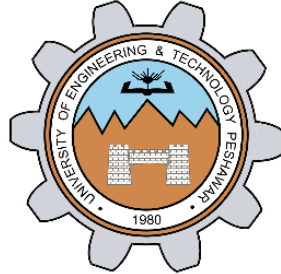


**LAB NO 04**  
**THE EXEC FUNCTION**



**Fall 2024**  
**CSE-302L Systems Programming Lab**

Submitted by:

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Submitted to:

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Department of Computer Systems Engineering  
University of Engineering and Technology, Peshawar

## LAB NO 04 THE EXEC FUNCTION

### Task 1

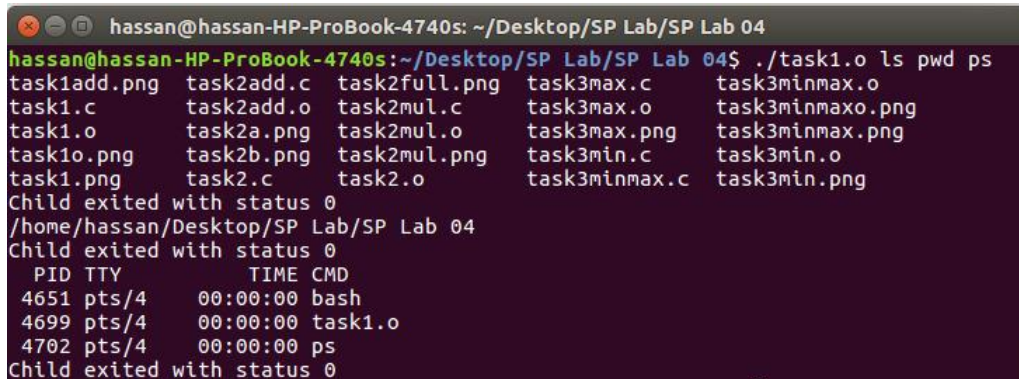
Write a program that takes N UNIX commands as arguments, creates N child processes, each of them implementing their respective commands. Parent process shall wait for all the child processes and receive and print the exit status of the child processes.

### Code:

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <sys/wait.h>
#include <unistd.h>

int main(int argc, char *argv[]) {
    int cmnds = argc - 1;
    pid_t pid;
    for (int i = 1; i <= cmnds; i++) {
        pid = fork();
        if (pid < 0) {
            perror("Fork failed");
            return -1;
        } else if (pid == 0) {
            execlp(argv[i], argv[i], NULL);
            perror("execlp failed");
            return -1;
        }
        else {
            int status;
            wait(&status);
            if(WIFEXITED(status)){
                printf("Child exited with status %d\n", WEXITSTATUS(status));
            }
        }
    }
    return 0;
}
```

### Output:



```
hassan@hassan-HP-ProBook-4740s: ~/Desktop/SP Lab/SP Lab 04
hassan@hassan-HP-ProBook-4740s:~/Desktop/SP Lab/SP Lab 04$ ./task1.o ls pwd ps
task1add.png task2add.c task2full.png task3max.c task3minmax.o
task1.c task2add.o task2mul.c task3max.o task3minmax.o.png
task1.o task2a.png task2mul.o task3max.png task3minmax.png
task1o.png task2b.png task2mul.png task3min.c task3min.o
task1.png task2.c task2.o task3minmax.c task3min.png
Child exited with status 0
/home/hassan/Desktop/SP Lab/SP Lab 04
Child exited with status 0
  PID TTY          TIME CMD
 4651 pts/4    00:00:00 bash
 4699 pts/4    00:00:00 task1.o
 4702 pts/4    00:00:00 ps
Child exited with status 0
```

## Task 2

- Write a program that takes integers as arguments and adds them.
- Write a program that takes integers as arguments and multiplies them.
- Write a program that takes integers as arguments & adds & multiplies them using the above two programs.

## Code:

```
#include <stdio.h>
#include <stdlib.h>

int main(int argc, char *argv[]) {
    int sum = 0;
    for (int i = 1; i < argc; i++) {
        sum += atoi(argv[i]);
    }
    return sum;
}
```

```
#include <stdio.h>
#include <stdlib.h>

int main(int argc, char *argv[]) {
    int product = 1;
    for (int i = 1; i < argc; i++) {
        product *= atoi(argv[i]);
    }
    return product;
}
```

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/wait.h>
#include <unistd.h>

int main (int argc, char*argv[]){
    pid_t pid1,pid2;
    pid1=fork();
    if(pid1==0){
        execv("./task2add.o", argv);
        perror("Exec Failed");
    }
    pid2=fork();
    if(pid2==0){
        execv("./task2mul.o", argv);
        perror("Exec Failed");
    }
    int status;
    waitpid(pid1,&status, 0);
    if(WIFEXITED(status)){
        printf("Addition: %d\n", WEXITSTATUS(status));
    }
    waitpid(pid2,&status,0);
    if(WIFEXITED(status)){
        printf("Multiplication %d\n", WEXITSTATUS(status));
    }
    return 0;
}
```

## Output:

```
hassan@hassan-HP-ProBook-4740s:~/Desktop/SP Lab/SP Lab 04$ ./task2.o 3 5 4 3
Addition: 15
Multiplication 180
```

### Task 3

Write a program “minmax.c” that takes an array as command line arguments. Program executes min.c and max.c programs in its two child processes. One child process calculates and returns the min value and other calculates and returns the max value in the array. The program “minmax.c” shall receive the values returned by the child processes and display these values.

### Code:

```
#include <stdio.h>
#include <stdlib.h>
int main(int argc, char *argv[]) {
    int max = atoi(argv[1]);
    for (int i = 2; i < argc; i++) {
        int num = atoi(argv[i]);
        if (num > max) {
            max = num;
        }
    }
    return max;
}
```

```
#include <stdio.h>
#include <stdlib.h>
int main(int argc, char *argv[]) {
    int min = atoi(argv[1]);
    for (int i = 2; i < argc; i++) {
        int num = atoi(argv[i]);
        if (num < min) {
            min = num;
        }
    }
    return min;
}
```

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/wait.h>
#include <unistd.h>

int main(int argc, char *argv[]) {
    int x = fork();
    if(x == 0){
        execv("task3min.o", argv);
    }
    int y = fork();
    if(y == 0){
        execv("task3max.o", argv);
    }
    int status;
    waitpid(x, &status, 0);
    if (WIFEXITED(status)) {
        printf("Min value: %d\n", WEXITSTATUS(status));
    }
    waitpid(y, &status, 0);
    if (WIFEXITED(status)) {
        printf("Max value: %d\n", WEXITSTATUS(status));
    }
    return 0;
}
```

### Output:

```
hassan@hassan-HP-ProBook-4740s:~/Desktop/SP Lab/SP Lab 04$ ./task3minmax.o 5 24 3 6
Min value: 3
Max value: 24
```

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**CSE 302L: SYSTEMS PROGRAMMING LAB**

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**LAB ASSESSMENT RUBRICS**

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<b>Criteria &amp; Point Assigned</b>	<b>Outstanding 2</b>	<b>Acceptable 1.5</b>	<b>Considerable 1</b>	<b>Below Expectations 0.5</b>	<b>Score</b>
<b>Attendance and Attentiveness in Lab</b> PLO08	Attended in proper Time and attentive in Lab	Attended in proper Time but not attentive in Lab	Attended late but attentive in Lab	Attended late not attentive in Lab	
<b>Capability of writing Program/ Algorithm/Drawing Flow Chart</b> PLO1, PLO2, PLO3, PLO5,	Right attempt/ no errors and well formatted	Right attempt/ no errors but not well formatted	Right attempt/ minor errors and not well formatted	Wrong attempt	
<b>Result or Output/ Completion of target in Lab</b> PLO9,	100% target has been completed and well formatted.	75% target has been completed and well formatted.	50% target has been completed but not well formatted.	None of the outputs are correct	
<b>Overall, Knowledge</b> PLO10,	Demonstrates excellent knowledge of lab	Demonstrates good knowledge of lab	Has partial idea about the Lab and procedure followed	Has poor idea about the Lab and procedure followed	
<b>Attention to Lab Report</b> PLO4,	Submission of Lab Report in Proper Time i.e., in next day of lab., with proper documentation.	Submission of Lab Report in proper time but not with proper documentation.	Late Submission with proper documentation.	Late Submission Very poor documentation	

**Instructor:**

Name: \_\_\_\_\_

Signature: \_\_\_\_\_