**Lab Report**

**Programming Tasks in an Integrated Development Environment (IDE)**

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**Introduction:**

This report provides an overview of how IDE and programming works and getting familiar with the editing and compilation environment, how to modify a simple C++ program, design a Struct and implement it in a C++programming.

**Task 1: Familiarizing with the IDE**

- Objective:

To learn and understand the basics of the Visual Studio as an IDE which includes installation of the IDE, setting it up, learn how to create project, the basics programming, compilation, execution, debugging, and documentation for foundation in CS and Engineering.

It enhances coding efficiency, streamlines the development process, and fosters effective problem-solving and project management skills.

- Process:

1. Installation and Setup: Downloaded and installed Visual Studio and configured it for C++ programming.

2. Project Creation: Initiated a new project in C++, entered the code as per the instructions from Gaddis.

3. Compilation and Execution: Compiled and ran the program and understood the process and the importance of syntax.

4. Debugging and Breakpoints: Practiced setting of breakpoints and going over the code to understand how the program works and how to debug.

5. Documentation: Documented the process through screenshots.

A computer screen shot of a program

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A screenshot of a computer

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**Task 2: Debugging a C++ Program**

- Objective: To debug a C++ program with errors related to arithmetic operations and variable initializations.

- Approach: Identified and fixed errors by analyzing the code, using debugging tool to debug it, resolving the issues, and compiling the code to validate if it has all the appropriate corrections.

**Errors and Reflections**

- A manual error, which is very common in C++ where variables need manual management (on line 35 he would have failed to notice the **div+1** that would have made it difficult for the program to work as mentioned). This could have been avoided by paying attention and regularly initializing the code.

- An arithmetic error which might have occurred due to confusion between integer and floating-point division. Can be easily avoided by paying attention to variable type.

- A logic error, due to usage of incorrect logic. Can be fixed by comprehensive testing and code reviews.

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**Task 3: Refactoring and Introducing Structured Arrays**

- Objective: To restructure the program to use a single-structured array and enhance data management.

- Procedure: Implemented a `Product` structure, restructured code to use this structure, and fixed bugs introduced during the process.

**Implementation and Bugs**

- Structure Definition: Defined a `Product` structure for better data binding.

- Restructure: Replaced multiple arrays with a single `Product` array.

- Common Bugs: Encountered typing and compiler errors

**Testing and Documentation**

- Performed thorough testing for correctness and stability.

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**Conclusion**

The completion of these tasks helped us understand and improve skills in using an IDE for software development. The experience gained in debugging and restructuring gave us an insight in understanding real-world challenges and solutions in programming. This foundation is essential for pursuing a successful career in CS and Engineering, where proficiency in software development, problem-solving, and effective communication are important.

**Reference:**

Gaddis, T. (2020). Program 8-6. *Starting Out with C++* (pp. 482-484)