

**Name:** Salma Saeed Mahmoud Ghareb

**ID:** 19015779

## **Operating Systems**

### **Lab #1**

#### **“Simple shell”**

---

- **A description of code and the major functions:**

- setupEnvironment(): function that prints the current address location at the beginning of the shell.
- shell(): the main function which contains the main while loop of the code.
- int readInput(char line[]): function that read the input line and return a different integer for each different command:
  - 1 → background process
  - 2 → cd ~ or cd .. or cd absolute path...etc
  - 22 → cd
  - 3 → echo command
  - 4 → export command
  - And exit() for exit command
- int checked(char line[]): function that checks if there is an expression that is needed to be evaluated, return 6 if so, 7 if not.
- void evaluatExpression(char command[], char \*args[], int cmdNum): function that replace the expression after an “\$” with its original value.
- int parse\_line(char\* args[] , char line[], int cmdNum): function to parse commands and to deal with arguments.

- void executeBuiltInShell(char\* command[], int cmdNum):  
function that executes built in commands: cd, echo and export.
- void executeCommand(char\* args[], int cmdNum): function that  
executes another commands(ls, cp...etc).

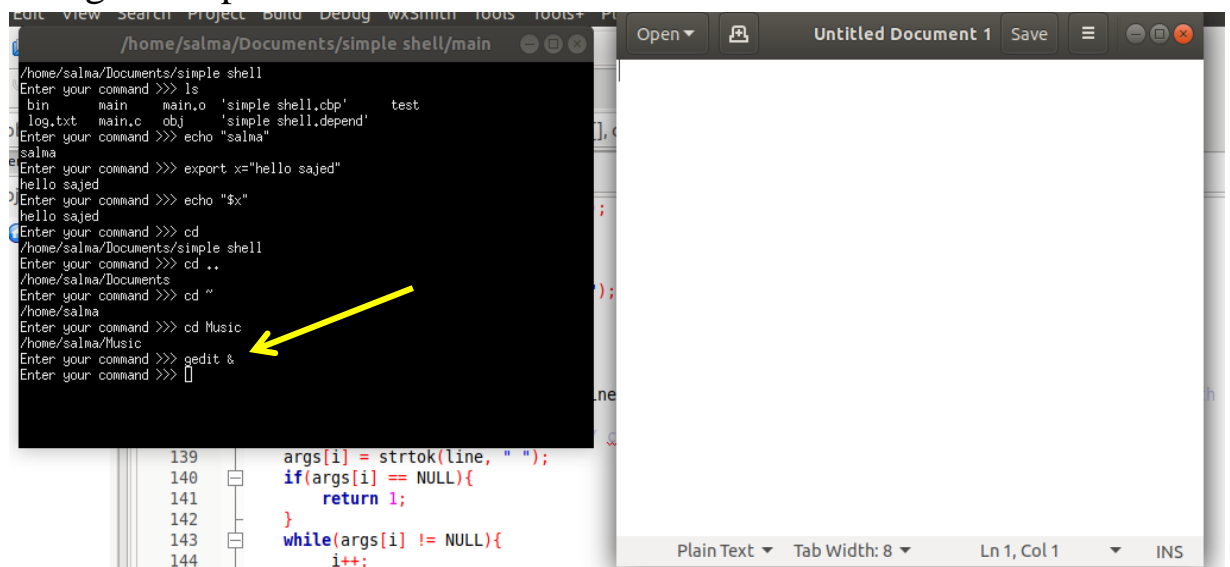
## Simple runs:

```

/home/salma/Documents/simple shell/main
/home/salma/Documents/simple shell
Enter your command >>> ls
bin      main    main.o  'simple shell.cbp'    test
log.txt  main.c  obj     'simple shell.depend'
Enter your command >>> echo "salma"
salma
Enter your command >>> export x="hello sajed"
hello sajed
Enter your command >>> echo "$x"
hello sajed
Enter your command >>> cd
/home/salma/Documents/simple shell
Enter your command >>> cd ..
/home/salma/Documents
Enter your command >>> cd ~
/home/salma
Enter your command >>> cd Music
/home/salma/Music
Enter your command >>> █

```

- background process:



```

/home/salma/Documents/simple shell/main
/home/salma/Documents/simple shell
Enter your command >>> ls
bin      main    main.o  'simple shell.cbp'    test
log.txt  main.c  obj     'simple shell.depend'
Enter your command >>> echo "salma"
salma
Enter your command >>> export x="hello sajed"
hello sajed
Enter your command >>> echo "$x"
hello sajed
Enter your command >>> cd
/home/salma/Documents/simple shell
Enter your command >>> cd ..
/home/salma/Documents
Enter your command >>> cd ~
/home/salma
Enter your command >>> cd Music
/home/salma/Music
Enter your command >>> gedit &
Enter your command >>> █

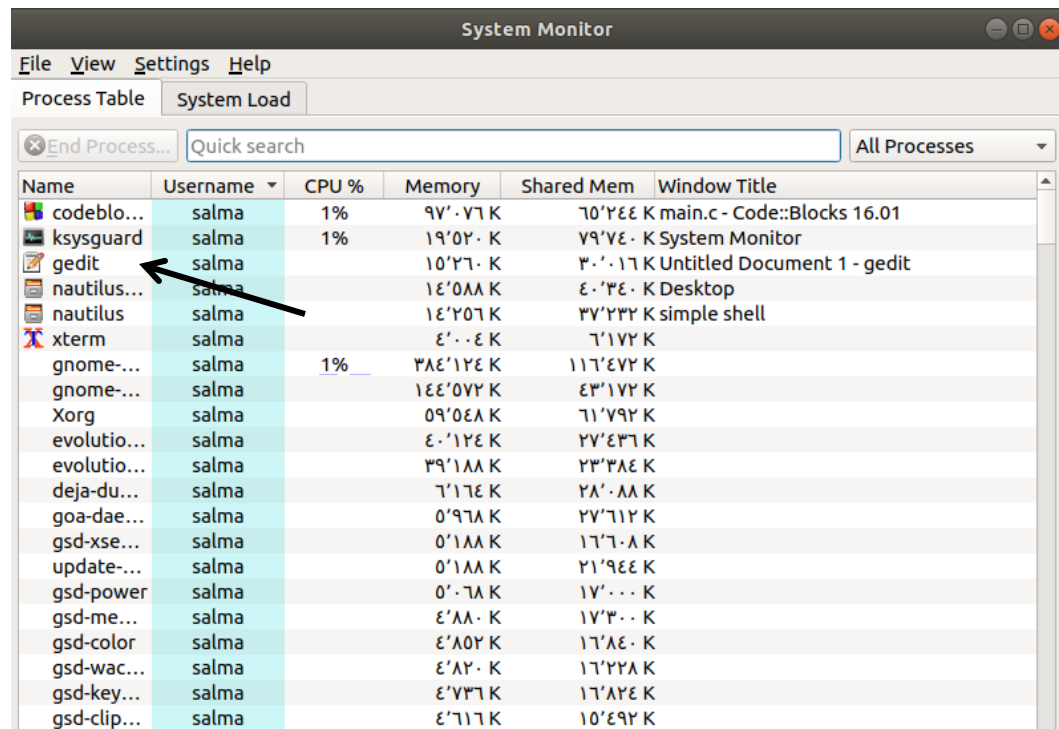
```

```

139  args[i] = strtok(line, " ");
140  if(args[i] == NULL){
141      return 1;
142  }
143  while(args[i] != NULL){
144      i++;

```

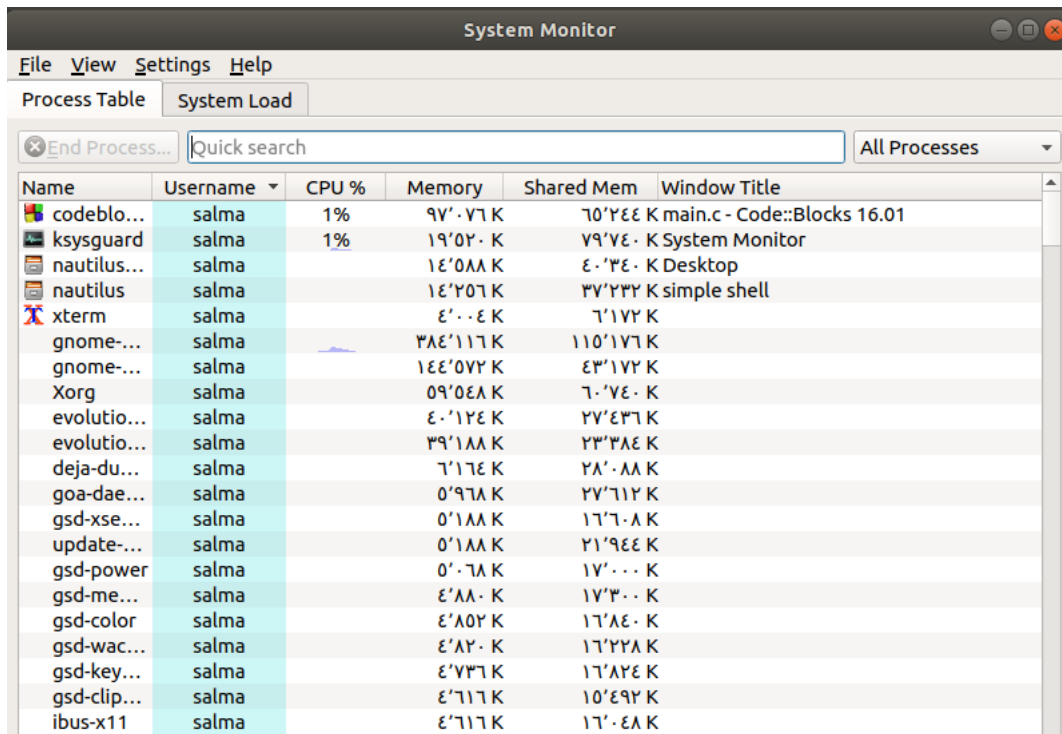
## System monitor:



The System Monitor window displays a list of running processes. An arrow points to the 'gedit' process, which is highlighted in blue. The 'gedit' process is running under the 'salma' user, using 10'27 K of memory and 0'00 K of shared memory. The window title is 'Untitled Document 1 - gedit'.

Name	Username	CPU %	Memory	Shared Mem	Window Title
codeblo...	salma	1%	97'07 K	70'244 K	main.c - Code::Blocks 16.01
ksysguard	salma	1%	19'02 K	79'74 K	System Monitor
gedit	salma		10'27 K	0'00 K	Untitled Document 1 - gedit
nautilus...	salma		14'08 K	4'34 K	Desktop
nautilus	salma		14'20 K	37'23 K	simple shell
xterm	salma		4'00 K	7'17 K	
gnome-...	salma	1%	384'12 K	116'47 K	
gnome-...	salma		144'07 K	43'17 K	
Xorg	salma		09'04 K	71'79 K	
evolutio...	salma		4'12 K	27'43 K	
evolutio...	salma		39'18 K	23'38 K	
deja-du...	salma		7'16 K	28'88 K	
goa-dae...	salma		0'97 K	27'71 K	
gsd-xse...	salma		0'18 K	17'68 K	
update-...	salma		0'18 K	21'94 K	
gsd-power	salma		0'78 K	17'00 K	
gsd-me...	salma		4'88 K	17'30 K	
gsd-color	salma		4'80 K	17'84 K	
gsd-wac...	salma		4'82 K	17'22 K	
gsd-key...	salma		4'73 K	17'82 K	
gsd-clip...	salma		4'71 K	10'49 K	

After closing gedit:



The System Monitor window displays a list of running processes after 'gedit' has been closed. The 'gedit' process is no longer present in the list. The 'gnome-...' process now shows a CPU usage of 1%.

Name	Username	CPU %	Memory	Shared Mem	Window Title
codeblo...	salma	1%	97'07 K	70'244 K	main.c - Code::Blocks 16.01
ksysguard	salma	1%	19'02 K	79'74 K	System Monitor
nautilus...	salma		14'08 K	4'34 K	Desktop
nautilus	salma		14'20 K	37'23 K	simple shell
xterm	salma		4'00 K	7'17 K	
gnome-...	salma	1%	384'11 K	110'17 K	
gnome-...	salma		144'07 K	43'17 K	
Xorg	salma		09'04 K	71'74 K	
evolutio...	salma		4'12 K	27'43 K	
evolutio...	salma		39'18 K	23'38 K	
deja-du...	salma		7'16 K	28'88 K	
goa-dae...	salma		0'97 K	27'71 K	
gsd-xse...	salma		0'18 K	17'68 K	
update-...	salma		0'18 K	21'94 K	
gsd-power	salma		0'78 K	17'00 K	
gsd-me...	salma		4'88 K	17'30 K	
gsd-color	salma		4'80 K	17'84 K	
gsd-wac...	salma		4'82 K	17'22 K	
gsd-key...	salma		4'73 K	17'82 K	
gsd-clip...	salma		4'71 K	10'49 K	
ibus-x11	salma		4'71 K	17'08 K	

```
/home/salma/Documents/simple shell/main
/home/salma/Documents/simple shell
Enter your command >>> ls
bin      main.o  'simple shell.cbp'    test
log.txt  main.c  obj    'simple shell.depend'
Enter your command >>> echo "salma"
salma
Enter your command >>> export x="hello sajed"
hello sajed
Enter your command >>> echo "$x"
hello sajed
Enter your command >>> cd
/home/salma/Documents/simple shell
Enter your command >>> cd ..
/home/salma/Documents
Enter your command >>> cd "
/home/salma
Enter your command >>> cd Music
/home/salma/Music
Enter your command >>> gedit &
Enter your command >>> gedit
[ ]

139      args[i] = strtok(line, " ");
140      if(args[i] == NULL){
141          return 1;
142      }
143      while(args[i] != NULL){
144          i++;
145          args[i] = strtok(NULL, " ");
```

Notice the difference:

- In the background process, the parent did not wait for the child to terminate, and the shell became ready to execute your next command immediately.
- In the other command process, the parent waited for the child to terminate before you can type your next command.

System monitor after the command → gedit , and before close it.

Name	Username	CPU %	Memory	Shared Mem	Window Title
codeblo...	salma	2%	97.7 K	70.244 K	main.c - Code::Blocks 16.01
ksysguard	salma	1%	18.988 K	79.176 K	System Monitor
gedit	salma		10.292 K	3.7.. K	Untitled Document 1 - gedit
nautilus...	salma		14.088 K	4.34.. K	Desktop
nautilus...	salma		14.206 K	37.232 K	simple shell
xterm	salma		4.0.. K	7.172 K	
gnome-...	salma	1%	380.728 K	117.044 K	
Xorg	salma		89.048 K	7.7.. K	
gnome-...	salma		144.072 K	43.172 K	
evolutio...	salma		4.124 K	27.436 K	
evolutio...	salma		39.188 K	23.388 K	
deja-du...	salma		7.164 K	28.88 K	
goa-dae...	salma		0.96 K	27.102 K	
gsd-xse...	salma		0.188 K	17.1.. K	
update...	salma		0.188 K	21.944 K	
gsd-power	salma		0.78 K	17.0.. K	
gsd-me...	salma		4.88.. K	17.3.. K	
gsd-color	salma		4.802 K	17.836 K	
gsd-wac...	salma		4.82.. K	17.228 K	
gsd-key...	salma		4.736 K	17.824 K	
gedit	salma		10.292 K	3.7.. K	

After the child terminated:

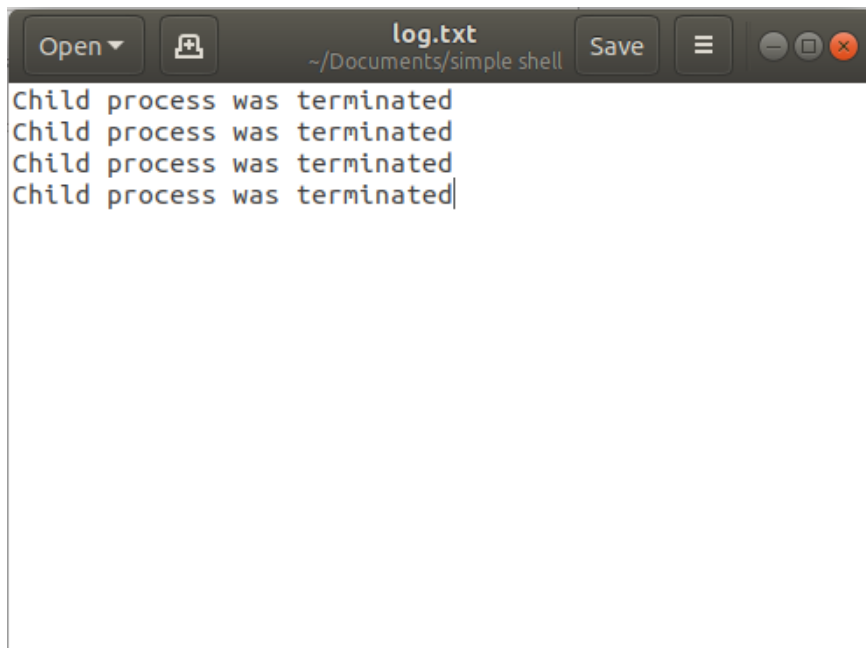
```
/home/salma/Documents/simple shell/main
/home/salma/Documents/simple shell
Enter your command >>> ls
  bin      main      main.o    'simple shell.cbp'    test
  log.txt  main.c    obj       'simple shell.depend'
Enter your command >>> echo "salma"
salma
Enter your command >>> export x="hello sajed"
hello sajed
Enter your command >>> echo "$x"
hello sajed
Enter your command >>> cd
/home/salma/Documents/simple shell
Enter your command >>> cd ..
/home/salma/Documents
Enter your command >>> cd ~
/home/salma
Enter your command >>> cd Music
/home/salma/Music
Enter your command >>> gedit &
Enter your command >>> gedit
Enter your command >>> 
```

System Monitor					
File View Settings Help					
Process Table		System Load			
End Process...	Quick search				All Processes
Name	Username	CPU %	Memory	Shared Mem	Window Title
codeblo...	salma	1%	9V·V6 K	70'Y44 K	main.c - Code::Blocks 16.01
ksysguard	salma	1%	19'·Y4 K	Y9'7V6 K	System Monitor
nautilus...	salma		14'0AA K	4·'Y4· K	Desktop
nautilus	salma		14'Y06 K	YV'YVY K	simple shell
xterm	salma		4'··4 K	7'1VY K	
gnome-...	salma	3%	YAA'Y·· K	110'1V6 K	
gnome-...	salma		144'0VY K	43'1VY K	
Xorg	salma		09'04A K	7·'Y4· K	
evolutio...	salma		4·'1Y4 K	YV'4V6 K	
evolutio...	salma		Y9'1AA K	YV'YAA K	
deja-du...	salma		7'164 K	YAA'·AA K	
goa-dae...	salma		0'96A K	YV'71Y K	
gsd-xse...	salma		0'1AA K	17'7·A K	
update-...	salma		0'1AA K	Y1'944 K	
gsd-power	salma		0'·7A K	1V'··· K	
gsd-me...	salma		4'AA· K	1V'Y·· K	
gsd-color	salma		4'AAV K	17'AA· K	
gsd-wac...	salma		4'AY· K	17'YVAA K	
gsd-key...	salma		4'VY6 K	17'AY4 K	
gsd-clip...	salma		4'716 K	10'49Y K	

Wrong command:

```
Enter your command >>> hj
ERROR: wrong command!!!
Enter your command >>> 
```

Log file:



The image shows a screenshot of a text editor window. The title bar at the top reads "log.txt" and the path below it is "~/Documents/simple shell". The window contains four lines of text, each reading "Child process was terminated". The text is in a monospaced font, and the cursor is at the end of the fourth line.

```
Child process was terminated
Child process was terminated
Child process was terminated
Child process was terminated|
```

**Video link:**

<https://drive.google.com/file/d/19V-DUcusXQJet9feCPjzrxWBKLhENPh6/view?usp=sharing>