Activity 3: Process Concept

สมาชิก

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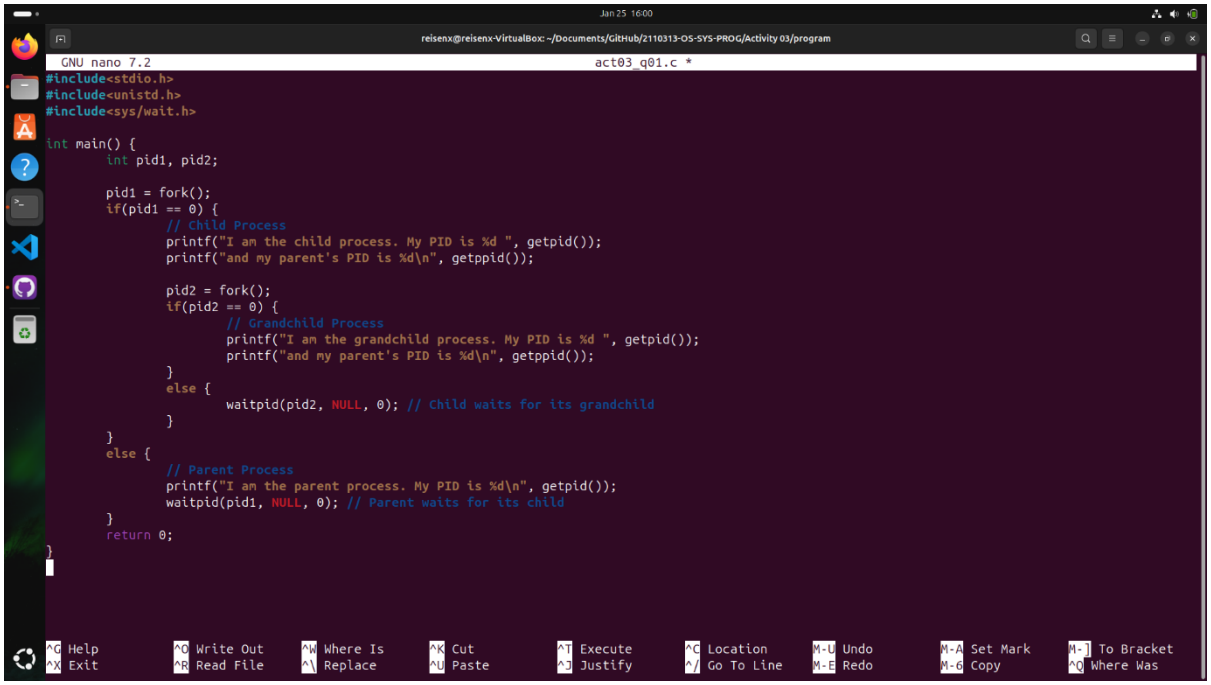
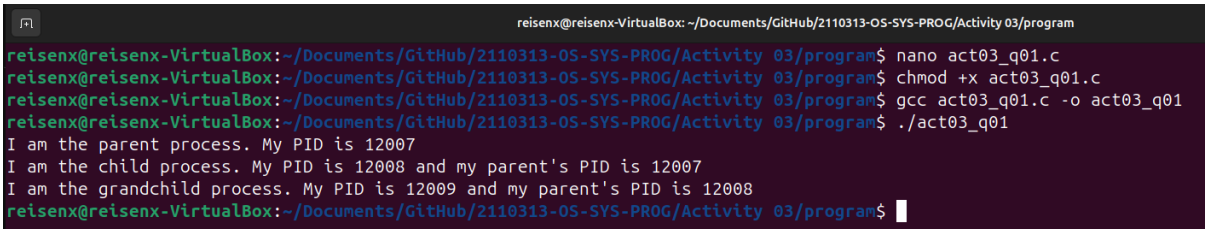
1. เขียนโปรแกรมสร้างโปรเซส 3 ระดับ โดยที่โปรเซสแต่ละระดับต้องบอกว่า ตัวเองเป็น parent, child หรือ grandchild แล้วแสดงค่า pid ของตนเอง และค่า ppid ด้วยโดยใช้ fork(), getpid() และ getppid()

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

int main() {
    int pid1, pid2;

    pid1 = fork();
    if(pid1 == 0) {
        // Child Process
        printf("I am the child process. My PID is %d ", getpid());
        printf("and my parent's PID is %d\n", getppid());

        pid2 = fork();
        if(pid2 == 0) {
            // Grandchild Process
            printf("I am the grandchild process. My PID is %d ", getpid());
            printf("and my parent's PID is %d\n", getppid());
        }
        else {
            waitpid(pid2, NULL, 0); // Child waits for its grandchild
        }
    }
    else {
        // Parent Process
        printf("I am the parent process. My PID is %d\n", getpid());
        waitpid(pid1, NULL, 0); // Parent waits for its child
    }
    return 0;
}
```


Jan 25 16:00
reisenx@reisenx-VirtualBox: ~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program
GNU nano 7.2
act03_q01.c *
#include<stdio.h>
#include<unistd.h>
#include<sys/wait.h>
int main() {
int pid1, pid2;
pid1 = fork();
if(pid1 == 0) {
// Child Process
printf("I am the child process. My PID is %d ", getpid());
printf("and my parent's PID is %d\n", getppid());
pid2 = fork();
if(pid2 == 0) {
// Grandchild Process
printf("I am the grandchild process. My PID is %d ", getpid());
printf("and my parent's PID is %d\n", getppid());
}
else {
waitpid(pid2, NULL, 0); // Child waits for its grandchild
}
}
else {
// Parent Process
printf("I am the parent process. My PID is %d\n", getpid());
waitpid(pid1, NULL, 0); // Parent waits for its child
}
return 0;
}
^G Help
^X Exit
^O Write Out
^R Read File
^W Where Is
^\ Replace
^K Cut
^U Paste
^T Execute
^J Justify
^C Location
^/ Go To Line
M-U Undo
M-E Redo
M-A Set Mark
M-6 Copy
M-] To Bracket
^Q Where Was


reisenx@reisenx-VirtualBox: ~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ nano act03_q01.c
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ chmod +x act03_q01.c
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ gcc act03_q01.c -o act03_q01
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ ./act03_q01
I am the parent process. My PID is 12007
I am the child process. My PID is 12008 and my parent's PID is 12007
I am the grandchild process. My PID is 12009 and my parent's PID is 12008
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$

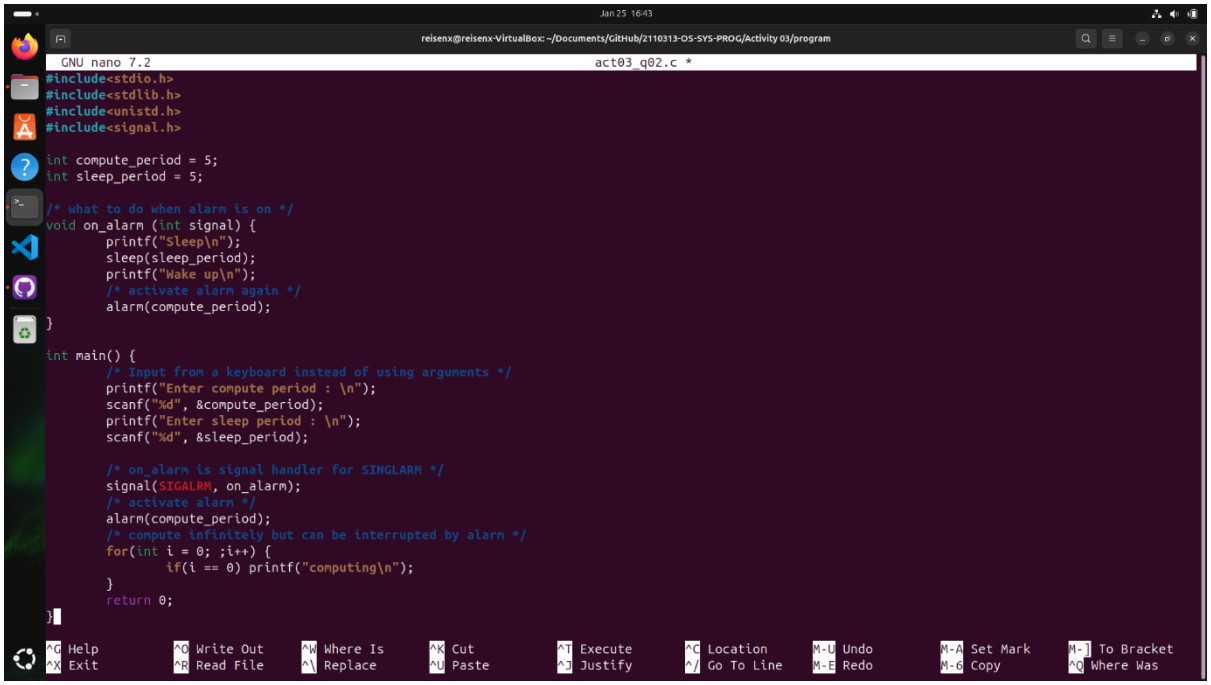
2. โปรแกรมต่อไปนี้ทำงานสลับระหว่างการคำนวณและการไม่ทำอะไรเลย (sleep)

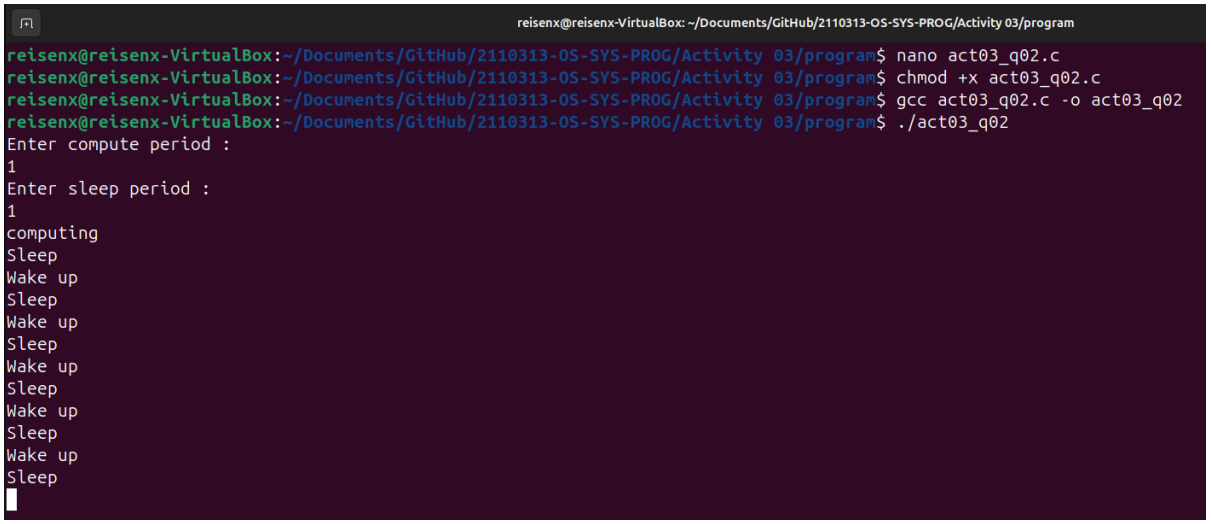
```c
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
#include<signal.h>

int compute_period = 5;
int sleep_period = 5;
int i;

/* what to do when alarm is on */

void on_alarm (int signal) {
    printf("Sleep\n");
    sleep(sleep_period);
    printf("Wake up\n");
    /* activate alarm again */
    alarm(compute_period);
}

main(int argc, char* argv[]) {
    int i;
    if(argc != 3) {
        printf("Usage: infinite <compute-period><sleepperiod>\n");
        exit(0);
    }
    else {
        compute_period = atoi(argv[1]);
        sleep_period = atoi(argv[2]);
    }
    /* on_alarm is signal handler for SINGLARM */
    signal(SIGALRM, on_alarm);
    /* activate alarm */
    alarm(compute_period);

    /* compute infinitely but can be interrupted by alarm */
    for(i = 0; ;i++) {
        if(i == 0) printf("computing\n");
    }
}
```

ให้แก้ไขโปรแกรมโดยเปลี่ยนจากการใช้ argument เป็นการถามค่า compute_period และ sleep_period จากแป้นพิมพ์

Solution Code

```c
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
#include<signal.h>

int compute_period = 5;
int sleep_period = 5;

/* what to do when alarm is on */
void on_alarm (int signal) {
    printf("Sleep\n");
    sleep(sleep_period);
    printf("Wake up\n");
    /* activate alarm again */
    alarm(compute_period);
}

int main() {
    /* Input from a keyboard instead of using arguments */
    printf("Enter compute period : \n");
    scanf("%d", &compute_period);
    printf("Enter sleep period : \n");
    scanf("%d", &sleep_period);

    /* on_alarm is signal handler for SINGLARM */
    signal(SIGALRM, on_alarm);
    /* activate alarm */
    alarm(compute_period);
    /* compute infinitely but can be interrupted by alarm */
    for(int i = 0; ;i++) {
        if(i == 0) printf("computing\n");
    }
    return 0;
}
```


Jan 25 16:43
reisenx@reisenx-VirtualBox: ~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program
GNU nano 7.2
act03_q02.c *
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
#include<signal.h>
int compute_period = 5;
int sleep_period = 5;
/* what to do when alarm is on */
void on_alarm (int signal) {
printf("Sleep\n");
sleep(sleep_period);
printf("Wake up\n");
/* activate alarm again */
alarm(compute_period);
}
int main() {
/* Input from a keyboard instead of using arguments */
printf("Enter compute period : \n");
scanf("%d", &compute_period);
printf("Enter sleep period : \n");
scanf("%d", &sleep_period);
/* on_alarm is signal handler for SINGLARM */
signal(SIGALRM, on_alarm);
/* activate alarm */
alarm(compute_period);
/* compute infinitely but can be interrupted by alarm */
for(int i = 0; ;i++) {
if(i == 0) printf("computing\n");
}
return 0;
}
^G Help
^X Exit
^O Write Out
^R Read File
^W Where Is
^\ Replace
^K Cut
^U Paste
^T Execute
^J Justify
^C Location
^/ Go To Line
M-U Undo
M-E Redo
M-A Set Mark
M-6 Copy
M-] To Bracket
^Q Where Was

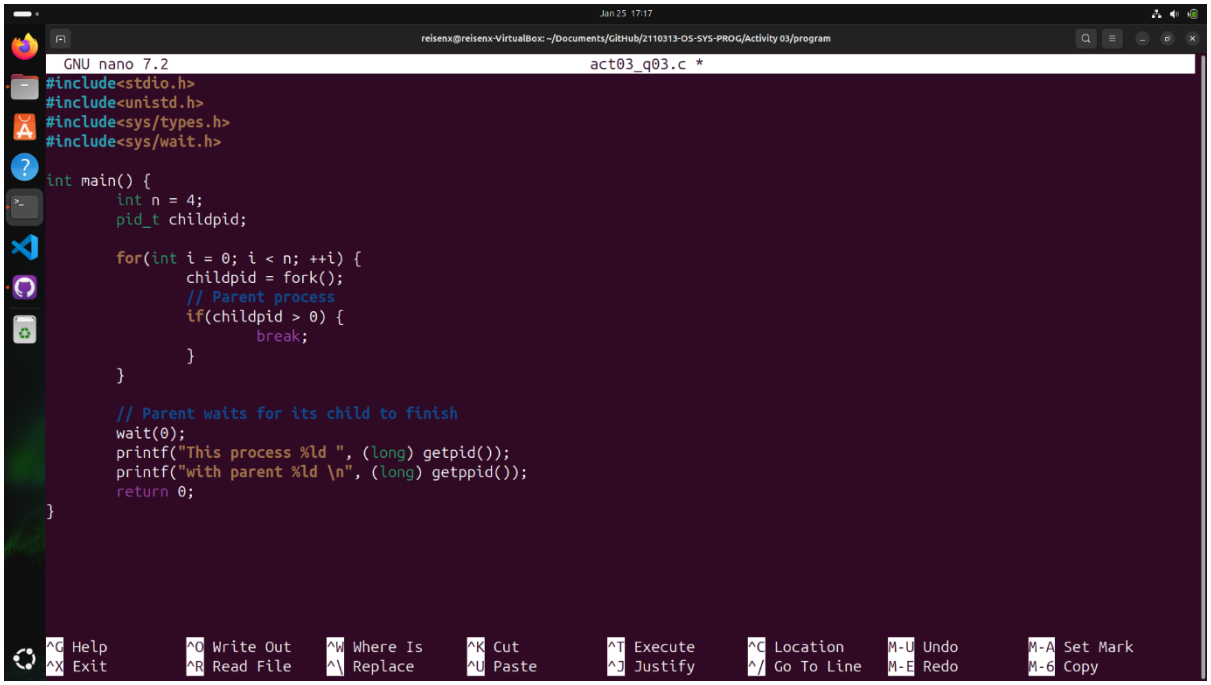

reisenx@reisenx-VirtualBox: ~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ nano act03_q02.c
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ chmod +x act03_q02.c
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ gcc act03_q02.c -o act03_q02
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ ./act03_q02
Enter compute period :
1
Enter sleep period :
1
computing
Sleep
Wake up
Sleep
Wake up
Sleep
Wake up
Sleep
Wake up
Sleep
Wake up
Sleep

3. แก้ไขโปรแกรมข้างล่างนี้ โดยให้กลับลำดับของข้อความที่พิมพ์ออกมา นั่นคือโปรเซสที่ถูกสร้างขึ้นหลังสุด (pid มากที่สุด) จะพิมพ์ข้อความออกมาแรกสุด และโปรเซสที่ถูกสร้างขึ้นแรกสุดจะพิมพ์ข้อความออกมาหลังสุด

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

main() {
    int i;
    int n;
    pid_t childpid;

    n = 4;
    for(i = 0; i < n; ++i) {
        childpid = fork();
        if(childpid > 0) {
            break;
        }
    }
    printf("This process %ld with parent %ld\n", (long) getpid(), (long)
getppid());
```

Solution Code

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

int main() {
    int n = 4;
    pid_t childpid;

    for(int i = 0; i < n; ++i) {
        childpid = fork();
        // Parent process
        if(childpid > 0) {
            break;
        }
    }
    // Parent waits for its child to finish
    wait(0);
    printf("This process %ld ", (long) getpid());
    printf("with parent %ld \n", (long) getppid());
    return 0;
}
```




```
reisenx@reisenx-VirtualBox: ~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ nano act03_q03.c
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ chmod +x act03_q03.c
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ gcc act03_q03.c -o act03_q03
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$ ./act03_q03
This process 13050 with parent 13049
This process 13049 with parent 13048
This process 13048 with parent 13047
This process 13047 with parent 13046
This process 13046 with parent 11502
reisenx@reisenx-VirtualBox:~/Documents/GitHub/2110313-OS-SYS-PROG/Activity 03/program$
```