静态、动态库的编译与调用

GCC 编译命令

静态库编译

```
1   gcc -c factorial.c      # compile
2   ar -crsv libfactorial.a factorial.o  # make static lib
3   gcc st_main.c libfactorial.a -o st_main  # link static lib
4   ./st_main 4    # calling
```

动态库编译

```
1   gcc -fPIC -c factorial.c      # compile
2   gcc -shared -o libfactorial.so factorial.o  # make dynamic lib
3   sudo cp libfactorial.so /usr/lib/  # configure path
4   gcc -o sh_main sh_main.c -lfactorial  # link dynamic lib
5   ./sh_main 4    # calling
```

运行结果

静态库

```
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ gcc -c factorial.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ls
factorial.c  factorial.h  factorial.o  sh_main.c  st_main.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ar -crsv libfactorial.a factorial.o
a - factorial.o
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ls
factorial.c  factorial.h  factorial.o  libfactorial.a  sh_main.c  st_main.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ gcc st_main.c libfactorial.a -o st_main
st_main.c: In function 'main':
st_main.c:12:85: warning: implicit declaration of function 'factorial' [-Wimplicit-function-declaration]
   12 |         printf("factorial value: f(%d) = %d! = %d\n", atoi(argv[1]), atoi(argv[1]), factorial(atoi(argv[1])));
      |                                                                                     ^~~~~~~~~
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ls
factorial.c  factorial.h  factorial.o  libfactorial.a  sh_main.c  st_main  st_main.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02 $ ./st_main 4
====== Static lib method ======
factorial value: f(4) = 4! = 24
zhli@zhli-virtual-machine:~/Course/HW/Ch02$
```

动态库


```
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ gcc -fPIC -c factorial.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ls
factorial.c  factorial.h  factorial.o  sh_main.c  st_main  st_main.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ gcc -shared -o libfactorial.so factorial.o
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ls
factorial.c  factorial.h  factorial.o  libfactorial.so  sh_main.c  st_main  st_main.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ sudo cp libfactorial.so /usr/lib/
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ gcc -o sh_main sh_main.c -lfactorial
sh_main.c: In function 'main':
sh_main.c:12:85: warning: implicit declaration of function 'factorial' [-Wimplicit-function-declaration]
   12 |         printf("factorial value: f(%d) = %d! = %d\n", atoi(argv[1]), atoi(argv[1]), factorial(atoi(argv[1])));
      |                                                                                      ^~~~~~~~~
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ls
factorial.c  factorial.h  factorial.o  libfactorial.so  sh_main  sh_main.c  st_main  st_main.c
zhli@zhli-virtual-machine:~/Course/HW/Ch02$ ./sh_main 4
====== Shared lib method ======
factorial value: f(4) = 4! = 24
zhli@zhli-virtual-machine:~/Course/HW/Ch02$
```

完整源代码

factorial.c

```c
#include <stdio.h>
int factorial(int n)
{
    if (n == 0 || n == 1) {
        return 1;
    } else {
        return n * factorial(n - 1);
    }
}
```

st_main.c

```c
/* C static lib method*/
#include <stdio.h>
#include <stdlib.h>
int main(int argc, char *argv[])
{
    if (argc<2)
    {
        printf("You MUST input parameters,ex> %s someword\n",argv[0]);
        exit(1);
    }
    printf("====== Static lib method ======\n");
    printf("factorial value: f(%d) = %d! = %d\n", atoi(argv[1]),
atoi(argv[1]), factorial(atoi(argv[1])));
    return 0;
```

```
14    }
```

sh_main.c

```c
/* C Shared lib method*/
#include <stdio.h>
#include <stdlib.h>
int main(int argc, char *argv[])
{
    if (argc<2)
    {
        printf("You MUST input parameters,ex> %s someword\n",argv[0]);
        exit(1);
    }
    printf("====== Shared lib method ======\n");
    printf("factorial value: f(%d) = %d! = %d\n", atoi(argv[1]),
atoi(argv[1]), factorial(atoi(argv[1])));
    return 0;
}
```