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| Author 1: | Jonathan Mabery |
| Email 1: | jmabery@uco.edu |
| Author 2: | Andrew Aprile |
| Email 2: | [aaprile@uco.edu](mailto:aaprile@uco.edu) |
| Course: | ADS. CMSC3613. CRN10040 |
| Assignment | Project 1. p01 |

## 3. Project Progress. Everything here is also in the file ProjectPlan.docx

### 1. Project Objectives

Implement a program that contains a record of people using a list structure. Use either contiguous or linked list implementation. Insert a database from a text file. Text file has a list of last names, first names, and ID numbers.

### 2. Task Breakdown

| **Task #** | | **Description** | | **Status** | | **Assigned To** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | | Understand class structure and data model | | Done | | Both |
| 2 | | Implement core functionalities | | Undergoing | | Both |
|  | 2-1 |  | Insert records in alphabetical order |  | Done | Jonathan Mabery |
| 2-2 | Print the contents of the record | Done | Andrew Aprile |
| 2-3 | Support search functionality | Done | Both |
| 3 | | Error handling and input validation | | Done | | Andrew Aprile |
| 4 | | Test application | | Done | | Both |
| 5 | | Finalize code and documentation | | Done | | Both |

### 3. Timeline

Make a tentative timeline to manage the project progress.

| **Date** | **Task** | **Notes** |
| --- | --- | --- |
| 9/13/25 | Start Project. Setup GitHub | Done |
| 9/15/25 | Complete task 1 | Done |
| 9/16/25 | Complete task 2 | Done |
| 9/20/25 | Complete task 3 | Done |
| 9/20/25 | Testing and debugging | Done |
| 9/21/25 | Submit project, code, report, documentation | Done |

### 4. Technical Details

* **Language:** C++ (Standard: e.g., C++11 or C++14)
* **Development Environment:** [e.g., Windows 11, Visual Studio Code, g++, etc.]
* **Key Concepts Used:**
  + OOP (Classes/Objects)
  + File I/O
  + List
  + Sorting
  + String matching and comparison
  + Efficient manipulation of a customized data type

### 5. File Structure

/p01\_group17.zip

│

├──/Code

├── List.h

├── utility.h

├── main.cpp

├── utility.cpp

├── makefile

├── data.txt

├── people.txt

├── smallpeople.txt

├── p01\_report.docx

├── p01-report.pdf

├── ProjectPlan.docx

├── ProjectPlan.pdf

└── README.md

### 6. Testing Plan

* **Manual test cases**
  + Create test cases
    - User selects invalid menu option.
      * Solution:
      * Display error message.
      * Display menu options again
    - User selects “Import List from File”. Then user inputs a file name that doesn’t exist
      * Solution:
      * Display message that says “Added 0 entries”
      * Display menu options again
    - User wants to display or search a record before adding entries
      * Solution:
      * Display a message saying that the record is empty
      * 
    - When the user selects the search list menu option and doesn’t enter the option for id or first last name.
      * Solution:
      * Display error message and ask again for input
      * A screenshot of a computer

        AI-generated content may be incorrect.
  + Input scenarios with expected vs actual output
* **Test in a standard environment**
  + Set up GitHub Actions
  + Compile the code
  + Optional: test cases
    - Duplicate entries
    - Invalid user input

### 7. Documentation

* **README.md** with:
  + Project description
  + How to compile and run
  + Usage instructions
* Code comments for clarity

### 8. Completion Checklist

| **Item** | **Done (Y / N)** |
| --- | --- |
| All features implemented | Y |
| Code compiles without errors | Y |
| Optional: all test cases pass | Y |
| Proper documentation | Y |
| Code is commented | Y |
| Submitted on time | Y |

## 4. Discussion Questions

### Q1:Which version of the list implementations is better: contiguous or linked? Please explain.

Contiguous is better when you have a known number of records, want to access them quickly, and don’t care about reserving a lot of memory.

Linked is better when you don’t know the number of records beforehand, don’t care about quick access, and want to preserve memory (memory is only used when a new record is created).

We used the contiguous implementation.

With our code, we started the clock when the user entered an ID or first and last name, then displayed the amount of time it took to find the record once found.

As shown here, we imported the data.txt file that the instructor provided and then searched for the last record with ID=55. Even though it is at the end of the list, it was found in 0.003 seconds. With a linked implementation, it would have to search in sequential order before going to the end of the list.

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### Q2: How to understand the function: void traverse(void (\*visit) (List\_entry &))?

This sends the address of the visit function to the list traverse function. The traverse function then calls the visit function to print out the data in the list that called it.

In main, we called the .traverse function and passed the function pointer “visit”.



List.h then iterated through the a loop using the record list counter, and calls the visit function for each pass

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The visit function is declared in utility.h



And defined in utility.cpp

A computer code with colorful text

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### Q3: What’s the search algorithm you used in Item 3? Briefly explain why it’s efficient.

We used a simple linear search algorithm. We made a for loop, limiting the loop to the size of the record, and searched for each element in the record.

This is really the only way to do it if the list is unsorted as in the case of ID.

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For searching based on last name, we could have implemented a binary search. This is because we inserted each element into the list in alphabetical order.

If the list was much larger, then using a binary search would be something that would be better.

### Q4: Can you directly use the comparison operators (e.g., >, <, >=, etc.) to compare instances of Personal\_record? If not directly supported, can you provide a solution to make it possible? Briefly explain your design.

Our Personal\_record design does not allow the use of those operators but it would be straightforward to make it so.

We would have to implement operator overloading. This allows us to directly compare characteristics of our record without using dot notation.

For example, if we made two Personal\_record ojects named ‘a’ and ‘b’, assigned the number 5 to a, and 6 to b, we can use the less than symbol to ask the program if a is less than b.

If those numbers were employee numbers representing the order in which they were hired, we could then see which employee was hired first.

Personal\_record a(“Joe”, “Smith”, 5);

Personal\_record b(“Mary”, “Jane”, 6);

if(a<b){

cout << “Joe was hired before Mary” << endl;

} else{

cout << “Mary was hired before Joe” << endl;

}

We would write the code in our Personal\_record structure

bool operator<(const Personal\_record& other) const {

return ID < other.ID;

}

## 5. Screenshots of the test run

Make and Execute

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Enter ‘1’ and press enter

Enter ‘data.txt’ and press enter

The data.txt file has two duplicates. For each one, it prints out the line “Duplicate record found. Discarding.

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Enter ‘2’ and press enter.

This displays the record in alphabetical order with each record separated by dashes -.

It also prints the number of records in our list.

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Type ‘3’ and press enter

Type ‘id’ or ‘fl’ to search by ID or Name

If you select id, enter id and press enter

A screenshot of a computer program

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Type ‘y’ if you want to search again

Type ‘fl’ then type ‘c cc’. This finds a record

A screenshot of a computer

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Type ‘n’ to exit search. This gets you back to the main menu.

A screenshot of a computer program

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Type ‘x’ to exit the program.

