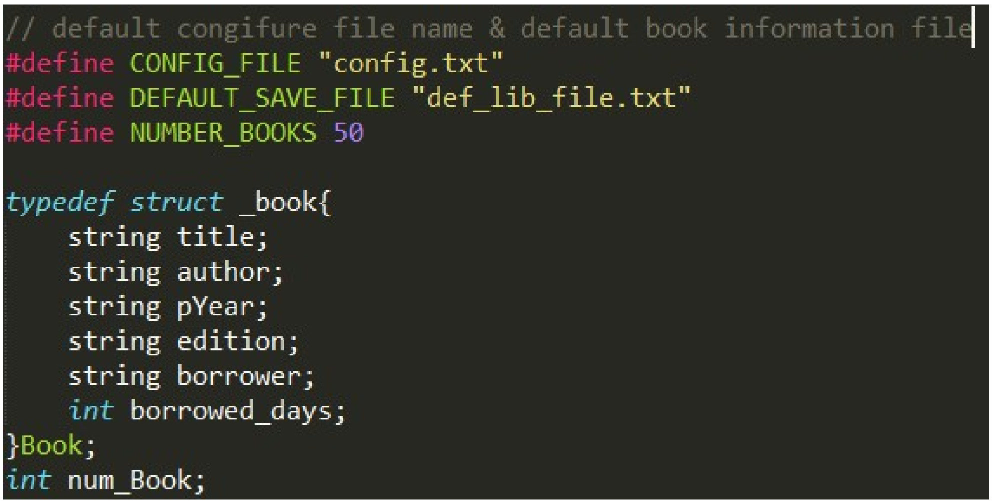
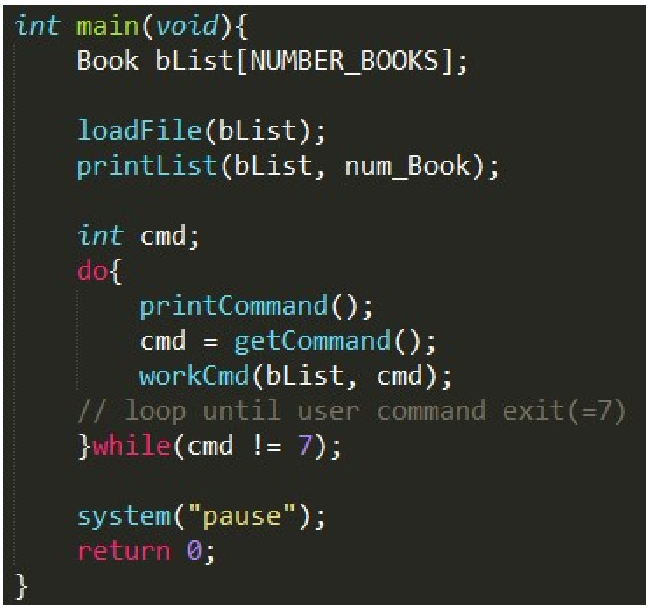
C++ Programming	Student number	21300691
Homework 4	Name	Cheung, Won Sik

Structures



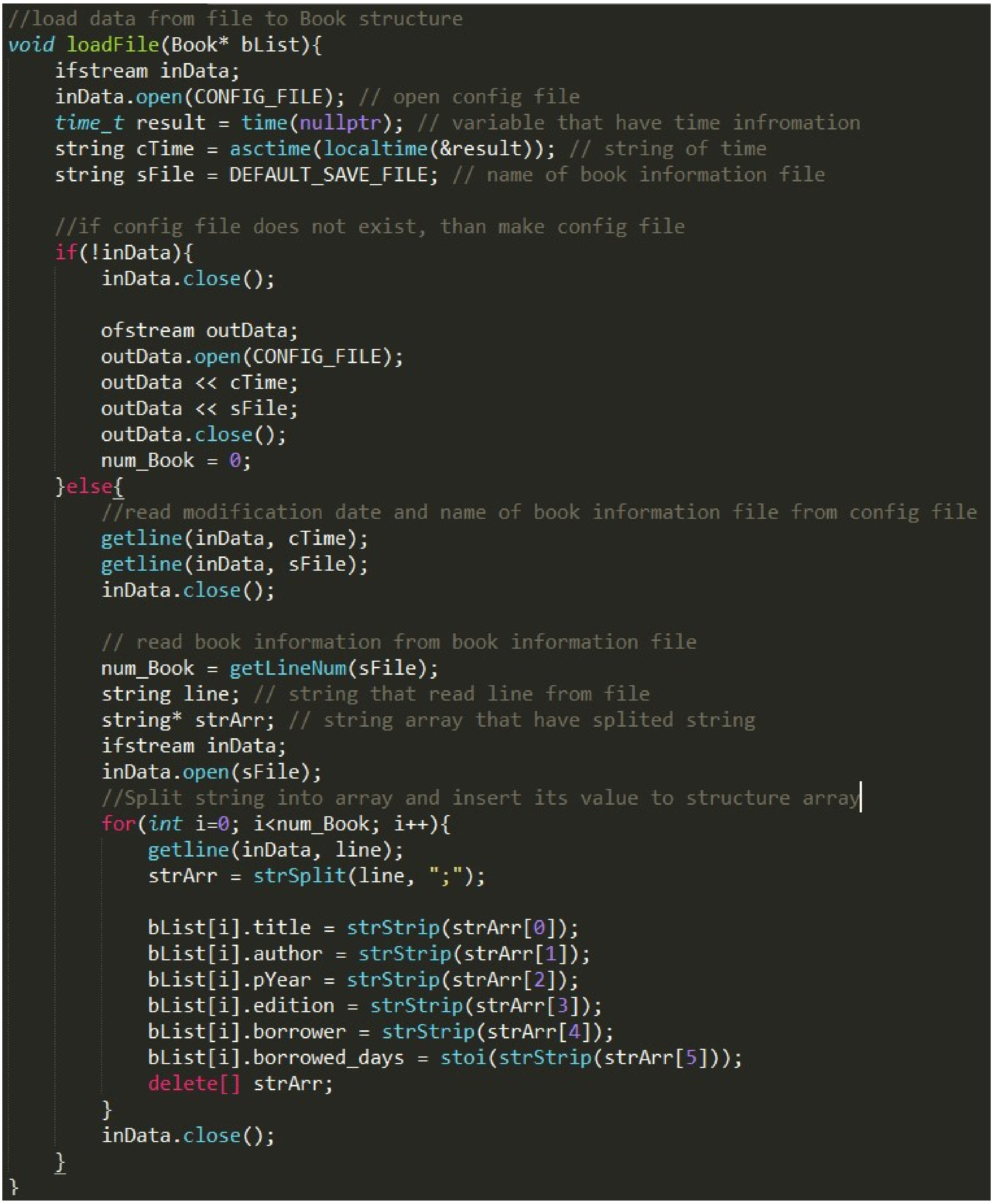
```
// default congifure file name & default book information file
#define CONFIG_FILE "config.txt"
#define DEFAULT_SAVE_FILE "def_lib_file.txt"
#define NUMBER_BOOKS 50

typedef struct _book{
    string title;
    string author;
    string pYear;
    string edition;
    string borrower;
    int borrowed_days;
}Book;
int num_Book;
```

Main Function



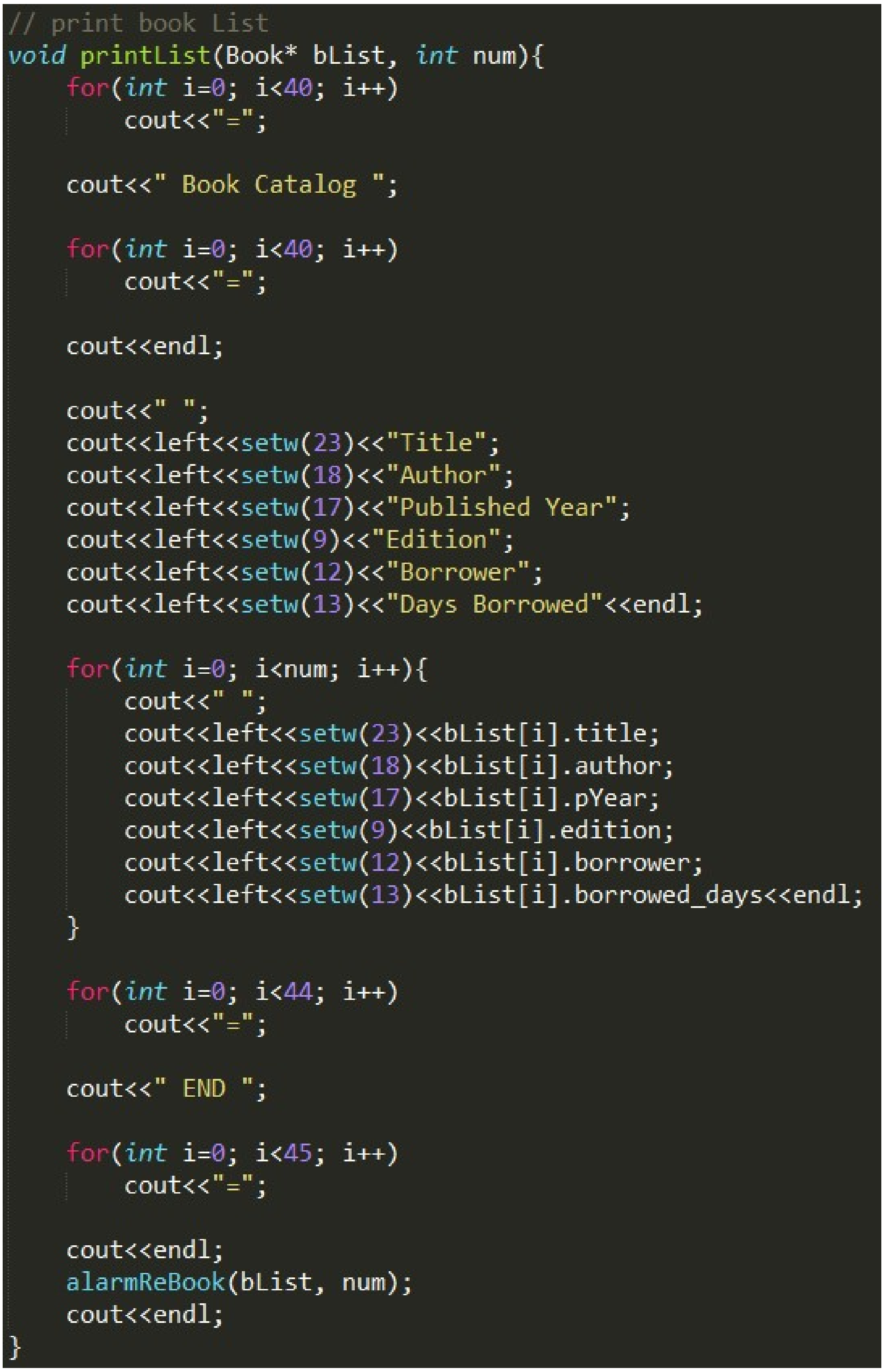
```
int main(void){
    Book bList[NUMBER_BOOKS];

    loadFile(bList);
    printList(bList, num_Book);

    int cmd;
    do{
        printCommand();
        cmd = getCommand();
        workCmd(bList, cmd);
    // loop until user command exit(=7)
    }while(cmd != 7);

    system("pause");
    return 0;
}
```

Load File Function



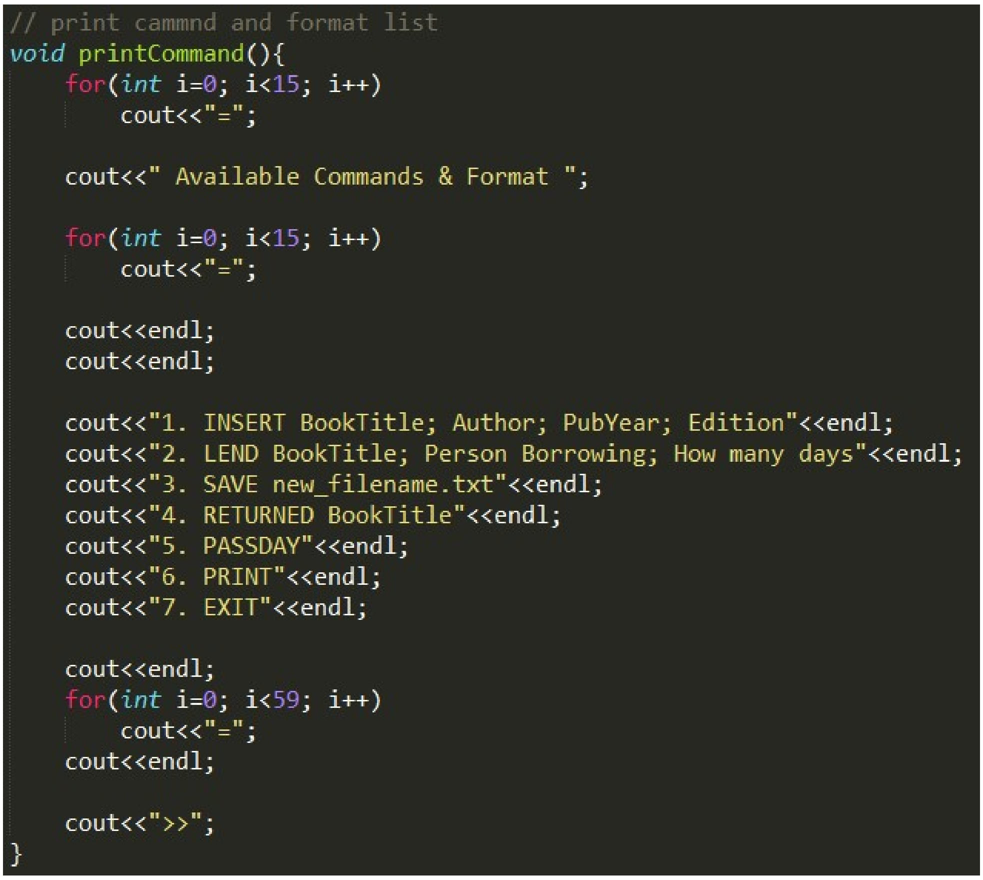
```
//load data from file to Book structure
void loadFile(Book* bList){
    ifstream inData;
    inData.open(CONFIG_FILE); // open config file
    time_t result = time(nullptr); // variable that have time infromation
    string cTime = asctime(localtime(&result)); // string of time
    string sFile = DEFAULT_SAVE_FILE; // name of book information file

    //if config file does not exist, than make config file
    if(!inData){
        inData.close();

        ofstream outData;
        outData.open(CONFIG_FILE);
        outData << cTime;
        outData << sFile;
        outData.close();
        num_Book = 0;
    }else{
        //read modification date and name of book information file from config file
        getline(inData, cTime);
        getline(inData, sFile);
        inData.close();

        // read book information from book information file
        num_Book = getLineNum(sFile);
        string line; // string that read line from file
        string* strArr; // string array that have splited string
        ifstream inData;
        inData.open(sFile);
        //Split string into array and insert its value to structure array
        for(int i=0; i<num_Book; i++){
            getline(inData, line);
            strArr = strSplit(line, ";");

            bList[i].title = strStrip(strArr[0]);
            bList[i].author = strStrip(strArr[1]);
            bList[i].pYear = strStrip(strArr[2]);
            bList[i].edition = strStrip(strArr[3]);
            bList[i].borrower = strStrip(strArr[4]);
            bList[i].borrowed_days = stoi(strStrip(strArr[5]));
            delete[] strArr;
        }
        inData.close();
    }
}
```

Print Book List Function



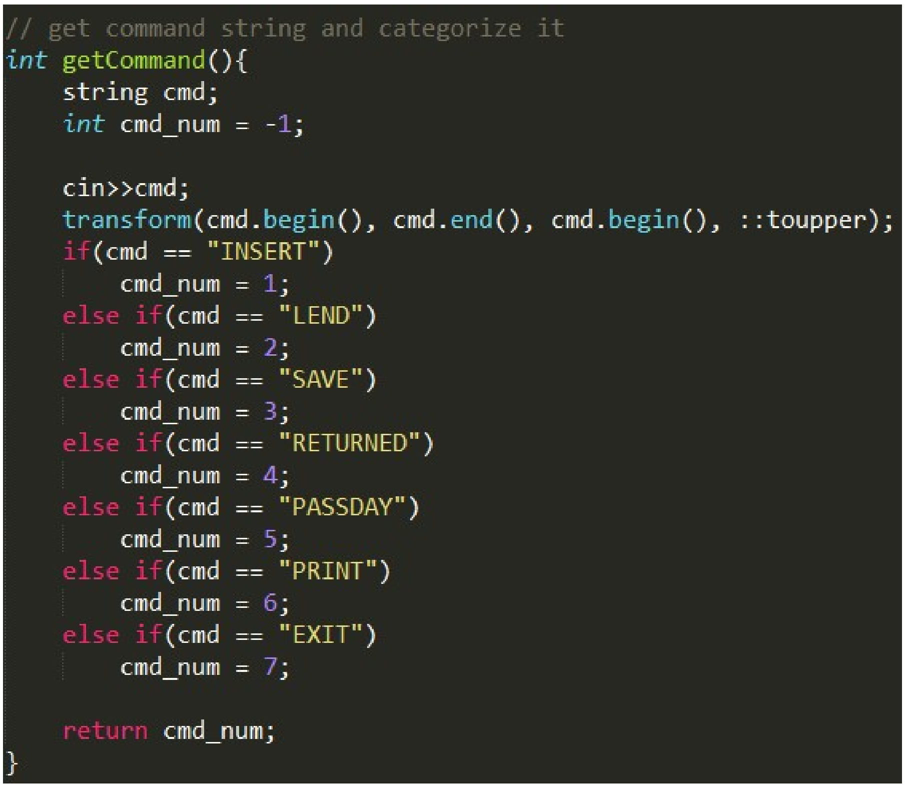
```
// print book List
void printList(Book* bList, int num){
    for(int i=0; i<40; i++)
        cout<<"=";

    cout<<" Book Catalog ";

    for(int i=0; i<40; i++)
        cout<<"=";

    cout<<endl;

    cout<<" ";
    cout<<left<<setw(23)<<"Title";
    cout<<left<<setw(18)<<"Author";
    cout<<left<<setw(17)<<"Published Year";
    cout<<left<<setw(9)<<"Edition";
    cout<<left<<setw(12)<<"Borrower";
    cout<<left<<setw(13)<<"Days Borrowed"<<endl;

    for(int i=0; i<num; i++){
        cout<<" ";
        cout<<left<<setw(23)<<bList[i].title;
        cout<<left<<setw(18)<<bList[i].author;
        cout<<left<<setw(17)<<bList[i].pYear;
        cout<<left<<setw(9)<<bList[i].edition;
        cout<<left<<setw(12)<<bList[i].borrower;
        cout<<left<<setw(13)<<bList[i].borrowed_days<<endl;
    }

    for(int i=0; i<44; i++)
        cout<<"=";

    cout<<" END ";

    for(int i=0; i<45; i++)
        cout<<"=";

    cout<<endl;
    alarmReBook(bList, num);
    cout<<endl;
}
```

Print Command Function



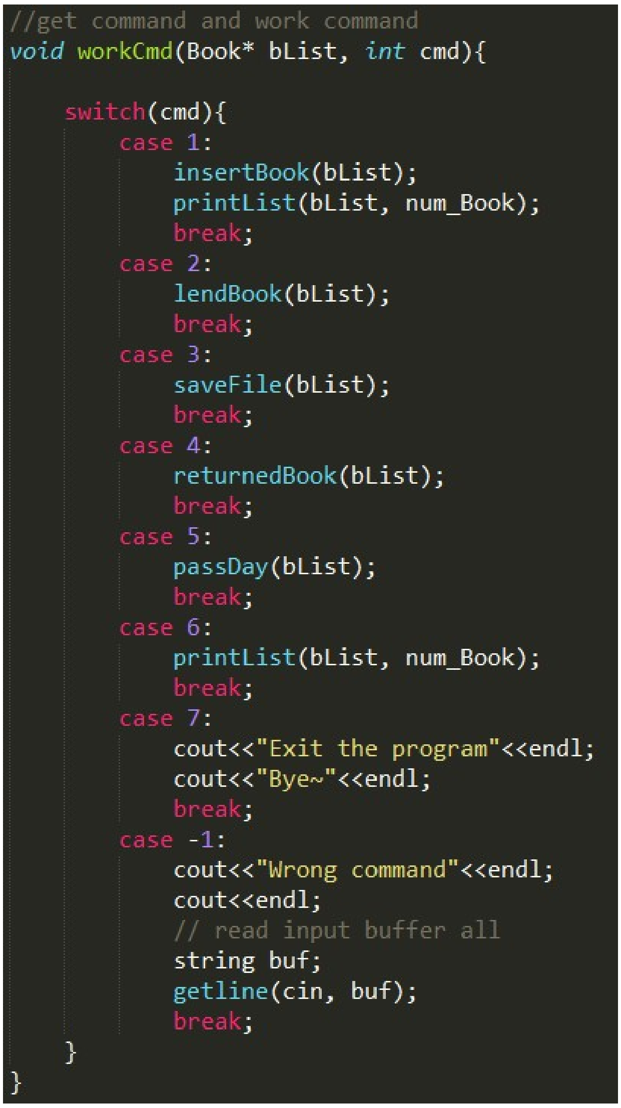
```
// print cammnd and format list
void printCommand(){
    for(int i=0; i<15; i++)
        cout<<"=";

    cout<<" Available Commands & Format ";

    for(int i=0; i<15; i++)
        cout<<"=";

    cout<<endl;
    cout<<endl;

    cout<<"1. INSERT BookTitle; Author; PubYear; Edition"<<endl;
    cout<<"2. LEND BookTitle; Person Borrowing; How many days"<<endl;
    cout<<"3. SAVE new_filename.txt"<<endl;
    cout<<"4. RETURNED BookTitle"<<endl;
    cout<<"5. PASSDAY"<<endl;
    cout<<"6. PRINT"<<endl;
    cout<<"7. EXIT"<<endl;

    cout<<endl;
    for(int i=0; i<59; i++)
        cout<<"=";
    cout<<endl;

    cout<<">>";
}
```

Parse Command Function



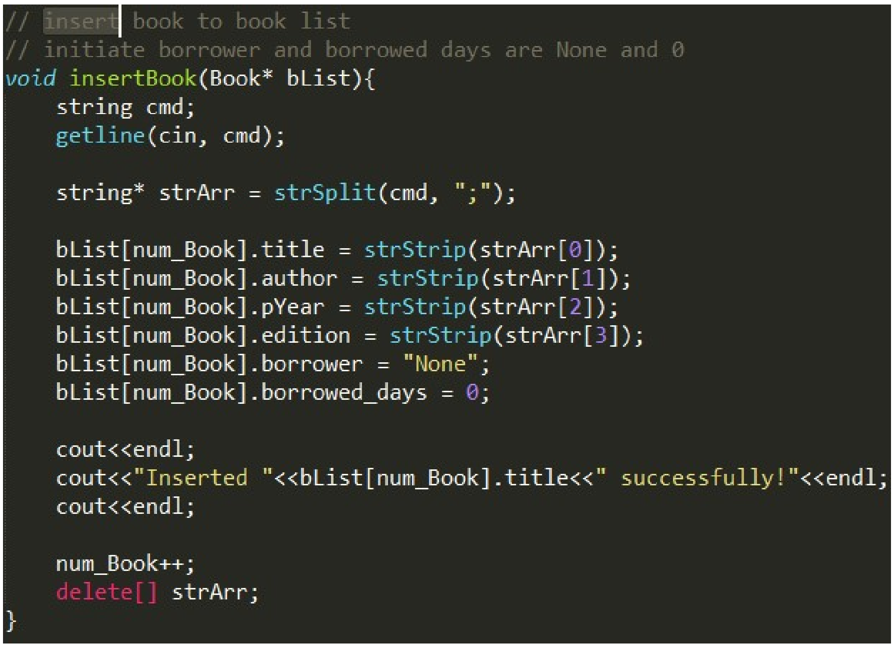
```
// get command string and categorize it
int getCommand(){
    string cmd;
    int cmd_num = -1;

    cin>>cmd;
    transform(cmd.begin(), cmd.end(), cmd.begin(), ::toupper);
    if(cmd == "INSERT")
        cmd_num = 1;
    else if(cmd == "LEND")
        cmd_num = 2;
    else if(cmd == "SAVE")
        cmd_num = 3;
    else if(cmd == "RETURNED")
        cmd_num = 4;
    else if(cmd == "PASSDAY")
        cmd_num = 5;
    else if(cmd == "PRINT")
        cmd_num = 6;
    else if(cmd == "EXIT")
        cmd_num = 7;

    return cmd_num;
}
```

Function that Execute Other Function by Command



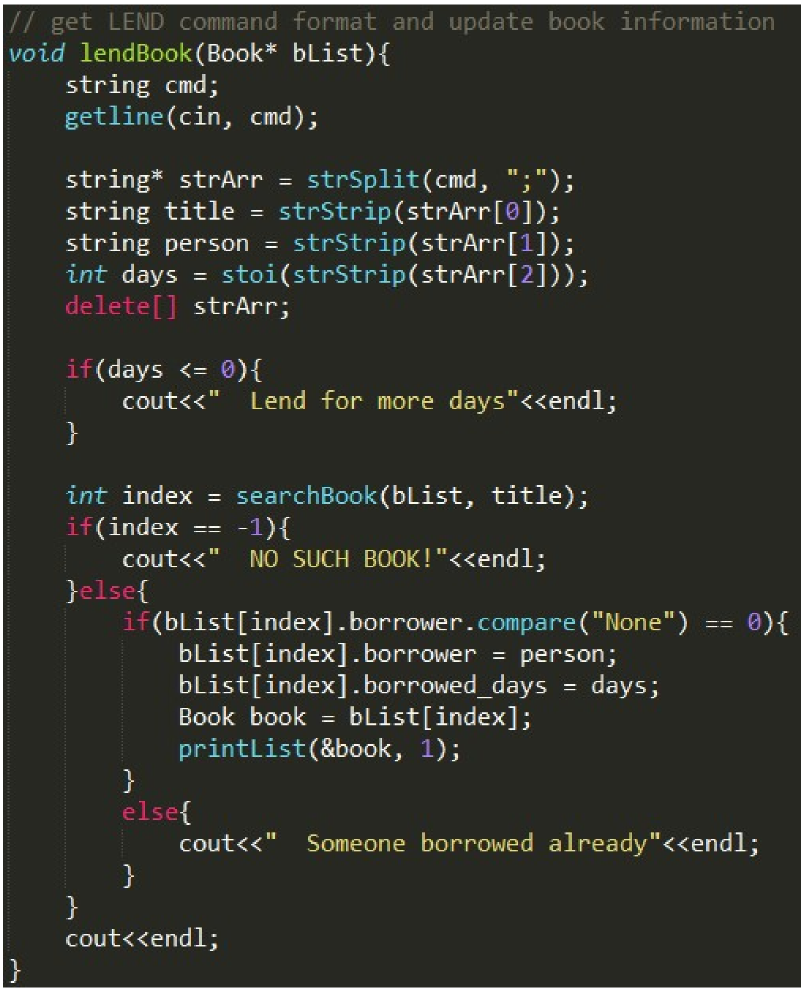
```
//get command and work command
void workCmd(Book* bList, int cmd){

    switch(cmd){
        case 1:
            insertBook(bList);
            printList(bList, num_Book);
            break;
        case 2:
            lendBook(bList);
            break;
        case 3:
            saveFile(bList);
            break;
        case 4:
            returnedBook(bList);
            break;
        case 5:
            passDay(bList);
            break;
        case 6:
            printList(bList, num_Book);
            break;
        case 7:
            cout<<"Exit the program"<<endl;
            cout<<"Bye~"<<endl;
            break;
        case -1:
            cout<<"Wrong command"<<endl;
            cout<<endl;
            // read input buffer all
            string buf;
            getline(cin, buf);
            break;
    }
}
```

Insert Book Function



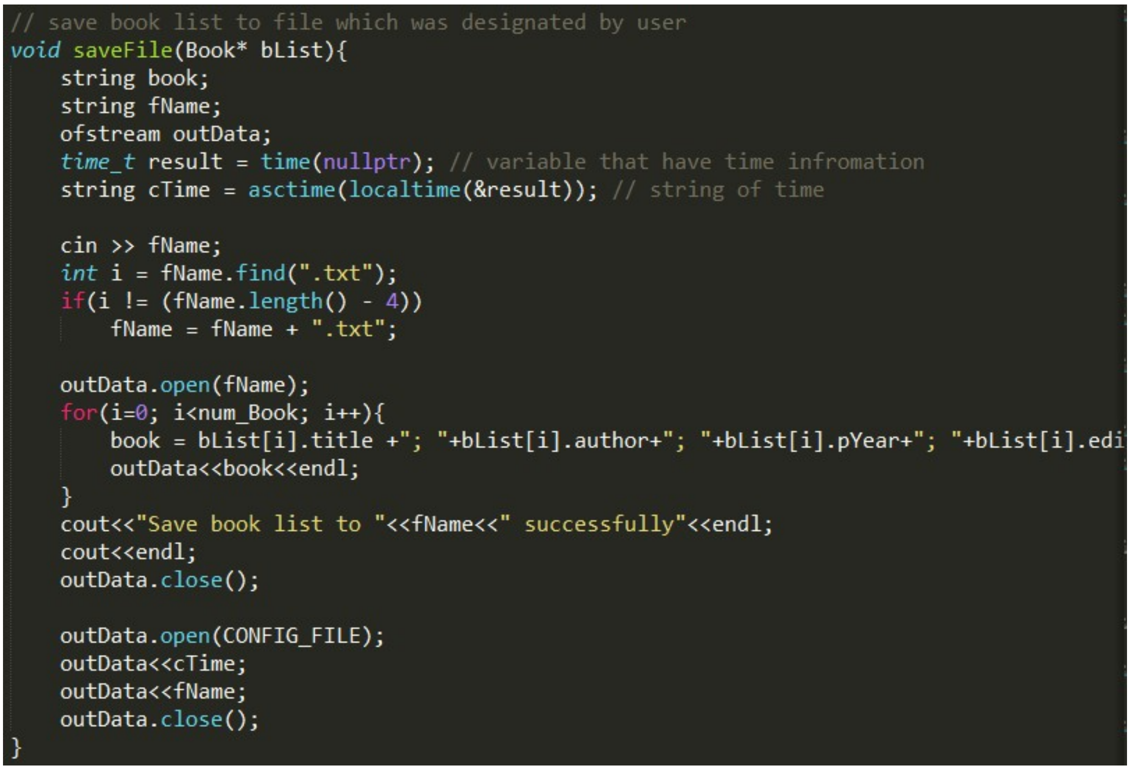
```
// insert book to book list
// initiate borrower and borrowed days are None and 0
void insertBook(Book* bList){
    string cmd;
    getline(cin, cmd);

    string* strArr = strSplit(cmd, ";");

    bList[num_Book].title = strStrip(strArr[0]);
    bList[num_Book].author = strStrip(strArr[1]);
    bList[num_Book].pYear = strStrip(strArr[2]);
    bList[num_Book].edition = strStrip(strArr[3]);
    bList[num_Book].borrower = "None";
    bList[num_Book].borrowed_days = 0;

    cout<<endl;
    cout<<"Inserted "<<bList[num_Book].title<<" successfully!"<<endl;
    cout<<endl;

    num_Book++;
    delete[] strArr;
}
```

Lend Book Function



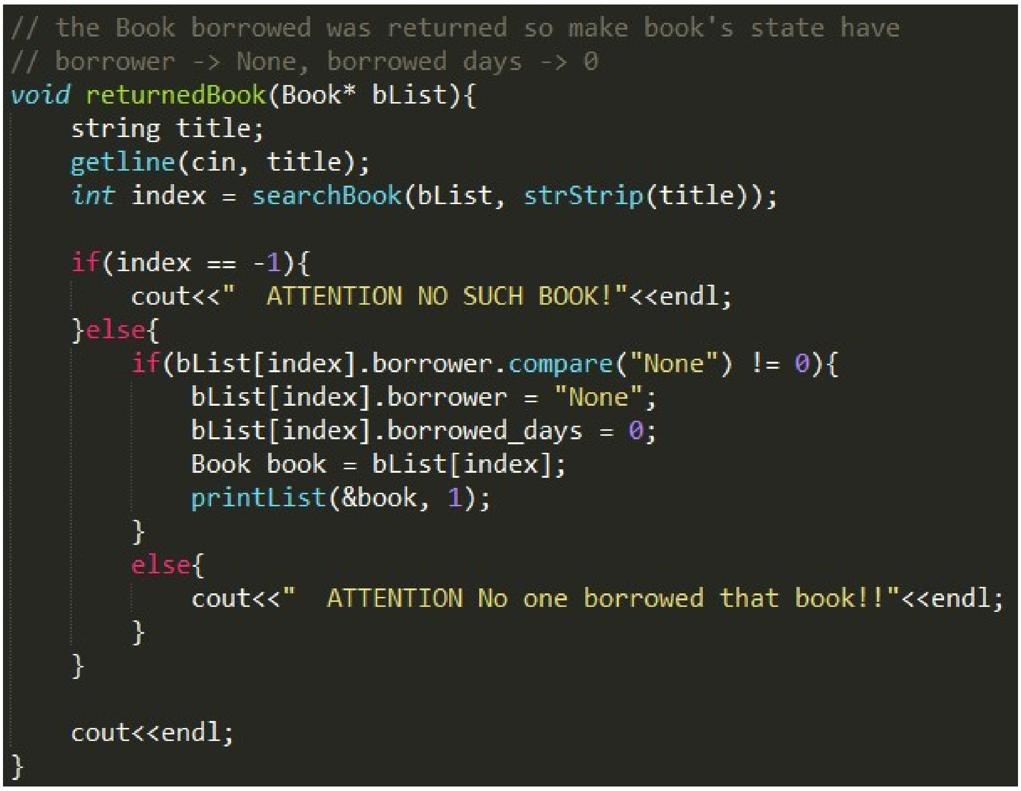
```
// get LEND command format and update book information
void lendBook(Book* bList){
    string cmd;
    getline(cin, cmd);

    string* strArr = strSplit(cmd, ";");
    string title = strStrip(strArr[0]);
    string person = strStrip(strArr[1]);
    int days = stoi(strStrip(strArr[2]));
    delete[] strArr;

    if(days <= 0){
        cout<<"  Lend for more days"<<endl;
    }

    int index = searchBook(bList, title);
    if(index == -1){
        cout<<"  NO SUCH BOOK!"<<endl;
    }else{
        if(bList[index].borrower.compare("None") == 0){
            bList[index].borrower = person;
            bList[index].borrowed_days = days;
            Book book = bList[index];
            printList(&book, 1);
        }
        else{
            cout<<"  Someone borrowed already"<<endl;
        }
    }
    cout<<endl;
}
```

Save File Function



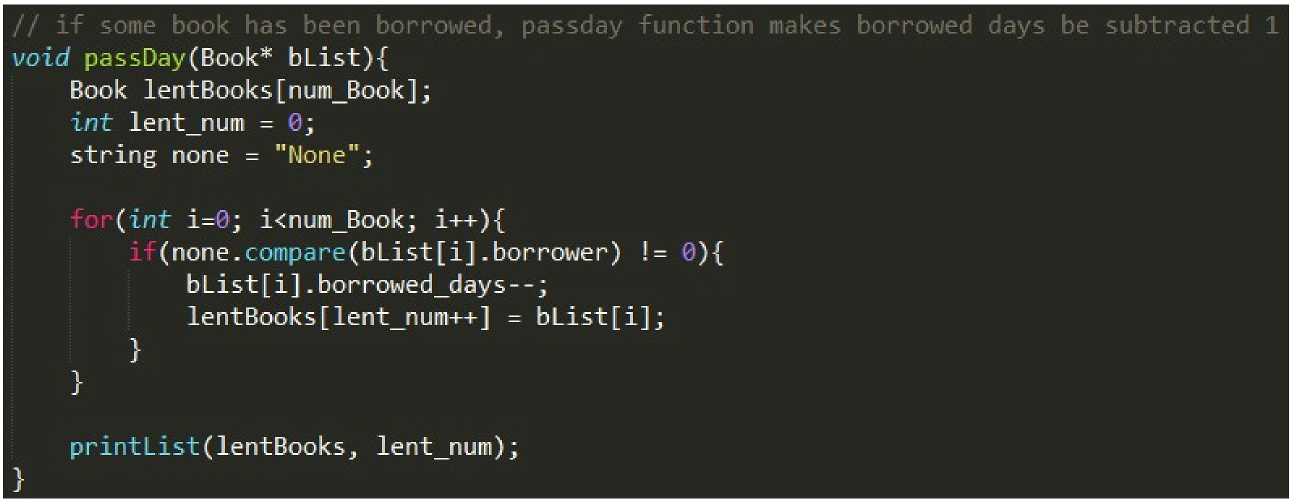
```
// save book list to file which was designated by user
void saveFile(Book* bList){
    string book;
    string fName;
    ofstream outData;
    time_t result = time(nullptr); // variable that have time infromation
    string cTime = asctime(localtime(&result)); // string of time

    cin >> fName;
    int i = fName.find(".txt");
    if(i != (fName.length() - 4))
        fName = fName + ".txt";

    outData.open(fName);
    for(i=0; i<num_Book; i++){
        book = bList[i].title +"; "+bList[i].author+"; "+bList[i].pYear+"; "+bList[i].edi
        outData<<book<<endl;
    }
    cout<<"Save book list to "<<fName<<" successfully"<<endl;
    cout<<endl;
    outData.close();

    outData.open(CONFIG_FILE);
    outData<<cTime;
    outData<<fName;
    outData.close();
}
```

Returned Book Function



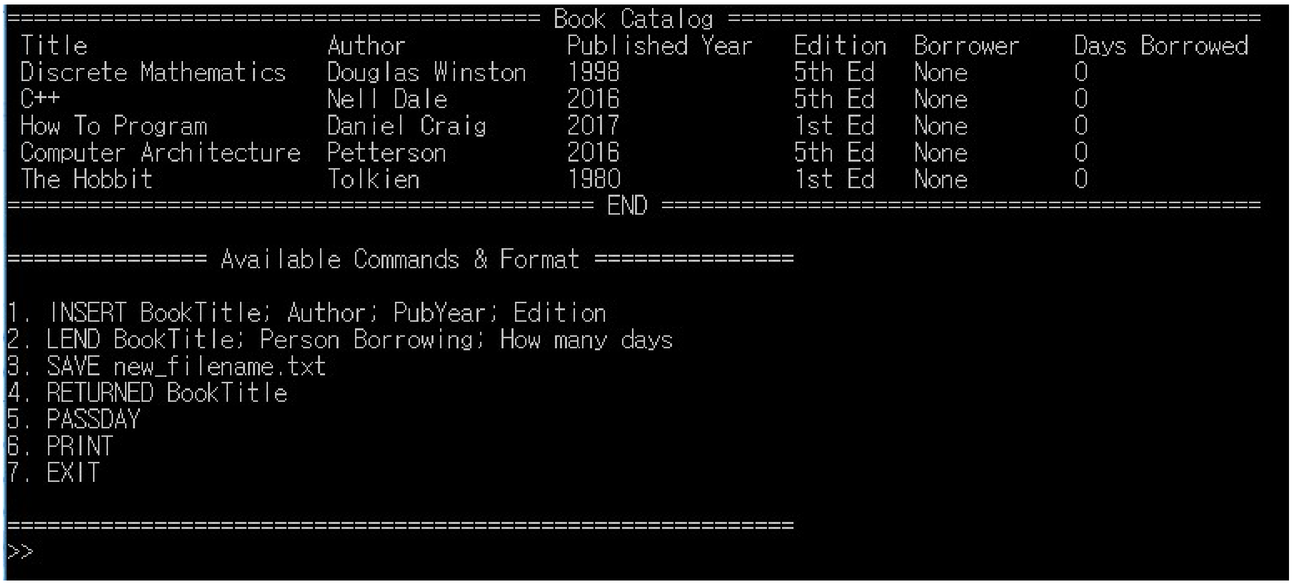
```
// the Book borrowed was returned so make book's state have
// borrower -> None, borrowed days -> 0
void returnedBook(Book* bList){
    string title;
    getline(cin, title);
    int index = searchBook(bList, strStrip(title));

    if(index == -1){
        cout<<"  ATTENTION NO SUCH BOOK!"<<endl;
    }else{
        if(bList[index].borrower.compare("None") != 0){
            bList[index].borrower = "None";
            bList[index].borrowed_days = 0;
            Book book = bList[index];
            printList(&book, 1);
        }
        else{
            cout<<"  ATTENTION No one borrowed that book!!"<<endl;
        }
    }

    cout<<endl;
}
```

Pass Day Function



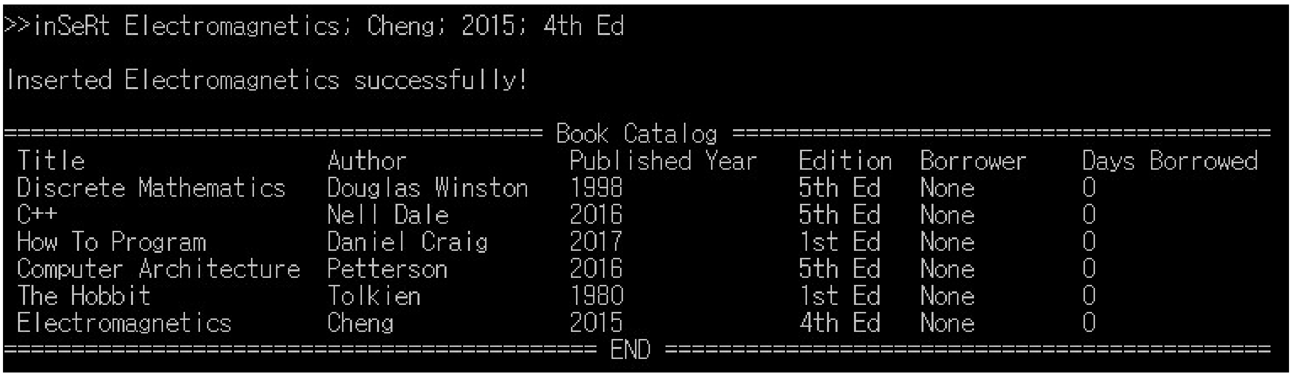
```
// if some book has been borrowed, passday function makes borrowed days be subtracted 1
void passDay(Book* bList){
    Book lentBooks[num_Book];
    int lent_num = 0;
    string none = "None";

    for(int i=0; i<num_Book; i++){
        if(none.compare(bList[i].borrower) != 0){
            bList[i].borrowed_days--;
            lentBooks[lent_num++] = bList[i];
        }
    }

    printList(lentBooks, lent_num);
}
```

Result



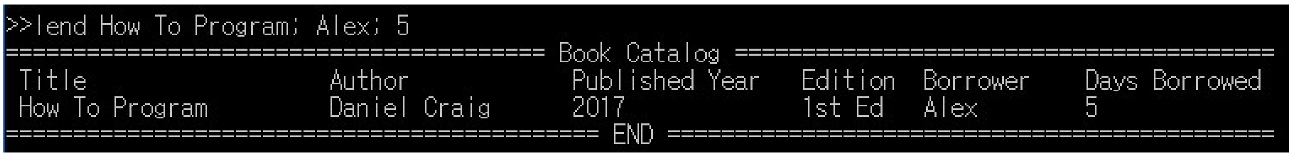
```
======================================== Book Catalog ========================================
 Title                   Author           Published Year   Edition   Borrower     Days Borrowed
 Discrete Mathematics    Douglas Winston  1998             5th Ed    None         0
 C++                     Nell Dale        2016             5th Ed    None         0
 How To Program          Daniel Craig     2017             1st Ed    None         0
 Computer Architecture   Petterson        2016             5th Ed    None         0
 The Hobbit              Tolkien          1980             1st Ed    None         0
============================================ END =============================================

=============== Available Commands & Format ===============

1. INSERT BookTitle; Author; PubYear; Edition
2. LEND BookTitle; Person Borrowing; How many days
3. SAVE new_filename.txt
4. RETURNED BookTitle
5. PASSDAY
6. PRINT
7. EXIT

===========================================================
>>
```

Insert



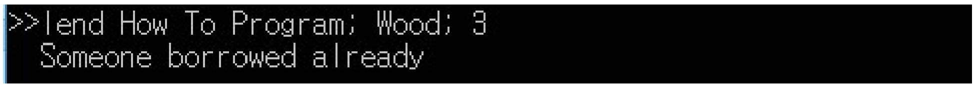
```
>>inSeRt Electromagnetics; Cheng; 2015; 4th Ed

Inserted Electromagnetics successfully!

======================================== Book Catalog ========================================
 Title                   Author           Published Year   Edition   Borrower     Days Borrowed
 Discrete Mathematics    Douglas Winston  1998             5th Ed    None         0
 C++                     Nell Dale        2016             5th Ed    None         0
 How To Program          Daniel Craig     2017             1st Ed    None         0
 Computer Architecture   Petterson        2016             5th Ed    None         0
 The Hobbit              Tolkien          1980             1st Ed    None         0
 Electromagnetics        Cheng            2015             4th Ed    None         0
============================================ END =============================================
```

Lend – Normal Situation



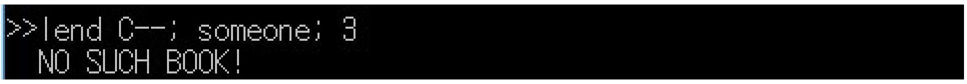
```
>>lend How To Program; Alex; 5
======================================== Book Catalog ========================================
 Title                   Author           Published Year   Edition   Borrower     Days Borrowed
 How To Program          Daniel Craig     2017             1st Ed    Alex         5
============================================ END =============================================
```

Lend – Lend Already Borrowed



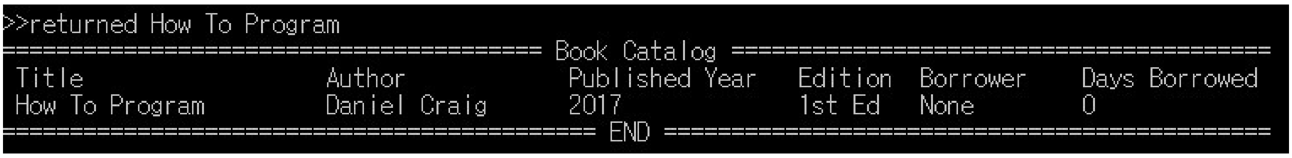
```
>>lend How To Program; Wood; 3
  Someone borrowed already
```

Lend – No Such Book



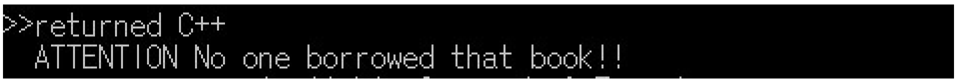
```
>>lend C--; someone; 3
  NO SUCH BOOK!
```

Returned – Normal Situation



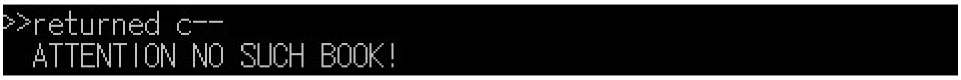
```
>>returned How To Program
======================================== Book Catalog ========================================
 Title                   Author             Published Year    Edition  Borrower     Days Borrowed
 How To Program          Daniel Craig       2017              1st Ed   None         0
============================================ END ============================================
```

Returned – No One Borrowed



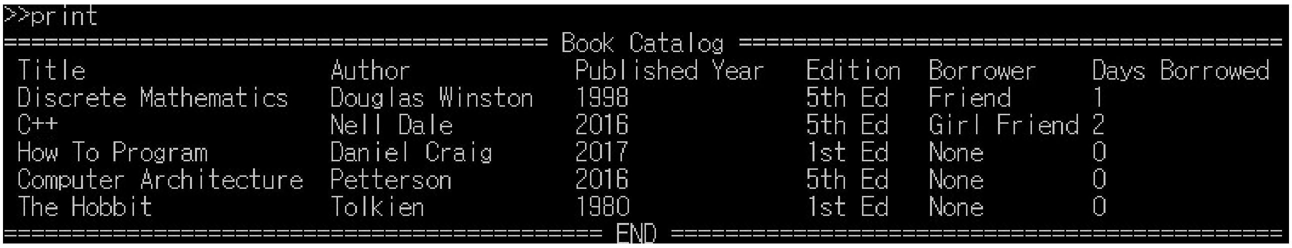
```
>>returned C++
  ATTENTION No one borrowed that book!!
```

Returned – No Such Book



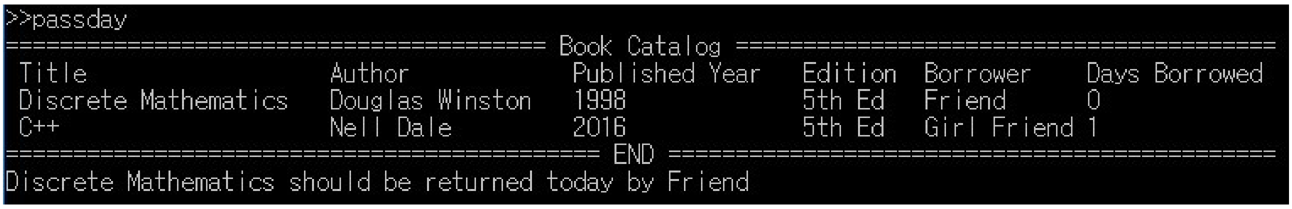
```
>>returned c--
  ATTENTION NO SUCH BOOK!
```

Print

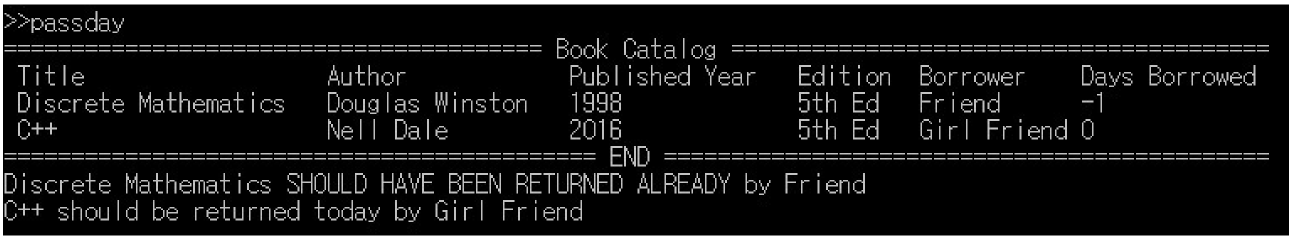


```
>>print
======================================== Book Catalog ========================================
 Title                   Author             Published Year    Edition  Borrower     Days Borrowed
 Discrete Mathematics    Douglas Winston    1998              5th Ed   Friend       1
 C++                     Nell Dale          2016              5th Ed   Girl Friend 2
 How To Program          Daniel Craig       2017              1st Ed   None         0
 Computer Architecture   Petterson          2016              5th Ed   None         0
 The Hobbit              Tolkien            1980              1st Ed   None         0
============================================ END ============================================
```

Pass Day

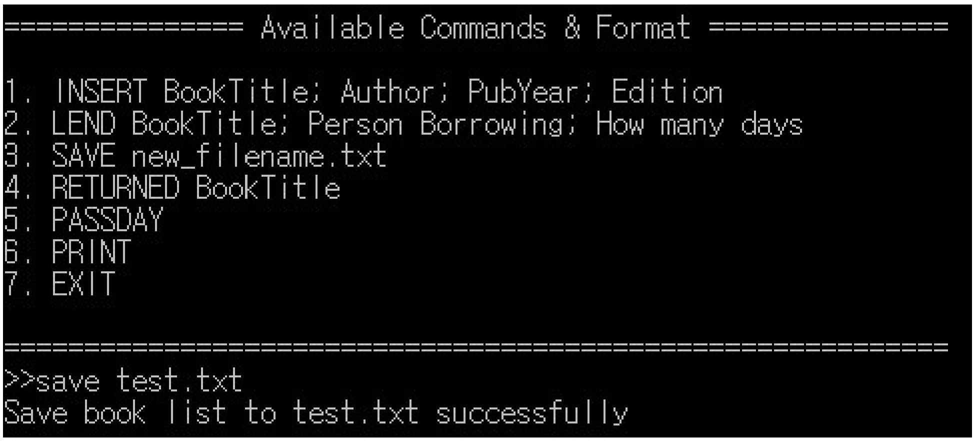


```
>>passday
======================================== Book Catalog ========================================
 Title                   Author             Published Year    Edition  Borrower     Days Borrowed
 Discrete Mathematics    Douglas Winston    1998              5th Ed   Friend       0
 C++                     Nell Dale          2016              5th Ed   Girl Friend 1
============================================ END ============================================
Discrete Mathematics should be returned today by Friend
```

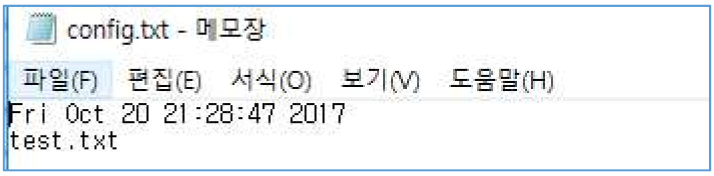


```
>>passday
======================================== Book Catalog ========================================
 Title                   Author             Published Year    Edition  Borrower     Days Borrowed
 Discrete Mathematics    Douglas Winston    1998              5th Ed   Friend       -1
 C++                     Nell Dale          2016              5th Ed   Girl Friend 0
============================================ END ============================================
Discrete Mathematics SHOULD HAVE BEEN RETURNED ALREADY by Friend
C++ should be returned today by Girl Friend
```

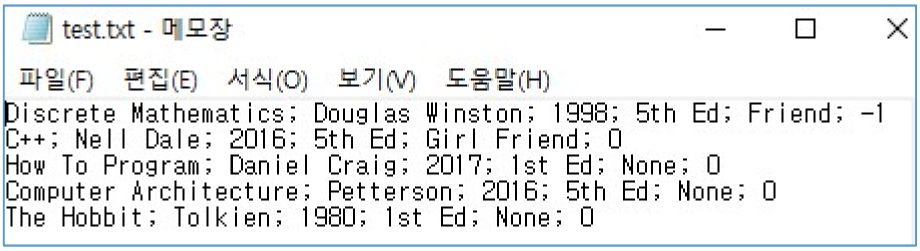
Save



```
=============== Available Commands & Format ===============

1. INSERT BookTitle; Author; PubYear; Edition
2. LEND BookTitle; Person Borrowing; How many days
3. SAVE new_filename.txt
4. RETURNED BookTitle
5. PASSDAY
6. PRINT
7. EXIT


===========================================================
>>save test.txt
Save book list to test.txt successfully
```

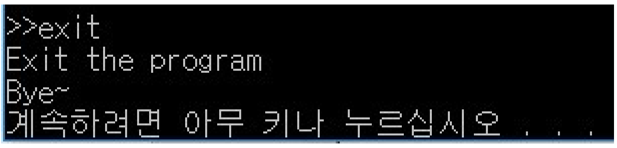


```
Fri Oct 20 21:28:47 2017
test.txt
```



```
Discrete Mathematics; Douglas Winston; 1998; 5th Ed; Friend; -1
C++; Nell Dale; 2016; 5th Ed; Girl Friend; 0
How To Program; Daniel Craig; 2017; 1st Ed; None; 0
Computer Architecture; Petterson; 2016; 5th Ed; None; 0
The Hobbit; Tolkien; 1980; 1st Ed; None; 0
```

Exit



```
>>exit
Exit the program
Bye~
계속하려면 아무 키나 누르십시오 . . .
```