

### IT215\_Systems\_Software\_march2022

vivek | 10 Mar 2022



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Finish State: Normal

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40 question(s) 55m 45s Time taken

16.3/60 Marks Scored

▼ Question 1

U	Time	taken:	2m	45s
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Marks Scored: 1/1

#### Assume that file1.txt contains following data. What will the file content after the execution of the code as shown.

Content of file1.txt:	char buf1[100];
12345abcde67890fghij	int fd1 = open("file1.txt", O_RDWR);
	read(fd1, buf1, 10);
	int fd2 = open("file1.txt", O_RDWR);
	write(fd2, buf1, 10);

#### Response:

OPTIONS	RESPONSE	ANSWER
None of the above		
1234567890abcdefghij		
12345abcde67890fghij	•	
12345abcde12345abcde		
abcdefghij1234567890		

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Q. 2

We want to concatenate two files, file1.txt and fil2.txt and create a new file, new.txt, with the concatenated content. Which of the following commands will be able to perform this? (NOTE: There can be more than one correct answer)

#### Response:

OPTIONS	RESPONSE	ANSWER
for i in {12}; do cat "file\$i.txt" >> new.txt; done		
findtype f -name 'file?.txt' -exec cat {} + >> new.txt		
cp file1.txt file2.txt > new.txt		
cat file1.txt file2.txt > new.txt	•	
cat file1.txt file2.txt   new.txt		

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Assume that the parent process runs with pid=10 and the child process runs with pid=11. Select all possible outputs expected when a parent out is executed with any integer value passed as a command-line argument?

```
//parent.c
                                                      //child.c
                                                      int main(int argc, char* argv[])
int main( int argc, char* argv[] )
{
                                                      {
                                                             int num=atoi(argv[1]);
       int i, childPID, status;
       if ( fork() == 0 ) /* Child */
                                                             if (num<=5)
                                                                     exit(0);
               strcpy(argv[0], "./child.out");
                                                             else if (num>5 && num<10)
               execv( "./child.out", &argv[0] );
                                                                     exit(5);
       }
                                                             else
       else
                                                                     exit(10);
                                                      }
               childPID = wait(&status);
               printf("%d\n",
childPID+WEXITSTATUS(status));
       }
```

#### Response:

OPTIONS	RESPONSE	ANSWER
0		
20		
5		
10		
15		•

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```
What will be the output from the code below?
main()
{
     int a[10]={9,8,7,6,5,4,3,2,1,0};
     int *p=&a[5];
     print("%d", a[p[0]]);
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
None of the above		
5		
Segmentation fault error		
Compilation error		
4		

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Following program is compiled as a out and being executed on the terminal window, how many times a out will be executed in total, including the one you run on the terminal window?

```
int main()
{
     while(1)
     {
         fork();
         execl("./a.out", "./a.out", NULL);
     }
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
2 times		
4 times		
None of the above		
1 time		
3 times		

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```
0
```

```
What is expected when the following code is executed?
main()
{
    int fd;
    char *str="write large data to a file using this string";
    fd = open("file.txt",O_WRONLY);
    fork();
    write(fd,str,strlen(str));
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
Compilation error		
None of the above		
Deadlock occurs		
Race condition occurs		
Runtime error		

▼ Question 7

Not Attempted

### What is expected when the following commands are executed? In -s sln1 file.txt In -s sln2 sln1 cat sln2

#### Response:

OPTIONS	RESPONSE	ANSWER
In -s sln2 sln1 will result in an error		
cat sln2 result in an error since we cannot use softlink of softlink		
cat sln2 result in an error since we cannot use softlink directly to view the file content		
None of the above		
Content of file.txt will be displayed in stdout		

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#### While executing a.out a user is getting an error "error while loading shared libraries", how can this error be fixed?

#### Response:

OPTIONS	RESPONSE	ANSWER
Adding a directory containing shared library to PATH environment variable	<b>⊘</b>	
Provide full path while running a.out e.g. ~/project/a.out	•	
Add a new configuration file in /etc/ld.so.conf.d folder with path to shared directory and load it using ldconfig		
Copy shared library to /usr/lib		<b>⊘</b>
Create LD_LIBRARY_PATH environment variable with full path to shared library	•	<b>⊘</b>

Question 9

U Time taken: 1m 25s

Marks Scored: 2/2

Select the true statements about the code snippet given below.

// code1.c #define max(a,b) a>b?a:b // code2.c

int max(int a, int b) {return a>b?a:b;}

#### Response:

OPTIONS	RESPONSE	ANSWER
Preprocessor will process max(int a, int b) in code2.c		
None of the above		
Compiler will process max(int a, int b)in code2.c	•	
Preprocessor will process max(a,b) in code1.c	•	•
Compiler will process max(a,b)in code1.c		

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### Question 10

#### The correct sequence of the GCC compilation process is

#### Response:

OPTIONS	RESPONSE	ANSWER
Preprocessing-Assembling-Compiling-Linking		
None of the above		
Assembling-Preprocessing-Compiling-Linking		
Compiling-Preprocessing-Assembling-Linking		
Preprocessing-Compiling-Assembling-Linking	•	<b>⊘</b>

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Consider the assembly code snippet of main() and func1() functions. Select all the true statements about the code?

#### 000000000001070 <func1@plt>:

1070: f3 0f 1e fa endbr64

1074: f2 ff 25 45 2f 00 00 bnd jmp QWORD PTR [rip+0x2f45] # 3fc0 <func1>

107b: 0f 1f 44 00 00 nop DWORD PTR [rax+rax\*1+0x0]

000000000001189 <main>:

1189: f3 0f 1e fa endbr64 118d: 55 push rbp

••••

11c8: e8 a3 fe ff ff call 1070 < func1@plt>

••••

122f: c9 leave 1230: c3 ret

#### Response:

OPTIONS	RESPONSE	ANSWER
func1() function is defined a dynamic library linked with application with main() function		
func1() function is defined in a separate object file but not linked with application with main() function		
None of the above		
func1() function is defined a static library linked with application with main() function		
func1() function is defined in the same file as main()		

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#### What are all possible functions of linker?

#### Response:

OPTIONS	RESPONSE	ANSWER
Finds address from the function definition in all object files and provide it for CALL		<b>⊘</b>
Convert assembly code into binary object code		
Links functions called from object files defined in static or dynamic library file to build executables		
Embed the function code from static library in executable file		
Expand all header files		

Question 13

① Time taken: 2m 16s

Marks Scored: 1/1

List out the process states in the same order the child process goes through when the following code gets executed.

### int main()

```
{
    if (fork() == 0)
    {
        int fd; char buf[100000]
        fd = open("large.txt",O_RDONLY);
        read(fd,buf,len(buf));
        exit(10)
    }
    else
    {
        while(1)
            sleep(5*60);
    }
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
Idle-Runnable-Running-Suspended-Runnable-Running-Terminated		
Idle-Runnable-Running-Sleeping-Runnable-Running-Terminated		
None of the above		
Idle-Runnable-Running-Sleeping-Runnable-Running-Zombified-Terminated	•	
Idle-Runnable-Running-Suspended-Runnable-Running-Zombified-Terminated		



Assume that file1.txt contains following data. What will be all possible content after the execution of the code as shown. (Note: Assume that read and write operations are atomic, which mean all 10 bytes will be read at the same time or written at the same time).

```
Content of file1.txt:

abcde12345fghij67890

char buf1[100]="abcdefghijklmnopqrst";

int fd1 = open("file1.txt", O_RDWR);

int pid = fork();

if (pid == 0)

read(fd1, buf1, 10);

else

write(fd1, buf1, 10);
```

#### Response:

OPTIONS	RESPONSE	ANSWER
abcde12345fghij67890		
None of the above		
1234567890abcdefghij		
abcde12345abcde12345		
abcdefghijfghij67890		

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A user with id sysuser executes and script2.sh terminal window. What will be the expected output from the script?

cd \$HOME
pwd=`pwd`
cd project/module
pwd=`pwd`
cd ..
cd \$pwd
cd .

#### Response:

OPTIONS	RESPONSE	ANSWER
current directory is /home/sysuser/project/module		
None of the above		
current directory is /home/sysuser/project	•	
script results in an error		
current directory is a home directory /home/sysuser		

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Lets assume libb.so and libb.a are created from b.o with function fn() having 75 bytes of binary code. What is the expected executable (a.out) file size when a.o is 125 bytes and following command is executed?

gcc -o a.out a.o ./libb.a

#### Response:

OPTIONS	RESPONSE	ANSWER
125 bytes		
75 bytes		
None of the above		
0 bytes		
200 bytes		

(	).
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1	7

Question 17

Not Attempted

Considering File Control Block (FCB) supports 10 direct pointers, 3 single indirect pointers, 3 double indirect pointers and 1 triple indirect pointers. Calculate the maximum size of the file supported by

#### Response:

OPTIONS	RESPONSE	ANSWER
541076KB		
None of the above		
524288KB		
384KB		
16384KB		

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# Considering the following content of the makefile, which of the targets will be build when make command is executed?

CC=gcc

%.o: %.c

\$(CC) -c -o \$@ \$^

libmylib.a: abc.o def.o

ar rs \$@ \$<

myapp.out: myapp.o

\$(CC) -o \$@ \$<

#### Response:

OPTIONS	RESPONSE	ANSWER
An executable myapp.out, a library libmylib.a and three object files myapp.o, abc.o and def.o		
Only two object files abc.o and def.o		
Library libmylib.a and two object files abc.o and def.o		
Library libmylib.a and three object files myapp.o, abc.o and def.o		
Only three object files myapp.o, abc.o and def.o		

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```
How many times will the "Is" command be executed?
   int main()
   {
      fork() || fork();
      execlp("ls", "ls", NULL);
   }
```

#### Response:

OPTIONS	RESPONSE	ANSWER
3 times		
1 time		
None of the above		
2 times	•	
4 times		

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```
How many times will the "Is" command be executed?
```

#### Response:

OPTIONS	RESPONSE	ANSWER
6 times		
None of the above		
2 times		
4 times		
8 times		

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When OS needs to context switch a process, which of the following information is saved by OS? So that when the process is ready to run again, it starts from where it was left off.

#### Response:

OPTIONS	RESPONSE	ANSWER
Stack Pointer		
Program Code		
Program counter	•	
Processor Status Word	•	
Data Area		

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### How many times will the "Is" command be executed?

#### Response:

OPTIONS	RESPONSE	ANSWER
8 times		
None of the above		
4 times		
2 times		
6 times		

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```
What are all possible outputs expected from the code below? int main()
```

```
int man()
{
    int a=5,b=10;
    if (fork() == 0)
    {
        a = a*2;
        b = b*2;
    }
    printf("a=%d\n",a);
    printf("b=%d\n",b);
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
a=5		
b=10		
a=10		
b=20		
a=10		
a=5		
b=20		
b=10		
b=10		
a=10		
b=20		
a=5		
a=5		
a=10		
b=10		<b>②</b>
b=20		
b=10		
b=20		
a=10		
a=5		

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What can you say about path1 and path2 when the following condition is true, assuming get\_inode(char \*path) returns inode number of a file or a directory? get\_inode(path1) == get\_inode(path2)

#### Response:

OPTIONS	RESPONSE	ANSWER
path1 and path2 are exactly the same string		
path1 has a value /. and path2 have a value /		
path1 and path2 are hardlinks for the same file/directory		
path1 and path2 are parent and child directories	•	
path1 is soft link pointing to path2		

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# What will be the output of the following script script.sh when command line argument passed is 123456?

```
n=$1
a=0
b=0
while [$n -gt 0]
do
b=`expr $n % 10`
a=`expr $a \* 10 + $b`
n=`expr $n / 10`
done
echo $a
```

#### Response:

OPTIONS	RESPONSE	ANSWER
654321		
321456		
Script results in an error		
None of the above		
123456		

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Lets assume libb.so and libb.a are created from b.o with function fn() having 75 bytes of binary code. What is the expected executable (a.out) file size when a.o is 125 bytes and following command is executed?

gcc -o a.out a.o -L . -lb

#### Response:

OPTIONS	RESPONSE	ANSWER
125 bytes		
75 bytes		
200 bytes		
0 bytes		
None of the above		

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# What will be the output when calling.sh shell script is executed?

#### Response:

OPTIONS	RESPONSE	ANSWER
None of the above		
1 0		
1 1	•	
0 1		
0 0		

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Assume that file1.txt contains following data. What is expected after the execution of the code as shown.

```
Content of file1.txt:

abcde12345fghij67890

char buf1[100]="abcdefghijkImnopqrst";

int pid = fork();

if (pid == 0) {

int fd1 = open("file1.txt", O_RDWR);

read(fd1, buf1, 10); }

else {

int fd2 = dup(fd1);

write(fd2, buf1, 10); }
```

#### Response:

OPTIONS	RESPONSE	ANSWER
Compilation error		
System-wide file open table has two fds with reference count of 2		
Runtime error		
Parent and Child process will have file descriptor tables with 2 fds each		
File content remain unchanged		<b>⊘</b>

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Assume that file1.txt contains following data. What will the file content after the execution of the code as shown.

Content of file1.txt:	char buf1[100];
12345abcde67890fghij	<pre>int fd1 = open("file1.txt", O_RDWR);</pre>
	read(fd1, buf1, 10);
	int fd2 = dup(fd1);
	write(fd2, buf1, 10);

#### Response:

OPTIONS	RESPONSE	ANSWER
12345abcde12345abcde		
1234567890abcdefghij		
abcdefghij1234567890		
None of the above		
12345abcde67890fghij		

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# Considering the following content of the makefile, which of the targets will be build when "make all" command is executed?

CC=gcc

%.o: %.c

\$(CC) -c -o \$@ \$^

libmylib.a: abc.o def.o

ar rs \$@ \$<

myapp.out: myapp.o

\$(CC) -o \$@ \$<

.phony: all

all: myapp.out libmylib.a

#### Response:

OPTIONS	RESPONSE	ANSWER
Only two object files abc.o and def.o		
Only three object files myapp.o, abc.o and def.o		
An executable myapp.out, a library libmylib.a and three object files myapp.o, abc.o and def.o		
Library libmylib.a and three object files myapp.o, abc.o and def.o		
Library libmylib.a and two object files abc.o and def.o		

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A user executes the script.sh consisting of following commands on the terminal window, which of the following statements are true?

var1=1

var2=2

export var1

bash script1.sh

#### Response:

OPTIONS	RESPONSE	ANSWER
script1.sh has different process id than script.sh		<b>⊘</b>
var1 and var2 both are local variables for the script.sh and are inaccessible to child shell as well as script1.sh		
Only var1 is accessible both in child shell and in script1.sh		
Only var1 is accessible in child shell but not accessible in script1.sh		
var1 and var2 both are accessible in child shell and script1.sh		

Mercer-Mettl | vivek Page 29 / 37 When preprocessing step is executed for the code below, which of the following statements are true?

```
#include <stdio.h>
int main()
{
    #ifdef PI
        printf("%f",PI);
    #else
        float pi=3.14;
    #endif
    return 0;
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
Preprocessed file will contain float pi=3.14		
Preprocessing step results in error due to the constant and variable defined with the same name pi		
Preprocessed file will contain printf("%f",3.14)		
Assembly code is generated after preprocessing step		
Forward declaration of printf will be included in the preprocessed file	•	

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# When Is -i is executed following output is generated, what can you say about the output? 1000 file1.txt 1000 file2.txt

1001 file3.txt → file1.txt

#### Response:

OPTIONS	RESPONSE	ANSWER
file1.txt and file2.txt have same inode numbers so they are softlinks		
struct stat s; stat("file1.txt",&s); printf("%d",s.st_nlinks); will print the value 2		
file1.txt and file2.txt have same inode numbers so they are hardlinks		
If we delete file1.txt, we can still get the content of the same file by executing cat file2.txt		
If we delete file1.txt, we can still get the content of the same file by executing cat file3.txt		

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34	

▼ Question 34

U	Time	taken:	56s
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Marks Scored: 0.8/2

### Which of the following command will redirect the standard output (stdout)?

#### Response:

OPTIONS	RESPONSE	ANSWER
>>		
>		
2>&1		
1>	•	

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### What is the expected behavior of the processes executing the code shown below?

```
int main()
{
        int status;
        fork();
        wait(&status);
```

#### Response:

OPTIONS	RESPONSE	ANSWER
Both parent and child terminates normally		
None of the above		
The parent process terminates normally, but the child process is blocked		
The child process terminates normally, but the parent process is blocked		
Both parent and child are blocked		

Q. 36

▼ Question 36

Not Attempted

## What will be the output of the following command? echo \$\$\$\$?

#### Response:

OPTIONS	RESPONSE	ANSWER
<pid><pid>&lt;0</pid></pid>		•
None of the above		
Script results in an error		
\$ <pid><pid>?</pid></pid>		
<pid>\$?</pid>		

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```
How many times will the "Is" command be executed?
  int main()
  {
    fork() && fork() && fork();
    execlp("Is", "Is", NULL);
}
```

#### Response:

OPTIONS	RESPONSE	ANSWER
3 times		
4 times		
5 times		
1 time		
2 times		

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Assume that file1.txt contains following data. At the end of execution of the following, select all the possible options with entries in parent process open file table (PPO), entries in child process open file table (CPO), entries in system-wide file open table (SWO) with offset (OFF) and reference count (REF).

```
Content of file1.txt:

abcde12345fghij67890

char buf1[100]="abcdefghijkImnopqrst";

int fd1 = open("file1.txt", O_RDWR);

int pid = fork();

if (pid == 0) {

read(fd1, buf1, 10); }

else {

int fd2 = dup(fd1);

write(fd2, buf1, 10); }
```

#### Response:

OPTIONS	RESPONSE	ANSWER
PPO=fd1,CPO=(fd1,fd2),SWO=fd1(OFF=20,REF=2)		
PPO=fd1,CPO=(fd1,fd2),SWO=fd1(OFF=20,REF=3)		<b>⊘</b>
PPO=fd1,CPO=(fd1,fd2),SWO=fd1(OFF=10,REF=1), SWO=fd2(OFF=10,REF=2)		
PPO=fd1,CPO=(fd1,fd2),SWO=fd1(OFF=10,REF=2), SWO=fd2(OFF=10,REF=1)		
PPO=fd1,CPO=fd2,SWO=fd1(OFF=10,REF=1), SWO=fd2(OFF=10,REF=1)		

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# Upon executing ~/project/a.out, a user gets a "command not found" error. What are the possible solutions to resolve the error?

#### Response:

OPTIONS	RESPONSE	ANSWER
Provide the full path while executing a.out		
Copy a.out to /usr/local/bin directory	•	
Add ~/project to a PATH environment variable	•	
Provide executable permission to a.out for the current user		
None of the above		

▼ Question 40

U Time taken: 3m 9s

Marks Scored: 1/1

# All users get a "Permission Denied" error while executing a out executable. Which of the following commands will you execute to fix the error?

#### Response:

OPTIONS	RESPONSE	ANSWER
chmod 550 a.out		
chmod 555 a.out		
chmod 500 a.out		
chown <uid> <groupid> a.out</groupid></uid>		
chmod 000 a.out		

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