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Computer Architecture and Operating Systems. ACCA4022)

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Introduction

An operating system is software that controls computer hardware and software resources and provides standard services for computer programmes. (OS). The operating system is a crucial part of a computer system's system software. Even while it is possible to directly interface software applications and hardware, most programmes are part of an operating system, allowing them to utilise the public library without having to worry about the precise hardware details provided.

The operating system of a computer controls the input devices, output devices, network devices, and storage devices. The operating system additionally provides services to facilitate the efficient running and management of any additional installed software programmes as well as memory allocation. The three most popular operating systems for personal computers are DOS, OS/2, and Windows, while there are other choices as well, such Linux. [1]

1. The operating system (OS) of the computer manages all the hardware and software. It performs basic functions such as processing input and output, controlling files, memory, and processes, as well as controlling peripheral devices like disc drives and printers.

Most of the time, several computer applications are running concurrently, and each one needs access to the computer's CPU, memory, and storage. The operating system coordinates this, making sure that each piece of software has the resources it requires.

An operating system is frequently pre-installed on any computer you purchase. Usually, people utilise the pre-installed operating system that comes with computers, but you can update or change it to your preferences.

Different operating systems will perform in different ways. They may differ graphically, organise programmes differently, and use different terms for similar functions.

Although there are many others, the three most common operating systems are Linux, Apple's macOS, and Microsoft's Windows. [2]

Moreover, the operating system offers other services to the computer system. Users can take advantage of a number of services that the operating system offers, which are enumerated in the following manner:

- Execution of Programs: The Operating System oversees carrying out all kinds of programmes, whether they are user applications or system programmes. The Operating System makes use of a variety of resources to ensure that all functionalities execute smoothly.
- Protection of Information and Resources: The Operating System oversees making the most secure use possible of all Information and Resources on the machine. Any attempt by an external resource to obstruct any kind of data or information must be thwarted by the operating system.
- Operation of Input/Output Devices: The Operating System oversees managing all types of inputs, including those from the keyboard, mouse, desktop, etc. For all types of inputs and outputs, the operating system handles all interfaces in the best way possible. As each sort of peripheral device has a unique nature, such as mice or keyboards, the Operating System oversees managing the data sent between them.

The Operating System makes sure that all these services are provided for users' convenience to make programming tasks simpler. The services offered by all different operating systems are essentially the same. [3]

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1. The "basic" PowerShell cmdlets are not officially listed anywhere. Yet, most experts concur that a small number of cmdlets are essential. These cmdlets are frequently combined with other cmdlets. PowerShell is frequently used as a scripting language to automate system management. It is also employed in CI/CD settings to develop, test, and deploy solutions.

The following are PowerShell cmdlets that you should be familiar with:

- Get-Command (Obtains every command)
- Get-Help (Information on Windows PowerShell principles and commands is displayed)
- Add-Content (Adds material to a file, such as text or data)
- Get-Content (Gets a file's contents)
- Clear-Content (Deletes an item's contents but not the object itself)
- Clear-Item (Deletes an item's contents but not the object itself)
- Clear-Host (Clears the host program's display)
- Set-Location (selects a location to be the current working location)
- Get-ChildItem (Obtains the files and folders on a device for the file system)
- Get-Alias (Retrieving the aliases for the active session) [4]

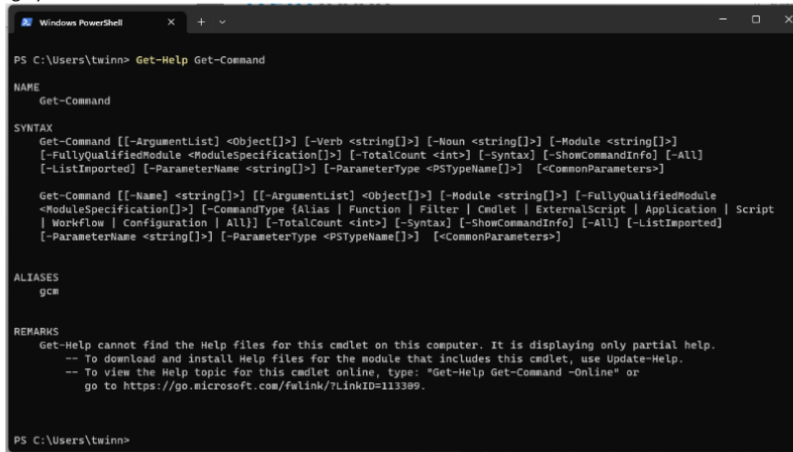
Get-Command

Get-Command is the first significant PowerShell cmdlet. When used alone, the Get-Command cmdlet will list every PowerShell cmdlet that is currently available. This list typically numbers in the thousands.

Even though Get-Command may not appear extremely useful, it is crucial that you are familiar with it. That's because it can assist you in locating the cmdlet you require in a specific circumstance.

Most PowerShell cmdlets are composed of a verb and a noun, separated by a dash. Get is a verb and Command is a noun in the instance of get-command. A verb or a term that is used in one cmdlet is commonly backed by other cmdlets, as well. For instance, many cmdlets employ the verb get. Get typically asks the command-line tool to return a list of data (examples: Get-Users, Get-Process, etc.). [5]

Any PowerShell cmdlet's syntax can be viewed by using the Get-Help command.



```
Windows PowerShell
PS C:\Users\twinn> Get-Help Get-Command

NAME
Get-Command

SYNTAX
Get-Command [[-ArgumentList] <Object[]>] [-Verb <string[]>] [-Noun <string[]>] [-Module <string[]>]
[-FullyQualifiedModule <ModuleSpecification[]>] [-TotalCount <int>] [-Syntax] [-ShowCommandInfo] [-All]
[-ListImported] [-ParameterName <string[]>] [-ParameterType <PSTypeName[]>] [-CommonParameters]

Get-Command [[-Name] <string[]>] [[-ArgumentList] <Object[]>] [-Module <string[]>] [-FullyQualifiedModule
<ModuleSpecification[]>] [-CommandType {Alias | Function | Filter | Cmdlet | ExternalScript | Application | Script
| Workflow | Configuration | All}] [-TotalCount <int>] [-Syntax] [-ShowCommandInfo] [-All] [-ListImported]
[-ParameterName <string[]>] [-ParameterType <PSTypeName[]>] [-CommonParameters]

ALIASES
gc

REMARKS
Get-Help cannot find the Help files for this cmdlet on this computer. It is displaying only partial help.
-- To download and install Help files for the module that includes this cmdlet, use Update-Help.
-- To view the Help topic for this cmdlet online, type "Get-Help Get-Command -Online" or
go to https://go.microsoft.com/fwlink/?LinkID=113309.

PS C:\Users\twinn>
```

2.

The Linux command line is the text user interface on your computer. Because it is commonly referred to as the shell, terminal, console, prompt, or by other names, using it may appear to be challenging and sophisticated. However, it also gives users the option of manually entering instructions at the terminal or of having operations that were pre-programmed in "Shell Scripts" run automatically. When attempting to follow instructions online, including many available on this website, using the command line may be important because it is feasible to copy and paste commands from websites.

Even the most seasoned CLI users routinely utilise a handful of straightforward commands.

These commands allow us to carry out fundamental tasks including navigating the folder hierarchy, gathering data, and making changes. [6]

Here are 10 basic Linux Command Lines:

- help command (displays the command's manual)
- Dir (List the folder and directory hierarchy)
- cd pathname (Alter the file system's directory (folder))
- cd \ (Go to the file system's root folder)
- cd .. (Advance the file system one level (one folder))
- copy (Add a file to a different folder)
- move (Place a file in a different folder)
- type filename (Put a file in)
- cls (the CLI window is cleared)
- exit (the CLI window is closed)

Linux is largely used on servers. Nearly 90% of the internet is run on Linux servers. This is because Linux is quick, secure, and reasonably priced. The major problem is the cost of employing Windows servers. This issue can be solved using Linux servers. The Android operating system, which powers over 80% of smartphones worldwide, is likewise built on the Linux kernel. On Windows, viruses typically run, but not on Linux. An important advantage is that programmers may automate command-line programmes rather than graphical ones.

The ability for programmers to automate command-line programmes over graphical ones is a significant benefit.

You will frequently encounter repetitious tasks like renaming files if you work with graphical apps like file managers. With a GUI file manager, this can become tiresome if you have a lot of files. The shell enables you to create a list of files using wildcards. [7]

3.

Batch scripting is a useful tool that enables the execution of command line instructions like files for Windows programme developers. Developers can automate a variety of tasks on servers and local machines using batch files. Setting up new projects or scheduling recurring chores automatically are two examples of repetitive tasks where it is very helpful.

Despite having equivalent counterparts for Mac, Linux, and other UNIX-like devices, batch files only function on Windows-based computers. Since they were initially created for DOS and OS/2, they are a relatively old piece of technology. As a result, they are now quite rare, even among development circles.

Among the frequent applications for Batch Script are

- putting up servers for various uses.
- automating maintenance tasks like removing unnecessary files or log files.
- automating the transfer of applications between environments.
- installing software simultaneously on several devices.

Files known as batch files often end in .bat, although they can alternatively end in .cmd or .btm. A batch file is simply a set of commands written in a very high-level language that the operating system reads and executes. A user can execute a batch file by opening it in the same way they would an .exe file, but instead of starting a programme, it will read and execute the batch file's commands.

The commands in batch scripts are run sequentially. You can essentially write and execute a sequence of command-prompt procedures using batch scripts. Batch scripts can still be useful for developers even if Windows PowerShell is a more recent alternative that offers more possibilities. Batch scripts will still operate on modern Windows 10 computers. [8]

Batch scripting makes it feasible to automate tasks, which is particularly useful for mundane tasks. Many operations that can be carried out at the command prompt can also be automated with batch scripts.

Normally, notepad is used to create batch files. The simplest tool for creating batch files is this one. The batch scripts' execution environment comes next. This is carried out on Windows computers using the command prompt or cmd.exe. All batch files are executed in this setting. [9]

4.

In numerous aspects, Linux is very different from previous operating systems. Because it is an open-source operating system, programmers can use it to make custom operating systems.

- Depending on your needs, you can choose from a variety of applications with varying features.
- The highly safe and resilient security is being improved in several ways by a global development community. It is not necessary to run a regular antivirus scan on it. Because Linux is so dependable and stable, businesses like Google, Amazon, and Facebook utilise it to protect their servers.
- Linux is free to use and can be installed on as many computers as you like.
- An operating system that is completely problem-free does not exacerbate infections, malware, or computer slowdown.

Listed below are the main key features of a Linux OS scripting language.

- **Multiuser Capacity**
Users can simultaneously share system resources including RAM, a hard drive, and an application programme while using multiuser capacity. However, they are required to use it in many terminals.
- **Multitasking**
By properly splitting the CPU time, multitasking enables numerous apps to execute simultaneously. UNIX, IBM's OS/390, Windows Vista, Windows XP, and Windows 7, 8, 9, and 10 are all platforms that support multitasking.
- **Security**
Data is protected in three ways:
Authentication: utilising a login ID and password
Authorization: With the help of read, write, and execute permissions
Files are changed into an unreadable format using encryption.
- **File System**
It offers a hierarchical method to organise directories and files. Based on the kind of files they contain, the folders are divided into binary directories, configuration directories, data directories, and memory directories.
- **Open Source**
The Linux source code is openly accessible to everyone and part of a community development initiative that enables users to alter, disseminate, and analyse the code.

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- Portability
Portability in this context does not refer to a smaller size. In this case, it indicates that Linux supports a variety of hardware, which means that the programme can function effectively on a variety of hardware. [10]

Conclusion

As only one programme could be run at a time on computers. Since they manage everything, including memory control and allocation, device detection, and output transmission to computer displays, operating systems are essential. Later in the decade, a range of software applications, sometimes known as libraries, were included with computers. These libraries were connected to create the early types of operating systems still in use today. Graphical user interfaces (GUIs) that take input from pointing devices are present in most current operating systems. This kind of pointing tool includes things like a mouse and a stylus. The most popular operating systems for IBM-compatible personal computers are Microsoft Windows, Linux, and Mac OS X.

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Instructor

29/100

Total:		29
1. Engagement with Literature Skills:		
+ Some good use of citations. + formatted reference list. - Some unreliable and dates sources (e.g. [1]) used. Additional paraphrasing is required during the first section of the report. - A book/academic paper could also be included in the reference list, and multiple citations used in places, to gain the extra marks in this category.	20	10
2. Knowledge and Understanding Skills: 4e		
Key functions: + Good overview of some key OS functions documented. - could be extended to include some additional areas. Bat & Bash Commands: + Overview of relevant commands demonstrates an understanding of the language. - Additional commands could be used to enhance knowledge and understanding of the language. Bat & Bash scripts: + Overview of the scripts capability is documented. - But no evidence of application is documented. - Scripts could be created and used to enhance knowledge and understanding of the language.	20	10
3. Cognitive and Intellectual Skills: 2e		
Evidence of some good analysis and understanding of OS functions and the command aspect of the	10	5

languages is clearly documented. – could be extended in some feature areas and the script syntax of the languages, to gain the extra marks in this category.		
4. Practical Application Skills: 10e		
1. Bat Commands: + x1 use of a PS command. - could be extended to include additional commands. 2. Bash Commands: - No use of Bash commands. 3. Bat Scripts: - No use of Bat scripts. 4. Bash Scripts: - No use of Bash scripts.	4 0	1
5. Transferable Skills for Life and Professional Practice: 5+1+2+2		
+ Good structure. - Report format and presentation could be improved. - No title page. - Report sections could be titled and numbered. - Tutorial Activity 1 – OS Types: No relevant supplementary information on OS types included in the Appendix of the report. - No evidence of engagement with a relevant course documented in the appendix.	1 0	3

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