

ICS EXE 9

May 6, 2020

1 Standard I/O

Problem 1

Suppose the file `foo.txt` contains the text “123456”, `bar.txt` contains the text “abcdef”, and `baz.txt` does not yet exist. Examine the following C code, and answer the questions below. (For space reasons, we are not checking error return codes, so assume that all functions return normally.)

```
1  int main() {
2      int fd1, fd2, fd3, fd4, fd5, fd6;
3      pid_t pid;
4      char c;
5      /* foo.txt has "123456" */
6      fd1 = open("foo.txt", O_RDONLY, 0);
7      fd2 = open("foo.txt", O_RDONLY, 0);
8      /* bar.txt has "abcdef" */
9      fd3 = open("bar.txt", O_RDWR, 0);
10     fd4 = open("bar.txt", O_RDWR, 0);
11     /* baz.txt does not exist initially */
12     fd5 = open("baz.txt",
13               O_WRONLY | O_CREAT | O_TRUNC,
14               S_IRUSR | S_IWUSR); /* r/w */
15     fd6 = dup(STDOUT_FILENO);
16     dup2(fd5, STDOUT_FILENO);
17     if ((pid = fork()) == 0) {
18         dup2(fd3, fd2);
19         read(fd3, &c, 1); printf("%c", c);
20         write(fd4, "!@#%>", 6);
21         read(fd3, &c, 1); printf("%c", c);
22         read(fd1, &c, 1); printf("%c", c);
23         read(fd2, &c, 1); printf("%c\n", c);
24         exit(0);
25     }
26     wait(NULL);
27     read(fd1, &c, 1); printf("%c", c);
28     fflush(stdout);
29     dup2(fd6, STDOUT_FILENO);
30     printf("done.\n");
31     return 0;
32 }
```

1. What will the contents of baz.txt be after the program completes?

ANS: a@1#\n2

2. What will be printed on stdout?

ANS: done.\n

Problem 2

```
1  int main() {
2      int fd1, fd2, fd3;
3      char c;
4      fd1 = open("foo.txt", O_RDWR, 0);
5      fd2 = open("bar.txt", O_RDWR, 0);
6      fd3 = open("baz.txt",
7                  O_RDWR | O_CREAT | O_TRUNC,
8                  S_IRUSR | S_IWUSR);
9      dup2(fd2, fd1);
10     if (Fork() == 0) {
11         read(fd1, &c, 1); printf("%c", c);
12         // close(fd1);
13         fd1 = open("foo.txt", O_RDWR, 0);
14         read(fd1, &c, 1); printf("%c\n", c);
15     } else {
16         wait(NULL);
17         dup2(fd1, fd2);
18         read(fd1, &c, 1);
19         write(fd3, &c, 1);
20         read(fd2, &c, 1);
21         write(fd3, &c, 1);
22     }
23     close(fd1); close(fd2); close(fd3);
24 }
```

Note: Initially, foo.txt contains SJTU; bar.txt contains 12345; baz.txt does not exist. No error occurs in the execution.

1. Please write down the output on the screen and the content of baz.txt when the program runs normally.

screen: [1] baz.txt: [2]

ANS: 1S 23

2. Please write down the refcount of the file table for foo.txt and bar.txt in line 10. NOTE: write 0 if the file table has already been freed.

foo.txt: [3] bar.txt: [4]

ANS: 0 4

3. What is the value of fd1 in line 12? If line 11 is uncommented, what is the value of fd1 in line 12?

ANS: 6(commented) 3(uncommented)