“Київський фаховий коледж зв’язку”

Циклова комісія Комп’ютерної інженерії

**ЗВІТ ПО ВИКОНАННЮ**

**ЛАБОРАТОРНОЇ РОБОТИ №5**

з дисципліни: «Операційні системи»

**Тема: “Команди Linux для архівування та стиснення даних. Робота з текстом”**

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Перевірив викладач

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**The goal of the work:**

**1. Getting practical skills for working with Bash teamwork.**

**2. Knowledge of basic commands for data archiving and compression.**

**3. Getting to know the basic actions when working with text in the terminal.**

**Material provision of classes**

**1. IBM PC type computer.**

**2. OS family Windows (Windows 7).**

**3. Virtual machine - Virtual Box (Oracle).**

**4. GNU/Linux operating system - CentOS.**

**5. Cisco network academy site netacad.com and its online Linux courses**

***Student Neroshchin D. prepared the material.***

**Tasks for preliminary preparation.**

**1. team.**

**The \* asterisk character is used to indicate zero or more characters of any kind in a file name. you can use**

**star character anywhere in the filename pattern.**

**Question mark? symbol represents any single character. Every question mark matches**

**exactly one character, no more and no less.**

**The characters in brackets [] are used to match a single character, representing the range of characters that are available**

**matching characters are possible. Brackets can also be used to represent a range of characters.**

**Exclamation mark! symbol is used in conjunction with square brackets to negate a range. for**

**For example, the pattern /etc/[!DP]\* matches any file that does not start with D or P.**

**Copying files**

**The cp command is used to copy files. It needs a source and a destination. 2. Study the materials of the online course of the Cisco Academy “NDG Linux Essentials”:**

**- Chapter 09 - Archiving and Compression**

**- Chapter 10 - Working with text**

**3. Take the test in the NDG Linux Essentials course on the following topics:**

**- Chapter 09 Exam**

**- Midterm Exam (Modules 1 - 9) will be a separate task in the Google class**

**- Chapter 10 Exam**

**4. Based on the source material, answer the following questions:**

**4.1. Description of data archiving and compression commands:**

**tar: command to create or unpack archives. Main parameters:**

**c (create): create a new archive.**

**x (extract): extract the archive.**

**v (Multilingual): Prints verbose output at runtime.**

**f (file): specifies the name of the archive. For example, tar -cvf archive.tar file1 file2.**

**z (gzip): Compression with gzip.**

**j (bzip2): Compression with bzip2.**

**xz: A command to compress and decompress data using the xz algorithm. Main parameters:**

**c (compress): Compress the file.**

**d (unzip): Unzip the file.**

**zip: command to create and unpack ZIP archives. Main parameters:**

**-r (recursive): Recursively add files and directories to the archive.**

**-u (update): update the archive with new files.**

**bzip2: A command to compress and decompress data using the bzip2 algorithm. Main parameters:**

**-c (stdout): output compressed data to standard output.**

**-d (unzip): Unzip the file.**

**gzip: A command to compress and decompress data using the gzip algorithm. Main parameters:**

**-c (stdout): output compressed data to standard output.**

**-d (unzip): Unzip the file.**

**To install these commands on Linux, use your distribution's package manager, such as apt for Ubuntu or yum for Fedora.**

**4.2. Examples of using commands for archiving and compression:**

**Creating a tar archive: tar -cvf archive.tar file1 file2**

**Unpacking the tar archive: tar -xvf archive.tar**

**Gzip file compression: gzip file.txt**

**Extract the gzip file: gzip -d file.txt.gz**

**bzip2 file compression: bzip2.txt file**

**Unzip the bzip2 file: bzip2 -d file.txt.bz2**

**xz file compression: xz.txt file**

**Extract the xz file: xz -d file.txt.xz**

**Creating a ZIP archive: zip -r folder archive.zip**

**Extract the ZIP archive: Unzip archive.zip**

**4.3. Description of commands for viewing the contents of files:**

**cat: outputs the contents of a file to standard output. The main parameter is specifying the name of the file, for example cat file.txt.**

**less: A file viewer that lets you view files page by page. Main parameters: less than file.txt.**

**more: Another file viewer that also lets you view files page by page. Main parameter: more file.txt.**

**head: Prints the first lines of the file. Main parameters: head -n 10 file.txt (display the first 10 lines).**

**tail: Outputs the last lines of the file. Main parameters: tail -n 20 file.txt (display the last 20 lines).**

**To install these commands in Linux, they are usually already included in the standard set of utilities.**

**4.4. Principles of operation of the command shell with channels, streams and filters:**

**Channels: Channels allow the output of one command to be passed as input to another command. For example, command1 | command2 passes command1's output as command2's input.**

**Streams: The shell has standard input (stdin), output (stdout), and error streams (stderr). Commands can redirect these streams to other files or devices.**

**Filters: Filters are commands that process a stream of data and return a result. For example, grep filters text by a pattern, and sed performs text replacement.**

**4.5. The grep command is used to search for text in files or to output other commands. The main parameter is the search template. For example, grep "pattern" file.txt searches for the pattern "pattern" in the file "file.txt" and outputs the matching lines.5. Prepare the initial version of the report electronically:**

**- Title page, topic and purpose of the work**

**- Glossary of terms**

**- Answers to p. 4.1 and p. 4.5 from tasks for preliminary preparation**

***Student A. Mishin prepared the material.***

***Progress***

***1. Initial work in CLI mode in Linux OS of the Linux family:***

***1.1. Start the VirtualBox virtual machine, select CentOS and run it. Log in***

***under user: CentOS, password for login: reverse (if you run LR in 401 aud.) and run***

***terminal.***

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

***1.3. Start your Linux family operating system (if you are working on your own PC and its***

***installed) and launch the terminal.***

***2. Work through all the command examples presented in the labs of the NDG Linux Essentials course -***

***Lab 9: Archiving and Compression and Lab 10: Working With Text. Create a table to describe these***

***teams\*\*\****

|  |  |
| --- | --- |
| Команда | Опис |
| tar | A command for archiving files and directories. |
| gzip або gunzip | A command to compress or decompress files using the gzip algorithm. |
| zip або unzip | The command for creating a ZIP archive and extracting files from a ZIP archive. |
| tar -cvf | Archiving files and directories using tar. |
| tar -xvf | Unpacking files from a tar archive. |
| tar -zcvf | Archiving files with gzip compression. |
| tar -zxvf | Unpacking gzip-compressed tar archives. |
| xz file1 | The command to compress the file file1 using the xz algorithm. |
| unxz file1.xz | A command to decompress a file that has been compressed with xz. |
| cat | A command to display the contents of a text file. |
| head | Outputs the first few lines of a text file. |
| tail | Outputs the last few lines from a text file. |
| grep | A command to find strings that match a specific pattern. |
| egrep | An extended version of the grep command that allows you to use regular expressions for more complex text searches. |
| fgrep | A fast version of the grep command (Fixed grep) that performs a simple text search without regular expressions. It processes large files faster, but does not support regular expressions. |
| echo "текст" > file.txt | Write text to file.txt, redirecting output from standard output (stdout) to a file. |
| cat file.txt | Outputting the contents of file.txt to the screen using the cat command. |
| find | A command to search for files and directories in the system by various criteria, such as name, type, size, etc. |
| tr | A command to replace or delete characters in a text stream or file. Can be used to process text and convert it into another format. |
| more | The command for step-by-step display of large files on the screen, allows you to view the text in parts and scroll down. |
| cut | A command to select and display specific columns or characters from each line of text, giving you the ability to truncate or split the text into columns using delimiters. |
| less | A command for viewing text files on the screen, allows you to scroll the content in both directions, search for text and perform other operations with the content of the file. |
| head | A command to display the first few lines of a text file on the screen. By default, it displays the first 10 lines. |
| tail | A command to print the last few lines from a text file to the screen. By default, it displays the last 10 lines. |
| grep | A command to find lines in text files that match a specific pattern or expression. Allows you to perform powerful text search and filtering. |

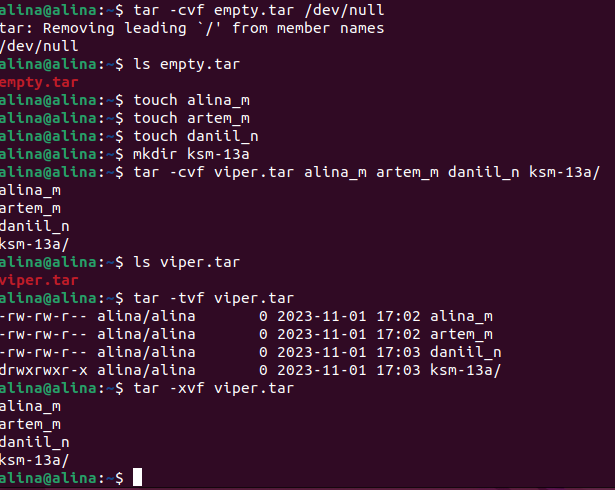
***The material was prepared by student Malienko A.***

***3. Familiarize yourself with the tar command and use it to perform the following actions in the terminal:***

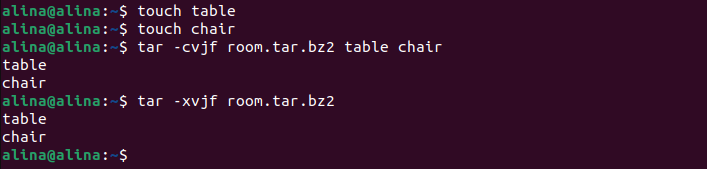
***- create a file with the extension .tar;***

***- create a file with the .tar extension consisting of several files and directories at the same time;***

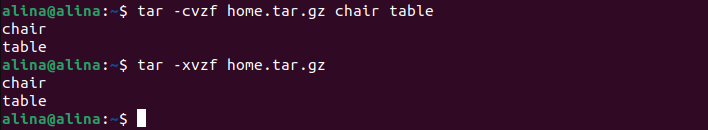
***- viewing the contents of the file;***

***- extract the contents of the tar file;***

- create a tar archive compressed with bzip;

- extract the contents of the tar bzip file;

- create an archive tar file compressed with gzip;

- extract the contents of the tar gzip file.

4. How will the redirection of output streams in bash for subsequent operations with commands

(marked as cmd) and files (marked as file):

|  |  |
| --- | --- |
| Команда | Що виконує команда? |
| cmd 1>file | The result of the cmd execution is written to the file file. |
| cmd > file | Similar to the previous command, the result of cmd execution is written to file, but errors are also displayed here. |
| cmd 2> file | The result of cmd execution is written to file, but here only the error output is redirected to the file file, and the output remains on the screen. |
| cmd >> file | The result of the cmd execution is added to the end of the file file. |
| cmd &> file | Output (STDOUT and STDERR) from cmd is redirected to the file file |
| cmd > file 2> 1 | This command redirects STDOUT to file and then redirects STDERR to STDOUT. Errors remain on the screen |
| cmd >> file 2>& 1 | Similar to the previous command, but the cmd execution result is appended to the end of the file file. |
| cmd 2>&1 > /dev/null | STDOUT and STDERR are redirected to /dev/null, which means discarding all output. |
| cmd 2>/dev/null | Redirects only STDERR to /dev/null, meaning all errors are discarded and STDOUT is output to the screen. |
| cmd1 | cmd2 | cmd1's STDOUT is passed to cmd2's input. That is, the output of the first command becomes the input for the second. |
| cmd1 2>&1 | cmd2 | cmd1's STDOUT and STDERR are piped to cmd2's input. That is, the output and errors of the first team become input for the second. |

***Student A. Mishin prepared the material.***

***5. Look at the examples below and explain what these commands do and what type they are***

***flow redirection they use:***

***Team***

***(command container)***

|  |  |  |
| --- | --- | --- |
| Команда | Що виконує команда? | Який потік перенаправлення? |
| $echo "It is a new story." > story | displays the line "It is a new story." to the output of the standard output | redirects STDOUT output to a file named "story". |
| $ date > date.txt | outputs the current date and time to STDOUT. | redirects STDOUT output to a file named "date.txt". |
| $ cat file1 file2 file3 > bigfile | concatenates the contents of files "file1", "file2" and "file3" and outputs them to STDOUT. | redirects STDOUT output to "bigfile". |
| $ls -l >> directory | outputs a list of files and directories in the current directory to STDOUT | adds STDOUT output to the end of the "directory" file. |
| $ sort < file1\_unsorted > file2\_sorted | sorts the contents of file "file1\_unsorted". | takes the contents of the file "file1\_unsorted" as input to the sort command, then the output of the sorted list is redirected to the file "file2\_sorted" |
| $ find -name '\*.txt' > file.txt 2> /dev/null | searches for files with the extension ".txt" in the current directory and all subdirectories. | redirects the STDOUT output (list of files found) to the file "file.txt". |
| $ cat file1\_unsorted | sort > file2\_sorted | output the contents of file "file1\_unsorted" | and then redirects STDERR output to a special file "/dev/null" responsible for discarding all error messages. |
| $ cat myfile | grep student | wc -l | outputs the contents of the file "myfile". | is used to pass the output of the cat command as input to the sort command. The output of the sort command is then redirected to the file "file2\_sorted". |

***Готував матеріал студент Нерощин Д.***

***Контрольні запитання***

**1 Comparative characteristics of compression and archiving processes:**

**Compression:**

**Compression is mainly aimed at reducing the size of files or data without creating an archive.**

**It is used to optimize disk space and transfer data over the network.**

**The most common compression formats include gzip, bzip2, xz.**

**Usually allows you to compress and decompress files faster because no archive structures are created.**

**Archiving:**

**Archiving creates an archive that can contain one or more files and stores them in a structure.**

**Usually used to group files together and maintain their hierarchy.**

**Archives can also be compressed to reduce the overall size.**

**The most common archive formats include tar, zip, rar.**

**Provides more functionality, such as adding and removing files from the archive.**

**2 Programs for compression and archiving in Linux:**

**7-Zip: Available for Linux through Wine. Supports many archive formats, including 7z, ZIP, RAR, and others.**

**PeaZip: A free and open source archiver that supports many formats. It has a graphical interface.**

**Ark: An archiver for the KDE environment that supports various archive formats.**

**3 Comparison of compression algorithms:**

**gzip: Uses the DEFLATE algorithm. Fast and efficient for text files.**

**bzip2: Uses the Burrows-Wheeler Transform algorithm. Usually allows to achieve better compressibility at the expense of greater computational complexity.**

**xz: Uses the LZMA2 algorithm. Usually provides the best compressibility, but takes longer to compress and decompress.**

**The fastest and most efficient algorithm depends on the type of data, but for most text files, gzip is fast and efficient enough.**

**4 Software tools for compression and archiving in mobile phones:**

**ZArchiver (Android): Allows you to compress and decompress archives in zip, 7z, tar, other formats.**

**iZip (iOS): Available for iOS. Supports compression and decompression of zip archives.**

**RAR (Android & iOS): Allows you to compress and decompress archives in RAR format.**

**5 Software tools for compression and archiving in Windows:**

**WinRAR: Popular archiver for Windows, supports many formats including RAR and ZIP.**

**7-Zip (Windows): An open source archiver for Windows that supports many formats.**

**WinZip: Allows you to compress and decompress ZIP archives and other formats.**

**6 Using compression and archiving to back up data:**

**Compression allows you to reduce the volume of redundant data, reducing the need for storage.**

**Archiving allows you to save the data structure and make a backup copy of this structure.**

**In other system administration tasks, compression and archiving can be used to send files over the network, save versions of programs, etc.**

**7 Destination of the /dev/null file directory:**

**/dev/null is known as the "trash bin" on Unix-like systems.**

**This file is intended to delete incoming data. Anything written to /dev/null is effectively deleted without saving.**