COMP304 Project1 Report

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P1:

Using the command's name as input, the find_command_location function returns the path where the command can be executed. It initially verifies that the input is a command and not just an empty string. The function determines whether the file exists and is executable if the command starts with a '/' or '.'. In this case, the command is interpreted as a path. The function looks for the command in the directories specified in the system's PATH environment variable if a path is not provided. By joining each directory with the command name, it creates the whole path and verifies that it is executable. In the event that the command cannot be located in the system's path, NULL is returned. If the command is found, the path is returned.

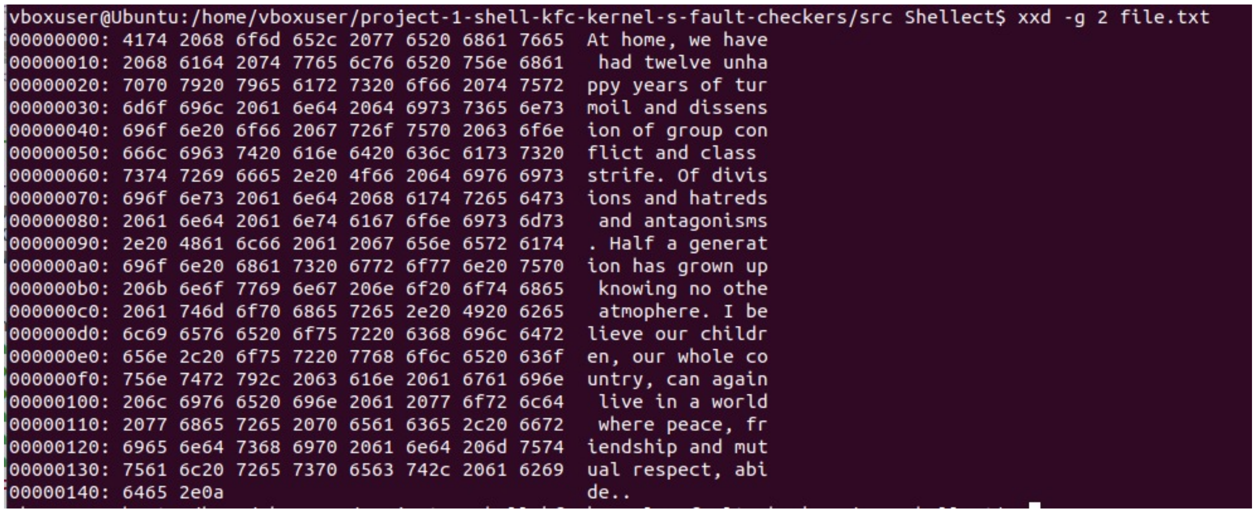
P2:

The handle_redirections function looks at the command structure to determine if there are any redirection operators used (< for input, > for output, and >> for appending to a file).To redirect input (<), it opens the specified file for reading and replaces the standard input (file descriptor 0) with that file. To redirect output (>), it opens (or creates if necessary) the specified file for writing, truncate it if it exists, and replaces the standard output (file descriptor 1). To add (>>), it opens the file to write to the end of the file without truncation, again overwriting the standard output. If a file cannot be opened or created, it prints an error message and exits the program.

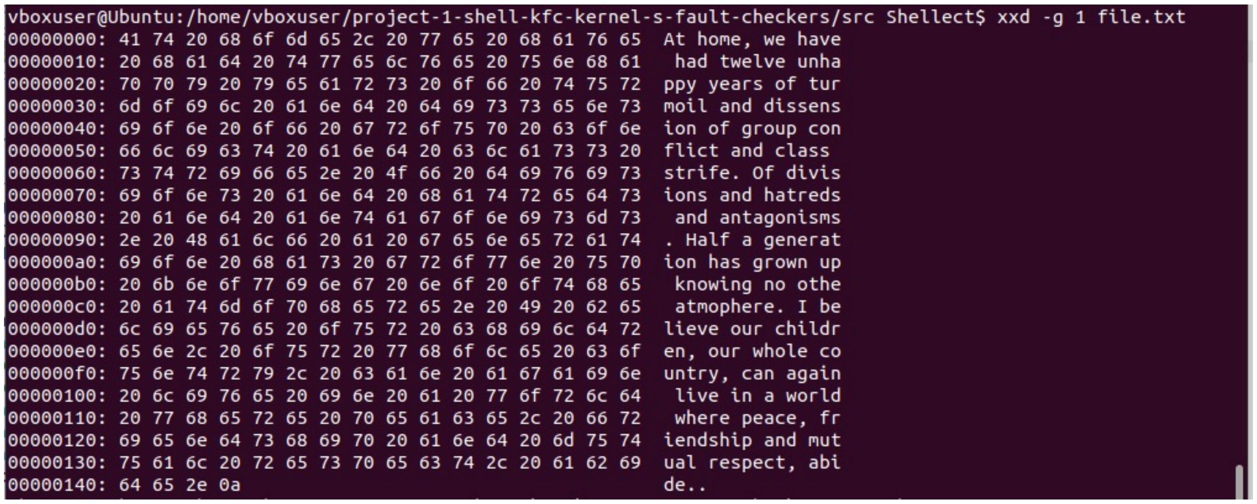
P3:

1. Hexdump:

In order to process input streams, the `hexdump` function reads fixed-size chunks into a buffer, iterates across the buffer, and outputs each byte in a formatted hexadecimal representation. It manages the byte grouping that is specified by the `groupsize` option. The function handles the layout visually, placing the printable ASCII equivalents of the hexadecimal bytes side by side and starting each line with an offset that increases as the file is read. The function pads the output to have a column structure and replaces a dot symbol for bytes that do not represent readable characters.



```
vboxuser@Ubuntu:/home/vboxuser/project-1-shell-kfc-kernel-s-fault-checkers/src Shellect$ xxd -g 2 file.txt
00000000: 4174 2068 6f6d 652c 2077 6520 6861 7665  At home, we have
00000010: 2068 6164 2074 7765 6c76 6520 756e 6861   had twelve unha
00000020: 7070 7920 7965 6172 7320 6f66 2074 7572  ppy years of tur
00000030: 6d6f 696c 2061 6e64 2064 6973 7365 6e73  moil and dissens
00000040: 696f 6e20 6f66 2067 726f 7570 2063 6f6e  ion of group con
00000050: 666c 6963 7420 616e 6420 636c 6173 7320  flict and class
00000060: 7374 7269 6665 2e20 4f66 2064 6976 6973  strife. Of divis
00000070: 696f 6e73 2061 6e64 2068 6174 7265 6473  ions and hatreds
00000080: 2061 6e64 2061 6e74 6167 6f6e 6973 6d73   and antagonisms
00000090: 2e20 4861 6c66 2061 2067 656e 6572 6174  . Half a generat
000000a0: 696f 6e20 6861 7320 6772 6f77 6e20 7570  ion has grown up
000000b0: 206b 6e6f 7769 6e67 206e 6f20 6f74 6865   knowing no othe
000000c0: 2061 746d 6f70 6865 7265 2e20 4920 6265   atmophere. I be
000000d0: 6c69 6576 6520 6f75 7220 6368 696c 6472  lieve our childr
000000e0: 656e 2c20 6f75 7220 7768 6f6c 6520 636f  en, our whole co
000000f0: 756e 7472 792c 2063 616e 2061 6761 696e  untry, can again
00000100: 206c 6976 6520 696e 2061 2077 6f72 6c64   live in a world
00000110: 2077 6865 7265 2070 6561 6365 2c20 6672   where peace, fr
00000120: 6965 6e64 7368 6970 2061 6e64 206d 7574  iendship and mut
00000130: 7561 6c20 7265 7370 6563 742c 2061 6269  ual respect, abi
00000140: 6465 2e0a                                de..
```



```
vboxuser@Ubuntu:/home/vboxuser/project-1-shell-kfc-kernel-s-fault-checkers/src Shellect$ xxd -g 1 file.txt
00000000: 41 74 20 68 6f 6d 65 2c 20 77 65 20 68 61 76 65  At home, we have
00000010: 20 68 61 64 20 74 77 65 6c 76 65 20 75 6e 68 61   had twelve unha
00000020: 70 70 79 20 79 65 61 72 73 20 6f 66 20 74 75 72  ppy years of tur
00000030: 6d 6f 69 6c 20 61 6e 64 20 64 69 73 73 65 6e 73  moil and dissens
00000040: 69 6f 6e 20 6f 66 20 67 72 6f 75 70 20 63 6f 6e  ion of group con
00000050: 66 6c 69 63 74 20 61 6e 64 20 63 6c 61 73 73 20  flict and class
00000060: 73 74 72 69 66 65 2e 20 4f 66 20 64 69 76 69 73  strife. Of divis
00000070: 69 6f 6e 73 20 61 6e 64 20 68 61 74 72 65 64 73  ions and hatreds
00000080: 20 61 6e 64 20 61 6e 74 61 67 6f 6e 69 73 6d 73   and antagonisms
00000090: 2e 20 48 61 6c 66 20 61 20 67 65 6e 65 72 61 74  . Half a generat
000000a0: 69 6f 6e 20 68 61 73 20 67 72 6f 77 6e 20 75 70  ion has grown up
000000b0: 20 6b 6e 6f 77 69 6e 67 20 6e 6f 20 6f 74 68 65   knowing no othe
000000c0: 20 61 74 6d 6f 70 68 65 72 65 2e 20 49 20 62 65   atmophere. I be
000000d0: 6c 69 65 76 65 20 6f 75 72 20 63 68 69 6c 64 72  lieve our childr
000000e0: 65 6e 2c 20 6f 75 72 20 77 68 6f 6c 65 20 63 6f  en, our whole co
000000f0: 75 6e 74 72 79 2c 20 63 61 6e 20 61 67 61 69 6e  untry, can again
00000100: 20 6c 69 76 65 20 69 6e 20 61 20 77 6f 72 6c 64   live in a world
00000110: 20 77 68 65 72 65 20 70 65 61 63 65 2c 20 66 72   where peace, fr
00000120: 69 65 6e 64 73 68 69 70 20 61 6e 64 20 6d 75 74  iendship and mut
00000130: 75 61 6c 20 72 65 73 70 65 63 74 2c 20 61 62 69  ual respect, abi
00000140: 64 65 2e 0a                                      de..
```

2. Command Aliases

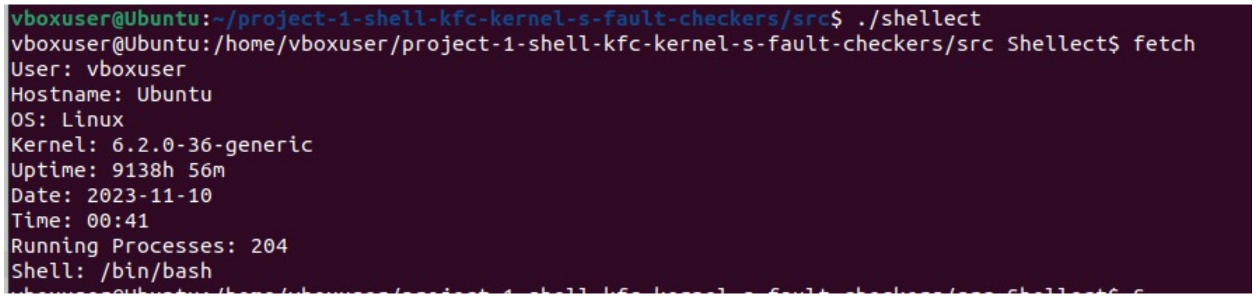
The alias handling code is organized to control shortcuts for commands. The create_aliases_from_text method uses getline to read a file called alias.txt line by line. An alias name and the command it represents, separated by a space, should appear on each line. The line is divided into these two sections using the strtok function. The append_alias method is then used to add these aliases to a linked list of aliases. This function determines whether an alias already exists and, if not, updates it or generates a new one. When processing user input, the linked list enables the shell to swiftly locate and swap out aliases with their matching commands. To locate the command, the find_alias_command function searches this list for aliases by name.

3. Good morning

The good_morning command works via scchedule_alarm method. It takes the minutes to play the music from the user and the path of the audio file. Then takes the current time via localtime function and calculate the time it will play the audio. Then by snprintf using with “at” command, it gives an order to the computer to play the sound at specified time. The method prints the details about the alarm command. When the time arrives, the method will run the audio.

4. Custom Command: Fetch

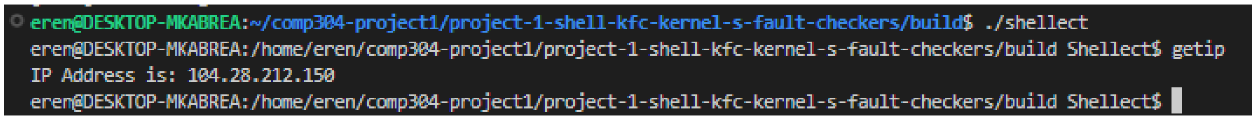
Important system and user data is being displayed by the `fetch` command. In order to access and display data, including the user's name, hostname, operating system type, kernel version, system uptime, current date and time, number of running processes, and the user's default shell, it is implemented using standard system calls and libraries. `fetch` reads from system files like `/proc/uptime} and dynamically gets this data upon invocation using functions like `gethostname}, `uname}, and `time}. Similar to the simplified version of the `neofetch` program included in many Linux distributions, it formats and outputs this data, giving a snapshot of the system's state and the user's surroundings.



```
vboxuser@Ubuntu:~/project-1-shell-kfc-kernel-s-fault-checkers/src$ ./shellect
vboxuser@Ubuntu:/home/vboxuser/project-1-shell-kfc-kernel-s-fault-checkers/src Shellect$ fetch
User: vboxuser
Hostname: Ubuntu
OS: Linux
Kernel: 6.2.0-36-generic
Uptime: 9138h 56m
Date: 2023-11-10
Time: 00:41
Running Processes: 204
Shell: /bin/bash
```

4.2: Custom Command: getip

By using "curl" command, we get the IP address of the user from an IP address data provider "http://ipinfo.io/ip" and read it by a file pointer. Then, if the output is not null, the method prints the ip address of the user in a user-friendly way. It is similar to the IP command of the Linux but with this command, the user does not need to put extra effort or remember extra commands to find his/her ip address.



```
eren@DESKTOP-MKABREA:~/comp304-project1/project-1-shell-kfc-kernel-s-fault-checkers/build$ ./shellect
eren@DESKTOP-MKABREA:/home/eren/comp304-project1/project-1-shell-kfc-kernel-s-fault-checkers/build Shellect$ getip
IP Address is: 104.28.212.150
eren@DESKTOP-MKABREA:/home/eren/comp304-project1/project-1-shell-kfc-kernel-s-fault-checkers/build Shellect$
```

P4: We could not implement the psvis command due to time constraints and the complexity of the method.