Department of Computer Science and Engineering

S.G.Shivanirudh , 185001146, Semester IV

2020

UCS1411 - Operating Systems Laboratory

Exercise – 2- Simulation of system commands using system calls

Objective:

To develop a C program to implement the cp, ls, grep commands (with some options) using system calls.

Code:

Q1. To develop a C program to implement the cp command using system calls

```
1 //Implementing cp command
2 #include<stdio.h>
3 #include<stdlib.h>
4 #include<sys/types.h>
5 #include<fcntl.h>
6 #include<string.h>
7 #include<unistd.h>
8
```

```
9  void main (int argc,char *argv[]){
10     if(argc<3)
11         printf("\n Insufficient arguments \n");
12     else{
13         if(argc==3){
14         //Non-interactive
15             int sourcefd=open(argv[1],O_RDWR);
16             //Non-existent source file
17             if(sourcefd==-1){
18                 printf("\n Source file does not exist \n");
19             }
20             else{
21                 //Reading source file
22                 char *tmpline=(char*)calloc(1000,sizeof(char)
    );
23                 int readfd=read(sourcefd,tmpline,100);
24
25                 tmpline[readfd]='\0';
26
27                 //Creating destination file if non-existent
28                 int destfd=open(argv[2],O_CREAT|O_RDWR);
29                 if(destfd==-1)
30                     printf("\n Destination file could not be
    created \n");
31                 else{
32                     write(destfd,tmpline,strlen(tmpline));
33                     printf("\n Content copied successfully\n"
    );
34                     close(destfd);
35                 }
36                 close(sourcefd);
37             }
38         }
39         else{
40             //Interactive
41             int sourcefd=open(argv[2],O_RDWR);
42             //Non-existent source file
43             if(sourcefd==-1){
44                 printf("\n Source file does not exist \n");
45             }
46             else{
47                 //Reading source file
48                 char *tmpline=(char*)calloc(1000,sizeof(char)
    );
49                 int readfd=read(sourcefd,tmpline,100);
50
51                 tmpline[readfd]='\0';
52
53                 //Creating destination file if non-existent
```

```
54                  int destfd=open(argv[3],O_CREAT|O_RDWR);
55                  if(destfd==-1)
56                      printf("\n Destination file could not be
    created \n");
57                  else{
58                      char opt;
59                      if(strcmp(argv[1],"-i")==0){
60                          printf("\n Copy contents? y/n ");
61                          scanf(" %c",&opt);
62                          if(opt=='Y'||opt=='y'){
63                              write(destfd,tmpline,strlen(
    tmpline));
64                              printf("\n Content copied
    successfully\n");
65                          }
66                          else{
67                              printf("\n Manual Abort. \n");
68                          }
69                      }
70                      else{
71                          write(destfd,tmpline,strlen(tmpline))
    ;
72                          printf("\n Content copied
    successfully\n");
73                      }
74                      close(destfd);
75                  }
76                  close(sourcefd);
77              }
78          }
79      }
80  }
81
82  /*
83  Output:
84  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp
85
86   Insufficient arguments
87  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp -i source.txt
88
89   Source file does not exist
90  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp -i source.txt dest.txt
91
92   Copy contents? y/n y
93
94   Content copied successfully
```

```
shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp source.txt dest.txt

 Content copied successfully
shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ cat source.txt
shiva
sharvan
shashuuuu
shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ cat dest.txt
shiva
sharvan
shashuuuu

*/
```

Q2. To develop a C program to implement the ls command using system calls

```
//Implementing cp command
#include<stdio.h>
#include<stdlib.h>
#include<sys/types.h>
#include<fcntl.h>
#include<string.h>
#include<unistd.h>

void main (int argc,char *argv[]){
    if(argc<3)
        printf("\n Insufficient arguments \n");
    else{
        if(argc==3){
        //Non-interactive
            int sourcefd=open(argv[1],O_RDWR);
            //Non-existent source file
            if(sourcefd==-1){
                printf("\n Source file does not exist \n");
            }
            else{
                //Reading source file
                char *tmpline=(char*)calloc(1000,sizeof(char)
    );
                int readfd=read(sourcefd,tmpline,100);

                tmpline[readfd]='\0';

```

```
27                  //Creating destination file if non-existent
28                  int destfd=open(argv[2],O_CREAT|O_RDWR);
29                  if(destfd==-1)
30                      printf("\n Destination file could not be
    created \n");
31                  else{
32                      write(destfd,tmpline,strlen(tmpline));
33                      printf("\n Content copied successfully\n"
    );
34                      close(destfd);
35                  }
36                  close(sourcefd);
37              }
38          }
39          else{
40              //Interactive
41              int sourcefd=open(argv[2],O_RDWR);
42              //Non-existent source file
43              if(sourcefd==-1){
44                  printf("\n Source file does not exist \n");
45              }
46              else{
47                  //Reading source file
48                  char *tmpline=(char*)calloc(1000,sizeof(char)
    );
49                  int readfd=read(sourcefd,tmpline,100);
50
51                  tmpline[readfd]='\0';
52
53                  //Creating destination file if non-existent
54                  int destfd=open(argv[3],O_CREAT|O_RDWR);
55                  if(destfd==-1)
56                      printf("\n Destination file could not be
    created \n");
57                  else{
58                      char opt;
59                      if(strcmp(argv[1],"-i")==0){
60                          printf("\n Copy contents? y/n ");
61                          scanf(" %c",&opt);
62                          if(opt=='Y'||opt=='y'){
63                              write(destfd,tmpline,strlen(
    tmpline));
64                              printf("\n Content copied
    successfully\n");
65                          }
66                          else{
67                              printf("\n Manual Abort. \n");
68                          }
69                      }
```

```
70                      else{
71                          write(destfd,tmpline,strlen(tmpline))
    ;
72                          printf("\n Content copied
    successfully\n");
73                      }
74                      close(destfd);
75                  }
76                  close(sourcefd);
77              }
78          }
79      }
80  }
81
82  /*
83  Output:
84  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp
85
86   Insufficient arguments
87  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp -i source.txt
88
89   Source file does not exist
90  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp -i source.txt dest.txt
91
92   Copy contents? y/n y
93
94   Content copied successfully
95  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./mycp source.txt dest.txt
96
97   Content copied successfully
98  shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ cat source.txt
99  shiva
100 sharvan
101 shashuuuu
102 shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ cat dest.txt
103 shiva
104 sharvan
105 shashuuuu
106
107 */
```

Q3. To develop a C program to implement the grep command using system calls

```c
//Implementing grep command
#include<stdio.h>
#include<stdlib.h>
#include<sys/types.h>
#include<fcntl.h>
#include<string.h>
#include<unistd.h>

int isSubstring(char* s1, char* s2)
{
    int M = strlen(s1);
    int N = strlen(s2);

    //Loop to slide pat[] one by one
    for (int i = 0; i <= N - M; i++) {
        int j;

        // For current index i, check for pattern match
        for (j = 0; j < M; j++)
            if (s2[i + j] != s1[j])
                break;

        if (j == M)
            return i;
    }

    return -1;
}

void main (int argc,char *argv[]){
    if(argc<2)
        printf("\n Insufficient arguments \n");
    else{

        int filefd;
        //printf("\n%d\n", argc);

        if(argc==3)
            filefd=open(argv[2],O_RDWR);
        else
            filefd=open(argv[3],O_RDWR);

        //Non-existent source file
        if(filefd==-1){
            printf("\n Source file does not exist \n");
        }
```

```
47          else{
48              //Reading source file
49              char *tmpline=(char*)calloc(1000,sizeof(char));
50              int readfd=read(filefd,tmpline,100);
51
52              tmpline[readfd]='\0';
53
54              char *lines[100];
55              for(int i=0;i<100;i++){
56                  lines[i]=(char*)malloc(sizeof(100));
57              }
58              int lctr=0;
59              char* token=strtok(tmpline,"\n");
60              while(token!=NULL){
61                  strcpy(lines[lctr++],token);
62                  token=strtok(NULL,"\n");
63              }
64
65              if(argc==3){
66                  for(int i=0;i<lctr;i++){
67                      if(isSubstring(argv[1],lines[i])!=-1)
68                          printf("\n%s\n",lines[i]);
69                  }
70              }
71              else{
72                  if(strcmp(argv[1],"-c")==0){
73                      int ctr=0;
74                      for(int i=0;i<lctr;i++){
75                          if(isSubstring(argv[2],lines[i])!=-1)
76                              ctr++;
77                      }
78                      printf("\n%d\n",ctr);
79                  }
80                  else if(strcmp(argv[1],"-v")==0){
81                      for(int i=0;i<lctr;i++){
82                          if(isSubstring(argv[2],lines[i])==-1)
83                              printf("\n%s\n",lines[i]);
84                      }
85                  }
86                  else if(strcmp(argv[1],"-n")==0){
87                      int ctr=0;
88                      for(int i=0;i<lctr;i++){
89                          if(isSubstring(argv[2],lines[i])!=-1)
    {
90                              ctr++;
91                              printf("\n%d %s\n",ctr,lines[i]);
92                          }
93                      }
94                  }
```

```
95              }
96
97              close(filefd);
98          }
99      }
100 }
101
102 /*
103 Output:
104 shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./a hi source.txt
105
106 shiva
107 shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./a -c hi source.txt
108
109 1
110 shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./a -v hi source.txt
111
112 sharvan
113
114 shashuuuu
115 shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ ./a -n hi source.txt
116
117 1 shiva
118 shivanirudh@shiva-ideapad:~/Desktop/Semester4/OSLAB/
    SystemCalls$ cat source.txt
119 shiva
120 sharvan
121 shashuuuu
122 */
```