C++ Programming Projects

General guidelines

Global variables may not be used in any of the assignments.

Classes whose instances are to be saved to a file must provide overloaded operators for writing to and reading from a file. A class may provide a separate member function for interactive entry of values.

All assignments have one thing in common: they need to write data to a file and to read data from a file. Reading and writing should work like opening file in an editor. When you open file the current data in memory is removed and replaced with the data that was read from the file. When you save data to file all data from memory is written to a file, replacing the previous content of the file. Initialize means that all exisiting data in memory is removed and user can start entering new data.

Write user friendly programs:

- When user is requested to enter values program must clearly state what type of values are expected
- If user enters an invalid value an error message must displayed

Reports must print data in formatted columns where printed data is aligned by columns. For example, when printing numbers make the field width large enough to hold largest number that you are going to print.

Do not use “magic numbers” – define constants if you need to limit for example the range of valid values. Note that in C++ constants are typically defined the class that needs them instead of using preprocessor defines.

Give descriptive names to classes and member functions.

Remember that you should delegate all tasks to objects. Start by thinking what each class in your program does and what is the relation between the classes.

Use STL (containers, algorithms, etc.) as much as possible. STL was designed for efficiency so there is no point in trying to re-implement existing functionality.

Ask questions and discuss your design decisions with the instructor and other students. Sharing and exchanging ideas is an essential part of the learning process.

Assignment 1

Write a program for keeping a driving diary. Program is used to record and store trips that a person makes with his/hers car.

The program stores following information about each trip:

- Start location

- Start time
- Odometer value at the start of the trip
- End location
- End time
- Odometer value at the end of the trip
- The amount of fuel you bought during the trip (does not necessarily apply to every trip)

The program must have (at least) following commands:

1. Initialize (clear all trip information)
2. Save trip data to file
3. Read trip data from file
4. Add a new trip
5. Remove a trip

   Print a report. Program asks user to enter upper and lower limit of driven distance and prints trips where the driven distance is in the specified range
6. Calculate average fuel consumption based on the driven distance and bought fuel.

Assignment 2

Write a quiz program. Questions contain at least following information.

- Question
- Alternative 1
- Alternative 2
- Alternative 3
- Alternative 4
- Correct answer (1,2,3, 4)

The program must have (at least) following commands:

1. Initialize (clear all questions)
2. Save questions to file
3. Read questions from file
4. Add a new question. Program asks user to enter new question and then asks user to enter answer alternatives. Then program prints question and alternatives and asks user to enter the correct answer which is saved.
5. Take the quiz. Program asks user 5 random questions (no duplicates allowed). After each question program tells if answer was correct or not but does not display the correct answer. After the quiz the program prints the final score (for example: Your score is 3 out of 5)

6. Print a report which lists all questions but does not display the answers

Program displays the question to user as follows:

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What is the first day of week in the Jewish calendar?
1) Sunday
2) Monday
3) Friday
Enter your answer:
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The alternatives must be displayed in random order when user takes the quiz and program picks two incorrect alternatives out of the three to display.

Assignment 3

Write a program that keeps record of books that are in the library. The program stores following information about each book:

- Name of the book
- Id number of the book
- Name of the person who borrowed this book
- Date when the book is to be returned

The program uses an array of records to hold the books in the library and keeps track of who borrowed books and when they are due to be returned.

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save library records to file
3. Read library records from file
4. Add a new book to library
5. Borrow a book
6. Return a book
7. Print a report which lists all books. First the ones that are out on a loan and then the ones that are available in the library.

Keeping a separate record of books and library card holders is considered an additional credit.

Assignment 4

Write a program that keeps record of student's curriculum (HOPS). Curriculum consists of courses that a student must take and their grades. Program stores following information about each course:

1. Name of the course
2. Course identification
3. Number of study points
4. Grade (you must also indicate whether the course has been completed or not)

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save curriculum to file
3. Read curriculum from file
4. Add a new course to curriculum
5. Remove a course from curriculum (a course that has been passed may not be removed!)
6. Enter a grade (0 - 5)
7. Print a transcript. First the courses that student has not yet taken then the ones that student has taken but not passed (i.e. grade is zero) and finally the ones that are passed and their grades.

Assignment 5

Write a program that keeps record of football results. Program stores following information about each match: name of home team

- name of opposing team
- home team score
- opposing team score
- location of match
- week number of match

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save records to file
3. Read records from file
4. Add new match
5. Make a correction to an existing match
6. Print a report of matches where user specified team has played.
7. Print a report of matches played in a user specified location.

Assignment 6

Write a program that keeps record of pictures that you have taken. Your program does not have to store real pictures, just names and other information. Program stores following information about each picture:

- Filename of the picture (for example, DSC00043.jpg)
- Description of the picture (for example “grandma’s birthday)
- Location where the picture was taken
- Number of people in the picture

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save picture records to file
3. Read picture records from file
4. Add new picture
5. Remove a picture
6. Print a report which lists pictures that have at least at least the user specified number of people in the picture
7. Print a report which lists all pictures and marks the pictures that contain only scenery with a star (number of people is zero)

Assignment 7

Write a program to keep record of names, addresses and telephone numbers.

Each structure contains the following information:

- Name
- E-mail address
- Telephone number
- City
- Relative

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save contact information to file
3. Read contact information from file
4. Add new person to phone book
5. Remove a person from the phone book

6. Print a list of persons who live in the given city
7. Print all contact information, relatives are printed before other persons

Assignment 8

Write a program to track your personal finance. Program keeps track of your financial situation by storing both your incomes and expenses. Program stores following information about each financial transaction:

- Type of transaction (income/expense)
- Description of transaction (for example: “this month’s salary”, “lunch”, “groceries”, “rent”, etc.
- Amount of money
- Date of transaction

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save financial records to file
3. Read financial records from file
4. Add money (income)
5. Spend money (expense)
6. Print a report which prints all transactions and in the end prints sum of incomes and expenses and difference between the sums (positive difference means you are saving, negative meaning that you are spending more than you earn)
7. Print a report that prints a sorted list of transactions. User selects from three options:
    a. All transactions in the same listing
    b. Expenses first then income
    c. Income first then expenses

Assignment 9

Write a program that a computer repair shop uses to keeps track of repaired computers. Program stores the following information about each repair:

- Name of the client
- Problem description
- Description of performed work/problem solution
- Time spent (minutes)
- Status (Completed / Pending)

The program must have (at least) following commands:

1. Initialize (clear all records)
2. Save repair records to file
3. Read repair records from file
4. Add a new repair task
5. Perform fix. (add solution + time spent to an existing task)
6. Display 3 most difficult repairs based on the time spent on the fix
7. Print a report which lists all repairs. Print first completed repairs and then pending repairs.

Assignment 10

Write a program that a travelling salesman can use to keep track of items he has for sale. Each item that he has for sale is recorded using this program. The program stores following information about each item:

- Name of item
- Price of item
- Number of items he has for sale
- Number of items sold so far

The program uses an array of records to hold the salesman's stock of item.

The program must have (at least) following commands:

1. Initialize (clear stock listing)
2. Save stock listing to file
3. Read stock listing from file
4. Add a new item to list
5. Sell an item (decrease items for sale & increase number of sold items)
6. Replenish stock (increase items for sale)
7. Print a report which lists all items in the stock and in the end prints total revenue (total amount of money received from selling items)