CSCI-1411 Fundamentals Of Computing Lab

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Lab 12: Advanced File Operations

- Introduction to Files:
  - Directive: #include <fstream>
  - Data types of a file
    - Output files: ofstream
    - Input files: ifstream
    - Both output and input files: fstream
  - Open a file:

```
logical_name.open(physical_name);
```

  - Close a file:

```
logical_name.close();
```

Lab 12: Advanced File Operations

- Character Input:
  - C-string: an array of characters
    - get: read a single character from a file (read any character, including whitespace)
    - put: write a single character to a file
    - To handle whitespaces, using cin.getline()

```
char letterGrade;
gradeFile.get(letterGrade);
gradeFile.put(letterGrade);

char name[12];
gradeFile.getline(name,12);
```

Lab 12: Advanced File Operations

- Character Input:
  - String object:
    - To handle whitespaces, using getline()

```
String letterGrade;
//directly from user input
getline(cin,letterGrade);
// from file
getline(my_file, letterGrade);
```

Lab 12: Advanced File Operations

- Binary Files:
  - Contain unformatted, non-ASCII data
  - Indicate by using ios::binary flag on open
  - Use read and write instead of <<, >>

```
char ch;
// read in a letter from file
inFile.read(&ch, sizeof(ch));
```

address of where to put the data being read in. The read function expects to read chars

how many bytes to read from the file

```
// send a character to a file
outFile.write(&ch, sizeof(ch));
```

Lab 12: Advanced File Operations

- Files & Records:
  - Can write structures to, read structures from files
  - To work with structures and files,
    - use ios::binary file flag upon open
    - use read, write member functions

```
logical_name.read((char *) struct_tag, sizeof(struct_tag));

logical_name.write((char *) &struct_tag, sizeof(struct_tag));
```

Lab 12: Advanced File Operations

- Random Access Files:
  - Sequential access: start at beginning of file and go through data in file, in order, to end
  - Random access: access data in a file in any order
    - seekg (seek get): used with files open for input
    - seekp (seek put): used with files open for output

offset

mode flag

```
inData.seekg(25L, ios::beg);
// set read position at 26th byte
// from beginning of file
outData.seekp(-10L, ios::cur);
// set write position 10 bytes
// before current position
```

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- Random Access Files:
  - Random access:
    - Important note !!!
      - If eof is true, it must be cleared before seekg or seekp using the function clear().
    - tellg member function: return current byte position in input file
    - tellp member function: return current byte position in output file

```
long int whereAmI;
whereAmI = inData.tellg();
whereAmI = outData.tellp();
```

      - Marker positions always begin with 0.

Lab 12: Advanced File Operations

- Overview:
  - Lab 12 Components
    - Lab Sections (12.1 non-optional, 12.2, 12.3, 12.4, 12.5)
    - 12.3/12.5 Represent the majority of the work

Lab 12: Advanced File Operations

- 12.1 Introduction to Files (non-optional)
  - (files.cpp)
  - Answer questions asked in exercise 3 & 4

- 12.2 Files as Parameters and Character Data
  - (Grades.cpp)
  - Answer questions asked in exercise 1

- 12.3 Binary Files and the write Function
  - (budget.cpp)
  - Implement Exercise 2

Lab 12: Advanced File Operations

- 12.4 Random Access Files
  - (randomAccess.cpp)
  - Answer questions asked in exercise 2
  - Skip exercise 3

- 12.5 Code Assignment
  - Pick option one or two
  - Name the source file (main.cpp)

Lab 12: Advanced File Operations

- □ Submission File Checklist
  - □ Submit all files on Canvas (One at a time or all of them in a single zip file). Be sure to include all source files and documents.

  - □ 12.1 files.cpp
  - □ 12.2 Grades.cpp
  - □ 12.3 budget.cpp
  - □ 12.4 randomAccess.cpp
  - □ 12.5 main.cpp