Introduction to C++

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| **Assessment Task Number:** Part 2 – Debugging Problems | |
| **Unit Code(s):** | **Unit Title(s):** |
| ICTPRG443 | Apply intermediate programming skills in different languages |
| ICTICT449 | Use version control systems in development environments |
| **Instructions to Learners:** | |

Download the student samples GitHub repository containing the project to debug from GitHub:

<https://github.com/AcademyOfInteractiveEntertainment/AIEYear1Samples>

You have received the following email from your supervisor:

Hi,

I have a problem with a bit of code one of the other interns has made.

The designers wanted a simple program to let them double-check the NPC data stored in the game’s data file.

In the *AIEYear1Samples* git repo you’ll find the project *IntroCPP\_BinaryFileIO\_NPCData*.

There are a few problems I have with this program:

* + - The designers tell me when they run this program on their real data files it takes way too long to load.   
      It seems the program reads the whole data file and stores the whole thing in memory – this is bad!  
      I need it to only load the current record. You’ll need to create a random-access algorithm to jump directly to the required record. DON’T sequentially read the file!
    - For some reason the NPC’s name isn’t being read in correctly. Can you fix this?
    - I get a crash when pressing the right arrow to go the next record while I’m on the last one (there are only 5 records in the sample file).
    - And finally, the most annoying thing is the whole program has no comments! Please add comments so the next intern knows what they’re doing.

When you’re done with your fixes, I want you to really *TEST* your work. Give me a brief report of how you tested your work – including what tests you ran and their results (I’m expecting at least 3 or 4 tests).

I also need to make sure you know what you’re doing in Visual Studio, so give me a few screenshots of you using the debugger. Show me:

* + - Some breakpoints you’ve placed in the code,
    - Some auto and custom watch variables displayed while debugging, and
    - The callstack while you’re debugging the program

Oh, and tell me the keyboard shortcuts for stepping through code in the debugger.

Do a good job and I’ll recommend you to the boss!

Cheers,  
Sam

Fix the problems described in the email above. Your final program must resolve all bugs, and use a random-access algorithm to read and load a single record at a time from the data file.

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| **Task** | | **Evidence Criteria** |
| 1. | Random Access File I/O | Update the given program to read a file using a random-access algorithm |
| 2. | Fix Name Display | Resolve the issue with the name displaying incorrectly |
| 3. | Program Crash | Resolve the issue with the program crashing when getting the next record |
| 4. | Comment Code | Add comments to the program.  Comments must be in line with industry standards or as defined by your trainer/assessor. |
| 5. | Testing Document | Document at least 3 test cases.  Documentation for each test case must list   * What is being tested * The input given * The expected output * The actual output * Any modifications made as a result of testing |
| 6. | Visual Studio Screenshots | A document containing screenshots of the following Visual Studio debugging features:   * Some breakpoints you’ve placed in the code, * Some auto and custom watch variables displayed while debugging, and * The callstack while you’re debugging the program |
| 7. | Debugging Shortcuts | A document containing a list of Visual Studio debugging shortcuts for navigating through code while using the debugger, including:   * Step Into * Step Over * Step Out |
| **Submission Requirements:** | | |
| You will need to submit the following:   * A Release build of each application that can execute as a stand-alone program * Your complete Visual Studio project   Be sure to remove any temporary build folders (i.e., the Debug and Release folders). Only project files, source code files, and any resource files used should be included in your submission.  Package all files in a single compressed archive file (.zip, .7z, or .rar) | | |

Document testing

In an attempt to make sure every system of the program works I have engaged 4 separate tests to demonstrate it’s sufficiency.

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| **Test** | **Expected Output** | **Actual Output** | **Passed?** |
| Changing through all records pressing both left and right through a full sequence. | All records display their name, age and image. | When pressing left immediately, the program won’t display an image or a name and state that the age is “0”. | Fail. |
| Adding additional characters onto name strings to test if they still cut off correctly. | All records display their name without the additional characters. | All records display their name without the additional characters. | Passed. |
| Test using variable watch to test if currentRecordIdx is capable of going below recordCount’s lowest value. | currentRecordIdx = 0 | currentRecordIdx = 0 | Passed. |

After failing the first test I have used both a variable watch and std::cout method to print which record is being used currently to test to see if I haven’t in any way went out of the bounds of the record index. Using this it shows that currentRecordIdx is always in the bounds of the record index.

Modification: after test 1 failed, I have attempted to fix the problem by stopping it from loading the empty page. Originally, I have tested it seeing if I would be able to reload it without the name as it appears to stop loading the empty record if it is run through a few times. In the first set of records, it will not load the first 3, then in the next set of records, it will only load the first 2, then only the first. In an attempt to solve this, I attempted to see if by checking if a value was not properly set, it would re-run the load function 1 spot below it, skipping the empty record. I believe the problem has occurred due to the method used to read the records. I have the load function set to read the first value and tell it to be ready to read the next record using tellG. My problem is that I then immediately attempt to load the previous record. I am unaware though why it will fail 3 records and then sequentially less.

Breakpoint screenshots

Variable Watch

A screenshot of a computer

Description automatically generated with medium confidence

Breakpoint

A screen shot of a computer program

Description automatically generated with low confidence

Call stack A picture containing screenshot, text, line, software

Description automatically generated

Shortcuts

Step in:f11

Step over:f10

Step out: shift,f11.