

实验五：UNIX V6++文件系统

1. 实验目的

结合课程所学知识，通过在 UNIX V6++实验环境中编写使用文件管理相关的系统调用或库函数的应用程序，进一步了解 UNIX 文件管理的工作过程。

2. 实验设备及工具

已配置好 UNIX V6++运行和调试环境的 PC 机一台。

3. 实验准备工作

在 UNIX V6++的/lib/file.c 文件中了解 UNIX V6++支持的所有和文件管理有关的库函数。

4. 实验内容

4.1. 完成文件操作的应用程序

在 UNIX V6++的 src/program 文件夹下添加一个 filetest.c 文件，如图 1，图 2 所示。代码如代码 1 所示。

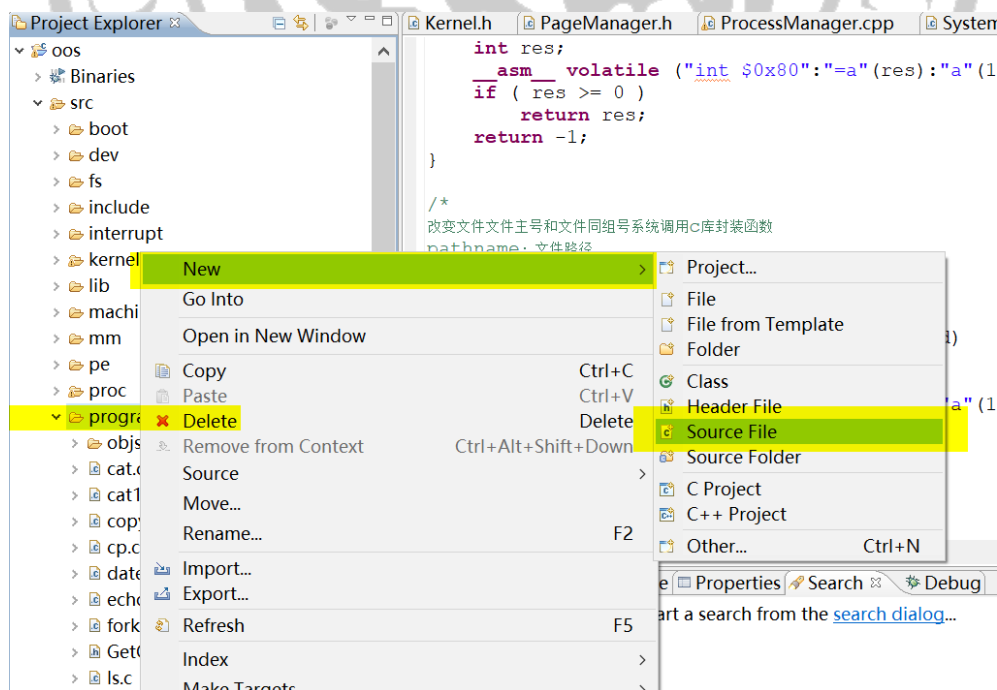


图 1

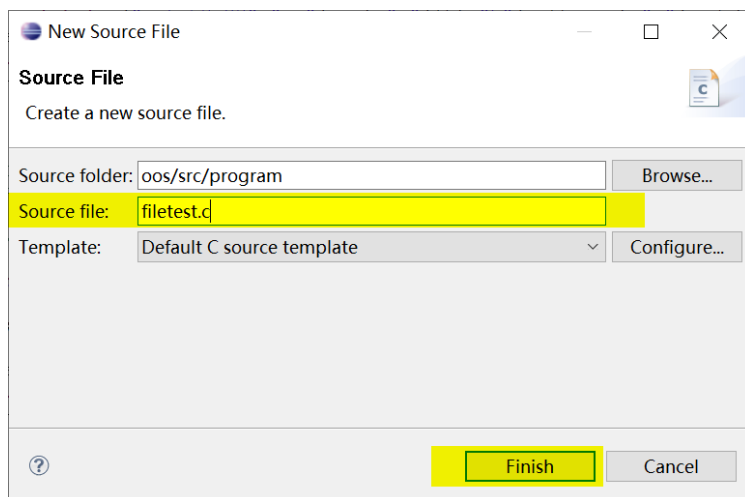


图 2

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

int main1()
{
    char data1[12]="Hello World!";
    char data2[12];
    int fd=0;
    int count = 0;

    fd = creat("/usr/Jessy",0666);
    if (fd>0)
        printf("The file %d is created.\n", fd);
    else
        printf("The file can not be created.\n");

    count = write(fd, data1, 12);
    if (count == 12)
        printf("The file is written %d characters .\n\n", count);
    else
        printf("The file can not be written successfully.\n\n");

    close(fd);

    fd = open("/usr/Jessy",01);
    if (fd>0)
        printf("The file %d is opened.\n", fd);
    else
        printf("The file can not be opened.\n");

    count = read(fd, data2, 12);
    printf("%d characters are read from file %d: %s.\n", count, fd, data2);

    return 1;
}
```

代码 1

4.2. 编译形成可执行文件

按照实验二的方法，编译形成可执行文件。首先修改 program 文件夹下的 Makefile 文件（需要修改的两个地方分别如图 3，图 4 所示）。其次，在 eclips 中选择 project-Build All，完成对 UNIX V6++代码的重新编译，如图 5 所示。

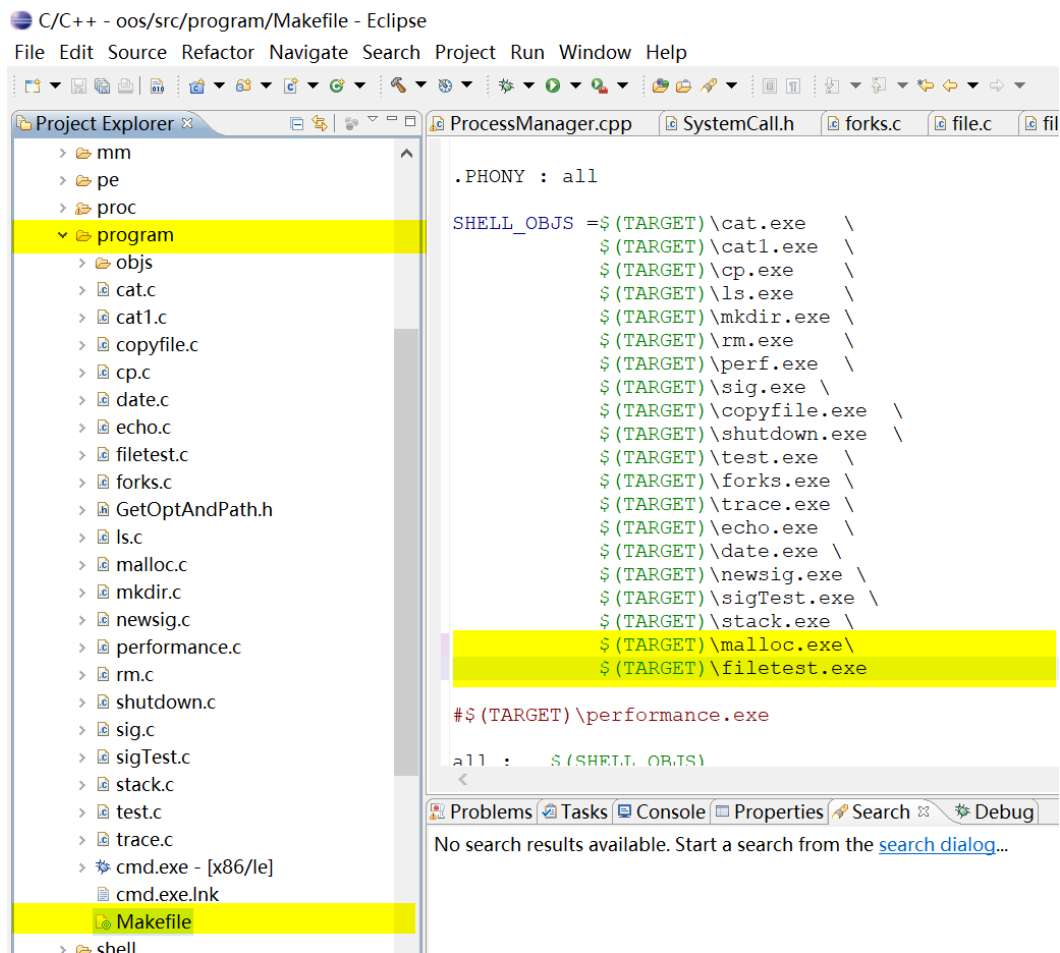


图 3

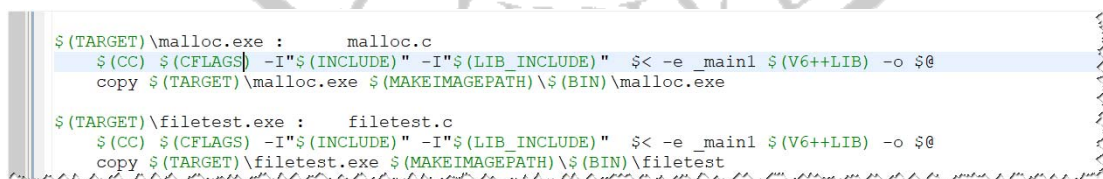


图 4

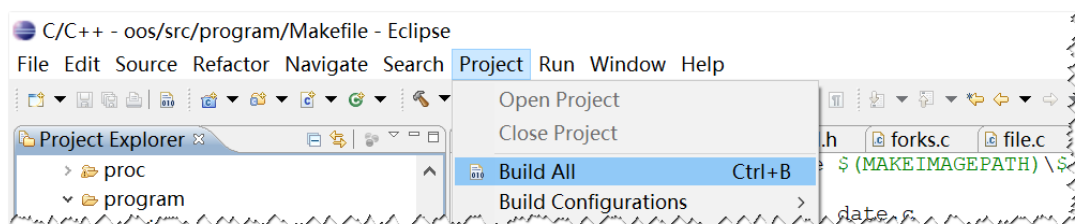
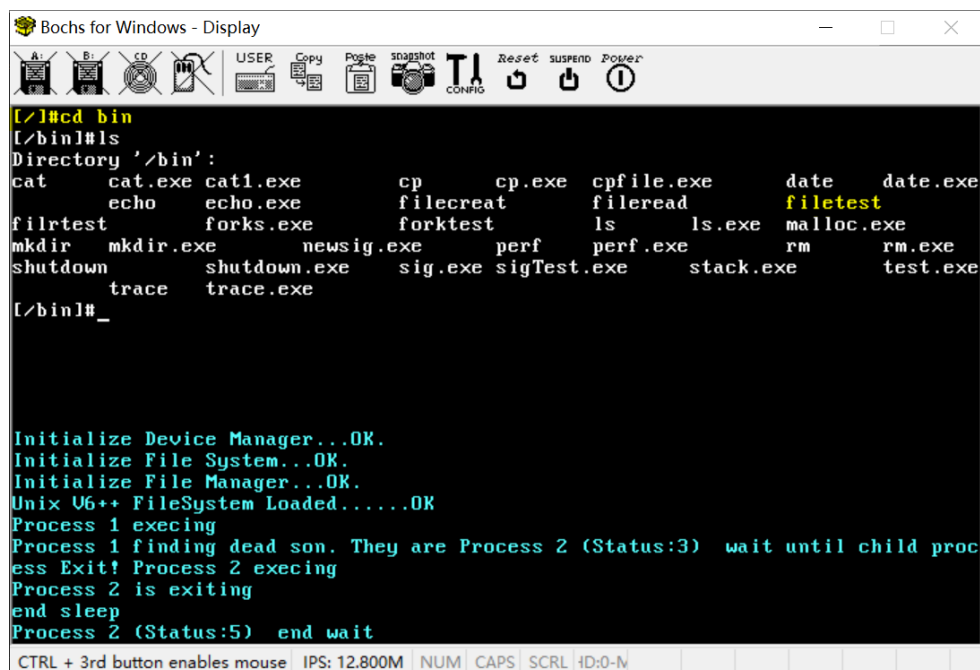


图 5

如果编译成功，则启动 UNIX V6++之后，进入 bin 文件夹，可以看到该文件夹下有刚编译通过形成的可执行文件 filetest，如图 6 所示。



```
[/]#cd bin
[/bin]#ls
Directory '/bin':
cat      cat.exe  cat1.exe      cp      cp.exe  cpfile.exe  date      date.exe
          echo     echo.exe      filecreat filecreat fileread    filetest
filrtest  forks.exe forktest     ls      ls.exe  malloc.exe
mkdir     mkdir.exe newsig.exe    perf     perf.exe rm          rm.exe
shutdown  shutdown.exe sig.exe sigTest.exe stack.exe test.exe
          trace   trace.exe

[/bin]#_

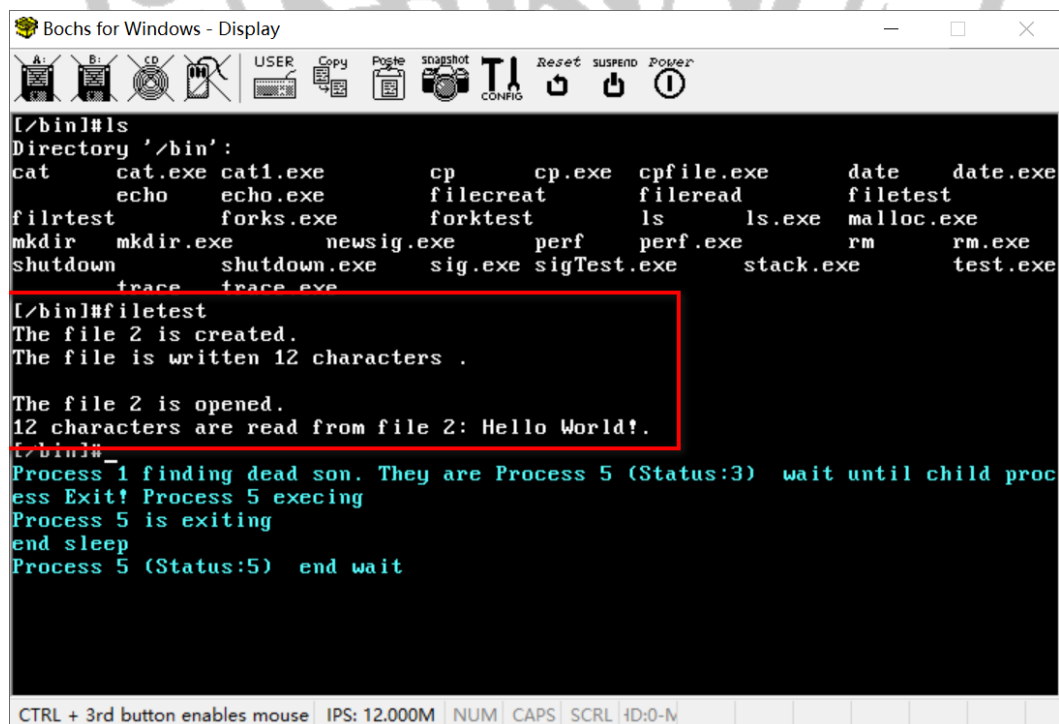
Initialize Device Manager...OK.
Initialize File System...OK.
Initialize File Manager...OK.
Unix V6++ FileSystem Loaded.....OK
Process 1 execing
Process 1 finding dead son. They are Process 2 (Status:3) wait until child process Exit! Process 2 execing
Process 2 is exiting
end sleep
Process 2 (Status:5) end wait

CTRL + 3rd button enables mouse  IPS: 12.800M  NUM  CAPS  SCRL  HD:0-M
```

图 6

4.3. 运行可执行文件

运行 filetest 程序，得到如图 7 所示的输出。



```
[/]#ls
Directory '/bin':
cat      cat.exe  cat1.exe      cp      cp.exe  cpfile.exe  date      date.exe
          echo     echo.exe      filecreat filecreat fileread    filetest
filrtest  forks.exe forktest     ls      ls.exe  malloc.exe
mkdir     mkdir.exe newsig.exe    perf     perf.exe rm          rm.exe
shutdown  shutdown.exe sig.exe sigTest.exe stack.exe test.exe
          trace   trace.exe

[/bin]#filetest
The file 2 is created.
The file is written 12 characters .

The file 2 is opened.
12 characters are read from file 2: Hello World!.
[/bin]#_

Process 1 finding dead son. They are Process 5 (Status:3) wait until child process Exit! Process 5 execing
Process 5 is exiting
end sleep
Process 5 (Status:5) end wait

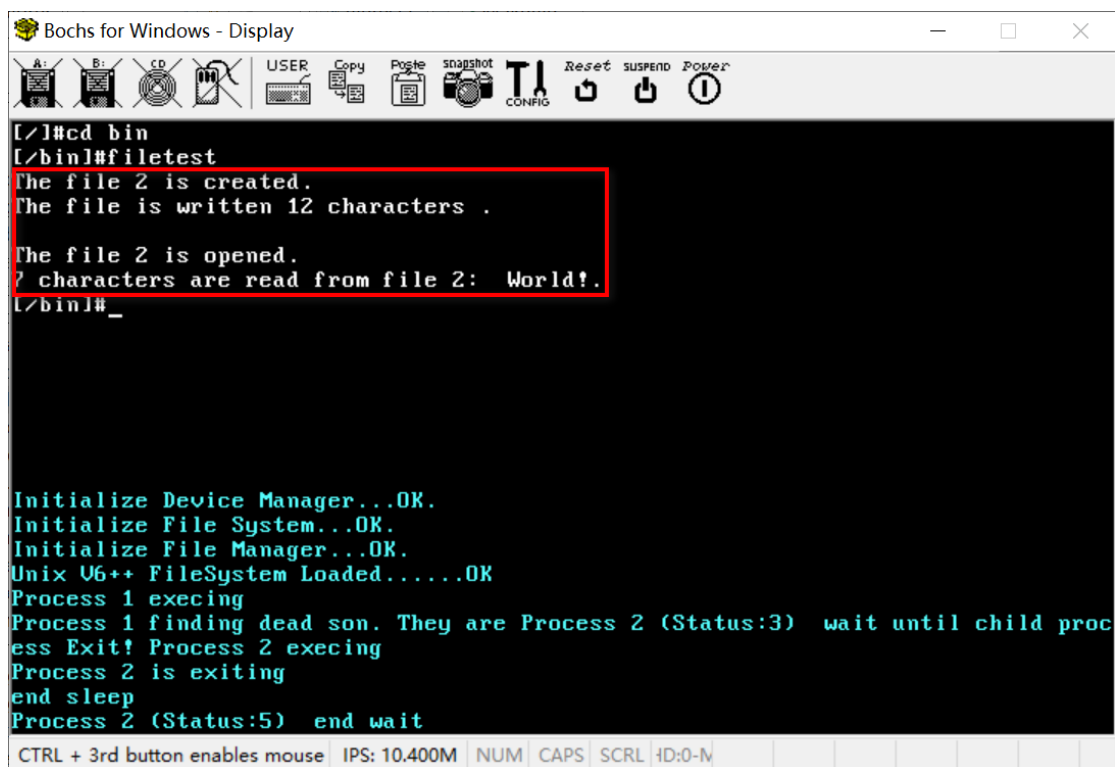
CTRL + 3rd button enables mouse  IPS: 12.000M  NUM  CAPS  SCRL  HD:0-M
```

图 7

将代码 2 中的语句做如图 8 所示的修改，观察编译运行后的输出情况，如图 9 所示。

```
printf("The file can not be opened.\n");  
  
seek(fd,5,0);  
count = read(fd, data2, 12);  
printf("%d characters are read from file %d: %s.\n", count, fd, data2);  
  
return 1;
```

图 8



```
Bochs for Windows - Display  
[/]#cd bin  
[/bin]#filetest  
The file 2 is created.  
The file is written 12 characters .  
  
The file 2 is opened.  
7 characters are read from file 2: World!.  
[/bin]#_  
  
Initialize Device Manager...OK.  
Initialize File System...OK.  
Initialize File Manager...OK.  
Unix U6++ FileSystem Loaded.....OK  
Process 1 execing  
Process 1 finding dead son. They are Process 2 (Status:3) wait until child proc  
ess Exit! Process 2 execing  
Process 2 is exiting  
end sleep  
Process 2 (Status:5) end wait  
CTRL + 3rd button enables mouse IPS: 10.400M NUM CAPS SCRL ID:0-N
```

图 9

5. 实验报告要求

- (1) (1 分) 给代码 1 添加注释，详细解释每一步操作的含义。
- (2) (1 分) 按上述过程，分别编辑、编译并运行 filetest 程序，截图展示程序的输出结果。
- (3) (1 分) 分别解释 creat 和 open 两个库函数中第二个参数的意义。
- (4) (1 分) 解释程序在作出图 8 的修改后，输出变为图 9 的原因。