describe what an operating system is.

2 The Chatty Call Centre is aware that an operating system carries out a number of different tasks but they would like some more detail on the tasks. Discuss the 3 main tasks carried out by an operating system.

Learning objectives

- compare single-user and multi-user operating systems
- compare one-task and multitasking operating systems

Success criteria

- demonstrate their knowledge of OS classification
- describe how work multitasking OS
- describe how work multi-user OS

Vocabulary

Batch OS, multi-user OS, one-task OS, multitasking OS, single-user OS, real time OS,

Task #1

READING TIME!

1. Single user operating systems
2. What is an operating system?
3. Multi-user multi-tasking operating system
4. Network operating systems
5. Real time systems
6. Batch processing

Task #2

- Prepare one question for each topic and ask the class

Multi-user operating system

- **Multi-user** - A multi-user operating system allows many different users to take advantage of the computer's resources simultaneously. The operating system must make sure that the requirements of the various users are balanced, and that each of the programs they are using has sufficient and separate resources so that a problem with one user doesn't affect the entire community of users. Unix, VMS and mainframe operating systems, such as *MVS*, are examples of multi-user operating systems.

Real Time operating System

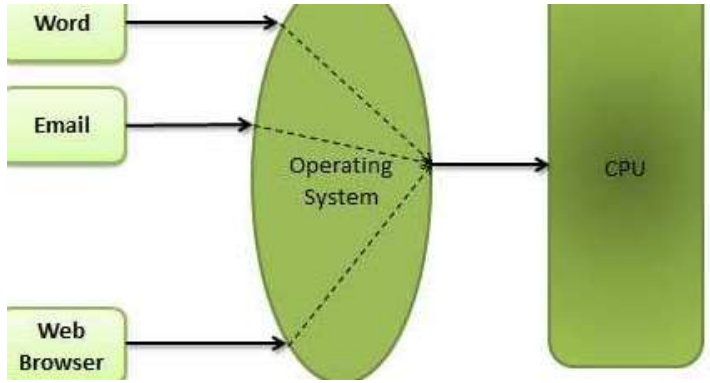
- Real time system is defines as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. The time taken by the system to respond to an input and display of required updated information is termed as response time. So in this method response time is very less as compared to the online processing.
- Real-time systems are used when there are rigid time requirements on the operation of a processor or the flow of data and real-time systems can be used as a control device in a dedicated application. Real-time operating system has well-defined, fixed time constraints otherwise system will fail. For example Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, and home-appliance controllers, Air traffic control system etc.

Multitasking

- A program that is loaded into memory and is executing is commonly referred to as a process.
- When a process executes, it typically executes for only a very short time before it either finishes or needs to perform I/O.
- Since interactive I/O typically runs at people speeds, it may take a long time to completed. During this time a CPU can be utilized by another process.
- Operating system allows the users to share the computer simultaneously. Since each action or command in a time-shared system tends to be short, only a little CPU time is needed for each user.
- As the system switches CPU rapidly from one user/program to the next, each user is given the impression that he/she has his/her own CPU, whereas actually one CPU is being shared among many users.

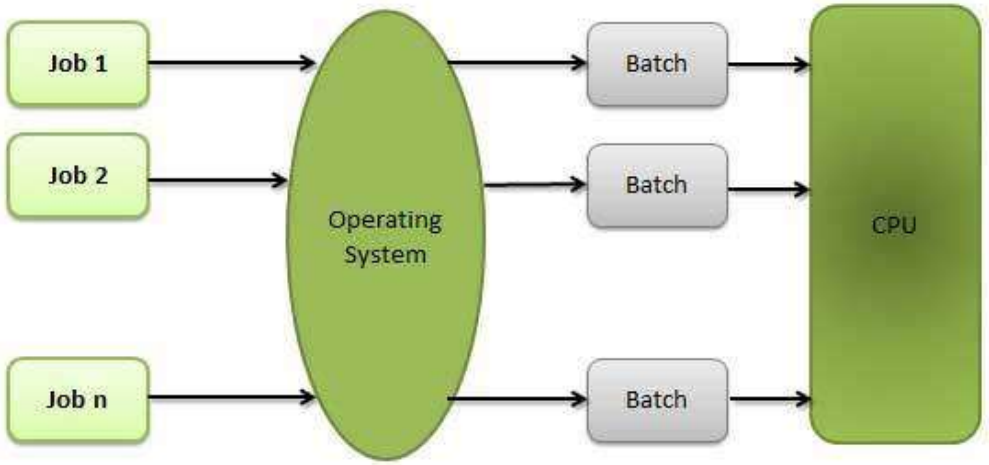
Multitasking

- Multitasking refers to term where multiple jobs are executed by the CPU simultaneously by switching between them. Switches occur so frequently that the users may interact with each program while it is running. Operating system does the following activities related to multitasking.
- The user gives instructions to the operating system or to a program directly, and receives an immediate response.
- Operating System handles multitasking in the way that it can handle multiple operations / executes multiple programs at a time.
- Multitasking Operating Systems are also known as Time-sharing systems.
- These Operating Systems were developed to provide interactive use of a computer system at a reasonable cost.
- A time-shared operating system uses concept of CPU scheduling and multiprogramming to provide each user with a small portion of a time-shared CPU.
- Each user has at least one separate program in memory.



Batch processing

- Batch processing is a technique in which Operating System collects one programs and data together in a batch before processing starts. Operating system does the following activities related to batch processing.
- OS defines a job which has predefined sequence of commands, programs and data as a single unit.
- OS keeps a number a jobs in memory and executes them without any manual information.
- Jobs are processed in the order of submission i.e. first come first served fashion.
- When job completes its execution, its memory is released and the output for the job gets copied into an output spool for later printing or processing.



Advantages and Disadvantages of Batch Processing

Advantages

- Batch processing takes much of the work of the operator to the computer.
- Increased performance as a new job get started as soon as the previous job finished without any manual intervention.

Disadvantages

- Difficult to debug program.
- A job could enter an infinite loop.
- Due to lack of protection scheme, one batch job can affect pending jobs.

Batch operating system

- The users of batch operating system do not interact with the computer directly. Each user prepares his job on an off-line device like punch cards and submits it to the computer operator. To speed up processing, jobs with similar needs are batched together and run as a group. Thus, the programmers left their programs with the operator. The operator then sorts programs into batches with similar requirements.
- The problems with Batch Systems are following.
- Lack of interaction between the user and job.
- CPU is often idle, because the speeds of the mechanical I/O devices is slower than CPU.
- Difficult to provide the desired priority.

Network operating System

- Network Operating System runs on a server and provides server the capability to manage data, users, groups, security, applications, and other networking functions. The primary purpose of the network operating system is to allow shared file and printer access among multiple computers in a network, typically a local area network (LAN), a private network or to other networks. Examples of network operating systems are Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD.
- The advantages of network operating systems are following.
- Centralized servers are highly stable.
- Security is server managed.
- Upgrades to new technologies and hardwares can be easily integrated into the system.
- Remote access to servers is possible from different locations and types of systems.
- The disadvantages of network operating systems are following.
- High cost of buying and running a server.
- Dependency on a central location for most operations.
- Regular maintenance and updates are required.

Memory Management

- Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.
- Main memory provides a fast storage that can be access directly by the CPU. So for a program to be executed, it must in the main memory. Operating System does the following activities for memory management.
- Keeps tracks of primary memory i.e. what part of it are in use by whom, what part are not in use.
- In multiprogramming, OS decides which process will get memory when and how much.
- Allocates the memory when the process requests it to do so.
- De-allocates the memory when the process no longer needs it or has been terminated.

Individual work (Bilimland.kz)

Follow the link to complete tasks 1,2,3 and test.

https://bilimland.kz/en/courses/computer-science/7th-grade/lesson/classification-of-operating-systems

Reflection

- What have you learned from the lesson?
- What was difficult for you to understand?

Resources

- https://en.wikibooks.org/wiki/A-level_Computing/AQA/Problem_Solving,_Programming,_Operating_Systems,_Databases_and_Networking/Operating_Systems/Role_of_the_operating_system
- https://en.wikibooks.org/wiki/A-level_Computing/AQA/Problem_Solving,_Programming,_Operating_Systems,_Databases_and_Networking/Operating_Systems/Operating_system_classifications
- http://www.tutorialspoint.com
- http://www.teach-ict.com
- http://computer.howstuffworks.com/operating-system3.htm