

# 1 makefile文件的作用

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makefile中指定了一系列规则，用来执行对工程源码的编译来，生成可执行文件。makefile在linux下尤为重要，因为在没有像windows上一样的集成开发环境，makefile带来的好处就是自动化编译，一个make命令就可以自动编译整个工程，也可以只编译修改过的部分，加快编译速度。

## 2 makefile的基本语法

---

```
target ... : prerequisites ...  
    command  
    ...  
    ...
```

### target

可以是一个obj文件，也可以是一个可执行文件，还可以是一个标签

### prerequisites

生成该target所依赖的文件和/或target

### command

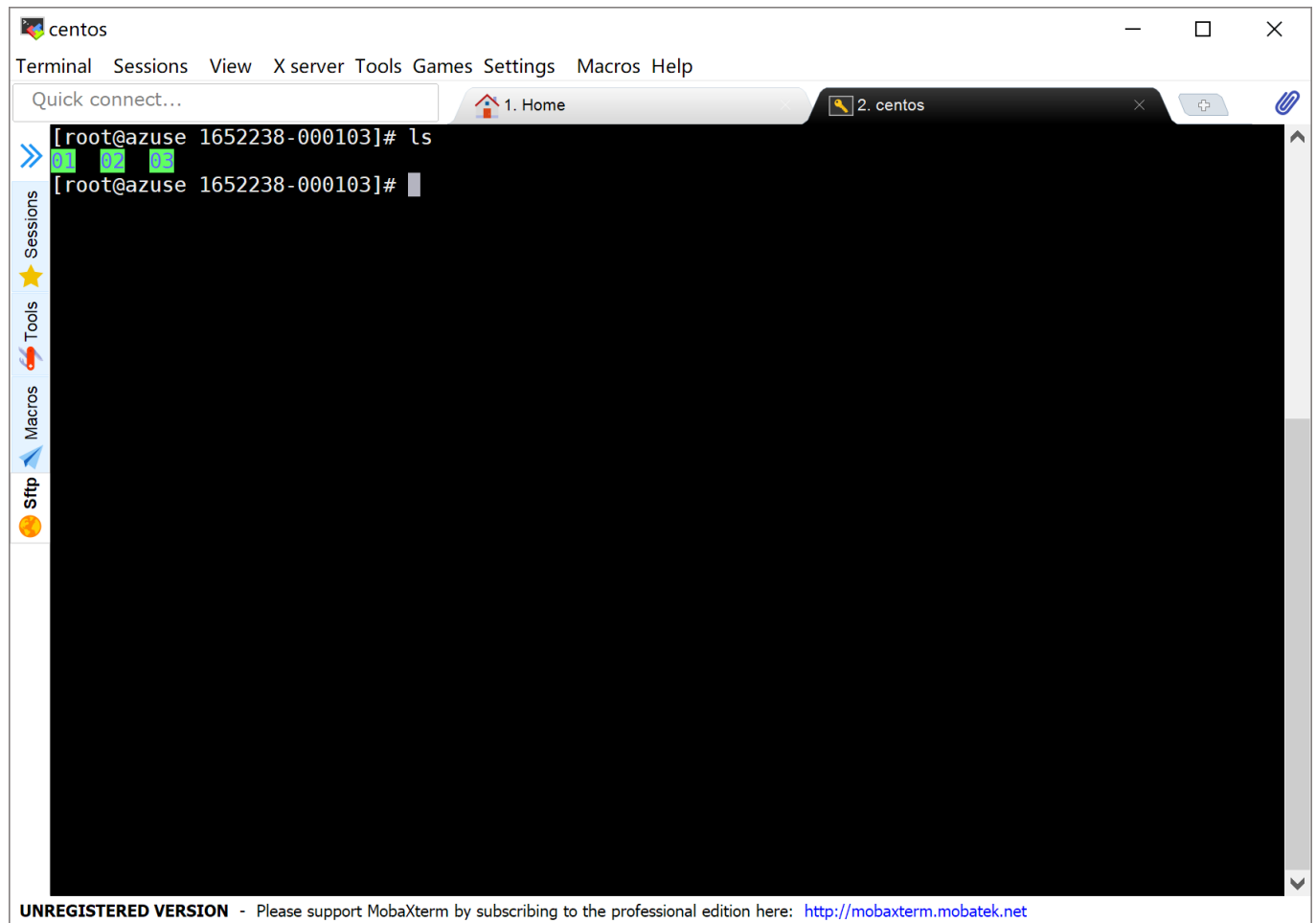
该target要执行的命令（任意shell命令）command前用tab隔开 例：

```
foo.o: foo.c defs.h  
    cc -c -g foo.c
```

## 3 常用情况makefile写法

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### 3.1 建立文件夹



### 3.2 编译test1.c test2.c test3.c的makefile

```
objects = test1.o test2.o test3.o
test : $(objects)
    gcc -o test $(objects)
test1.o:
test2.o:
test3.o:
clean :
    rm test $(objects)
```

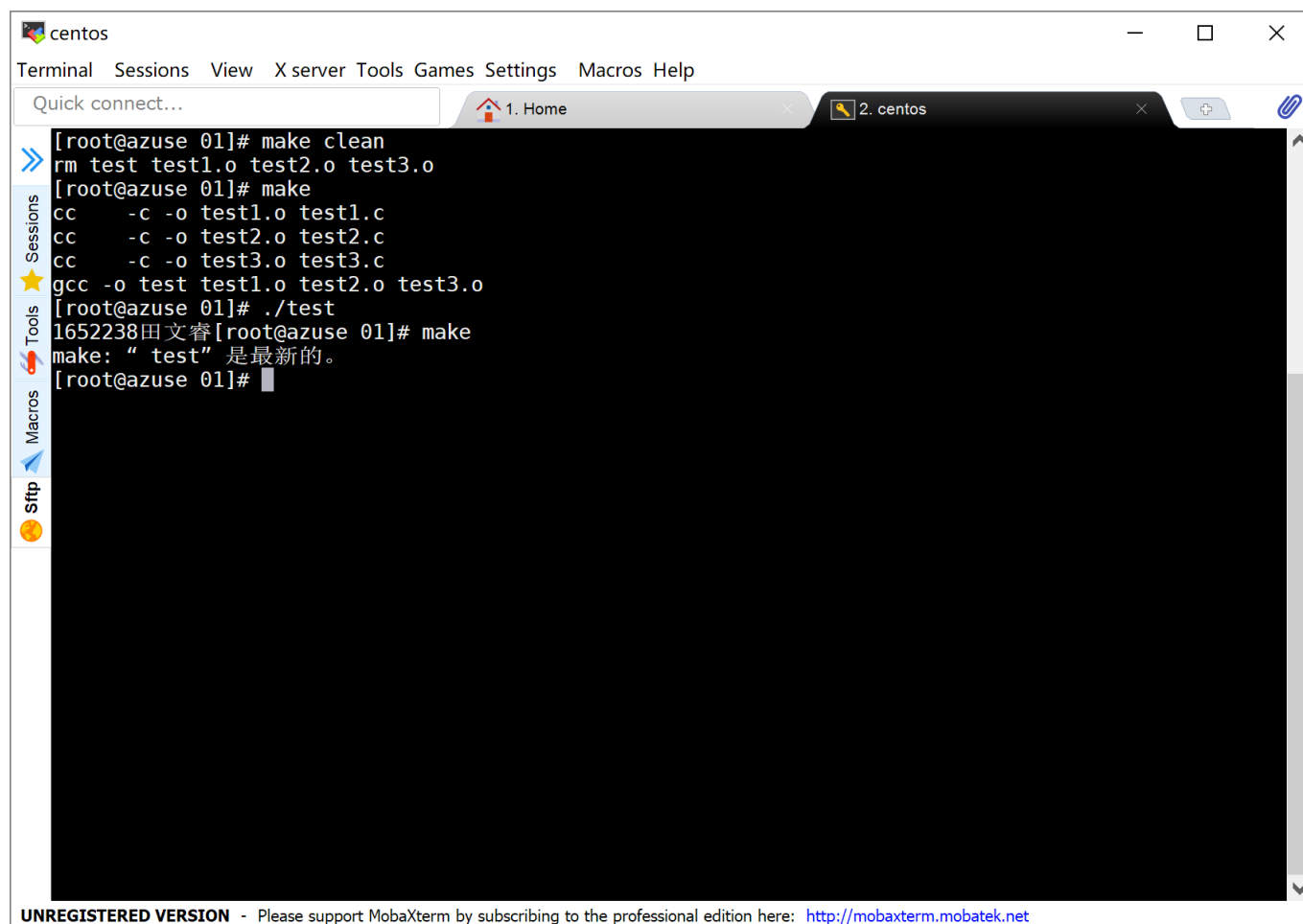
```
//test1.c
#include <stdio.h>
int fun1(){
    printf("1652238");
    return;
}
```

```
//test2.c
#include <stdio.h>
int fun2()
```

```
{  
    printf("田文睿");  
    return 0;  
}
```

```
//test3.c  
#include <stdio.h>  
int fun1();  
int fun2();  
  
int main(){  
    fun1();  
    fun2();  
    return 0;  
}
```

## 使用效果



```
centos  
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Quick connect... 1. Home 2. centos  
[root@azuse 01]# make clean  
rm test test1.o test2.o test3.o  
[root@azuse 01]# make  
cc -c -o test1.o test1.c  
cc -c -o test2.o test2.c  
cc -c -o test3.o test3.c  
gcc -o test test1.o test2.o test3.o  
[root@azuse 01]# ./test  
1652238田文睿  
[root@azuse 01]# make  
make: "test" 是最新的。  
[root@azuse 01]#
```

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make:可以正常编译出test可执行文件

再次make:不会重复编译文件

make clean:可以清空已编译的.o文件

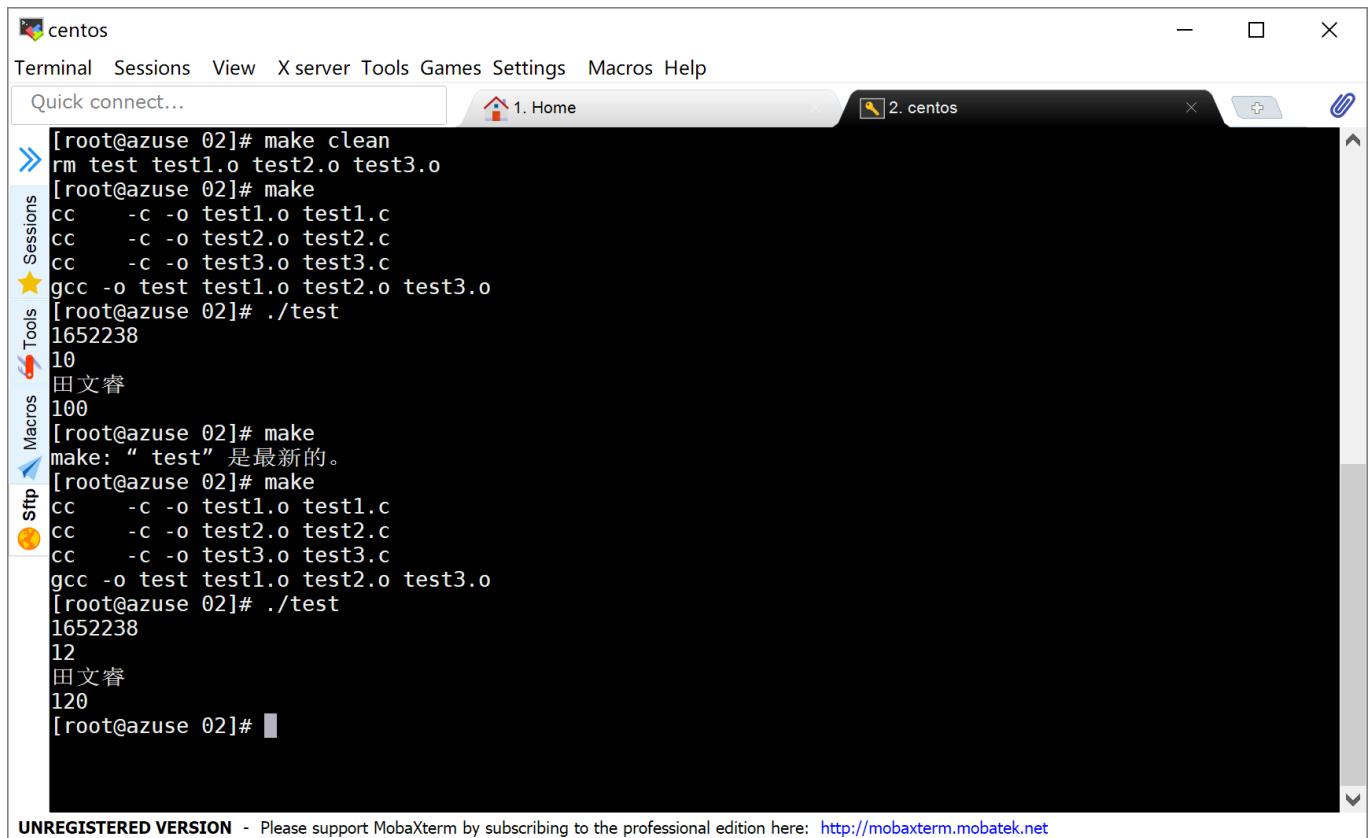
## 3.3 编译test1.c test2.c test3.c 以及 test.h的makefile

```
# makefile 02
objects = test1.o test2.o test3.o
test : $(objects)
    gcc -o test $(objects)
test1.o : test.h
test2.o : test.h
test3.o : test.h
clean :
    rm test $(objects)
```

```
// test1.c
#include "test.h"
int fun1(){
    printf("1652238\n");
    printf("%d\n",a);
    return 0;
}
```

```
// test2.c
#include "test.h"
int fun2(){
    printf("田文睿\n");
    printf("%d\n",a*10);
    return 0;
}
```

```
// test3.c
#include "test.h"
int main(){
    fun1();
    fun2();
    return 0;
}
```



```
[root@azuse 02]# make clean
rm test test1.o test2.o test3.o
[root@azuse 02]# make
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
gcc -o test test1.o test2.o test3.o
[root@azuse 02]# ./test
1652238
10
田文睿
100
[root@azuse 02]# make
make: " test" 是最新的。
[root@azuse 02]# make
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
gcc -o test test1.o test2.o test3.o
[root@azuse 02]# ./test
1652238
12
田文睿
120
[root@azuse 02]#
```

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make : 正常编译

./test : 输出正确

修改#define a 的值, 再次make : make自动重新编译

make clean : 可以清空以编译的.o文件

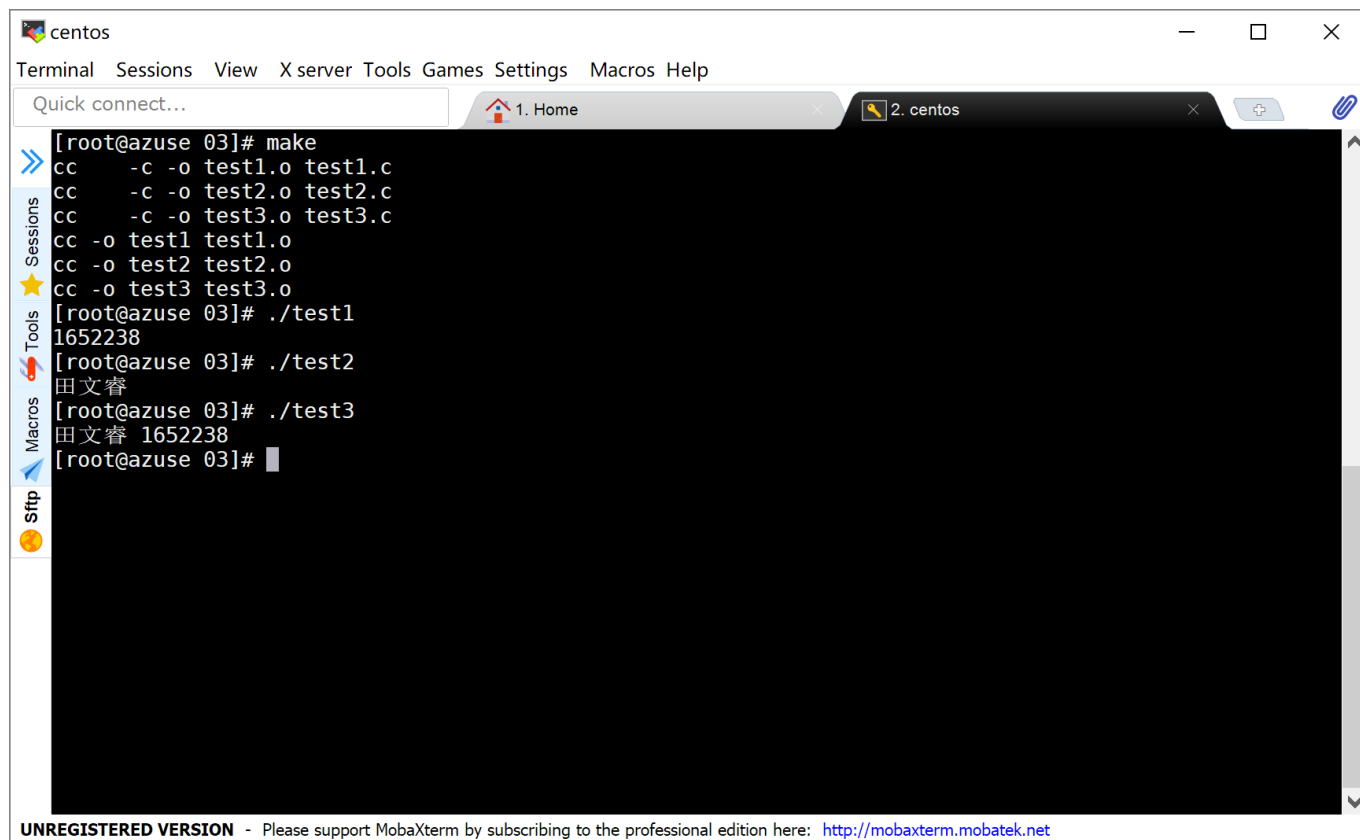
### 3.4 分别编译test1 test2 test3的makefile

```
# makefile 03
all : test1.o test2.o test3.o
    cc -o test1 test1.o
    cc -o test2 test2.o
    cc -o test3 test3.o

test1.o :
test2.o :
test3.o :
clean:
    rm -f test1.o test2.o test3.o test1 test2 test3
```

一起编译 : make

编译成三个可执行文件test1 test2 test3



```
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[root@azuse 03]# make
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
cc -o test1 test1.o
cc -o test2 test2.o
cc -o test3 test3.o
[root@azuse 03]# ./test1
1652238
[root@azuse 03]# ./test2
田文睿
[root@azuse 03]# ./test3
田文睿 1652238
[root@azuse 03]#
```

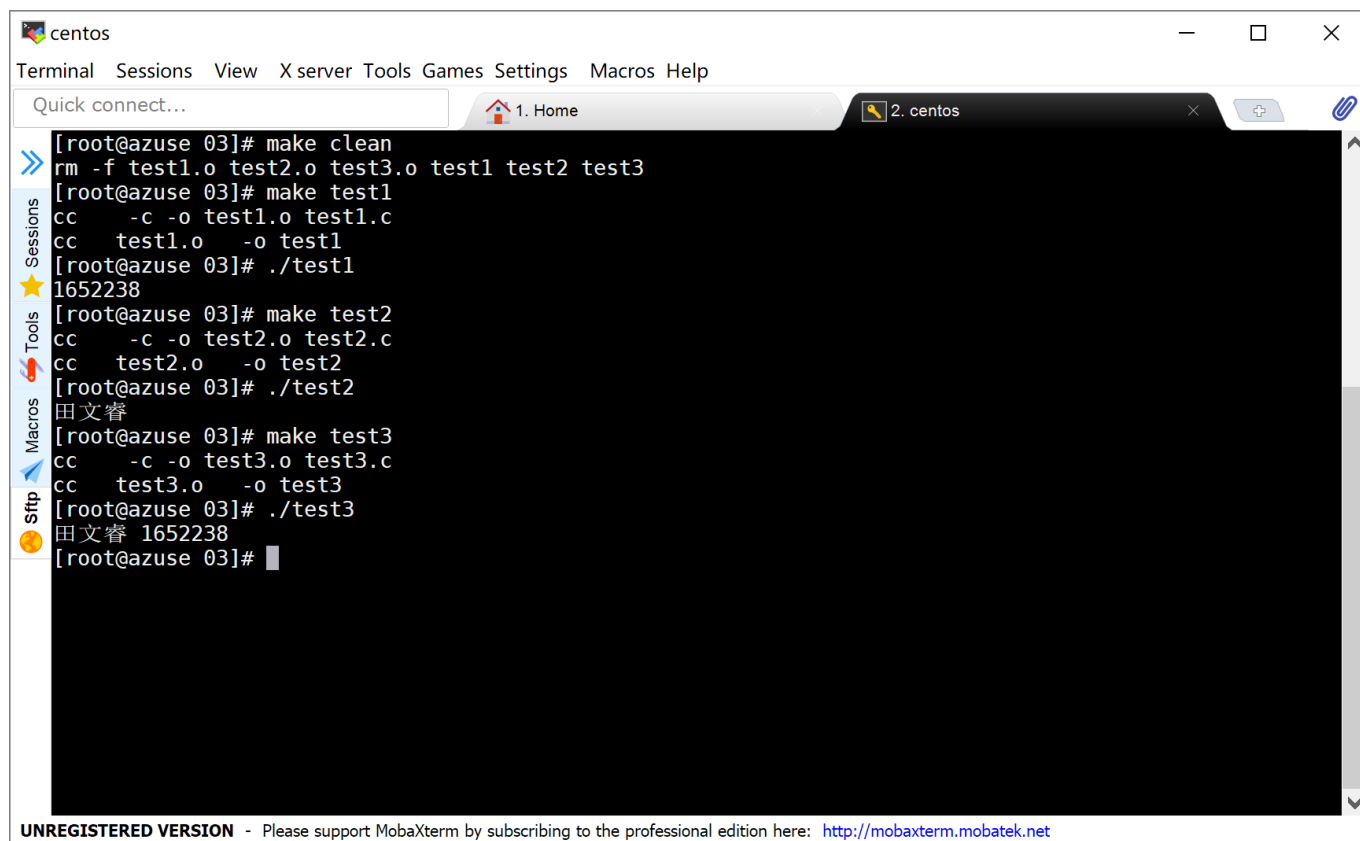
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分别编译：

make test1

make test2

make test3



```
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Quick connect... 1. Home 2. centos

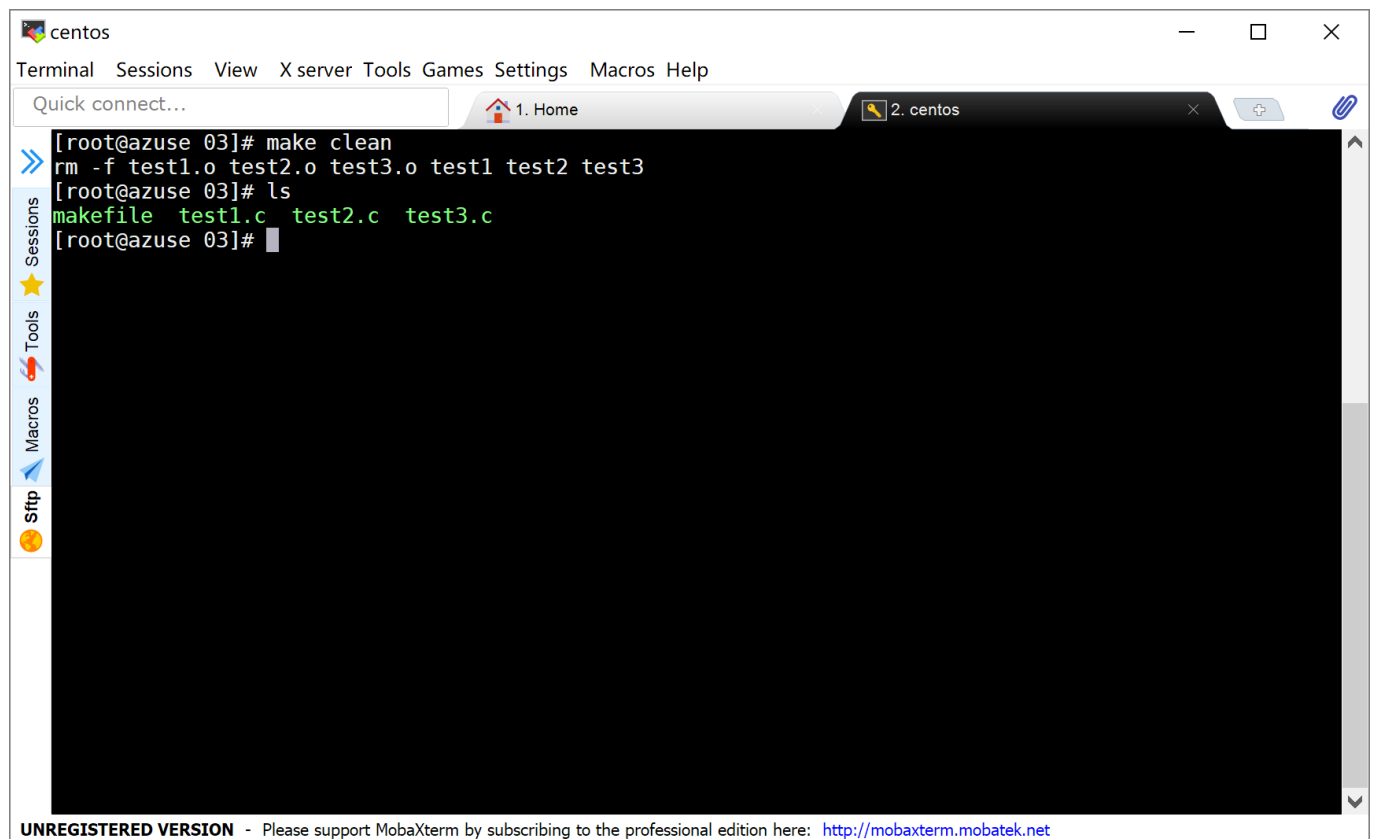
[root@azuse 03]# make clean
rm -f test1.o test2.o test3.o test1 test2 test3
[root@azuse 03]# make test1
cc -c -o test1.o test1.c
cc test1.o -o test1
[root@azuse 03]# ./test1
1652238
[root@azuse 03]# make test2
cc -c -o test2.o test2.c
cc test2.o -o test2
[root@azuse 03]# ./test2
田文睿
[root@azuse 03]# make test3
cc -c -o test3.o test3.c
cc test3.o -o test3
[root@azuse 03]# ./test3
田文睿 1652238
[root@azuse 03]#
```

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清除：

make clean

删除掉所有.o和可执行文件，只保留.c



The screenshot shows a MobaXterm terminal window with a CentOS session. The terminal output is as follows:

```
[root@azuse 03]# make clean
rm -f test1.o test2.o test3.o test1 test2 test3
[root@azuse 03]# ls
makefile test1.c test2.c test3.c
[root@azuse 03]#
```

The window title bar indicates it is an "UNREGISTERED VERSION" of MobaXterm, with a link to the professional edition at <http://mobaxterm.mobatek.net>.

### 3.5 1652238-000103目录下的makefile

```
# makefile 1652238

subdir=$(shell find . -maxdepth 1 -type d)
dirs:=$(basename $(subst ./,%, $(subdir)))

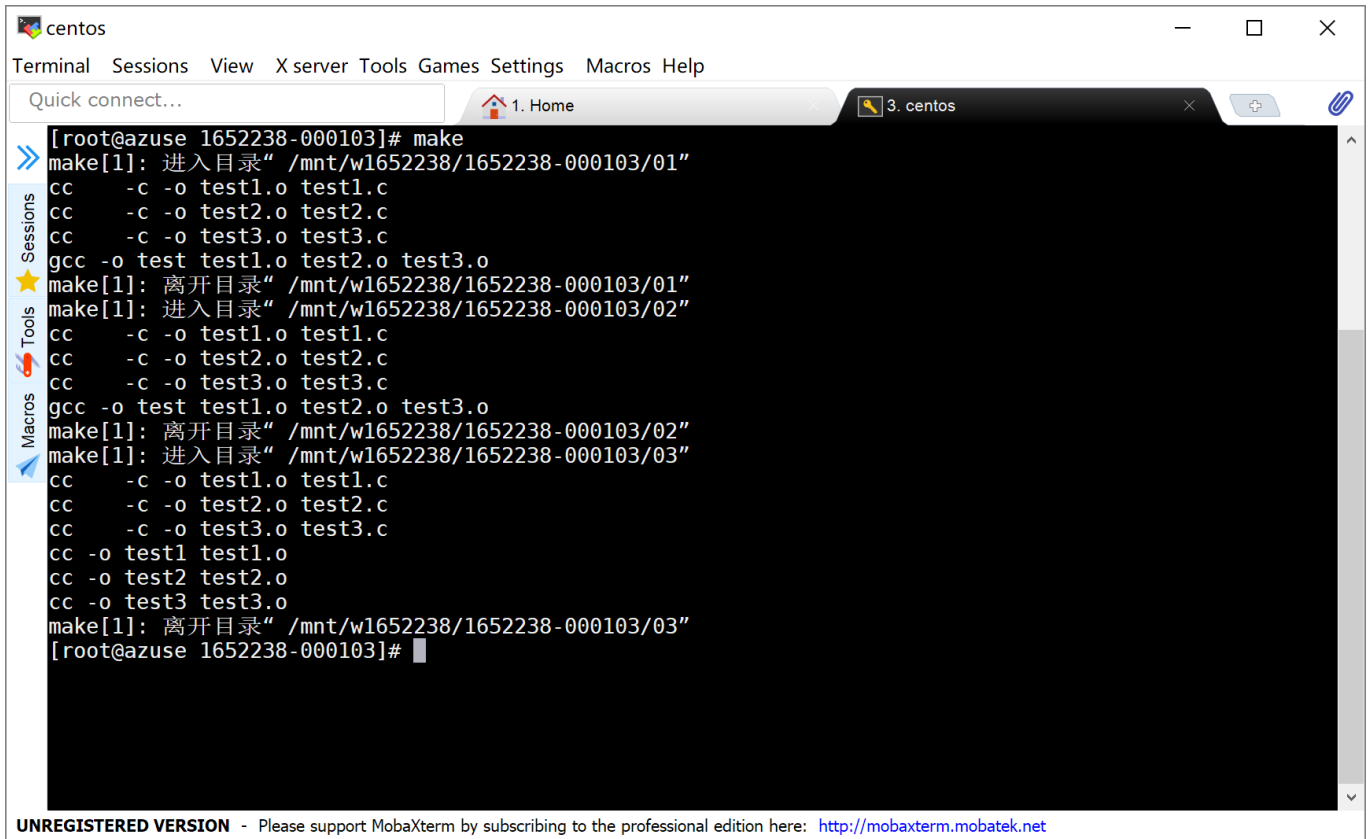
.PHONY: $(dirs) clean

$(dirs):
    @for dir in $(dirs); do \
        $(MAKE) -C $$dir; \
    done

clean:
    @for dir in $(dirs); do \
        $(MAKE) -C $$dir clean; \
    done
```

分别编译各个文件夹：

make

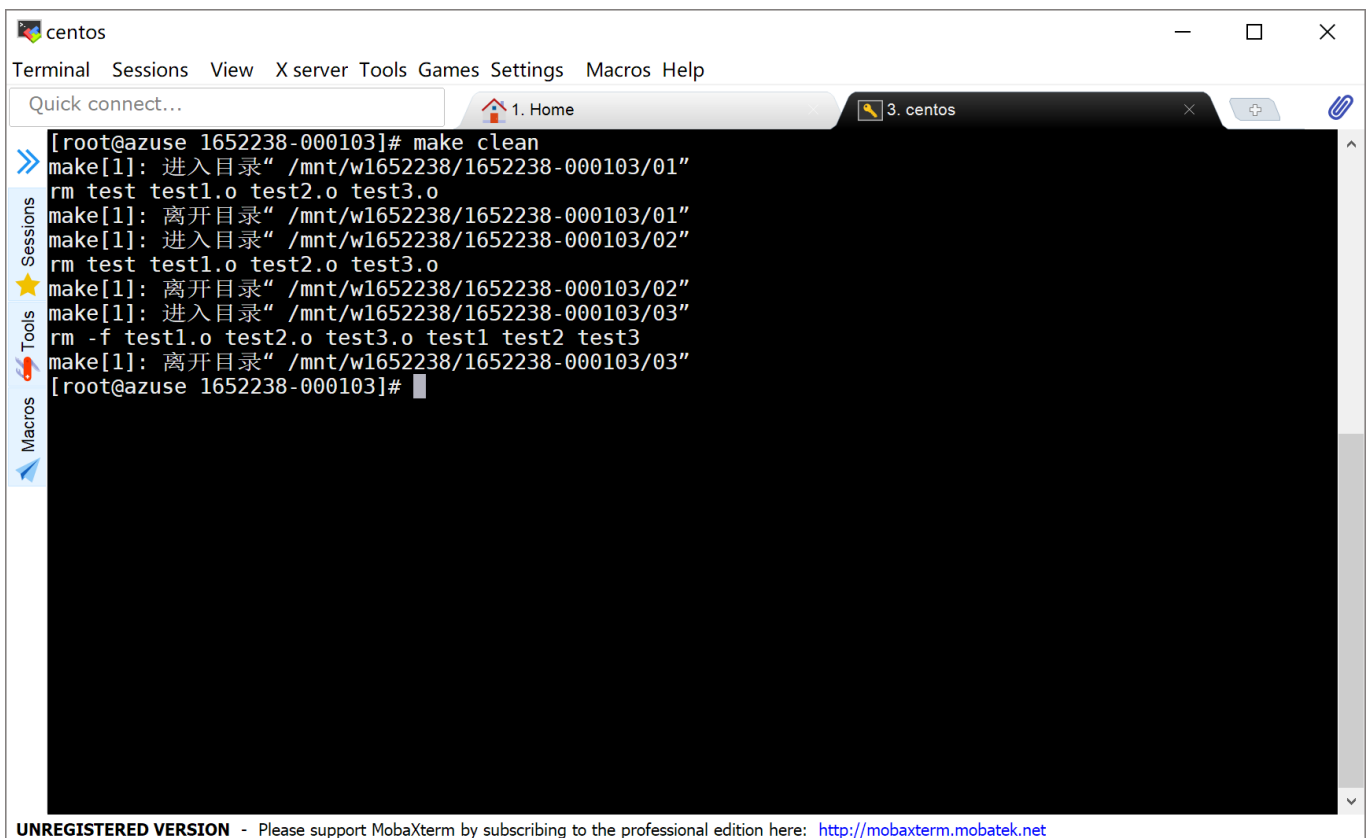


```
centos
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Quick connect... 1. Home 3. centos
[root@azuse 1652238-000103]# make
make[1]: 进入目录 "/mnt/w1652238/1652238-000103/01"
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
gcc -o test test1.o test2.o test3.o
make[1]: 离开目录 "/mnt/w1652238/1652238-000103/01"
make[1]: 进入目录 "/mnt/w1652238/1652238-000103/02"
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
gcc -o test test1.o test2.o test3.o
make[1]: 离开目录 "/mnt/w1652238/1652238-000103/02"
make[1]: 进入目录 "/mnt/w1652238/1652238-000103/03"
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
cc -o test1 test1.o
cc -o test2 test2.o
cc -o test3 test3.o
make[1]: 离开目录 "/mnt/w1652238/1652238-000103/03"
[root@azuse 1652238-000103]#
```

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清除子文件夹内的.o和可执行文件：

make clean



```
centos
Terminal Sessions View X server Tools Games Settings Macros Help
Quick connect... 1. Home 3. centos
[root@azuse 1652238-000103]# make clean
make[1]: 进入目录 "/mnt/w1652238/1652238-000103/01"
rm test test1.o test2.o test3.o
make[1]: 离开目录 "/mnt/w1652238/1652238-000103/01"
make[1]: 进入目录 "/mnt/w1652238/1652238-000103/02"
rm test test1.o test2.o test3.o
make[1]: 离开目录 "/mnt/w1652238/1652238-000103/02"
make[1]: 进入目录 "/mnt/w1652238/1652238-000103/03"
rm -f test1.o test2.o test3.o test1 test2 test3
make[1]: 离开目录 "/mnt/w1652238/1652238-000103/03"
[root@azuse 1652238-000103]#
```

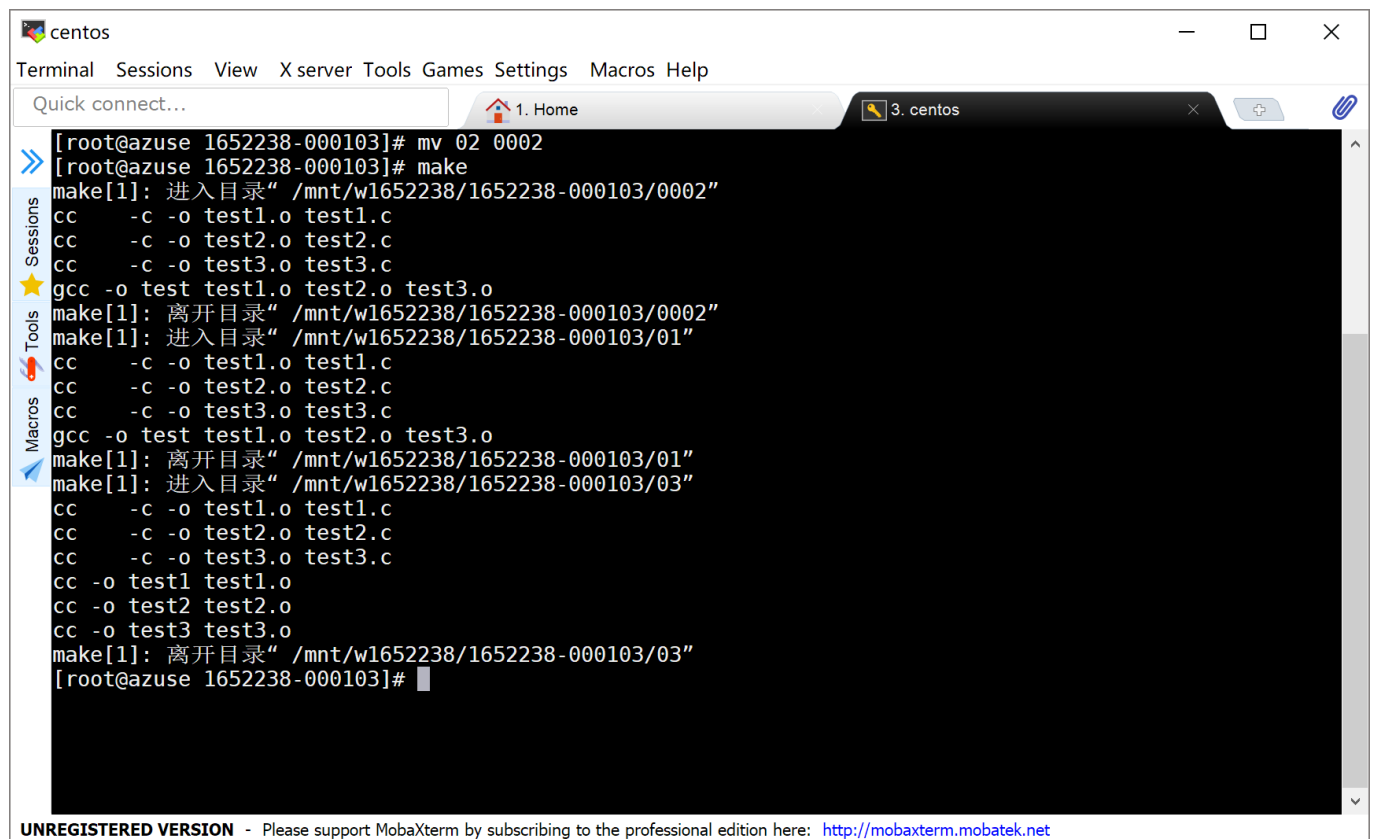
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修改文件夹名字后一样可以正常编译：

mv 02 0002



## make



```
[root@azuse 1652238-000103]# mv 02 0002
[root@azuse 1652238-000103]# make
make[1]: 进入目录“ /mnt/w1652238/1652238-000103/0002”
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
gcc -o test test1.o test2.o test3.o
make[1]: 离开目录“ /mnt/w1652238/1652238-000103/0002”
make[1]: 进入目录“ /mnt/w1652238/1652238-000103/01”
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
gcc -o test test1.o test2.o test3.o
make[1]: 离开目录“ /mnt/w1652238/1652238-000103/01”
make[1]: 进入目录“ /mnt/w1652238/1652238-000103/03”
cc -c -o test1.o test1.c
cc -c -o test2.o test2.c
cc -c -o test3.o test3.c
cc -o test1 test1.o
cc -o test2 test2.o
cc -o test3 test3.o
make[1]: 离开目录“ /mnt/w1652238/1652238-000103/03”
[root@azuse 1652238-000103]#
```

## 3 打包文件

```
tar -cjf linux-makefile.tar.bz2 1652238-000103/
```