hw9: Linking and Loading

Due May 5 at 11:59pm **Points** 8 **Questions** 8
Available Apr 26 at 12am - May 5 at 11:59pm **Time Limit** 40 Minutes
Allowed Attempts 2

This quiz was locked May 5 at 11:59pm.

Attempt History

	Attempt	Time	Score
KEPT	Attempt 2	18 minutes	8 out of 8
LATEST	Attempt 2	18 minutes	8 out of 8
	Attempt 1	22 minutes	7 out of 8

Score for this attempt: **8** out of 8
Submitted May 5 at 6:32pm
This attempt took 18 minutes.

Question 1

1 / 1 pts

Consider the following code:

```
int arr[ 8 ];
int* p = arr;
int val = 0;
void main() {
   int x;
   static int y;
   printf("end of main\n");
}
```

The specific memory areas variable `y` and the string `"end of main\n"` will be stored in are [Select] and [Select] respectively.

Answer 1:

Correct!

.bss

Answer 2:

Correct!

.rodata

Question 2

1 / 1 pts

```
int func(int val);
int x = 34;

int main(){
  int y;
  y = func(x);
  return 0;
}
```

The code above is compiled with only the -c flag to create an object file named main.o. In which section of the ELF formatted object file is **the location in the assembly code where func(x) is called** found?

- .symtab
- [✓ .rel.text] Correct!
- .rel.data
- .data
- .bss

Question 3

1 / 1 pts

```
#include <stdio.h>
```

```
int func(int val);
int x = 34;
extern int z;

static int doubleIt(int val) {
        return 2*val;
}

int main() {
        int y;
        y = func(x);
        int *a = &y;
        int b = doubleIt(z);
        printf("%d\n", b);
        return 0;
}
```

Select **ALL** the correct statements with respect to the above code?

- [ ] References to the function doubleIt in the code above will need relocation during linking.

Correct!

- [✓] References to the variable z in the code above will need relocation during linking.

Correct!

- [✓] References to the variable x in the code above will need relocation during linking.

Correct!

- [✓] References to the function func in the code above will need relocation during linking.

Question 4

1 / 1 pts

Given the following main.c

```
int a[2] = {1, 2};
int b[4];
int c = 68;
int main(){
  return 0;
}
```

and the symbol table extracted from main.o

```
Num:    Value  Size Type    Bind   Vis      Ndx Name
  8: 00000000     8 OBJECT  GLOBAL DEFAULT    2 a
  9: 00000004    16 OBJECT  GLOBAL DEFAULT  COM b
 10: X            4 OBJECT  GLOBAL DEFAULT    2 c
 11: 00000000    10 FUNC    GLOBAL DEFAULT    1 main
```

The value of **X** is:

Correct!

8

orrect Answers

8 (with margin: 0)

Question 5

1 / 1 pts

Consider the following code:

```
static int a(void) {
  return 0 + 0;
}

extern int b;
int c = 11;

int main() {
    int d = a();
    return d;
}
```

Select **ALL** the options that will have an entry in the symbol table '.symtab'?

Correct!

✓ a

Correct!

✓ c

☐ d

Correct! ✓ b

Correct! ✓ main

Question 6

1 / 1 pts

Consider the following 3 programs:

1	2	3

`//contents of file foo.c:`
`int a = 5;`
`int main() {`
`        f();`
`        return 0;`
`}`
`//contents of file bar.c:`
`extern int a = 0;`
`void f() {`
`        printf("%d\n", a);`
`}`
	`//contents of file foo.c:`
	`int a = 5;`
	`int main() {`
	`        f();`
	`        return 0;`
	`}`
	`//contents of file bar.c:`
	`static int a = 4;`
	`void f() {`
	`        printf("%d\n", a);`
	`}`
		`//contents of file foo.c:`
		`int a = 5;`
		`int main() {`
		`        f();`
		`        return 0;`
		`}`
		`//contents of file bar.c:`
		`int b;`
		`void f() {`
		`        printf("%d\n", b);`
		`}`

```
If the command "gcc foo.c bar.c" is executed, which of the above programs do not result in a linker error
```

○ 3 only

○ 2 only

○ 2 and 3

Correct! ● 1, 2, and 3

○ 1 only

Question 7

1 / 1 pts

Consider the following makefile:

```
main: main.o func1.o
        gcc main.o func1.o -o main
main.o: main.c
        gcc -c main.c
func1.o: func1.h func1.c
        gcc -c func1.c
```

Also consider the following directory listing:

```
-rw-r----- 1 skrentny skrentny   84 Dec  6 09:42 func1.c
-rw-r----- 1 skrentny skrentny   18 Dec  6 09:43 func1.h
-rwxr-x--- 1 skrentny skrentny 6558 Dec  6 10:01 main*
-rw-r----- 1 skrentny skrentny  130 Dec  6 09:44 main.c
-rw-r----- 1 skrentny skrentny  120 Dec  6 09:40 Makefile
```

Which one lists the commands that are executed as a result of entering `make` on the Linux command line?

Hint: check file dates and determine which rules must execute because any file they depend upon has changed, and in which sequence the rules will execute to build the desired target.

○
```
make: `main' is up to date.
```

Correct!

[✓]
```
gcc -c main.c
gcc -c func1.c
gcc main.o func1.o -o main
```

○
```
gcc -c func1.c
gcc main.o func1.o -o main
```

○
```
gcc -c main.c
gcc main.o func1.o -o main
```

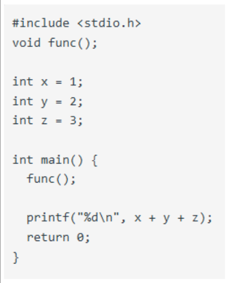
○
```
gcc main.o func1.o -o main
```

Question 8

1 / 1 pts

What is the output of the program below when compiled using:

```
gcc main.c func.c
```

main.c	func.c
	

```c
#include <stdio.h>
void func();

int x = 1;
int y = 2;
int z = 3;

int main() {
  func();

  printf("%d\n", x + y + z);
  return 0;
}
```

```c
extern int
x;
extern int
y;
extern int
z;
void func()
{
  x = x + y;
  y = 4 + z;
  z = x + y;
}
```

- 6
- Correct! [✓ 20]
- 13
- 4
- Undefined behavior
- 3

Quiz Score: **8** out of 8