CS 551 OPERATING SYSTEM DESIGN AND IMPLEMENTATION

PROJECT #1 DESIGN DOCUMENT

PROJECT TEAM MEMBERS:

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Objective:

Developing a new shell that should be invoked from Ash shell provided by minix. It should perform the following functions.

- It Should read the profile file which has home directory and path specified in it.
- Path is set to /bin and /usr/bin and home folder is set to according to the value provided in the profile file. In this case, it is /root directory
- Execute basic linux commands such as date, ls , pwdetc
- Implement the new redirection operator => to write output to a file
- Implement the pipe mechanism using $ sign where the input of one command is given to other
- Terminate Shell when ctrl –c is pressed. It should ask for confirmation.to exit

Execution:

The utilities provided in /bin and /usr/bin should be used by our shell prompt. We are using popen(), execvp to execute the commands. We also use popen to implement the pipe functionality. The user is allowed to use the commands on the command line. The command line reads the commands and they are parsed to generate the commands and arguments.

Create New Process:

Functionality to create new process is implemented. It creates a new process and outputs the pid when getpid command is executed.

Redirection:

We used a new redirection operator “=>” to redirect the output to a file. We used popen to open pipe to the command and then fopen to open file pointer and then write the output of pipe to the file.
Eg:

Ls –l => file1

Pipes:

We implemented piping in a different way. In here, second command is executed first and then the output is given to the inner command. Also, the commands are separated by $. Nested piping is also implemented.

Eg:

```
$wc $ (fgrep –l include MinixShell.c)
```

EXIT:

- We have designed the custom shell in such a way that it can be terminated by “ exit command or by “ ctrl –c”.
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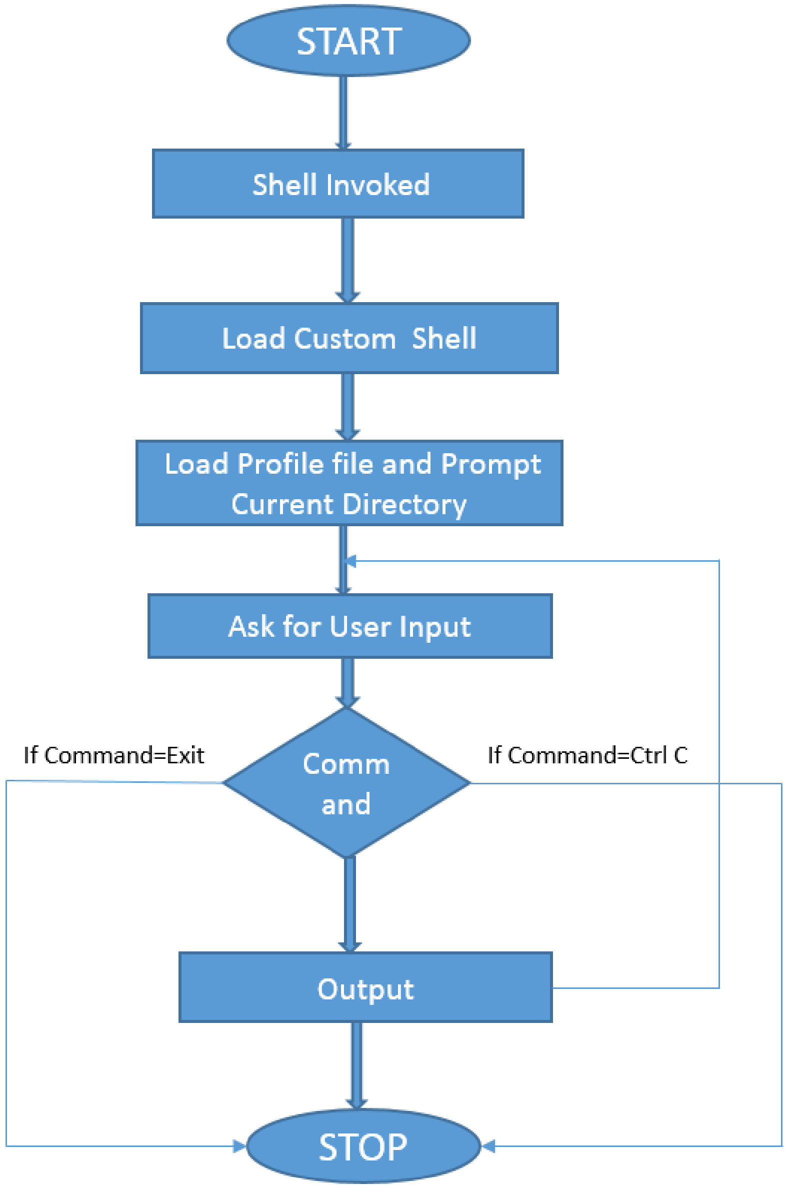
EXCEPTION HANDLING:

The exception handling is done at every possible stages of our program and depending on the type of value, the corresponding exceptions are executed.

- Home directory error: we use chdir function to set the home directory and also to get the current working directory. If chdir function cannot set the directory or change the directory, corresponding message is displayed.
- fopen error:We use fopen to create or open file at several parts of program.If the fopenfails, it will return NULL pointer, ourshell will report it as open file failed and corresponding message is printed.
- Invalid Command error:If an invalid command is entered, we throw the invalid command error.
- pipe failed error: If the pipe fails, it returns -1 and shows the prompt.

The Detailed functional design of our program is explained in the flowchart shown below.


START
Shell Invoked
Load Custom Shell
Load Profile file and Prompt Current Directory
Ask for User Input
If Command=Exit
Comm and
If Command=Ctrl C
Output
STOP