# FILE ORGANIZATION

## 1st Homework Assignment

**Due on: Friday, November 5, 2004**

- In this homework you will implement a simple library catalog system in which a user can search for a book with respect to Book Title or ISBN Number. Also the administrator of the system could add a book record, delete a book record, or update book information.

### ► Step 1

Each record has three fields:

- Book Title,
- Author Name,
- ISBN Number.

We assume that fixed-length record size is used. So we may represent the record as the following data structure in C++:

```
typedef struct TBook {
    char author[16] ;
    char title[24] ;
    char isbn[10] ;
    char *key(){return isbn;}
} SBook ;
```

### ► Step 2

Implement add, delete, and update functions. Make sure that you consider the following situations in your design:

- When you add a record, first look at the AVAIL LIST, then write the record. If there is a record available in the AVAIL LIST, write the record to a record AVAIL LIST points and make appropriate changes on the AVAIL LIST
- If the record to be added already exits, do not write that record to the file
- When you delete a record, do not physically delete the record from file, just put a marker on the file and make appropriate changes on AVAIL LIST
- If the record to be deleted does not exist, display a warning message on the screen
- The file should be compact after exiting the program, i.e. there should be no records marked as deleted in the file.

### ► Step 3

Implement two sorted lists, one for isbn and one for book title. Keep the lists sorted after add and delete operations.

### ► Step 4

Implement searching on Book Title and ISBN Number.

You should **provide a report** with your source code including a **detailed** explanation and a **flow chart** of the source code.

Note:
1) You may use the code attached to the document as a starting point. The code is not complete, so you may need to make changes on the functions or on structure of the code.
2) You may use any programming language other than C++ such as Java or C#.

| **IMPORTANT** |
| --- |
| ➢ You must follow the official Homework Guidelines (http://www.ce.itu.edu.tr/lisans/kilavuz). |
| ➢ Academic dishonesty including but not limited to cheating, plagiarism, collaboration is unacceptable and subject to disciplinary actions. Any student found guilty will have grade F. Assignments are due in class on the due date. Late assignments will generally not be accepted. Any exception must be approved. Approved late assignments are subject to a grade penalty. |

```
typedef struct TBook {
     char author[16] ;
     char title[24] ;
     char isbn[10] ;
     char *key(){return isbn;}
} SBook ;

template <typename KeyType>
bool Equal(KeyType key1,KeyType key2){
     if (key1==key2) return true ;
     return false ;
}

bool Equal(char *key1,char *key2){
     return (strcmp(key1,key2)==0) ;
}

bool Greater(char *key1,char *key2){
     return (strcmp(key1,key2)>0) ;
}

long getFileLength(FILE *stream){
   long curpos, length;

   curpos = ftell(stream);
   fseek(stream, 0L, SEEK_END);
   length = ftell(stream);
   fseek(stream, curpos, SEEK_SET);
   return length;
}
```

```
template <typename RecordType>
void readRecord(FILE *hFile,RecordType &rec,int rrn){
     fseek(hFile,rrn*sizeof(RecordType),SEEK_SET) ;
     fread(&rec,sizeof(RecordType),1,hFile) ;
}

template <typename KeyType,typename RecordType>
bool BinarySearch(FILE *hFile,RecordType &rec, KeyType &key){
    int low=0,high=getFileLength(hFile)/sizeof(RecordType)-1 ;
    int guess ;
    while (low<=high){
          guess = (high+low)/2 ;
          readRecord(hFile,rec,guess) ;
          if (Equal(rec.key(),key)) return true ;
          if (Greater(rec.key(),key)) high = guess-1 ;
          else low = guess+1 ;
    }
    return false;
}
```