“Kyiv Professional College of Communications”

Computer Engineering Cycle Commission

**PERFORMANCE REPORT**

**LABORATORY WORK №4**

in the discipline: "Operating Systems"

**Topic: "Linux commands for process management"**

Performed by students

RPZ-93B group

Team:

Бушовська О.В,

Білобровенко О.С.,

Скворцов Д.Є.

The teacher checked:

Сушанова В.С.

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**The goal of the work:**

1. Gaining practical skills in working with the Bash command shell.

2. Familiarity with basic commands for process management.

**Material support of classes**

1. Computer type IBM PC.

2. Windows family of operating systems (Windows 7).

3. Virtual machine - Virtual Box (Oracle).

4. GNU / Linux operating system - CentOS.

5. Cisco Network Academy website netacad.com and its online Linux courses

**Tasks for preliminary preparation.**

***Готувала матеріал студентка Білобровенко Олександра***

1. Read brief theoretical information for laboratory work and make a small dictionary of basic English terms on the purpose of commands and their parameters.

|  |  |
| --- | --- |
| Англійська | Українська |
| process ID | ідентифікатор процесу |
| terminal ID | ідентифікатор терміналу |
| The state of the process | стан процесу |
| The priority of the process | пріоритет процесу |

1. On the basis of the considered material give answers to the following questions:
   1. What commands do you know to monitor the status of processes? How to view their possible parameters?

Ps and top.

The ps Command Unix Parameters

Parameter Description

-A Shows all processes

-N Shows the opposite of the specified parameters

-a Shows all processes except session headers and processes without a terminal

-d Shows all processes except session headers

-e Shows all processes

-C cmslist Shows processes contained in the list cmdlist

-G grplist Shows processes with a group ID listed in grplist

-U userlist Shows processes owned by a userid listed in userlist

-g grplist Shows processes by session or by groupid contained in grplist

-p pidlist Shows processes with PIDs in the list pidlist

-s sesslist Shows processes with session ID in the list sesslist

-t ttylist Shows processes with terminal ID in the list ttylist

-u userlist Shows processes by effective userid in the list userlist

-F Uses extra full output

-O format Displays specific columns in the list format, along with the default columns

-M Displays security information about the process

-c Shows additional scheduler information about the process

-f Displays a full format listing

Shows job information

-l Displays a long listing

-o format Displays only specific columns listed in format

-y Prevents display of process flags

-Z Displays the security context information

-H Displays processes in a hierarchical format (showing parent processes)

-n namelist Defines the values to display in the WCHAN column

-w Uses wide output format, for unlimited width displays

-L Shows process threads

-V Displays the version of ps

The top Command

* **-v** - display the version of the program;
* **-b** - mode for data output only, the program does not accept interactive commands and is executed until it is completed manually;
* **-c** - display full path to executable command files;
* **-d** - information update interval;
* **-H** - turns on the output of process streams;
* **-i** - do not display processes that do not use processor resources;
* **-n** - the number of data update cycles after which the program must be closed;
* **-o** - field to sort by;
* **-O** - ​​display all available fields for sorting;
* **-p** - track only processes specified by PID, you can specify several PIDs;
* **-u** Show only processes running as the specified user.

1.2 Can the ps command monitor the status of processes in real time?

No. To view the list of processes that change in real time, you must use the program top.

1.3 By what parameters is it possible to sort processes in the top command? How to switch between them?

To perform a memory sort (%MEM) on top, just type Shift+M in the top command mode. If you are interested in which of the processes is running the longest, press Shift + T, and you will see the information of interest in the TIME + column. You can sort the processes by their number (PID) by typing Shift+N on the keyboard.

To return to the sorting mode by the level of processor resource consumption, use the Shift + P combination.

Not all sorting methods can be set using hotkeys. For example, to determine the processes that consume the most SWAP, use the field selection menu, which is called by the Shift + F combination.

Using the navigation keys, we find SWAP (or any other necessary parameter), using the “d” key we fix its addition to the general table of the top command (the “\*” symbol will appear next to confirm your choice). To set sorting by SWAP, here we press "s" and exit the menu (ESC). Ready!

You can make sure that the sorting works according to the given attribute by pressing "x". The column with the corresponding feature will be highlighted (in bold).

1.4 What commands do you know to complete the processes?

The active process can be terminated by pressing the <CTRL> <C> key or the DEL key. To end the background process, use the kill command, which has several formats: kill PID kill - signal PID kill% n This command can take as an argument the work number or process ID. To check the elimination of this process, you can execute the command ps, resulting in the answer on the display screen: 237 Terminated And if you execute the command jobs then we also get a similar confirmation: [20] + Terminated that is, send a certain signal to the process. More than 20 signals can be sent, each with its own number. If you enter the command kill 0, you can eliminate all background processes. If a process "hangs", then you need to go to another console, and use it to enter the kill command to eliminate the "hung" process. It is guaranteed that you can destroy a process with signal 9, for example: kill - 9 125 A normal user has the right to stop only processes running from his terminal. To complete the process, the system call exit () is used, which releases all resources used, including memory and kernel table structures.

2. Learn Cisco Academy Online Course Materials:

-NDG Linux Unhatched (Chapter 14 - 18 all Topics)

3. Answer the following questions (based on the course studied):

3.1. What filter commands do you know?

**Awk** is a great scanning and pattern processing language and can be used to create useful filters on **Linux.**

**Sed** is a powerful stream editor for filtering and transforming text.

The basic command is [**grep**](https://blog.sedicomm.com/2018/07/22/12-prakticheskih-primerov-komandy-grep-v-linux/)**,**  its variants are the same as using certain options for  **grep.**

**Head** is used to display the first parts of a file, it outputs the first 10 lines by default.

**Tail** outputs the last parts (10 lines by default) of the file. Use the **-n** switch and a number to specify the number of lines to display.

**Sort** is used to sort the lines of a text file or standard input.

The **uniq** command is used to report duplicate lines, it filters lines from standard input and writes the result to standard output. After running sort on input stream, you can remove duplicate rows with **uniq** like in the example below.

**Fmt is** a simple text editor that reformats paragraphs in the specified file and outputs the results to standard output.

The **pr** command converts text files or standard input for printing.

**More** is a useful file-reading filter designed primarily for viewing certificates. It shows the contents of the file page by page, to scroll further you need to press **[Enter]** .

The **less** command is the opposite of the **more command,** but it offers additional functionality and is slightly faster with large files.

3.2. What are regular expressions and base patterns, what are they used for?

Regular expressions are a very powerful tool for pattern matching, processing, and modifying strings that can be used for a variety of tasks. Here are the main ones:

* Checking text input;
* Find and replace text in a file;
* Batch rename files;
* Interaction with services such as Apache;
* Checking a string against a pattern.

Basic Patterns. Regular expressions are patterns that only certain commands are able to interpret. Regular expressions can be expanded to match certain sequences of characters in text. The examples displayed on this page will make use of regular expressions to demonstrate their power when used with the grep command. In addition, these examples provide a very visual demonstration of how regular expressions work, the text that matches will be displayed in a red color.

3.3. What basic network configuration commands do you know?

1. Ping

Ping is used to test the capacity of a network host to interact with another host. Just enter the Ping command, followed by the destination host name or IP address. Ping utilities seem to be the most common networking tool.

2. NetStat

Netstat is a common TCP-IP command line method that is present on most Windows, Linux, UNIX, and other operating systems. Regarding the protocol, netstat provides statistics and information on the use of the current TCP-IP connection network

3. Ip Config

The IP Configuration command displays basic information about setting the device's IP address. Just enter the IP configuration in the Windows prompt and IP, the subnet mask, and the default gateway that will be displayed on the current device.

4. Hostname

A computer needs a unique address to communicate with each other. The host name can be alphanumeric or alphanumeric and contains specific characters that are used specifically to identify a specific node or device on the network. For example, a host name must have a top-level domain name (TLD) and a space between one and 63 characters when used in a domain name system (DNS) or on the Internet.

5. Tracing in network teams

The tracert command is the command line used to receive the network packet being sent and received and the number of transitions required for that packet to reach the target. This command can also be attributed properly. It provides some details about the path that the packet travels from the source to the specified destination.

6. Nslookup

Nslookup, which means the name server search command, is a command-line network utility used to retrieve information about Internet servers. It provides information about the DNS name server (domain name system), ie the name and IP address of the default DNS server.

7. Routes

In IP networks, routing tables are used to route packets from one subnet to another. The Route command provides device routing tables. To get this result, just enter the print route.

8. ARP

ARP stands for address resolution protocol. Although network communications can easily be considered as an IP address, packet delivery ultimately depends on media access control (MAC). This is where the address resolution protocol comes into force.

9. Ping Ping in network commands

We discussed the Ping team and the Tracert team. There are similarities between these teams. Team routing that combines the best aspects of Tracert and Ping.

3.4. What package management systems do you know why you need them?

npm

npm (Node.js Package Manager) is a package manager included with Node.js.

RPM

RPM is a package management system originally developed by Red Hat for the Red Hat Linux operating system . RPM is now used in many distributions of the Linux operating system , for example, Fedora , RHEL, ASP Linux, ALT Linux, Mandriva, openSUSE .

dpkg

dpkg is the package management system used by the Debian operating system and various distributions based on it, such as Ubuntu .

pacman

Pacman is the official package manager for the Arch Linux distribution . It is a powerful package management system and at the same time easy to learn. Allows you to easily manage and customize packages, whether they come from the official Arch repository or you build your own.

Portage

Portage is the main package management system for Gentoo Linux . An analogue of the FreeBSD ports system. It is a set of utilities in Python and Bash designed to facilitate and streamline the installation of software from source codes or binary packages, taking into account all dependencies.

Entropy

Entropy is a package management system for Sabayon Linux. Represents an alternative to portage and can be installed with it, compatibility with which is ensured by running special scripts. For this system, there is a text client - Equo and a graphic - Sulfur.

PiSi

PiSi is a package management system used by the Turkish distribution Pardus

Image Packaging System

Image Packaging System is a package management system created by Sun Microsystems for OpenSolaris .

OneGet

OneGet is a package management system created by Microsoft for use on the Windows 10 operating system via PowerShell.

4. Prepare the initial version of the report in electronic form:

- Title page, topic and purpose of the work

- Glossary of terms

- Answers to clauses 2.1-2.4 and clause 3.1-c of tasks for preliminary preparation.

Progress.

***Готував матеріал студент Скворцов Дмитро***

1. Initial work in CLI mode in Linux Linux family:

1.1 Start the VirtualBox virtual machine, select CentOS, and start it. Log in under the user: CentOS, login password: reverse (if you are performing LR in room 401) and lower the terminal.

1.2 Start the Ubuntu\_PC virtual machine (if you are performing LR tasks through the netacad academy)

1.3 Start your Linux operating system (if you are running your own PC and have it installed) and start the terminal.

1. Start the terminal, and on the command line, follow these steps to familiarize yourself with working with directories:

* display the contents of the directory / proc. Where is it located and what is it for? Describe the information about its content.
* display current user sessions. What team can do this?
* display information about all running processes. What parameters should be used?
* display information about the processes of one user. What parameters should be used?
* display information only about system processes. What parameters should be used?
* display information about the processes according to your chosen criteria (5 examples). What parameters are used?

1. When working with processes, it is often necessary to start and work with background processes. Answer the following questions:

* What is the difference between the background process and the usual. Where are they used?
* Describe the following commands and explain what they do - the jobs, bg, fg command.
* Which command can you use to view information about background processes and tasks running on your system?
* How to pause the background process, then resume it and restart if necessary?

Test questions

***Готувала матеріал студентка Бушовська Ольга***

1. What is the purpose of the / proc directory on Linux systems? What information does it store?

Its main task is to obtain the state of the system and partially perform control actions. Process information is stored in the /proc/N directories, where N is the numeric process ID. This directory contains various pseudo-files that contain information about the process itself and its associated environment:

/proc/N/cmdline - The contents of the command line that started the process.

/proc/N/environ - Description of the environment in which the process is running. It can be useful for viewing the contents of the environment, if you need to, for example, see if an environment variable has been set before running the program.

/proc/N/exe - A symbolic link to the executable file of the running program.

/proc/N/limits - Limits on the use of system resources, relevant for the running process.

/proc/N/mounts - List of mounted resources that are available to the process

/proc/N/status - The status of the running program. It includes information such as the ID of the parent process, the status of the process itself, its name, ID, user ID, group ID, groups that the process owner belongs to, how many threads the process is using, how much memory it is using, and so on.

1. How do you dynamically determine which of the three processes currently uses the most memory? What percentage of memory does it consume?

The command is best for gathering information about the processes that are collected in the system in real time (running this command can be a dynamic control, which with the team currently uses the most memory).

■ VIRT: The total amount of virtual memory that the process uses

■ RES: the amount of physical memory that the process uses

■% MEM: The portion of available physical memory that the process

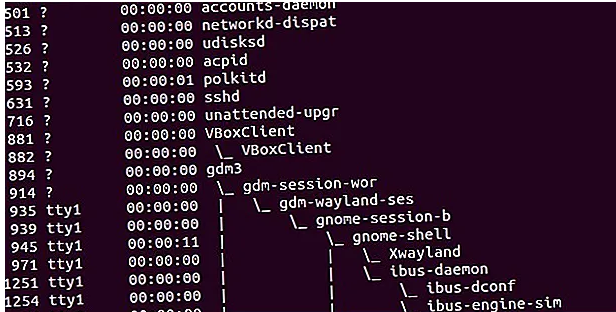
1. How to get a hierarchy of parent processes in Linux systems? Give its structure and describe.

ps -eH | Less

Indentation indicates which processes are the parents of which other processes.

To add a little more clarity, we can ask ps to add ASCII strings and draw the hierarchy as a tree. Ability to do this - forest option.

ps -eH --forest | Less

this makes it easier to keep track of which processes are the parents of other processes.

1. How is the top command different from ps?

Top

This utility notifies the user of all running processes on the Linux machine.

PS

This command means "Status Process". This is similar to Task Manager, which pops up in a Windows machine when we use Cntrl + Alt + Del. This command is similar to the "top" command, but the information displayed is different.

1. What additional features does htop implement compared to top?

Unlike top, htop shows all the processes in the system. Also shows uptime, CPU and memory usage.

htop is often used in cases where the information provided by the top utility is insufficient, such as finding memory leaks in processes.

1. Describe the components of your mobile OS that allow you to monitor the processes running in the system?

For Android - Activity Monitor Touch

1. Does your mobile system support terminal process control? If so, describe exactly how.

Don’t support.

1. Is it possible to install third-party software that will allow you to organize the management and monitoring of processes in your mobile phone. Briefly describe them.

At the top of the Activity Monitor window, the power consumption of individual programs and their processes is displayed.

Energy load. The relative value of the current energy consumption of the program (the lower the value, the better).

Consumption in 12 hours The average power load of the program for the last 12 hours or since the computer started (the less, the better). This column only appears on Mac laptops.

App Nap. App Nap activity indicator of this application.

Graphic map. Information about whether the program uses high-performance graphics mode. This column only appears on Mac laptops with one or more graphics cards.

Prohibition of sleep mode. This setting determines whether the program will prevent Mac from going to sleep.

User. The name of the user performing the process.

**Conclusion:** I gained practical skills in working with the Bash command shell. I got acquainted with the basic commands for process management.