电 子 科 技 大 学

综合练习 报　告

学生姓名：任振华　　学 号：2017060801023　　指导教师：李林

学生 E-mail：renzhenhuatime@foxmail.com

一、综合练习名称

设计并实现一个基于插件框架结构的文件统计分析软件

二、实验要求

以插件的形式，实现若干文件统计分析功能。需要实现的功能至少包括：

1.统计指定的某个文件的行数

2.统计指定的某个文件的单词数

3.统计指定目录下、特定后缀名的所有文件的行数。

4.每项功能使用单独的一个插件实现

其它要求：

1.被统计的文件使用 ASCII 编码

2.使用方式：插件框架程序需要处于一个循环中，不停地接收用户发来的命令（不能使用命令行参数，指定要执行的插件功能及其参数）

三、设计与实现

插件部分设计：

我在插件系统中设计实现了 6 个插件(插件 1，2，3 满足实验要求)：

插件 1：统计指定的某个文件的行数

插件 2：统计指定的某个文件的单词数

插件 3：统计指定目录下、特定后缀名的所有文件的行数。

插件 4：统计指定目录下、特定后缀名的所有文件的单词数。

插件 5：统计指定的某个文件的大小(字节数)

插件 6：统计指定目录下、特定后缀名的所有文件的大小(字节数)

实现插件 1：读取换行符，数量+1 即可

关键代码如下：

```
virtual void Func(char *File) //统计文件行数
{
    int fd;
    char temp;
    int num = 0;
    if (-1 == (fd = open(File, O_RDONLY))) //只读方式打开文件
    {
        cout << "Can not open: " << File << endl;
        return;
    }
    while (read(fd, &temp, 1))
    {
        if (temp == '\n') //每次读到换行符 num++
        {
            num++;
        }
    }
    close(fd);                                //关闭文件
    cout << File << " line: " << num << endl; //展示
}
```

实现插件 2：先写一个统计每行单词数的函数，通过把每行的单词数

加起来来统计文件的单词总数

关键代码如下：

```
int FuncLine(const char *szLine) //统计每行单词数
{
    int nWords = 0;
    int i = 0;
    for (; i < strlen(szLine); i++)
    {
        if (*(szLine + i) != ' ')
        {
            nWords++;
            while ((*(szLine + i) != ' ') && (*(szLine + i) != '\0'))
            {
                i++;
            }
        }
    }
    return nWords;
}
void Func(char *File)  //统计文件单词数
{
    int nWords = 0;                         //词计数变量，初始值为0
    FILE *fp;                               //文件指针
    char carrBuffer[1024];                  //每行字符缓冲，每行最多1024 个字
符
    if ((fp = fopen(File, "r")) == NULL) //打开文件
    {
        cout << "fopen error" << endl;
        exit(-1);
    }
    while (!feof(fp)) //如果没有读到文件末尾
    {
        //从文件中读一行
        if (fgets(carrBuffer, sizeof(carrBuffer), fp) != NULL)
            //统计每行词数
            nWords += FuncLine(carrBuffer);
    }
    fclose(fp); //关闭文件
    cout << "word numbers: " << nWords << endl;
}
```

实现插件 3：关键在于在递归查找目录下每一个文件的过程中，匹配

文件后缀名是否与特定后缀名相同，匹配成功调用函数打印该文件行数

获取文件后缀名的代码：

string suffixStr = filename.substr(filename.find_last_of('.') + 1);//获取文件后缀

关键代码如下：

```
virtual void Func(char *File) //统计文件行数
{
    int fd;
    char temp;
    int num = 0;
    if (-1 == (fd = open(File, O_RDONLY))) //只读方式打开文件
    {
        cout << "Can not open: " << File << endl;
        return;
    }
    while (read(fd, &temp, 1))
    {
        if (temp == '\n') //每次读到换行符 num++
        {
            num++;
        }
    }
    close(fd);                                  //关闭文件
    cout << File << " line: " << num << endl; //展示
}
virtual void Func(string path, string suffix)
{
    DIR *dir;
    struct dirent *ptr;
    if ((dir = opendir(path.c_str())) == nullptr)
    {
        perror("Open directory error...");//打开目录文件失败
        exit(1);
    }
    while ((ptr = readdir(dir)) != nullptr)//用 readdir 读取 DIR dir 结构体
    {
        if (strcmp(ptr->d_name, ".") == 0 || strcmp(ptr->d_name, "..")
== 0)//跳过. 和 ..文件
            continue;
        else if (ptr->d_type == 8)
        {
            string filename = ptr->d_name; //转换为 string
            string suffixStr = filename.substr(filename.find_last_of('.
') + 1); //获取文件后缀
            if (suffixStr == suffix) //匹配后缀
            {
                //files.push_back(path + "/" + ptr->d_name);
                char p[100];
                strcpy(p, (path + "/" + ptr->d_name).c_str());
                Func(p); //调用函数打印该文件行数
            }
        }
        else if (ptr->d_type == 4) //directory
        {
            Func(path + "/" + ptr->d_name, suffix); //递归
        }
    }
    closedir(dir);//关闭流
}
```

实现插件 4：与实现 3 类似，只是把调用的函数换成打印文件单词数的函数即可。

实现插件 5：统计文件大小，又因为我们假设了被统计的文件使用 ASCII 编码，而一个字符的 ASCII 码占用存储空间为 1 个字节，所以统计字符数即可获得文件大小。

关键代码如下：

```
virtual void Func(char *File)
{
    int fd;
    char temp;
    int num = 0;
    if (-1 == (fd = open(File, O_RDONLY))) //只读方式打开
    {
        cout << "Can not open: " << File << endl;
        return;
    }
    while (read(fd, &temp, 1)) //每读取一个字符就加1
    {
        num++;
    }
    close(fd); //关闭文件
    if (0 == num)
    {
        cout << "Empty file: " << File << endl;
    }
    cout << File << " size is : " << num << endl; //打印文件大小
}
```

实现插件 6：与实现插件 3，4 类似，只是把调用的函数换成打印文件大小的函数而已。

调用插件部分设计：

设计实现了2个类，class SearchPlugin用来实现在目录plugin下搜索插件，class CPluginController用来管理插件。两个类如下：

```
class SearchPlugin
{
public:
    SearchPlugin() {
    }
    ~SearchPlugin() {
    }
    bool GetPlugin(vector<string>& PluginName);
};
class CPluginController
{
public:
    CPluginController(void);
    virtual ~CPluginController(void);

    bool InitializeController(void);//初始化
    bool UninitializeController(void);//释放

    bool ProcessHelp(void);
    bool ProcessRequest(int FunctionID);
    bool IfProcess(char *Function);//判断插件是否存在
    bool ProcessFunction(char *Function, char *Document);//执行插件1，
2, 5
    bool ProcessFunction(char *Function, char *Dir, char *Suffix); //
执行插件3, 4, 6
private:
    std::vector<void *> m_vhForPlugin;
    std::vector<IPlugin*> m_vpPlugin;
};
```

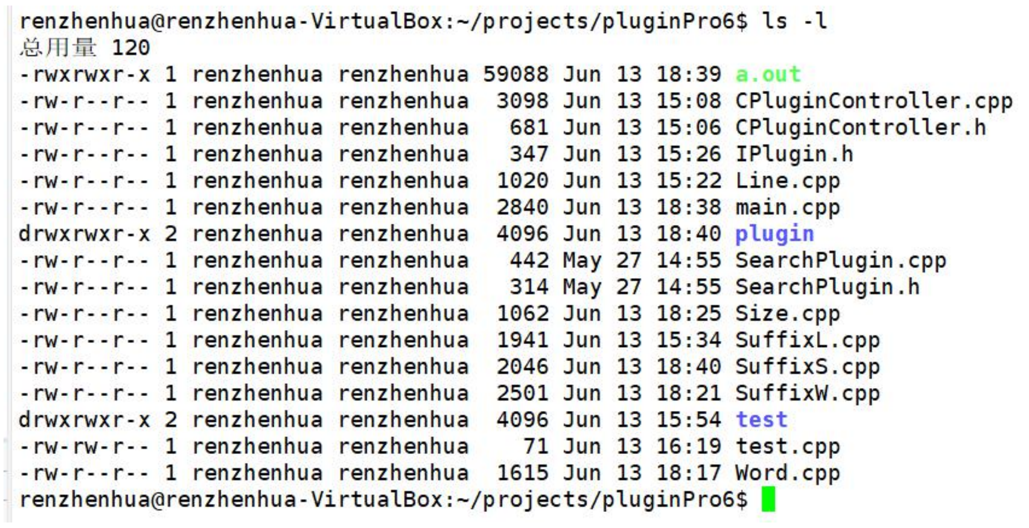
主程序部分：因为要求不使用命令行，所以使用一个 while (1)来不断接收用户的命令。

执行插件的关键代码：

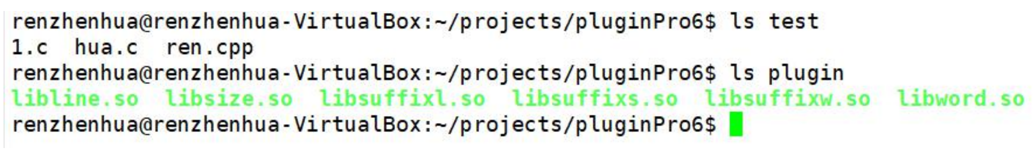
```
if (input == 'r')//执行插件1, 2, 5
{
    CPluginController ptr;
    cout << "输入文件名" << endl;
    char File[MAXSIZE];
    cin >> File;
    cout << "输入执行的插件代号" << endl;
    char Function[MAXSIZE];
    cin >> Function;
    ptr.InitializeController();//初始化
    if (ptr.IfProcess(Function) == false) //判断插件是否存在
    {
        cout << "No this plugin!" << endl;
    }
    else
    {
        ptr.ProcessFunction(Function, File);//调用插件功能
    };
    ptr.UninitializeController();//释放
    if (input == 'e')//输入'e'时退出
    {
        exit(0);
        break;
    }
}
if (input == 'd')//执行插件3, 4, 6
{
    CPluginController ptr;
    cout << "输入目录名" << endl;
    char Dir[MAXSIZE];
    cin >> Dir;
    cout << "输入后缀名" << endl;
    char Suffix[MAXSIZE];
    cin >> Suffix;
    cout << "输入执行的插件代号" << endl;
    char Function[MAXSIZE];
    cin >> Function;
    ptr.InitializeController();//初始化
    if (ptr.IfProcess(Function) == false) //判断插件是否存在
    {
        cout << "No this plugin!" << endl;
    }
    else
    {
        ptr.ProcessFunction(Function, Dir, Suffix);//调用插件功能
    };
    ptr.UninitializeController();//释放
    if (input == 'e')//输入'e'时退出
    {
        exit(0);
        break;
    }
}
```

四、测试

项目视图如下：test 为测试目录，下面有 3 个测试文件，test.cpp 也为测试文件，plugin 下面存放好了编译好的插件

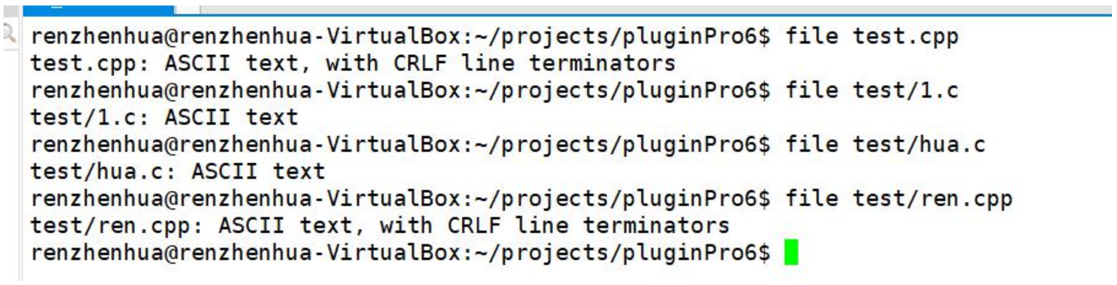


```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ls -l
总用量 120
-rwxrwxr-x 1 renzhenhua renzhenhua 59088 Jun 13 18:39 a.out
-rw-r--r-- 1 renzhenhua renzhenhua  3098 Jun 13 15:08 CPluginController.cpp
-rw-r--r-- 1 renzhenhua renzhenhua   681 Jun 13 15:06 CPluginController.h
-rw-r--r-- 1 renzhenhua renzhenhua   347 Jun 13 15:26 IPlugin.h
-rw-r--r-- 1 renzhenhua renzhenhua  1020 Jun 13 15:22 Line.cpp
-rw-r--r-- 1 renzhenhua renzhenhua  2840 Jun 13 18:38 main.cpp
drwxrwxr-x 2 renzhenhua renzhenhua  4096 Jun 13 18:40 plugin
-rw-r--r-- 1 renzhenhua renzhenhua   442 May 27 14:55 SearchPlugin.cpp
-rw-r--r-- 1 renzhenhua renzhenhua   314 May 27 14:55 SearchPlugin.h
-rw-r--r-- 1 renzhenhua renzhenhua  1062 Jun 13 18:25 Size.cpp
-rw-r--r-- 1 renzhenhua renzhenhua  1941 Jun 13 15:34 SuffixL.cpp
-rw-r--r-- 1 renzhenhua renzhenhua  2046 Jun 13 18:40 SuffixS.cpp
-rw-r--r-- 1 renzhenhua renzhenhua  2501 Jun 13 18:21 SuffixW.cpp
drwxrwxr-x 2 renzhenhua renzhenhua  4096 Jun 13 15:54 test
-rw-rw-r-- 1 renzhenhua renzhenhua    71 Jun 13 16:19 test.cpp
-rw-r--r-- 1 renzhenhua renzhenhua  1615 Jun 13 18:17 Word.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ 
```



```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ls test
1.c   hua.c   ren.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ls plugin
libline.so  libsize.so  libsuffixl.so  libsuffixs.so  libsuffixw.so  libword.so
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ 
```

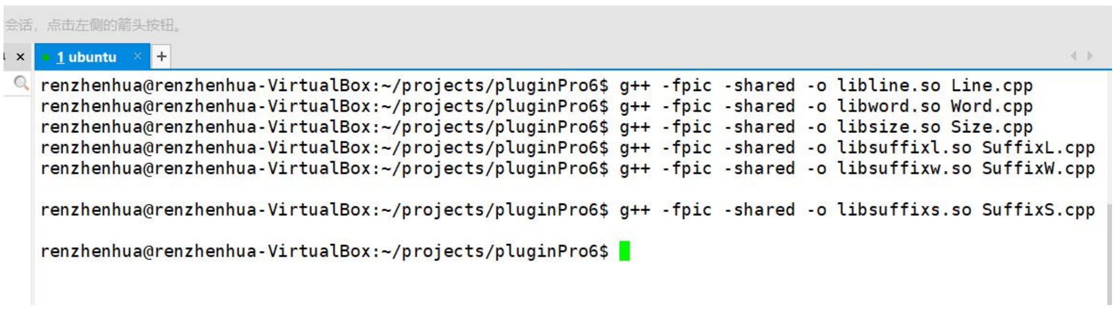
test.cpp 和 test 目录下的文件均为 ASCII text



```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ file test.cpp
test.cpp: ASCII text, with CRLF line terminators
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ file test/1.c
test/1.c: ASCII text
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ file test/hua.c
test/hua.c: ASCII text
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ file test/ren.cpp
test/ren.cpp: ASCII text, with CRLF line terminators
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ 
```

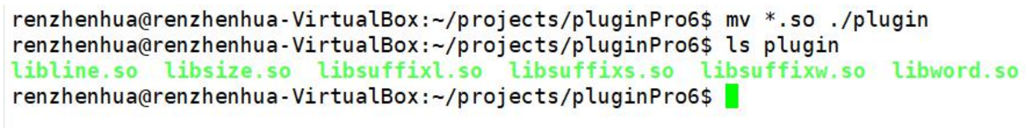
测试流程：

1. 编译插件，并放到 plugin 目录中



```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ -fpic -shared -o libline.so Line.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ -fpic -shared -o libword.so Word.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ -fpic -shared -o libsize.so Size.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ -fpic -shared -o libsuffixl.so SuffixL.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ -fpic -shared -o libsuffixw.so SuffixW.cpp

renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ -fpic -shared -o libsuffixs.so SuffixS.cpp

renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ 
```

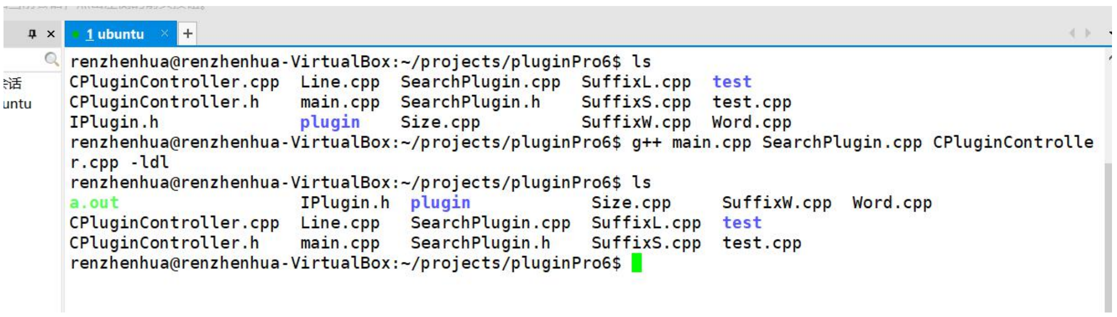
编译插件



```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ mv *.so ./plugin
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ls plugin
libline.so  libsize.so  libsuffixl.so  libsuffixs.so  libsuffixw.so  libword.so
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ 
```

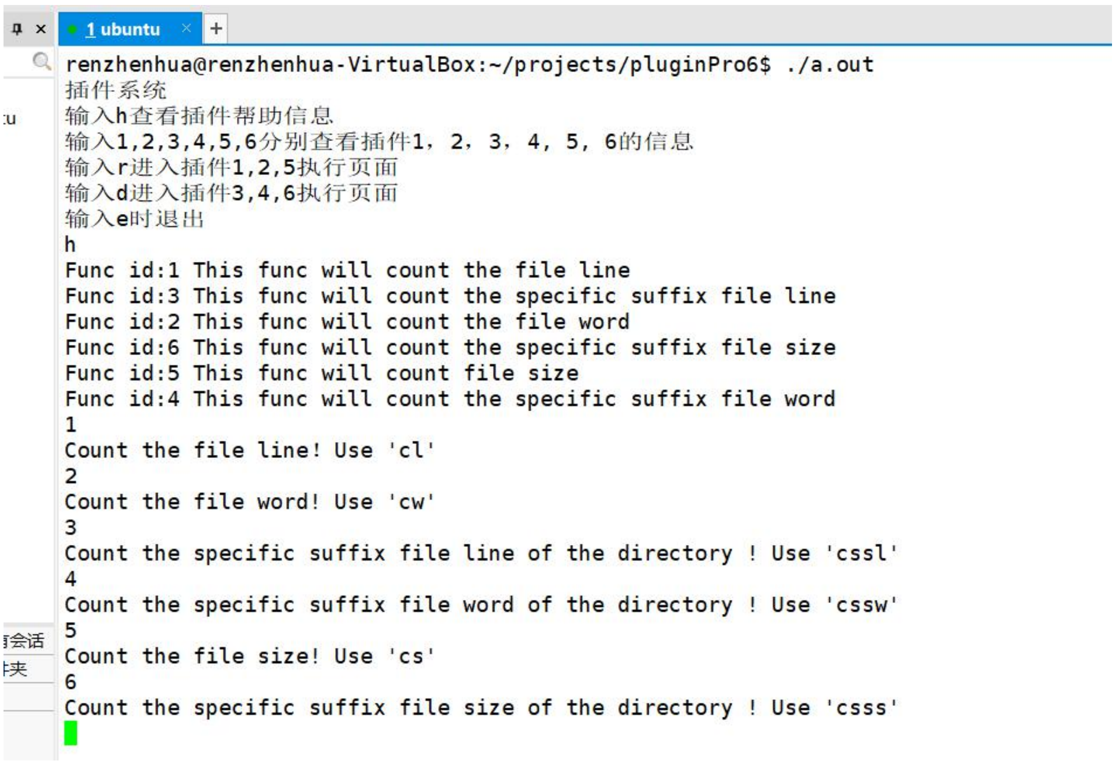
放入 plugin 目录中

2. 编译主程序，生成 a.out 可执行文件



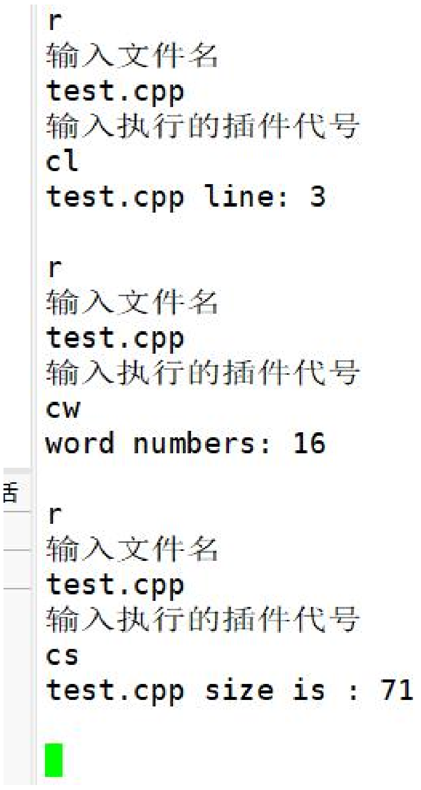
```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ls
CPluginController.cpp  Line.cpp   SearchPlugin.cpp  SuffixL.cpp  test
CPluginController.h    main.cpp   SearchPlugin.h    SuffixS.cpp  test.cpp
IPlugin.h              plugin     Size.cpp          SuffixW.cpp  Word.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ g++ main.cpp SearchPlugin.cpp CPluginControlle
r.cpp -ldl
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ls
a.out                  IPlugin.h  plugin            Size.cpp     SuffixW.cpp  Word.cpp
CPluginController.cpp  Line.cpp   SearchPlugin.cpp  SuffixL.cpp  test
CPluginController.h    main.cpp   SearchPlugin.h    SuffixS.cpp  test.cpp
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ 
```

3. 执行 a.out 文件测试



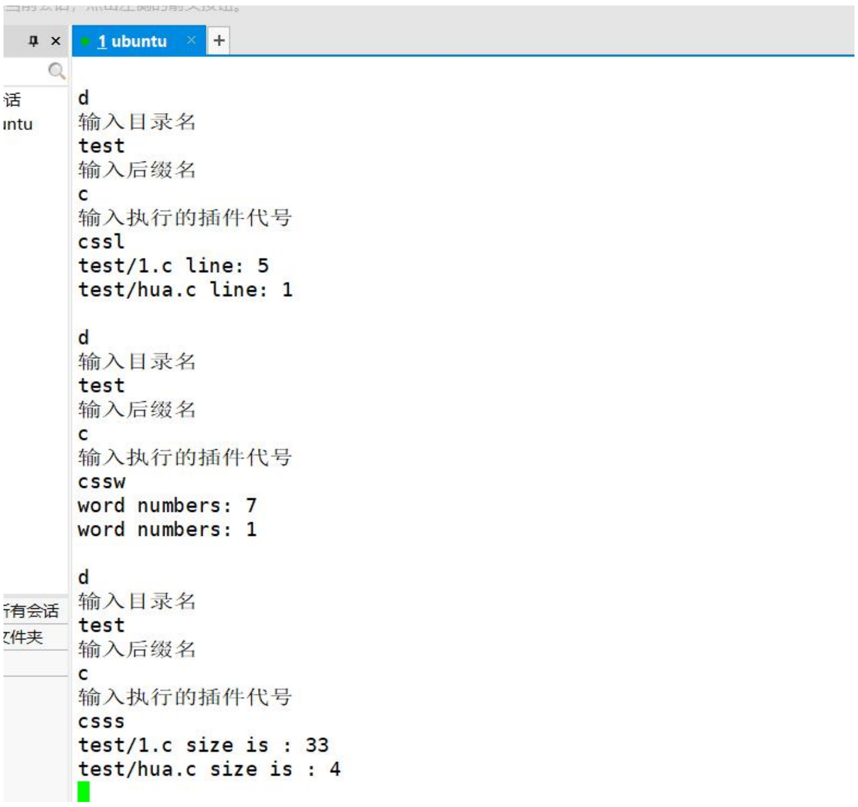
```
renzhenhua@renzhenhua-VirtualBox:~/projects/pluginPro6$ ./a.out
插件系统
输入h查看插件帮助信息
输入1,2,3,4,5,6分别查看插件1, 2, 3, 4, 5, 6的信息
输入r进入插件1,2,5执行页面
输入d进入插件3,4,6执行页面
输入e时退出
h
Func id:1 This func will count the file line
Func id:3 This func will count the specific suffix file line
Func id:2 This func will count the file word
Func id:6 This func will count the specific suffix file size
Func id:5 This func will count file size
Func id:4 This func will count the specific suffix file word
1
Count the file line! Use 'cl'
2
Count the file word! Use 'cw'
3
Count the specific suffix file line of the directory ! Use 'cssl'
4
Count the specific suffix file word of the directory ! Use 'cssw'
5
Count the file size! Use 'cs'
6
Count the specific suffix file size of the directory ! Use 'csss'
```

打印帮助信息



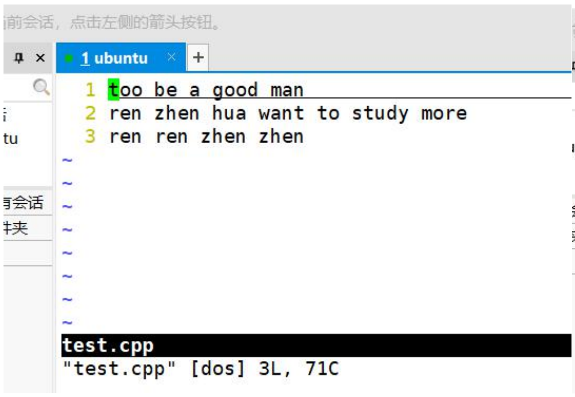
```
r
输入文件名
test.cpp
输入执行的插件代号
cl
test.cpp line: 3

r
输入文件名
test.cpp
输入执行的插件代号
cw
word numbers: 16

r
输入文件名
test.cpp
输入执行的插件代号
cs
test.cpp size is : 71
```

输入 r 执行插件 1，2，5

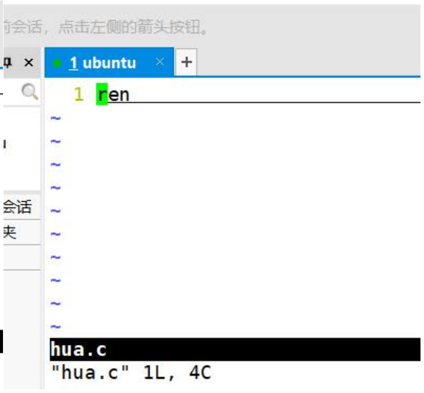


```
d
输入目录名
test
输入后缀名
c
输入执行的插件代号
cssl
test/1.c line: 5
test/hua.c line: 1

d
输入目录名
test
输入后缀名
c
输入执行的插件代号
cssw
word numbers: 7
word numbers: 1

d
输入目录名
test
输入后缀名
c
输入执行的插件代号
csss
test/1.c size is : 33
test/hua.c size is : 4
```

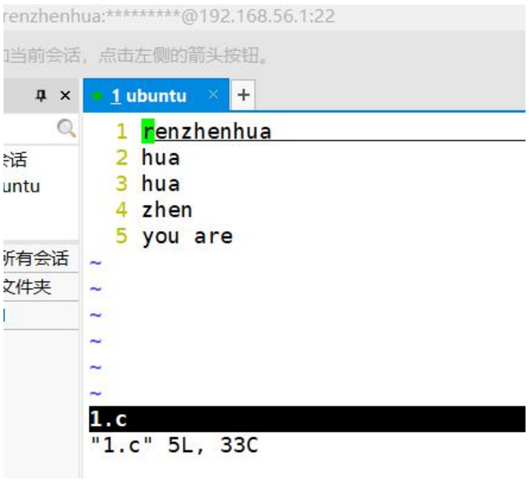
输入 d 利用目录测试插件 3，4，6



```
too be a good man
ren zhen hua want to study more
ren ren zhen zhen
~
test.cpp
"test.cpp" [dos] 3L, 71C
```



```
ren
~
hua.c
"hua.c" 1L, 4C
```



```
renzhenhua
hua
hua
zhen
you are
~
1.c
"1.c" 5L, 33C
```

查看 test.cpp, test/hua.c, test/1.c,验证程序正确性

五、对本课程或本作业的建议和意见

本次综合练习中，练习了 linux 下 c++面向对象编程的能力，对个人水平有比较大的提高。

六、附录

IPlugin.h:

```
#ifndef _IPLUGIN_H_
#define _IPLUGIN_H_

#include<string>

class IPlugin
{
public:
    virtual void Print() = 0;
    virtual void Help() = 0;
    virtual int GetID() = 0;
    virtual char* GetName() = 0;
    virtual void Func(char*file) = 0;
    virtual void Func(std::string path, std::string suffix) = 0;
public:
    IPlugin(){
    }
    virtual ~IPlugin(){
    }
};

#endif
```

Line.cpp:

```
#include<iostream>
#include <unistd.h>
#include <fcntl.h>
#include <string.h>
#include <string>
#include"IPlugin.h"

using namespace std;
```

```
char FUNC_NAME[] = "cl"; //count the line

class Plugin:
    public IPlugin
{
public:
    Plugin()
    {
    }
    virtual ~Plugin()
    {
    }
    virtual void Print()
    {
        cout << "Count the file line! Use 'cl'" << endl;
    }
    virtual void Help()
    {
        cout <<"Func id:1 " << "This func will count the file line" <<endl;
    }
    virtual int GetID()
    {
        return 1;
    }
    virtual char *GetName()
    {
        return FUNC_NAME;
    }
    virtual void Func(char* File)//统计文件行数
    {
        int fd;
        char temp;
        int num = 0;
        if (-1 == (fd = open(File, O_RDONLY)))//只读打开文件
        {
            cout << "Can not open: " << File << endl;
            return;
        }
        while (read(fd, &temp, 1))
        {
            if (temp == '\n')//每次读到换行符num++
            {
                num++;
            }
        }
        close(fd);//关闭文件
        cout << File << " line: " << num << endl;//展示
    }
    virtual void Func(string path, string suffix) {

    }
};
extern "C" void GetInterface(IPlugin **ppPlugin)
{
    static Plugin plugin;
    *ppPlugin = &plugin;
}
```

Word.cpp:

```
#include<iostream>
#include <unistd.h>
#include <fcntl.h>
#include <map>
#include <cstdio>
#include <string.h>
#include"IPlugin.h"

using namespace std;
char FUNC_NAME[] = "cw"; //count the word cw
class Plugin:
    public IPlugin
{
public:
    Plugin()
    {
    }
    virtual ~Plugin()
    {
    }
    virtual void Print()
    {
        cout << "Count the file word! Use 'cw'" << endl;
    }
    virtual void Help()
    {
        cout <<"Func id:2 " << "This func will count the file word" <<endl;
    }
```

```
virtual int GetID()
{
    return 2;
}
virtual char *GetName()
{
    return FUNC_NAME;
}
int FuncLine(const char *szLine)
{
    int nWords = 0;
    int i = 0;
    for (; i < strlen(szLine); i++)
    {
        if (*(szLine + i) != ' ')
        {
            nWords++;
            while ((*(szLine + i) != ' ') && (*(szLine + i) != '\0'))
            {
                i++;
            }
        }
    }
    return nWords;
}
void Func(char *File)
{
    int nWords = 0;//词计数变量，初始值为0
    FILE *fp; //文件指针
    char carrBuffer[1024];//每行字符缓冲，每行最多1024个字符
    if ((fp = fopen(File, "r")) == NULL)//打开文件
    {
        cout << "fopen error" << endl;
        exit(-1);
    }
    while (!feof(fp))//如果没有读到文件末尾
    {
        //从文件中读一行
        if (fgets(carrBuffer, sizeof(carrBuffer), fp) != NULL)
            //统计每行词数
            nWords += FuncLine(carrBuffer);
    }
    fclose(fp);//关闭文件
    cout << "word numbers: "<<nWords << endl;
    }
    virtual void Func(string path, string suffix) {

    }
};
extern "C" void GetInterface(IPlugin **ppPlugin)
{
    static Plugin plugin;
    *ppPlugin = &plugin;
}
```

Size.cpp:

```
#include<iostream>
#include <unistd.h>
#include <fcntl.h>
#include"IPlugin.h"

using namespace std;
char FUNC_NAME[] = "cs"; //count the file size
class Plugin :
    public IPlugin
{
public:
    Plugin()
    {
    }
    virtual ~Plugin()
    {
    }
    virtual void Print()
    {
        cout << "Count the file size! Use 'cs'" << endl;
    }
    virtual void Help()
    {
        cout << "Func id:5 " << "This func will count file size" << endl;
    }
    virtual int GetID()
    {
        return 5;
    }
    virtual char *GetName()
    {
        return FUNC_NAME;
    }
    virtual void Func(char *File)
    {
        int fd;
        char temp;
        int num = 0;
        if (-1 == (fd = open(File, O_RDONLY)))
        {
            cout << "Can not open: " << File << endl;
            return;
        }
        while (read(fd, &temp, 1))
        {
            num++;
        }
        close(fd);
        if (0 == num)
        {
            cout << "Empty file: " << File << endl;
        }
        cout << File << " size is : " << num << endl;
    }
    virtual void Func(string path, string suffix) {

    }
};
extern "C" void GetInterface(IPlugin **ppPlugin)
{
    static Plugin plugin;
    *ppPlugin = &plugin;
}
```

SuffixL.cpp:

```
#include <iostream>
#include <unistd.h>
#include <fcntl.h>
#include <string.h>
#include <string>
#include <vector>
#include <fstream>
#include <cstring>
#include <errno.h>
#include <cstdio>
#include <dirent.h>
```

```
#include "IPlugin.h"

using namespace std;

char FUNC_NAME[] = "cssl"; //count the special suffix file line

class Plugin :
    public IPlugin
{
public:
    Plugin()
    {
    }
    virtual ~Plugin()
    {
    }
    virtual void Print()
    {
        cout << "Count the specific suffix file line of the directory ! Use 'cssl'" << endl;
    }
    virtual void Help()
    {
        cout << "Func id:3 " << "This func will count the specific suffix file line" <<
endl;
    }
    virtual int GetID()
    {
        return 3;
    }
    virtual char *GetName()
    {
        return FUNC_NAME;
    }
    virtual void Func(char* File) {
        int fd;
        char temp;
        int num = 0;
        if (-1 == (fd = open(File, O_RDONLY)))
        {
            cout << "Can not open: " << File << endl;
            return;
        }
        while (read(fd, &temp, 1))
        {
            if (temp == '\n')
            {
                num++;
            }
        }
        close(fd);
        cout << File << " line: " << num << endl;
    }
    virtual void Func(string path, string suffix) {
        DIR *dir;
        struct dirent *ptr;
        if ((dir = opendir(path.c_str())) == nullptr) {
            perror("Open directory error...");
            exit(1);
        }
        while ((ptr = readdir(dir)) != nullptr) {
            if (strcmp(ptr->d_name, ".") == 0 || strcmp(ptr->d_name, "..") == 0)
                continue;
            else if (ptr->d_type == 8) {
                string filename = ptr->d_name;
                string suffixStr = filename.substr(filename.find_last_of('.') + 1);//
获取文件后缀
                if (suffixStr == suffix) {
                    //files.push_back(path + "/" + ptr->d_name);
                    char p[100];
                    strcpy(p, (path + "/" + ptr->d_name).c_str());
                    Func(p);
                }
            }
            else if (ptr->d_type == 4) //directory
            {
                Func(path + "/" + ptr->d_name, suffix); //递归
            }
        }
        closedir(dir);
    }
};
extern "C" void GetInterface(IPlugin **ppPlugin)
{
    static Plugin plugin;
    *ppPlugin = &plugin;
}
```

SuffixW.cpp:

```
#include <iostream>
#include <unistd.h>
#include <fcntl.h>
#include <string.h>
#include <string>
#include <vector>
#include <fstream>
#include <cstring>
#include <errno.h>
#include <cstdio>
#include <dirent.h>
#include <map>
#include "IPlugin.h"

using namespace std;

char FUNC_NAME[] = "cssw"; //count the special suffix file word

class Plugin :
    public IPlugin
{
public:
    Plugin()
    {
    }
    virtual ~Plugin()
    {
    }
    virtual void Print()
    {
        cout << "Count the specific suffix file word of the directory ! Use 'cssw'" << endl;
    }
    virtual void Help()
    {
        cout << "Func id:4 " << "This func will count the specific suffix file word" <<
endl;
    }
    virtual int GetID()
    {
        return 4;
    }
    virtual char *GetName()
```

```
{
    return FUNC_NAME;
}
int FuncLine(const char *szLine)
{
    int nWords = 0;
    int i = 0;
    for (; i < strlen(szLine); i++)
    {
        if (*(szLine + i) != ' ')
        {
            nWords++;
            while ((*(szLine + i) != ' ') && (*(szLine + i) != '\0'))
            {
                i++;
            }
        }
    }
    return nWords;
}
void Func(char *File)
{
    int nWords = 0;//词计数变量，初始值为0
    FILE *fp; //文件指针
    char carrBuffer[1024];//每行字符缓冲，每行最多1024个字符
    if ((fp = fopen(File, "r")) == NULL)//打开文件
    {
        cout << "fopen error" << endl;
        exit(-1);
    }
    while (!feof(fp))//如果没有读到文件末尾
    {
        //从文件中读一行
        if (fgets(carrBuffer, sizeof(carrBuffer), fp) != NULL)
            //统计每行词数
            nWords += FuncLine(carrBuffer);
    }
    fclose(fp);//关闭文件
    cout << "word numbers: " << nWords << endl;
}
virtual void Func(string path, string suffix) {
    DIR *dir;
    struct dirent *ptr;
    if ((dir = opendir(path.c_str())) == nullptr) {
```

```
                perror("Open directory error...");
                exit(1);
            }
            while ((ptr = readdir(dir)) != nullptr) {
                if (strcmp(ptr->d_name, ".") == 0 || strcmp(ptr->d_name, "..") == 0)
                    continue;
                else if (ptr->d_type == 8) {
                    string filename = ptr->d_name;
                    string suffixStr = filename.substr(filename.find_last_of('.') + 1);//
获取文件后缀
                    if (suffixStr == suffix) {
                        //files.push_back(path + "/" + ptr->d_name);
                        char p[100];
                        strcpy(p, (path + "/" + ptr->d_name).c_str());
                        Func(p);
                    }
                }
                else if (ptr->d_type == 4) //directory
                {
                    Func(path + "/" + ptr->d_name, suffix); //递归
                }
            }
            closedir(dir);
        }
};
extern "C" void GetInterface(IPlugin **ppPlugin)
{
    static Plugin plugin;
    *ppPlugin = &plugin;
}
```

SuffixS.cpp:

```
#include <iostream>
#include <unistd.h>
#include <fcntl.h>
#include <string.h>
#include <string>
#include <vector>
#include <fstream>
#include <cstring>
#include <errno.h>
#include <cstdio>
#include <dirent.h>
#include "IPlugin.h"
```

```
using namespace std;

char FUNC_NAME[] = "csss"; //count the special suffix file size

class Plugin :
    public IPlugin
{
public:
    Plugin()
    {
    }
    virtual ~Plugin()
    {
    }
    virtual void Print()
    {
        cout << "Count the specific suffix file size of the directory ! Use 'csss'" << endl;
    }
    virtual void Help()
    {
        cout << "Func id:6 " << "This func will count the specific suffix file size" <<
endl;
    }
    virtual int GetID()
    {
        return 6;
    }
    virtual char *GetName()
    {
        return FUNC_NAME;
    }
    virtual void Func(char *File)
    {
        int fd;
        char temp;
        int num = 0;
        if (-1 == (fd = open(File, O_RDONLY)))
        {
            cout << "Can not open: " << File << endl;
            return;
        }
        while (read(fd, &temp, 1))
        {
            num++;
        }
        close(fd);
        if (0 == num)
        {
            cout << "Empty file: " << File << endl;
        }
        cout << File << " size is : " << num << endl;
    }
    virtual void Func(string path, string suffix) {
        DIR *dir;
        struct dirent *ptr;
        if ((dir = opendir(path.c_str())) == nullptr) {
            perror("Open directory error...");
            exit(1);
        }
        while ((ptr = readdir(dir)) != nullptr) {
            if (strcmp(ptr->d_name, ".") == 0 || strcmp(ptr->d_name, "..") == 0)
                continue;
            else if (ptr->d_type == 8) {
                string filename = ptr->d_name;
                string suffixStr = filename.substr(filename.find_last_of('.') + 1);//
获取文件后缀
                if (suffixStr == suffix) {
                    //files.push_back(path + "/" + ptr->d_name);
                    char p[100];
                    strcpy(p, (path + "/" + ptr->d_name).c_str());
                    Func(p);
                }
            }
            else if (ptr->d_type == 4) //directory
            {
                Func(path + "/" + ptr->d_name, suffix); //递归
            }
        }
        closedir(dir);
    }
};
extern "C" void GetInterface(IPlugin **ppPlugin)
{
    static Plugin plugin;
    *ppPlugin = &plugin;
}
```

CPluginController.h:

```
#ifndef _CPLUGINCONTROLLER_H_
#define _CPLUGINCONTROLLER_H_

#include <vector>

class IPlugin;

class CPluginController
{
public:
    CPluginController(void);
    virtual ~CPluginController(void);

    bool InitializeController(void);//初始化
    bool UninitializeController(void);//释放

    bool ProcessHelp(void);
    bool ProcessRequest(int FunctionID);
    bool IfProcess(char *Function);//判断插件是否存在
    bool ProcessFunction(char *Function, char *Document);//执行插件1，2，5
    bool ProcessFunction(char *Function, char *Dir, char *Suffix); //执行插件3，4，6
private:
    std::vector<void *> m_vhForPlugin;
    std::vector<IPlugin*> m_vpPlugin;
};

#endif
```

CPluginController.cpp:

```
#include "CPluginController.h"
#include "SearchPlugin.h"
#include "IPlugin.h"
#include "dlfcn.h"

CPluginController::CPluginController(void)
{

}

CPluginController::~CPluginController(void)
{

}
```

```cpp
bool CPluginController::InitializeController(void)
{
    //存放所有插件的文件名
    std::vector<std::string> PluginName;
    //定义插件搜索类对象
    SearchPlugin ptr;
    //获取所有的插件文件名
    if (!ptr.GetPlugin(PluginName))
        return false;
    for (unsigned int i = 0; i < PluginName.size(); i++)
    {
        typedef int(*PLUGIN_CREATE)(IPlugin**);
        PLUGIN_CREATE GetIFC;
        IPlugin *pPlugin = NULL;
        //打开动态链接库文件
        void* handle = dlopen(PluginName[i].c_str(), RTLD_LAZY);
        if (handle != NULL)
        {
            m_vhForPlugin.push_back(handle);
            //获取导出的接口对象指针
            GetIFC = (PLUGIN_CREATE)dlsym(handle, "GetInterface");
            if (NULL != GetIFC)
            {
                (GetIFC)(&pPlugin);
                if (pPlugin != NULL)
                {
                    m_vpPlugin.push_back(pPlugin);
                }
            }
        }
    }
    return true;
}

bool CPluginController::UninitializeController()
{
    for (unsigned int i = 0; i < m_vhForPlugin.size(); i++)
    {
        dlclose(m_vhForPlugin[i]);
    }
    return true;
}
```

```
bool CPluginController::ProcessRequest(int FunctionID)
{
    for (unsigned int i = 0; i < m_vpPlugin.size(); i++)
    {
        if (m_vpPlugin[i]->GetID() == FunctionID)
        {
            m_vpPlugin[i]->Print();
            break;
        }
    }
    return true;
}

bool CPluginController::ProcessHelp(void)
{
    //存放所有插件的文件名
    std::vector<std::string> PluginName;
    //定义插件搜索类对象
    SearchPlugin ptr;
    //获取所有的插件文件名
    if (!ptr.GetPlugin(PluginName))
        return false;
    for (unsigned int i = 0; i < PluginName.size(); i++)
    {
        typedef int(*PLUGIN_CREATE)(IPlugin**);
        PLUGIN_CREATE GetIFC;
        IPlugin *pPlugin = NULL;
        //打开动态链接库文件
        void* handle = dlopen(PluginName[i].c_str(), RTLD_LAZY);
        if (handle != NULL)
        {
            //获取导出的接口对象指针
            GetIFC = (PLUGIN_CREATE)dlsym(handle, "GetInterface");
            if (NULL != GetIFC)
            {
                (GetIFC)(&pPlugin);
                if (pPlugin != NULL)
                {
                    pPlugin->Help();
                }
            }
            dlclose(handle);
        }
    }
    return true;
}

bool CPluginController::IfProcess(char *Function)//判断插件是否存在
{
    unsigned int i;
    for (i = 0; i < m_vpPlugin.size(); i++)
    {
        if (strcmp(Function, m_vpPlugin[i]->GetName()) == 0)
        {
            break;
        }
    };
    if (i < m_vpPlugin.size())//插件存在
    {
        return true;
    }
    else
    {
        return false;
    }
}

bool CPluginController::ProcessFunction(char *Function, char*File)//执行插件1，2，5功能
{
    for (unsigned int i = 0; i < m_vpPlugin.size(); i++)
    {
        if (strcmp(Function, m_vpPlugin[i]->GetName()) == 0)
        {
            m_vpPlugin[i]->Func(File);//插件功能
            break;
        }
    }
    return true;
}

bool CPluginController::ProcessFunction(char *Function, char *Dir, char *Suffix)//执行插
件3，4，6的功能
{
    for (unsigned int i = 0; i < m_vpPlugin.size(); i++)
    {
        if (strcmp(Function, m_vpPlugin[i]->GetName()) == 0)
        {
            m_vpPlugin[i]->Func(Dir, Suffix);//插件功能
            break;
        }
    }
    return true;
}
```

SearchPlugin.h:

```
#ifndef _SEARCHPLUGIN_H_
#define _SEARCHPLUGIN_H_

#include<iostream>
#include<vector>
#include<string>
#include<dirent.h>
#include<cstring>

using namespace std;
class SearchPlugin
{
public:
    SearchPlugin() {
    }
    ~SearchPlugin() {
    }
    bool GetPlugin(vector<string>& PluginName);
};

#endif // !_SEARCHPLUGIN_H_
```

SearchPlugin.cpp:

```
#include "SearchPlugin.h"

bool SearchPlugin::GetPlugin(vector<string>& PluginName) {
    DIR*dir = opendir("./plugin");
    if (0 == dir) {
        return false;
    }
    while (1) {
        struct dirent *ptr = readdir(dir);
        if (0 == ptr) {
            break;
        }
        if (strcmp(ptr->d_name, ".") == 0 || strcmp(ptr->d_name, "..") == 0)
            continue;
        string str = "./plugin/";
        str = str + ptr->d_name;
        PluginName.push_back(str);
    }
    closedir(dir);
    return true;
}
```

main.cpp:

```
#include <iostream>
#include <cstdio>
#include <string.h>
#include <stdlib.h>
#include "CPluginController.h"

#define MAXSIZE 100

using namespace std;

int main()
{
    char input;
    cout << "插件系统" << endl;
    cout << "输入h查看插件帮助信息" << endl;
    cout << "输入1,2,3,4,5,6分别查看插件1, 2, 3, 4, 5, 6的信息" << endl;//1,2,3为所需要实现的插件功能
    cout << "输入r进入插件1,2,5执行页面" << endl;                         //4,5,6为额外增加的插件功能
    cout << "输入d进入插件3,4,6执行页面" << endl;
    cout << "输入e时退出" << endl;
    while (1) {
        scanf("%c", &input);
        getchar();
        if (input == 'h') {
            CPluginController pc;
            pc.ProcessHelp();
        }
        if (input == '1') {
            CPluginController pc;
            pc.InitializeController();
            pc.ProcessRequest(1);
            pc.UninitializeController();
        }
        if (input == '2') {
```

```
        CPluginController pc;
        pc.InitializeController();
        pc.ProcessRequest(2);
        pc.UninitializeController();
    }
    if (input == '3') {
        CPluginController pc;
        pc.InitializeController();
        pc.ProcessRequest(3);
        pc.UninitializeController();
    }
    if (input == '4') {
        CPluginController pc;
        pc.InitializeController();
        pc.ProcessRequest(4);
        pc.UninitializeController();
    }
    if (input == '5') {
        CPluginController pc;
        pc.InitializeController();
        pc.ProcessRequest(5);
        pc.UninitializeController();
    }
    if (input == '6') {
        CPluginController pc;
        pc.InitializeController();
        pc.ProcessRequest(6);
        pc.UninitializeController();
    }
    if (input == 'r') {
        CPluginController ptr;
        cout << "输入文件名" << endl;
        char File[MAXSIZE];
        cin >> File;
        cout << "输入执行的插件代号" << endl;
        char Function[MAXSIZE];
        cin >> Function;
        ptr.InitializeController();
        if (ptr.IfProcess(Function) == false)//判断插件是否存在
        {
            cout << "No this plugin!" << endl;
        }
        else
        {
                ptr.ProcessFunction(Function, File);
            };
            ptr.UninitializeController();
            if (input == 'e') {
                exit(0);
                break;
            }
        }
        if (input == 'd') {
            CPluginController ptr;
            cout << "输入目录名" << endl;
            char Dir[MAXSIZE];
            cin >> Dir;
            cout << "输入后缀名" << endl;
            char Suffix[MAXSIZE];
            cin >> Suffix;
            cout << "输入执行的插件代号" << endl;
            char Function[MAXSIZE];
            cin >> Function;
            ptr.InitializeController();
            if (ptr.IfProcess(Function) == false)//判断插件是否存在
            {
                cout << "No this plugin!" << endl;
            }
            else
            {
                ptr.ProcessFunction(Function, Dir, Suffix);
            };
            ptr.UninitializeController();
            if (input == 'e') {
                exit(0);
                break;
            }
        }
        if (input == 'e') {
            exit(0);
            break;
        }
    }
}
```