

Program 9. Shared & Static Libraries:

Code:

File: addsub.c

```
int add(int a, int b) {  
    return a + b;  
}  
  
int subtract(int a, int b) {  
    return a - b;  
}
```

File: addsub.h

```
int add(int, int);  
int subtract(int, int);
```

File: multdiv.c

```
int multiply(int a, int b) {  
    return a*b;  
}  
  
int divide(int a, int b) {  
    return a/b;  
}
```

File: multdiv.h

```
int multiply(int, int);  
int divide(int, int);
```

File: main.c

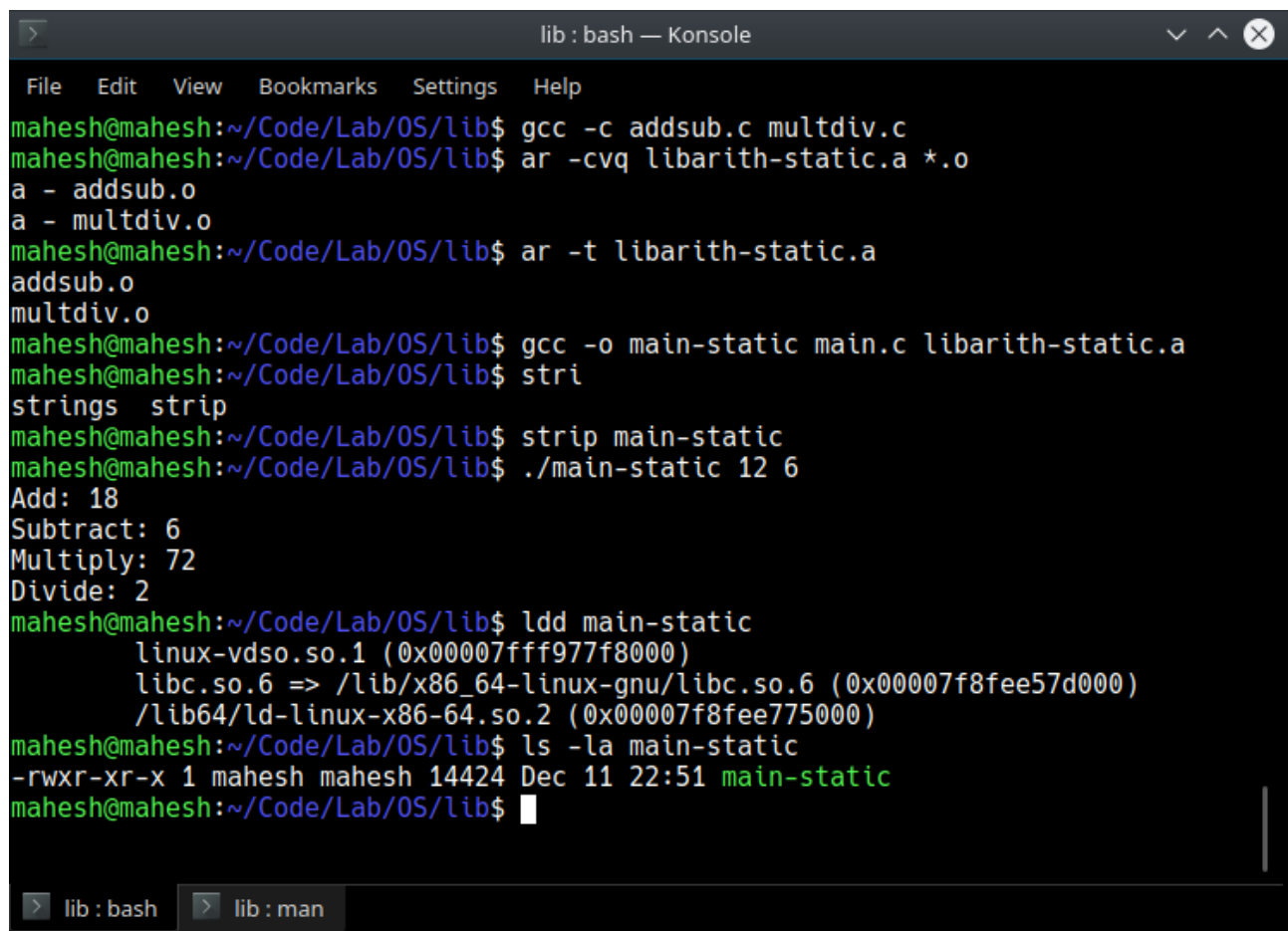
```
#include<stdio.h>  
#include<assert.h>  
#include<stdlib.h>  
  
#include "multdiv.h"
```

```
#include "addsub.h"
```

```
int main(int argc, char *argv[]) {  
    assert(argc == 3);  
    int a = atoi(argv[1]), b = atoi(argv[2]);  
    printf("Add: %d\n", add(a,b));  
    printf("Subtract: %d\n", subtract(a,b));  
    printf("Multiply: %d\n", multiply(a,b));  
    printf("Divide: %d\n", divide(a,b));  
    return 0;  
}
```

Compiling & Output:

Static Linking:



```
lib : bash — Konsole  
File Edit View Bookmarks Settings Help  
mahesh@mahesh:~/Code/Lab/OS/lib$ gcc -c addsub.c multdiv.c  
mahesh@mahesh:~/Code/Lab/OS/lib$ ar -cvq libarith-static.a *.o  
a - addsub.o  
a - multdiv.o  
mahesh@mahesh:~/Code/Lab/OS/lib$ ar -t libarith-static.a  
addsub.o  
multdiv.o  
mahesh@mahesh:~/Code/Lab/OS/lib$ gcc -o main-static main.c libarith-static.a  
mahesh@mahesh:~/Code/Lab/OS/lib$ strip  
strings strip  
mahesh@mahesh:~/Code/Lab/OS/lib$ strip main-static  
mahesh@mahesh:~/Code/Lab/OS/lib$ ./main-static 12 6  
Add: 18  
Subtract: 6  
Multiply: 72  
Divide: 2  
mahesh@mahesh:~/Code/Lab/OS/lib$ ldd main-static  
linux-vdso.so.1 (0x00007fff977f8000)  
libc.so.6 => /lib/x86_64-linux-gnu/libc.so.6 (0x00007f8fee57d000)  
/lib64/ld-linux-x86-64.so.2 (0x00007f8fee775000)  
mahesh@mahesh:~/Code/Lab/OS/lib$ ls -la main-static  
-rwxr-xr-x 1 mahesh mahesh 14424 Dec 11 22:51 main-static  
mahesh@mahesh:~/Code/Lab/OS/lib$
```

Dynamic Linking:

```
lib : bash — Konsole
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mahesh@mahesh:~/Code/Lab/OS/lib$ gcc -Wall -fPIC -c addsub.c multdiv.c
mahesh@mahesh:~/Code/Lab/OS/lib$ gcc -shared -Wl,-soname,libarith.so -o libarith.so *.o
mahesh@mahesh:~/Code/Lab/OS/lib$ gcc -L./ -Wl,-rpath,'$ORIGIN' -larith -o main-dynamic main.c
mahesh@mahesh:~/Code/Lab/OS/lib$ strip main-dynamic
mahesh@mahesh:~/Code/Lab/OS/lib$ ./main-dynamic 12 6
Add: 18
Subtract: 6
Multiply: 72
Divide: 2
mahesh@mahesh:~/Code/Lab/OS/lib$ ldd main-dynamic
        linux-vdso.so.1 (0x00007ffdf9d88000)
        libarith.so => /home/mahesh/Code/Lab/OS/lib/./libarith.so (0x00007f96cbb2d000)
        libc.so.6 => /lib/x86_64-linux-gnu/libc.so.6 (0x00007f96cb93d000)
        /lib64/ld-linux-x86-64.so.2 (0x00007f96cbb3d000)
mahesh@mahesh:~/Code/Lab/OS/lib$ ls -la main-dynamic
-rwxr-xr-x 1 mahesh mahesh 14456 Dec 11 22:54 main-dynamic
mahesh@mahesh:~/Code/Lab/OS/lib$
```