Operating Systems

Lab 1

Simple Shell

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Problem Statement:

It is required to implement a Unix shell program. A shell is simply a program that conveniently allows you to run other programs. The shell must support:

1. The "Exit" command.

2. Commands with no arguments.

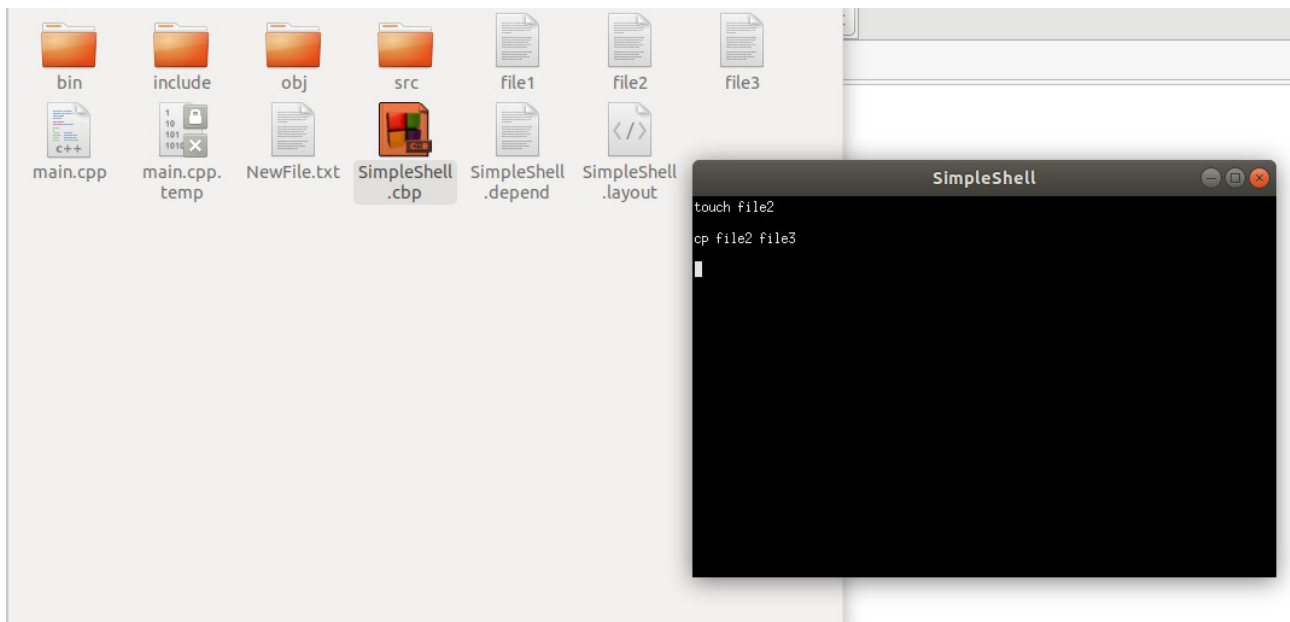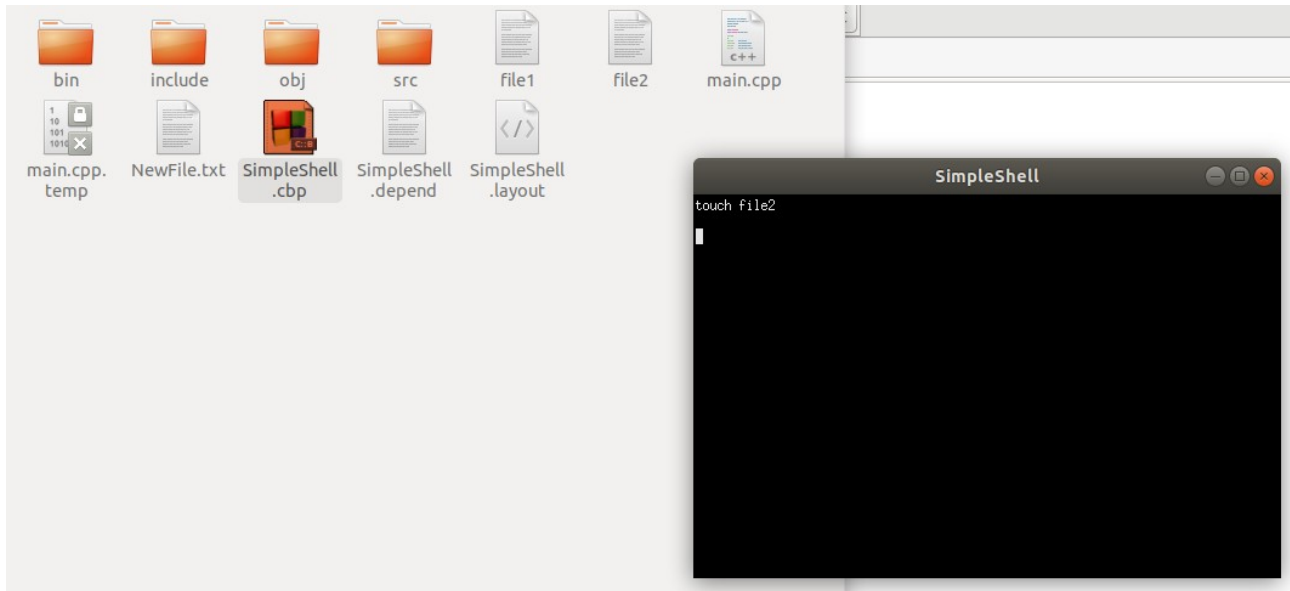3.Commands with arguments.

4.A command executed in background using &.

Program Design, implementation:

- The program is implemented using C++ programming language. It has two main classes called "Parsing" and "Forking" and a main to run the program from.

- The main class reads the input from the user and if it doesn't read "exit" then it passes it to the "Parsing class".

- The "Parsing class" parses the input commands into an array of chars then passes the array to the "Forking" class.

- The "Forking" class creates a child process then executes the execvp() system call.

- After that it determines weather the user wants the parent process to wait for the child or not; if he wants it to wait then it executes the call wait().

- If the user doesn't want the parent process to wait, then a signal handle is executed where it waits for the child to finish its process in the background then signals to the parent that the child process is done by writing in a log file that the "child process was terminated".

Assumptions:

- It is assumed that the user enters the input separated by commas.

- It is assumed that if the user wants to run the process in the background then he follow his commands by an "&".

Sample Runs:

Screenshots for the processes hierarchy:

Process Name	User	% CPU	ID	Memory	Disk read total	Disk write total	Disk read	Disk write	Priority
▼◆ gdm-x-session	nada	0	1393	664.0 KiB	N/A	N/A	N/A	N/A	Normal
▼◆ gnome-session-binary	nada	0	1417	2.7 MiB	1.2 MiB	8.0 KiB	N/A	N/A	Normal
◆ deja-dup-monitor	nada	0	2079	5.5 MiB	432.0 KiB	N/A	N/A	N/A	Normal
▼◻ gnome-shell	nada	2	1553	138.6 MiB	51.9 MiB	28.0 KiB	N/A	N/A	Normal
▼◆ codeblocks	nada	0	1868	62.3 MiB	72.0 MiB	552.0 KiB	N/A	N/A	Normal
▼◆ xterm	nada	0	2358	3.9 MiB	N/A	N/A	N/A	N/A	Normal
▼◆ cb_console_runn	nada	0	2359	160.0 KiB	N/A	N/A	N/A	N/A	Normal
▼◼ sh	nada	0	2360	68.0 KiB	N/A	N/A	N/A	N/A	Normal
▼◆ SimpleShell	nada	0	2361	144.0 KiB	N/A	N/A	N/A	N/A	Normal
▼◆ firefox	nada	0	2363	113.6 MiB	115.5 MiB	340.0 KiB	122.7 KiB/s	N/A	Normal
◆ Web Cor	nada	0	2597	16.2 MiB	N/A	N/A	N/A	N/A	Normal
◆ Web Cor	nada	0	2433	45.7 MiB	N/A	N/A	N/A	N/A	Normal
◆ WebExt	nada	0	2524	23.7 MiB	N/A	N/A	N/A	N/A	Normal
◼ gnome-system-monit	nada	0	2224	13.5 MiB	23.1 MiB	48.0 KiB	N/A	N/A	Normal
▼◆ ibus-daemon	nada	0	1583	2.0 MiB	4.0 KiB	4.0 KiB	N/A	N/A	Normal
◆ ibus-dconf	nada	0	1587	744.0 KiB	N/A	N/A	N/A	N/A	Normal
◆ ibus-engine-simple	nada	0	1789	736.0 KiB	N/A	N/A	N/A	N/A	Normal
◆ gnome-software	nada	0	1972	114.8 MiB	15.9 MiB	N/A	N/A	N/A	Normal
◆ gsd-a11y-settings	nada	0	1701	872.0 KiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-clipboard	nada	0	1702	4.6 MiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-color	nada	0	1705	5.3 MiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-datetime	nada	0	1708	7.0 MiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-disk-utility-notify	nada	0	1761	1.3 MiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-housekeeping	nada	0	1709	944.0 KiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-keyboard	nada	0	1710	4.8 MiB	4.0 KiB	N/A	N/A	N/A	Normal
◆ gsd-media-keys	nada	0	1716	5.1 MiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-mouse	nada	0	1718	868.0 KiB	N/A	N/A	N/A	N/A	Normal
◆ gsd-power	nada	0	1663	5.2 MiB	N/A	N/A	N/A	N/A	Normal