Program :

Orphan :

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

void bubblesort(int arr[],int n){
   for(int i=0; i<n-1; i++)
      for(int j=0; j< n-i-1; j++)
         if (arr[j] > arr[j +1]){
            int temp = arr[j];
            arr[j] = arr[j+1];
            arr[j+1] = temp;
            }
            printf("\nSorted array by Bubble sort in child process = ");
            for(int i=0;i<n;i++){
               printf("%d ",arr[i]);
            }
            printf("\n");
}

void selectionsort(int arr[], int n){
   int min_idx;
   for(int i=0; i< n-1; i++){
      min_idx=i;
      for(int j=i+1; j<n; j++)
      if(arr[j] < arr[min_idx])
         min_idx = j;
      if(min_idx !=i){
         int temp = arr[min_idx];
         arr[min_idx] = arr[i];
         arr[i] = temp;
```

```
        }
    }
    printf("\nSorted array by selection sort in parent process = ");
    for(int i=0;i<n;i++){
        printf("%d ",arr[i]);
    }
    printf("\n");
}

int main(){
    pid_t pid;
    int n;
    printf("Enter the number of element = ");
    scanf("%d",&n);
    int arr[n];
    printf("Enter the array = ");
    for(int i = 0;i<n;i++)
    scanf("%d",&arr[i]);
    pid = fork();
    if(pid==0){
        printf("\n********** CHILD PROCESS **********\n");
        printf("\nIt is child process with pid = %d and ppid = %d \n",getpid(),getppid());
        bubblesort(arr,n);
        printf("\n***** CHILD PROCESS TERMINATED *****\n");
    }
    else{
        wait(NULL);
        printf("\n\n\n****** PARENT PROCESS **********\n");
        printf("nIt is parent process with pid = %d and ppid = %d \n",getpid(),getppid());
        selectionsort(arr,n);
        printf("\n***** PARENT PROCESS TERMINATED *****\n");
    }
}
```

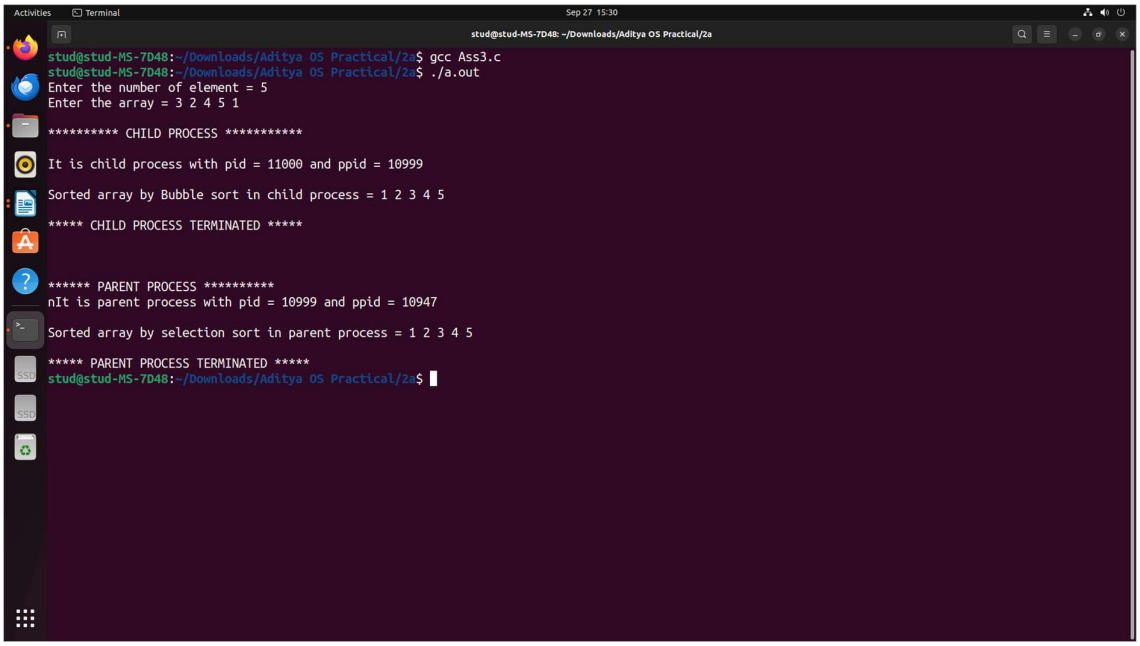
Zombie :

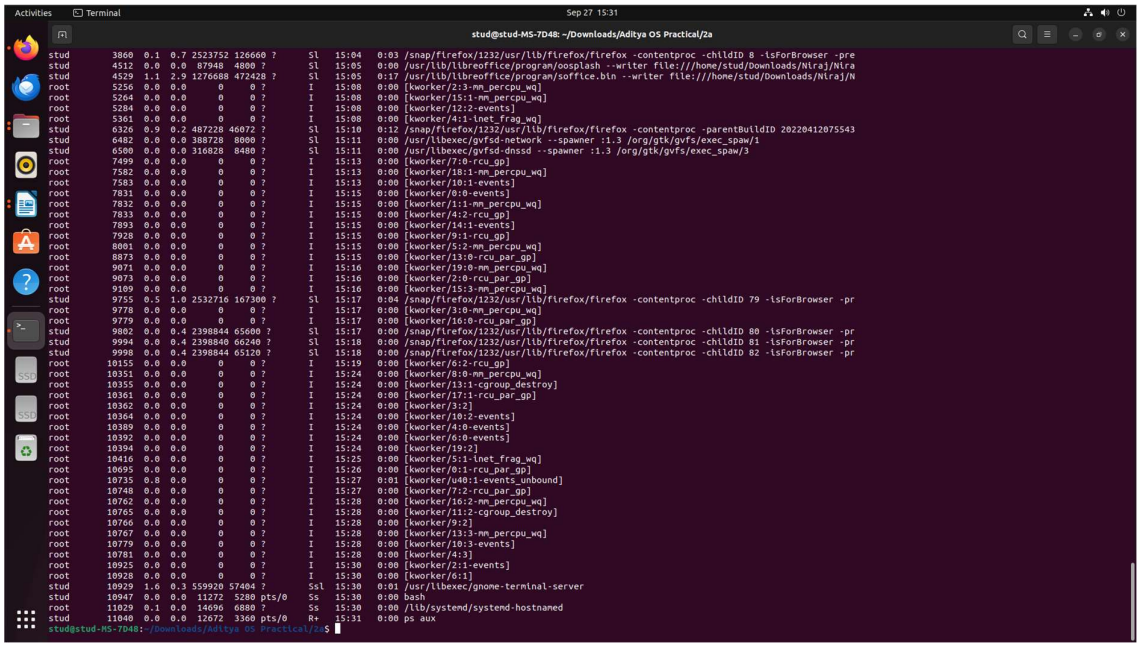
```
#include<stdio.h>
#include<unistd.h>
#include<sys/types.h>
#include<sys/wait.h>

void bubblesort(int arr[],int n){
        for(int i=0; i<n-1; i++)
                for(int j=0; j< n-i-1; j++)
                        if (arr[j] > arr[j +1]){
                                int temp = arr[j];
                                arr[j] = arr[j+1];
                                arr[j+1] = temp;
                                }
                                printf("\nSorted array by Bubble sort in child process = ");
                                for(int i=0;i<n;i++){
                                        printf("%d ",arr[i]);
                                }
                                printf("\n");
}

void selectionsort(int arr[], int n){
        int min_idx;
        for(int i=0; i< n-1; i++){
                min_idx=i;
                for(int j=i+1; j<n; j++)
                if(arr[j] < arr[min_idx])
                        min_idx = j;
                if(min_idx !=i){
                        int temp = arr[min_idx];
                        arr[min_idx] = arr[i];
```

```
                        arr[i] = temp;
                }
        }
        printf("\nSorted array by selection sort in parent process = ");
        for(int i=0;i<n;i++){
                printf("%d ",arr[i]);
        }
        printf("\n");
}

int main(){
        pid_t pid;
        int n;
        printf("Enter the number of element = ");
        scanf("%d",&n);
        int arr[n];
        printf("Enter the array = ");
        for(int i = 0;i<n;i++)
        scanf("%d",&arr[i]);
        pid = fork();
        if(pid==0){
                wait(NULL);
                printf("\n********** CHILD PROCESS **********\n");
                printf("\nIt is child process with pid = %d and ppid = %d \n",getpid(),getppid());
                bubblesort(arr,n);
                printf("\n***** CHILD PROCESS TERMINATED *****\n");
        }
        else{
                printf("\n\n\n****** PARENT PROCESS **********\n");
                printf("nIt is parent process with pid = %d and ppid = %d \n",getpid(),getppid());
                selectionsort(arr,n);
                printf("\n***** PARENT PROCESS TERMINATED *****\n");
        }
```

```
}
```

Output :


Activities
Terminal
Sep 27 15:30
stud@stud-MS-7D48: ~/Downloads/Aditya OS Practical/2a
stud@stud-MS-7D48:~/Downloads/Aditya OS Practical/2a$ gcc Ass3.c
stud@stud-MS-7D48:~/Downloads/Aditya OS Practical/2a$ ./a.out
Enter the number of element = 5
Enter the array = 3 2 4 5 1
********** CHILD PROCESS **********
It is child process with pid = 11000 and ppid = 10999
Sorted array by Bubble sort in child process = 1 2 3 4 5
***** CHILD PROCESS TERMINATED *****
****** PARENT PROCESS **********
nIt is parent process with pid = 10999 and ppid = 10947
Sorted array by selection sort in parent process = 1 2 3 4 5
***** PARENT PROCESS TERMINATED *****
stud@stud-MS-7D48:~/Downloads/Aditya OS Practical/2a$


Activities
Terminal
Sep 27 15:31
stud@stud-MS-7D48: ~/Downloads/Aditya OS Practical/2a
stud 3860 0.1 0.7 2523752 126660 ? Sl 15:04 0:03 /snap/firefox/1232/usr/lib/firefox/firefox -contentproc -childID 8 -isForBrowser -pre
stud 4512 0.0 0.0 87948 4800 ? Sl 15:05 0:00 /usr/lib/libreoffice/program/oosplash --writer file:///home/stud/Downloads/Niraj/Nira
stud 4529 1.1 2.9 1276688 472428 ? Sl 15:05 0:17 /usr/lib/libreoffice/program/soffice.bin --writer file:///home/stud/Downloads/Niraj/N
root 5256 0.0 0.0 0 0 ? I 15:08 0:00 [kworker/2:3-mm_percpu_wq]
root 5264 0.0 0.0 0 0 ? I 15:08 0:00 [kworker/15:1-mm_percpu_wq]
root 5284 0.0 0.0 0 0 ? I 15:08 0:00 [kworker/12:2-events]
root 5361 0.0 0.0 0 0 ? I 15:08 0:00 [kworker/4:1-inet_frag_wq]
stud 6326 0.9 0.2 487228 46072 ? Sl 15:10 0:12 /snap/firefox/1232/usr/lib/firefox/firefox -contentproc -parentBuildID 20220412075543
stud 6482 0.0 0.0 388728 8000 ? Sl 15:11 0:00 /usr/libexec/gvfsd-network --spawner :1.3 /org/gtk/gvfs/exec_spaw/1
stud 6500 0.0 0.0 316828 8480 ? Sl 15:11 0:00 /usr/libexec/gvfsd-dnssd --spawner :1.3 /org/gtk/gvfs/exec_spaw/3
root 7499 0.0 0.0 0 0 ? I 15:13 0:00 [kworker/7:0-rcu_gp]
root 7582 0.0 0.0 0 0 ? I 15:13 0:00 [kworker/18:1-mm_percpu_wq]
root 7583 0.0 0.0 0 0 ? I 15:13 0:00 [kworker/10:1-events]
root 7831 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/0:0-events]
root 7832 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/1:1-mm_percpu_wq]
root 7833 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/4:2-rcu_gp]
root 7893 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/14:1-events]
root 7928 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/9:1-rcu_gp]
root 8001 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/5:2-mm_percpu_wq]
root 8873 0.0 0.0 0 0 ? I 15:15 0:00 [kworker/13:0-rcu_par_gp]
root 9071 0.0 0.0 0 0 ? I 15:16 0:00 [kworker/19:0-mm_percpu_wq]
root 9073 0.0 0.0 0 0 ? I 15:16 0:00 [kworker/2:0-rcu_par_gp]
root 9109 0.0 0.0 0 0 ? I 15:16 0:00 [kworker/15:3-mm_percpu_wq]
stud 9755 0.5 1.0 2532716 167300 ? Sl 15:17 0:04 /snap/firefox/1232/usr/lib/firefox/firefox -contentproc -childID 79 -isForBrowser -pr
root 9778 0.0 0.0 0 0 ? I 15:17 0:00 [kworker/3:0-mm_percpu_wq]
root 9779 0.0 0.0 0 0 ? I 15:17 0:00 [kworker/16:0-rcu_par_gp]
stud 9982 0.0 0.4 2398844 65600 ? Sl 15:17 0:00 /snap/firefox/1232/usr/lib/firefox/firefox -contentproc -childID 80 -isForBrowser -pr
stud 9994 0.0 0.4 2398840 66240 ? Sl 15:18 0:00 /snap/firefox/1232/usr/lib/firefox/firefox -contentproc -childID 81 -isForBrowser -pr
stud 9998 0.0 0.4 2398844 65120 ? Sl 15:18 0:00 /snap/firefox/1232/usr/lib/firefox/firefox -contentproc -childID 82 -isForBrowser -pr
root 10155 0.0 0.0 0 0 ? I 15:19 0:00 [kworker/6:2-rcu_gp]
root 10351 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/8:0-mm_percpu_wq]
root 10355 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/13:1-cgroup_destroy]
root 10361 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/17:1-rcu_par_gp]
root 10362 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/3:2]
root 10364 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/10:2-events]
root 10389 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/4:0-events]
root 10392 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/6:0-events]
root 10394 0.0 0.0 0 0 ? I 15:24 0:00 [kworker/19:2]
root 10416 0.0 0.0 0 0 ? I 15:25 0:00 [kworker/5:1-inet_frag_wq]
root 10695 0.0 0.0 0 0 ? I 15:26 0:00 [kworker/0:1-rcu_par_gp]
root 10735 0.8 0.0 0 0 ? I 15:27 0:01 [kworker/u40:1-events_unbound]
root 10748 0.0 0.0 0 0 ? I 15:27 0:00 [kworker/7:2-rcu_par_gp]
root 10762 0.0 0.0 0 0 ? I 15:28 0:00 [kworker/16:2-mm_percpu_wq]
root 10765 0.0 0.0 0 0 ? I 15:28 0:00 [kworker/11:2-cgroup_destroy]
root 10766 0.0 0.0 0 0 ? I 15:28 0:00 [kworker/9:2]
root 10767 0.0 0.0 0 0 ? I 15:28 0:00 [kworker/13:3-mm_percpu_wq]
root 10779 0.0 0.0 0 0 ? I 15:28 0:00 [kworker/10:3-events]
root 10781 0.0 0.0 0 0 ? I 15:28 0:00 [kworker/4:3]
root 10925 0.0 0.0 0 0 ? I 15:30 0:00 [kworker/2:1-events]
root 10928 0.0 0.0 0 0 ? I 15:30 0:00 [kworker/6:1]
stud 10929 1.6 0.3 559920 57404 ? Ssl 15:30 0:01 /usr/libexec/gnome-terminal-server
stud 10947 0.0 0.0 11272 5280 pts/0 Ss 15:30 0:00 bash
root 11029 0.1 0.0 14696 6880 ? Ss 15:30 0:00 /lib/systemd/systemd-hostnamed
stud 11040 0.0 0.0 12672 3360 pts/0 R+ 15:31 0:00 ps aux
stud@stud-MS-7D48:~/Downloads/Aditya OS Practical/2a$