LAB EXERCISE-06

SYSTEM CALLS

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1.FORK()

```
[s2019103562@centos8-linux Mon Mar 22 09:11 AM lab06]$ vim fork.c
[s2019103562@centos8-linux Mon Mar 22 09:12 AM lab06]$ gcc fork.c -o fork
[s2019103562@centos8-linux Mon Mar 22 09:12 AM lab06]$ ./fork
My id is 2368723:I am the parent
My id is 2368725:I am the parent
My id is 2368724:I am the parent
My id is 2368726:I am the parent
[s2019103562@centos8-linux Mon Mar 22 09:12 AM lab06]$ vim fork.c
[s2019103562@centos8-linux Mon Mar 22 09:12 AM lab06]$ cat fork.c
#include<stdio.h>
#include<unistd.h>
#include<sys/types.h>
int main(){
        pid_t p=fork();
        fork();
        printf("My id is %d:",getpid());
        if(getpid()>0)
                printf("I am the parent\n");
        else if(getpid()==0)
                printf("I am the child\n");
        else
                printf("Error\n");
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:12 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 09:12 AM lab06]$ vim fork2.c
[s2019103562@centos8-linux Mon Mar 22 09:18 AM lab06]$ gcc fork2.c -o fork2
[s2019103562@centos8-linux Mon Mar 22 09:18 AM lab06]$ ./fork2
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
[s2019103562@centos8-linux Mon Mar 22 09:18 AM lab06]$ cat fork2.c
#include<stdio.h>
#include<unistd.h>
#include<sys/types.h>
int main(){
        fork();
        fork();
        fork();
        printf("Hello World\n");
        //calling fork n times executes the processes after the fork call 2^n times
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:18 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 09:25 AM lab06]$ cat fork3.c
#include<stdio.h>
#include<unistd.h>
#include<sys/types.h>
#define MAXCOUNT 10
void childProcess(){
        int i;
        for(i=1;i<=MAXCOUNT;i++)
                printf("This line is from child %d\n",i);
                printf("****Child Process is done****\n");
}
void ParentProcess(){
        int i;
        for(i=1;i<=MAXCOUNT;i++)
                printf("This line is from Parent %d\n",i);
        printf("****Parent process is done****\n");
}

int main(){
        pid_t p;
        p=fork();
        if(p==0)
                childProcess();
        else
                ParentProcess();
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:25 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 09:24 AM lab06]$ vim fork3.c
[s2019103562@centos8-linux Mon Mar 22 09:24 AM lab06]$ gcc fork3.c -o fork3
[s2019103562@centos8-linux Mon Mar 22 09:25 AM lab06]$ ./fork3
This line is from Parent 1
This line is from Parent 2
This line is from Parent 3
This line is from Parent 4
This line is from Parent 5
This line is from Parent 6
This line is from Parent 7
This line is from Parent 8
This line is from Parent 9
This line is from Parent 10
****Parent process is done****
This line is from child 1
This line is from child 2
This line is from child 3
This line is from child 4
This line is from child 5
This line is from child 6
This line is from child 7
This line is from child 8
This line is from child 9
This line is from child 10
****Child Process is done****
```

2.CLONE()

```
[s2019103562@centos8-linux Mon Mar 22 09:34 AM lab06]$ vim clone.c
[s2019103562@centos8-linux Mon Mar 22 09:34 AM lab06]$ gcc clone.c -o clone
[s2019103562@centos8-linux Mon Mar 22 09:34 AM lab06]$ ./clone
Parent id:2404998
Child pid:2404998
[s2019103562@centos8-linux Mon Mar 22 09:34 AM lab06]$ cat clone.c
#define _GNU_SOURCE
#include<sched.h>
#include<signal.h>
#include<unistd.h>
#include<stdlib.h>
#include<stdio.h>
#define STACK 1000
int do_something(){
        printf("Child pid:%d\n",getpid());
        return 0;
}
int main(){
        void* stack=malloc(STACK);
        if(!stack){
                perror("Malloc failed\n");
                exit(0);
        }
        if(clone(&do_something,(char*)stack+STACK,CLONE_VM,0)<0){
                perror("Clone failed\n");
                exit(0);
        }
        printf("Parent id:%d\n",getpid());
        do_something();
        free(stack);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:34 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 09:47 AM lab06]$ vim clone3.c
[s2019103562@centos8-linux Mon Mar 22 09:48 AM lab06]$ gcc clone3.c -o clone3
[s2019103562@centos8-linux Mon Mar 22 09:48 AM lab06]$ ./clone3 5
This part of code is running under child process
5 * 1 = 5
5 * 2 = 10
5 * 3 = 15
5 * 4 = 20
5 * 5 = 25
5 * 6 = 30
5 * 7 = 35
5 * 8 = 40
5 * 9 = 45
5 * 10 = 50
INFO:Child process has been terminated

[s2019103562@centos8-linux Mon Mar 22 09:48 AM lab06]$ cat clone3.c
#define _GNU_SOURCE
#include<sched.h>
#include<stdio.h>
#include<unistd.h>
#include<stdlib.h>
#include<signal.h>
#include<sys/wait.h>
int fn(void* arg){
        int i;
        printf("This part of code is running under child process\n");
        int n=atoi(arg);
        for(i=1;i<=10;i++)
                printf("%d * %d = %d\n",n,i,(n*i));
        return 0;
}
int main(int argc,char* argv[]){
        void* child_stack=malloc(1024 * 1024);
        if(child_stack == NULL){
                printf("Unable to allocate memory. Malloc failed\n");
                exit(0);
        }
        int pid=clone(fn,child_stack + (1024 * 1024),SIGCHLD,argv[1]);
        if(pid<0){
                printf("Error in creating the child process\n");
                exit(0);
        }
        wait(NULL);
        free(child_stack);
        printf("INFO:Child process has been terminated\n");
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:48 AM lab06]$
```

3.EXEC AND ITS VARIANTS

execvp

```
[s2019103562@centos8-linux Mon Mar 22 10:08 AM lab06]$ vim execvp.c
[s2019103562@centos8-linux Mon Mar 22 10:09 AM lab06]$ gcc execvp.c -o execvp
[s2019103562@centos8-linux Mon Mar 22 10:09 AM lab06]$ ./execvp
My id is 2494968:I am the parent
My id is 2494970:I am the parent
My id is 2494969:I am the parent
My id is 2494971:I am the parent
[s2019103562@centos8-linux Mon Mar 22 10:09 AM lab06]$ cat execvp.c
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
int main(){
        char* args[]={"./fork",NULL};
        execvp(args[0],args);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:10 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 10:41 AM lab06]$ vim execvp2.c
[s2019103562@centos8-linux Mon Mar 22 10:41 AM lab06]$ gcc execvp2.c -o execvp2
[s2019103562@centos8-linux Mon Mar 22 10:41 AM lab06]$ ./execvp2
total 1.9M
drwx------     7 asiro        asiro       311 Jan  8 11:14 asiro
drwx------.   18 audcse       audcse     4.0K Mar  1 11:21 audcse
drwx------    20 dbstudent    rusa1s     4.0K Feb 17 16:24 dbstudent
drwx------    22 deepti       deepti     4.0K Feb 19 13:13 deepti
drwx------     4 gfl          gfl         141 Feb 20 11:32 gfl
drwx------     3 s2018103002  1544        98 Feb 23 15:09 rpass
drwx------    16 s10052       rusa1s     4.0K Feb 23 15:25 s10052
drwx------    21 s10055       rusa1s     4.0K Mar  2 14:25 s10055
drwx------    16 s10065       rusa1s     4.0K Feb 27 12:15 s10065
drwx------    25 s10097       rusa1s     4.0K Mar  4 11:55 s10097
drwx------    28 s10131       rusa1s     4.0K Mar 10 23:51 s10131
drwx------    10 s10135       rusa1s     4.0K Mar  2 14:09 s10135
drwx------    20 s10138       rusa1s     4.0K Feb 22 13:29 s10138
drwx------    27 s10221       rusa1s     4.0K Mar 18 16:35 s10221
drwx------     4 s10246       rusa1s     4.0K Mar  1 15:46 s10246
drwx------    16 s1044        rusa1s     4.0K Mar  2 16:30 s1044
drwx------    21 s1052        rusa1s     4.0K Mar  1 14:56 s1052
drwx------    21 s1056        rusa1s     4.0K Mar  2 13:12 s1056
drwx------    30 s1090        rusa1s     4.0K Mar  1 16:30 s1090
drwx------    23 s1100        rusa1s     4.0K Mar  2 14:16 s1100
drwx------    25 s1172        rusa1s     4.0K Mar 19 18:46 s1172
drwx------    22 s1196        rusa1s     4.0K Mar  2 16:29 s1196
drwx------    26 s1360        rusa1s     4.0K Mar 19 23:24 s1360
drwx------    20 s1430        rusa1s     4.0K Mar  1 22:35 s1430
drwx------    19 s1434        rusa1s     4.0K Mar 19 11:19 s1434
drwx------    22 s1472        rusa1s     4.0K Mar 19 09:25 s1472
drwx------    33 s1482        rusa1s     4.0K Feb 28 11:41 s1482
drwx------     5 s1518        rusa1s     4.0K Mar  1 16:14 s1518
drwx------    27 s1580        rusa1s     4.0K Mar 20 12:27 s1580
drwx------    19 s1666        rusa1s     4.0K Mar  2 17:12 s1666
drwx------    23 s1850        rusa1s     4.0K Mar  1 14:11 s1850
drwx------    21 s1872        rusa1s     4.0K Mar  2 13:41 s1872
```

```
drwx------    21 s1872        rusa1s   4.0K Mar   2 13:41 s1872
drwx------    25 s200160      rusa1s   4.0K Mar   2 14:04 s200160
drwx------     3 s200169      rusa1s     98 Nov 23 16:15 s200169
drwx------     4 s2012103028  rusa1s   4.0K Mar 19 11:33 s2012103028
drwx------     4 s2014103033  rusa1s    236 Mar 16 11:44 s2014103033
drwx------     4 s2014103060  rusa1s    279 Mar 16 12:55 s2014103060
drwx------     4 s2014103569  rusa1s    163 Mar 18 15:17 s2014103569
drwx------     4 s2015103581  rusa1s    163 Mar 17 12:55 s2015103581
drwx------     3 s2015103622  rusa1s     98 Mar 18 15:02 s2015103622
drwx------    23 s201526      rusa1s   4.0K Mar 19 15:11 s201526
drwx------     4 s2016103030  rusa1s    163 Mar 17 10:16 s2016103030
drwx------     4 s2016103031  rusa1s    279 Mar 18 16:19 s2016103031
drwx------     4 s2016103505  rusa1s   4.0K Mar 19 13:45 s2016103505
drwx------     4 s2016103526  rusa1s    319 Mar 16 12:59 s2016103526
drwx------     4 s2016103544  rusa1s    163 Mar 17 10:22 s2016103544
drwx------     4 s2016103570  rusa1s    252 Mar 16 11:58 s2016103570
drwx------     4 s2016103613  rusa1s   4.0K Mar 19 13:25 s2016103613
drwx------     4 s2017103029  rusa1s    163 Mar 17 09:43 s2017103029
drwx------     4 s2017103618  rusa1s   4.0K Feb 26 16:50 s2017103618
drwx------     6 s2018103002  rusa1s    242 Mar   6 13:50 s2018103002
drwx------     6 s2018103003  rusa1s   4.0K Mar 16 14:15 s2018103003
drwx------     6 s2018103005  rusa1s    238 Mar   6 13:30 s2018103005
drwx------     9 s2018103006  rusa1s    268 Mar 16 12:20 s2018103006
drwx------     5 s2018103007  rusa1s    205 Mar 18 16:01 s2018103007
drwx------     7 s2018103008  rusa1s    258 Mar   6 23:55 s2018103008
drwx------     6 s2018103009  rusa1s    241 Mar 17 19:01 s2018103009
drwx------     6 s2018103010  rusa1s    186 Mar 18 16:13 s2018103010
drwx------    11 s2018103011  rusa1s   4.0K Mar 16 12:12 s2018103011
drwx------    11 s2018103012  rusa1s   4.0K Mar 16 12:29 s2018103012
drwx------    10 s2018103013  rusa1s    308 Mar 18 17:17 s2018103013
drwx------    14 s2018103014  rusa1s   4.0K Mar 16 12:27 s2018103014
drwx------    11 s2018103015  rusa1s   4.0K Mar 21 21:48 s2018103015
drwx------     5 s2018103016  rusa1s   4.0K Mar 18 16:01 s2018103016
drwx------     8 s2018103017  rusa1s    295 Mar 16 23:01 s2018103017
drwx------     8 s2018103018  rusa1s    255 Mar 16 12:28 s2018103018
drwx------     6 s2018103019  rusa1s   4.0K Mar 18 16:05 s2018103019
drwx------    14 s2018103020  rusa1s   4.0K Mar 16 14:11 s2018103020
drwx------     9 s2018103021  rusa1s   4.0K Mar 16 16:57 s2018103021
drwx------     5 s2018103022  rusa1s   4.0K Mar 18 16:13 s2018103022
drwx------     5 s2018103023  rusa1s    223 Mar   6 14:37 s2018103023
```

```
drwx------    5 s2018103023   rusa1s   223 Mar  6 14:37 s2018103023
drwx------    6 s2018103025   rusa1s   227 Mar 18 16:58 s2018103025
drwx------   12 s2018103026   rusa1s  4.0K Mar 16 12:37 s2018103026
drwx------   10 s2018103027   rusa1s  4.0K Mar 16 11:20 s2018103027
drwx------   11 s2018103029   rusa1s  4.0K Mar 16 13:02 s2018103029
drwx------   16 s2018103030   rusa1s  4.0K Mar 21 03:28 s2018103030
drwx------    3 s2018103031   rusa1s    78 Feb 17 15:41 s2018103031
drwx------   11 s2018103032   rusa1s   295 Mar 16 11:19 s2018103032
drwx------    9 s2018103034   rusa1s   268 Mar 18 16:18 s2018103034
drwx------    7 s2018103035   rusa1s   250 Mar 16 15:35 s2018103035
drwx------   11 s2018103036   rusa1s  4.0K Mar 16 11:46 s2018103036
drwx------    8 s2018103038   rusa1s   297 Mar 19 11:38 s2018103038
drwx------    9 s2018103040   rusa1s  4.0K Mar 21 14:17 s2018103040
drwx------    6 s2018103041   rusa1s   241 Mar 13 18:16 s2018103041
drwx------    5 s2018103042   rusa1s  4.0K Mar 13 12:04 s2018103042
drwx------    5 s2018103043   rusa1s   205 Mar 18 16:12 s2018103043
drwx------    7 s2018103044   rusa1s   280 Mar  8 14:59 s2018103044
drwx------    5 s2018103045   rusa1s   220 Mar 17 16:45 s2018103045
drwx------    5 s2018103046   rusa1s  4.0K Mar 18 16:09 s2018103046
drwx------    6 s2018103047   rusa1s   264 Mar  8 18:46 s2018103047
drwx------    9 s2018103048   rusa1s   332 Mar 16 12:02 s2018103048
drwx------    8 s2018103050   rusa1s   307 Mar 16 13:39 s2018103050
drwx------    3 s2018103051   rusa1s    98 Nov 24 12:45 s2018103051
drwx------    7 s2018103053   rusa1s   257 Mar 22 10:41 s2018103053
drwx------   13 s2018103056   rusa1s  4.0K Mar 16 13:34 s2018103056
drwx------    8 s2018103057   rusa1s   254 Mar 17 16:38 s2018103057
drwx------    5 s2018103058   rusa1s   203 Mar 17 17:33 s2018103058
drwx------    5 s2018103059   rusa1s   247 Mar  8 15:56 s2018103059
drwx------   10 s2018103060   rusa1s   283 Mar 16 11:53 s2018103060
drwx------    6 s2018103062   rusa1s   301 Mar  8 16:08 s2018103062
drwx------    5 s2018103064   rusa1s  4.0K Mar 18 16:34 s2018103064
drwx------    6 s2018103065   rusa1s   237 Mar  8 13:55 s2018103065
drwx------    4 s2018103066   rusa1s  4.0K Mar 17 19:54 s2018103066
drwx------    7 s2018103067   rusa1s  4.0K Mar 17 17:59 s2018103067
drwx------    8 s2018103068   rusa1s   273 Mar 15 12:15 s2018103068
drwx------    5 s2018103070   rusa1s   215 Mar 17 16:11 s2018103070
drwx------    5 s2018103071   rusa1s   249 Mar  8 16:04 s2018103071
drwx------    5 s2018103072   rusa1s  4.0K Mar 16 13:27 s2018103072
drwx------    6 s2018103074   rusa1s   244 Mar  8 20:46 s2018103074
drwx------    9 s2018103075   rusa1s   273 Mar 16 12:59 s2018103075
```

```
drwx------     5 s2018103549  rusa1s     236 Mar 18 16:37 s2018103549
drwx------    10 s2018103553  rusa1s    4.0K Mar 16 11:09 s2018103553
drwx------     7 s2018103555  rusa1s     301 Mar 18 16:05 s2018103555
drwx------     6 s2018103556  rusa1s     268 Mar  6 14:01 s2018103556
drwx------     6 s2018103559  rusa1s     240 Mar 13 11:55 s2018103559
drwx------     9 s2018103560  rusa1s     302 Mar 16 12:04 s2018103560
drwx------     8 s2018103562  rusa1s     275 Mar 15 20:35 s2018103562
drwx------     6 s2018103565  rusa1s     254 Mar 16 14:37 s2018103565
drwx------     6 s2018103568  rusa1s     238 Mar 16 01:01 s2018103568
drwx------     5 s2018103569  rusa1s     214 Mar 17 16:23 s2018103569
drwx------     7 s2018103570  rusa1s    4.0K Mar 17 17:55 s2018103570
drwx------    11 s2018103571  rusa1s     325 Mar 17 21:27 s2018103571
drwx------    10 s2018103572  rusa1s     286 Mar 16 12:33 s2018103572
drwx------    16 s2018103573  rusa1s    4.0K Mar 18 16:42 s2018103573
drwx------    12 s2018103574  rusa1s    4.0K Mar 16 12:46 s2018103574
drwx------     5 s2018103576  rusa1s     203 Mar  3 17:46 s2018103576
drwx------    10 s2018103577  rusa1s    4.0K Mar  9 01:35 s2018103577
drwx------     5 s2018103579  rusa1s     245 Mar 18 16:39 s2018103579
drwx------     6 s2018103580  rusa1s     235 Mar  6 16:09 s2018103580
drwx------    12 s2018103583  rusa1s    4.0K Mar 21 00:02 s2018103583
drwx------     5 s2018103586  rusa1s     224 Mar  6 13:51 s2018103586
drwx------    12 s2018103587  rusa1s    4.0K Mar 16 13:40 s2018103587
drwx------     5 s2018103588  rusa1s     199 Mar 18 16:41 s2018103588
drwx------     7 s2018103589  rusa1s     282 Mar  9 23:37 s2018103589
drwx------     9 s2018103591  rusa1s     275 Mar 22 09:03 s2018103591
drwx------     9 s2018103592  rusa1s     271 Mar 16 12:14 s2018103592
drwx------    10 s2018103595  rusa1s    4.0K Mar 16 13:05 s2018103595
drwx------     5 s2018103598  rusa1s     216 Mar 17 16:40 s2018103598
drwx------    10 s2018103599  rusa1s     331 Mar 16 19:07 s2018103599
drwx------     3 s2018103600  rusa1s      98 Feb 17 15:41 s2018103600
drwx------     9 s2018103601  rusa1s     293 Mar  9 16:40 s2018103601
drwx------     5 s2018103603  rusa1s     205 Mar 18 16:29 s2018103603
drwx------     5 s2018103604  rusa1s     199 Mar  1 15:08 s2018103604
drwx------     7 s2018103607  rusa1s     278 Mar  8 13:47 s2018103607
drwx------     9 s2018103608  rusa1s    4.0K Mar 16 12:30 s2018103608
drwx------     6 s2018103609  rusa1s     227 Mar 18 17:09 s2018103609
drwx------    10 s2018103610  rusa1s    4.0K Mar  8 16:14 s2018103610
drwx------     5 s2018103612  rusa1s     224 Mar 18 16:13 s2018103612
drwx------     7 s2018103613  rusa1s     277 Mar  8 13:52 s2018103613
drwx------     9 s2018103614  rusa1s     321 Mar 16 13:35 s2018103614
```

```
drwx------    7 s2018103607  rusa1s    278 Mar  8 13:47 s2018103607
drwx------    9 s2018103608  rusa1s   4.0K Mar 16 12:30 s2018103608
drwx------    6 s2018103609  rusa1s    227 Mar 18 17:09 s2018103609
drwx------   10 s2018103610  rusa1s   4.0K Mar  8 16:14 s2018103610
drwx------    5 s2018103612  rusa1s    224 Mar 18 16:13 s2018103612
drwx------    7 s2018103613  rusa1s    277 Mar  8 13:52 s2018103613
drwx------    9 s2018103614  rusa1s    321 Mar 16 13:35 s2018103614
drwx------    8 s2018103616  rusa1s    271 Mar 16 16:25 s2018103616
drwx------    6 s2018103619  rusa1s    236 Mar 16 12:24 s2018103619
drwx------    9 s2018103620  rusa1s   4.0K Mar 16 12:24 s2018103620
drwx------    5 s2018103621  rusa1s    223 Mar 18 16:09 s2018103621
drwx------    8 s2018103622  rusa1s    247 Mar 16 13:10 s2018103622
drwx------    6 s2018103624  rusa1s   4.0K Mar 17 17:29 s2018103624
drwx------    7 s2018103625  rusa1s    282 Mar  8 15:04 s2018103625
drwx------    6 s2018103626  rusa1s    219 Mar 17 18:20 s2018103626
drwx------   23 s201869      rusa1s   4.0K Mar 19 19:33 s201869
drwx------   11 s2019103001  rusa1s   4.0K Mar 22 10:40 s2019103001
drwx------    4 s2019103002  rusa1s    163 Feb 20 10:44 s2019103002
drwx------   12 s2019103003  rusa1s   4.0K Mar 22 10:17 s2019103003
drwx------   13 s2019103004  rusa1s   4.0K Mar 22 10:41 s2019103004
drwx------   21 s2019103005  rusa1s   4.0K Mar 21 22:25 s2019103005
drwx------   10 s2019103006  rusa1s   4.0K Mar 22 10:33 s2019103006
drwx------   15 s2019103007  rusa1s   4.0K Mar 22 10:40 s2019103007
drwx------   26 s2019103008  rusa1s   4.0K Mar 18 23:32 s2019103008
drwx------   12 s2019103009  rusa1s   4.0K Mar 22 10:38 s2019103009
drwx------   31 s2019103010  rusa1s   4.0K Mar 22 10:41 s2019103010
drwx------   27 s2019103011  rusa1s   4.0K Mar 22 07:14 s2019103011
drwx------    8 s2019103012  rusa1s    336 Mar 22 10:38 s2019103012
drwx------   14 s2019103013  rusa1s   4.0K Mar 22 10:39 s2019103013
drwx------   29 s2019103014  rusa1s   4.0K Mar 18 14:18 s2019103014
drwx------    7 s2019103015  rusa1s   4.0K Mar 22 10:38 s2019103015
drwx------   15 s2019103016  rusa1s   4.0K Mar 22 10:09 s2019103016
drwx------   20 s2019103017  rusa1s   4.0K Mar 18 12:46 s2019103017
drwx------    6 s2019103018  rusa1s   4.0K Mar 22 10:41 s2019103018
drwx------   12 s2019103019  rusa1s   4.0K Mar 22 10:36 s2019103019
drwx------   22 s2019103020  rusa1s   4.0K Mar 18 22:54 s2019103020
drwx------   12 s2019103021  rusa1s   4.0K Mar 15 12:39 s2019103021
drwx------   13 s2019103022  rusa1s   4.0K Mar 22 10:35 s2019103022
drwx------   26 s2019103023  rusa1s   4.0K Mar 18 12:15 s2019103023
drwx------   15 s2019103024  rusa1s   4.0K Mar 22 10:40 s2019103024
drwx------    9 s2019103025  rusa1s   4.0K Mar 22 10:13 s2019103025
```

```
drwx------    35 s337328      rusa1s   4.0K Mar 18 19:45 s337328
drwx------    29 s337656      rusa1s   4.0K Mar 20 10:44 s337656
drwx------    14 s340801      rusa1s   4.0K Mar  5 21:17 s340801
drwx------    28 s343736      rusa1s   4.0K Mar  2 20:56 s343736
drwx------    22 s344036      rusa1s   4.0K Mar  9 09:48 s344036
drwx------    19 s344208      rusa1s   4.0K Mar  2 15:35 s344208
drwx------    26 s345635      rusa1s   4.0K Mar  2 16:11 s345635
drwx------    32 s346526      rusa1s   4.0K Mar  2 16:32 s346526
drwx------    23 s354452      rusa1s   4.0K Mar  2 15:35 s354452
drwx------    59 s6714        rusa1s   4.0K Feb 23 15:19 s6714
drwx------    19 s7988        rusa1s   4.0K Feb 28 21:25 s7988
drwx------    27 s922514      rusa1s   4.0K Mar 19 10:42 s922514
drwx------    55 s922758      rusa1s   4.0K Mar  1 16:33 s922758
drwx------     3 shan         shan       98 Mar  2 13:57 shan
drwx------     3 t35540       t35540     98 Nov 23 11:41 t35540
drwx------     6 t60724       t60724   4.0K Mar 22 10:40 t60724
drwx------     6 t63097       rusa1f   4.0K Mar  5 14:16 t63097
drwx------     5 t65762       rusa1f    224 Mar  3 16:35 t65762
drwx------     4 t66001       t66001    219 Nov 24 19:28 t66001
drwx------     3 t66078       rusa1f     98 Feb 18 14:12 t66078
drwx------    18 t66091       rusa1f   4.0K Mar  2 15:23 t66091
drwx------     3 t66181       rusa1f     78 Feb 18 14:01 t66181
drwx------     3 t69430       rusa1f     98 Feb 18 11:32 t69430
drwx------     5 t69452       t69452    181 Dec  1 11:17 t69452
drwx------     4 t700105      t700105   219 Nov 24 19:28 t700105
drwx------     4 t700114      t700114   200 Nov 24 19:28 t700114
drwx------     3 t700120      t700120    78 Nov 23 11:40 t700120
drwx------     3 t700135      t700135    78 Nov 23 11:40 t700135
drwx------     3 t700136      t700136    98 Nov 23 11:40 t700136
drwx------     3 t700137      t700137    98 Nov 23 11:40 t700137
drwx------     4 t700138      t700138   138 Nov 23 14:37 t700138
drwx------     4 t700139      t700139   242 Nov 24 19:28 t700139
drwx------     4 t700142      t700142   218 Nov 24 08:39 t700142
drwx------     3 t700146      t700146    98 Nov 23 11:40 t700146
drwx------     3 t700150      t700150    78 Nov 23 11:39 t700150
drwx------     4 t700154      t700154   163 Nov 23 11:55 t700154
drwx------     4 t702245      rusa1s    203 Feb 18 11:46 t702245
drwx------    18 tfl          tfl      4.0K Mar  3 12:07 tfl
drwx------    32 try          try      4.0K Mar  5 13:23 try
[s2019103562@centos8-linux Mon Mar 22 10:41 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 10:41 AM lab06]$ cat execvp2.c
#include<unistd.h>
#include<stdio.h>
int main(){
        char* program="ls";
        char* args[]={program,"-lh","/home",NULL};
        execvp(program,args);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:45 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 10:51 AM lab06]$ vim execvp2.c
[s2019103562@centos8-linux Mon Mar 22 10:51 AM lab06]$ gcc execvp2.c -o execvp2
[s2019103562@centos8-linux Mon Mar 22 10:51 AM lab06]$ ./execvp2
total 0
-rw-r--r-- 1 s2019103562 rusa1s 0 Mar 22 10:51 sample.txt
-rw-r--r-- 1 s2019103562 rusa1s 0 Mar 22 10:50 text.txt

[s2019103562@centos8-linux Mon Mar 22 10:51 AM lab06]$ cat execvp2.c
#include<unistd.h>
#include<stdio.h>
int main(){
        char* program="ls";
        char* args[]={program,"-lh","./subd",NULL};
        execvp(program,args);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:51 AM lab06]$
```

Execv:

```
[s2019103562@centos8-linux Mon Mar 22 10:11 AM lab06]$ vim execvp.c
[s2019103562@centos8-linux Mon Mar 22 10:11 AM lab06]$ vim execv.c
[s2019103562@centos8-linux Mon Mar 22 10:13 AM lab06]$ gcc execv.c -o execv
[s2019103562@centos8-linux Mon Mar 22 10:13 AM lab06]$ ./execv
I am in execv.c
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
[s2019103562@centos8-linux Mon Mar 22 10:13 AM lab06]$ cat execv.c
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
int main(){
        char* args[]={"./fork2",NULL};
        printf("I am in execv.c \n");
        execv(args[0],args);
        printf("This will not be printed\n");
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:13 AM lab06]$
```

Execlp

```
[s2019103562@centos8-linux Mon Mar 22 10:13 AM lab06]$ vim execlp.c
[s2019103562@centos8-linux Mon Mar 22 10:16 AM lab06]$ gcc execlp.c -o execlp
[s2019103562@centos8-linux Mon Mar 22 10:16 AM lab06]$ ./execlp
total 260
16 clone    4 clone3.c 16 execlp    16 execv    16 execvp   16 exit    4 exit2.c 16 fork    4 fork2.c  4 fork3.c 16 wait    4 wait2.c  4 wait3.c
16 clone3   4 clone.c  4 execlp.c  4 execv.c  4 execvp.c 16 exit2   4 exit.c  16 fork2 16 fork3   4 fork.c  16 wait2 16 wait3   4 wait.c
[s2019103562@centos8-linux Mon Mar 22 10:16 AM lab06]$ cat execlp.c
#include<stdio.h>
#include<unistd.h>
int main(){
        char* binaryPath="ls";
        char* arg1="-a";
        char* arg2="-s";
        execlp(binaryPath,arg1,arg2,NULL);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:16 AM lab06]$
```

Execl

```
[s2019103562@centos8-linux Mon Mar 22 10:18 AM lab06]$ vim execl.c
[s2019103562@centos8-linux Mon Mar 22 10:18 AM lab06]$ gcc execl.c -o execl
[s2019103562@centos8-linux Mon Mar 22 10:18 AM lab06]$ ./execl
total 280
16 clone    4 clone3.c  16 execl    16 execlp   16 execv    16 execvp   16 exit     4 exit2.c  16 fork    4 fork2.c   4 fork3.c  16 wait    4 wait2.c   4 wait3.c
16 clone3   4 clone.c   4 execl.c   4 execlp.c   4 execv.c   4 execvp.c  16 exit2    4 exit.c   16 fork2  16 fork3     4 fork.c   16 wait2   16 wait3    4 wait.c
[s2019103562@centos8-linux Mon Mar 22 10:18 AM lab06]$ cat execl.c
#include<stdio.h>
#include<unistd.h>
int main(){
        char* binaryPath="/bin/ls";
        char* arg1="-a";
        char* arg2="-s";
        execl(binaryPath,arg1,arg2,NULL);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:18 AM lab06]$ □
```

Execle

```
[s2019103562@centos8-linux Mon Mar 22 10:28 AM lab06]$ vim execle.c
[s2019103562@centos8-linux Mon Mar 22 10:29 AM lab06]$ gcc execle.c -o execle
[s2019103562@centos8-linux Mon Mar 22 10:29 AM lab06]$ ./execle
Visit centos8-linux.audcse: from your browser
[s2019103562@centos8-linux Mon Mar 22 10:29 AM lab06]$ cat execle.c
#include<stdio.h>
#include<unistd.h>
int main(){
        char* binaryPath="/bin/bash";
        char* arg1="-c";
        char* arg2="echo \"Visit $HOSTNAME:$PORT from your browser\"";
        char* const env[]={"HOSTNAME=14.139.161.31","PORT=8080",NULL};
        execle(binaryPath,binaryPath,arg1,arg2,NULL);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:29 AM lab06]$ □
```

Execve

```
[s2019103562@centos8-linux Mon Mar 22 10:29 AM lab06]$ vim execve.c
[s2019103562@centos8-linux Mon Mar 22 10:34 AM lab06]$ gcc execve.c -o execve
[s2019103562@centos8-linux Mon Mar 22 10:34 AM lab06]$ ./execve
Visit 14.139.161.31:8080 from your browser
[s2019103562@centos8-linux Mon Mar 22 10:34 AM lab06]$ cat execve.c
#include<unistd.h>
#include<stdio.h>
int main(){
        char* binaryPath="/bin/bash";
        char* const args[]={binaryPath,"-c","echo \"Visit $HOSTNAME:$PORT from your browser\"",NULL};
        char* const env[]={"HOSTNAME=14.139.161.31","PORT=8080",NULL};
        execve(binaryPath,args,env);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:34 AM lab06]$ □
```

4.WAIT()

```
[s2019103562@centos8-linux Mon Mar 22 09:57 AM lab06]$ vim wait.c
[s2019103562@centos8-linux Mon Mar 22 09:59 AM lab06]$ gcc wait.c -o wait
[s2019103562@centos8-linux Mon Mar 22 09:59 AM lab06]$ ./wait
Parent pid:2478159
Child pid:2478160
[s2019103562@centos8-linux Mon Mar 22 09:59 AM lab06]$ cat wait.c
#include<stdio.h>
#include<stdlib.h>
#include<sys/wait.h>
#include<unistd.h>
int main(){
        pid_t cpid;
        if(fork()==0)
                exit(0);
        else
                cpid=wait(NULL);
        printf("Parent pid:%d\n",getpid());
        printf("Child pid:%d\n",cpid);
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:59 AM lab06]$
```

```
[s2019103562@centos8-linux Mon Mar 22 09:59 AM lab06]$ vim wait2.c
[s2019103562@centos8-linux Mon Mar 22 10:03 AM lab06]$ gcc wait2.c -o wait2
[s2019103562@centos8-linux Mon Mar 22 10:03 AM lab06]$ ./wait2
Exit status:0
[s2019103562@centos8-linux Mon Mar 22 10:03 AM lab06]$ cat wait2.c
#include<stdio.h>
#include<stdlib.h>
#include<sys/wait.h>
#include<unistd.h>
void waitex(){
        int stat;
        if(fork()==0)
                exit(0);
        else
                wait(&stat);
        if(WIFEXITED(stat))
                printf("Exit status:%d\n",WEXITSTATUS(stat));
        else if(WIFSIGNALED(stat))
                psignal(WTERMSIG(stat),"Exit signal");
}
int main(){
        waitex();
        return 0;
}
```

```
[s2019103562@centos8-linux Mon Mar 22 10:07 AM lab06]$ vim wait3.c
[s2019103562@centos8-linux Mon Mar 22 10:07 AM lab06]$ gcc wait3.c -o wait3
[s2019103562@centos8-linux Mon Mar 22 10:07 AM lab06]$ ./wait3
Child 100 terminated with status:0
Child 101 terminated with status:0
Child 102 terminated with status:0
Child 103 terminated with status:0
Child 104 terminated with status:0
[s2019103562@centos8-linux Mon Mar 22 10:07 AM lab06]$ cat wait3.c
#include<stdio.h>
#include<unistd.h>
#include<stdlib.h>
#include<sys/wait.h>
void waitex(){
        int i,stat;
        pid_t pid[5];
        for(i=0;i<5;i++){
                if((pid[i]=fork())==0){
                        sleep(1);
                        exit(100+i);
                }
        }
        for(i=0;i<5;i++){
                pid_t cpid=waitpid(pid[i],&stat,0);
                if(WIFEXITED(stat))
                        printf("Child %d terminated with status:%d\n",WEXITSTATUS(stat));
        }
}
int main(){
        waitex();
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 10:08 AM lab06]$ 
```

5.EXIT()

```
[s2019103562@centos8-linux Mon Mar 22 09:52 AM lab06]$ vim exit.c
[s2019103562@centos8-linux Mon Mar 22 09:52 AM lab06]$ gcc exit.c -o exit
[s2019103562@centos8-linux Mon Mar 22 09:52 AM lab06]$ ./exit
[s2019103562@centos8-linux Mon Mar 22 09:52 AM lab06]$ cat exit.c
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
int main(){
        pid_t p=fork();
        if(getpid()==0)
                printf("Child Process\n");
        else
                exit(0);
        return 0;
}

[s2019103562@centos8-linux Mon Mar 22 09:52 AM lab06]$ 
```

```
[s2019103562@centos8-linux Mon Mar 22 09:56 AM lab06]$ vim exit2.c
[s2019103562@centos8-linux Mon Mar 22 09:56 AM lab06]$ gcc exit2.c -o exit2
[s2019103562@centos8-linux Mon Mar 22 09:56 AM lab06]$ ./exit2
Exit code:15
[s2019103562@centos8-linux Mon Mar 22 09:56 AM lab06]$ cat exit2.c
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
#include<sys/types.h>
#include<sys/wait.h>
int main(){
        pid_t pid=fork();
        if(pid==0)
                exit(9999);
        int status;
        waitpid(pid,&status,0);
        if(WIFEXITED(status)){
                int exit_status=WEXITSTATUS(status);
                printf("Exit code:%d\n",exit_status);
        }
        return 0;
}
[s2019103562@centos8-linux Mon Mar 22 09:57 AM lab06]$
```