
Direct Access to Files: Examples in C++

Silly Example

```
// Author: Arnold Rosenbloom
#include <iostream.h>
#include <fstream.h>

int main(int argc, char * argv[]) {
    fstream fs;
    fs.open(argv[1], ios::in|ios::out);

    char newCharacter;
    int byteCount;
    newCharacter='W';

    fs.seekp(0, ios::end); // go to the end of the file
    byteCount=fs.tellp();
    cout << argv[1] << " has " << byteCount << " bytes\n";

    if(byteCount>=5){
        // go to byte 5 and write the new character
        fs.seekp(4, ios::beg);
        fs.write(&newCharacter, sizeof(char));
    }

    if(byteCount>=23){
        // go to the byte 23 and write the newCharacter
        fs.seekp(22, ios::beg);
        fs << newCharacter; // a different way to write
    }
    fs.close();
    exit(0);
}
```

1

2

Index Builder

```
#include <fstream.h>
#include <string.h>
class entry {
public:
    int key;
    int pointer;
};
void makeIndex (char * filename, entry * index,
               int & indexSize) {
    in.open (filename, ios::in);
    indexSize = 0;
    while (!in.fail()) {
        char line[100];
        int byteCount;
        char stnum_string[10];
        int stnum;

        byteCount = in.tellg();
        in.getline(line, 100, '\n');

        strncpy(stnum_string, line, 9);
        stnum_string[9] = 0;
        stnum = atoi(stnum_string);

        indexSize++;
        index[indexSize].key = stnum;
        index[indexSize].pointer = byteCount;
    }
    in.close();
}
```

3

```
char * lookup (int student_num, entry * index,
               int indexSize, fstream in) {

    for (int i=0; i<indexSize; i++) {
        if (index[i].key == student_num) {
            char line[100];
            in.seekg(index[i].pointer);
            in.getline(line, 100, '\n');
            return line;
        }
    }
    return 0;
}
```

4

```

void doLookups (entry * index, int indexSize, char * filename)

    fstream in;
    in.open (filename, ios::in);

    while (1) {
        int num;
        char * student_rec;
        cout << "Student number to search for: ";
        cin >> num;
        if (num == -1) break;
        student_rec = lookup (num, index, indexSize, in);
        if (student_rec == 0)
            cout << "Not found.\n";
        else
            cout << student_rec << "\n";
    }
}

int main(void) {
    entry index[500];
    int indexSize;
    makeIndex ("smallfile", index, indexSize);
    doLookups (index, indexSize, "smallfile");
    exit(0);
}

```

5

Binary Search

```

// Adapted from code written by Arnold Rosenbloom.

int BinarySearch(fstream & fs, Record & t){

    Record try;
    int low=0; int high;
    fs.seekg(0,ios::end);
    high=((fs.tellg()-1)/Record::recordSize);
    while(low<high){
        int middle=(high+low)/2;
        fs.seekg(Record::recordSize*middle);
        fs >> try;
        if(try.compare(t)==0)return(try);
        if(try.compare(t)<0)low=middle+1;
        else high=middle-1;
    }
    return(low);
}

```

6

Using RRNs

Assume that you have a data file that is already open. Given a relative record number, write a C++ method to go to the beginning of that record in the file in preparation for reading it.

Include in the parameter list all information that is needed by the method; do not assume that you have access to any variables outside the method.

```

void seekToRelRec( fstream & file, const int recSize;
                  int recNum ) {

    file.seekg( recSize*recNum, ios::beg );

}

```

7