**4-2 Milestone Three: Enhancement Two: Algorithms and Data Structure**

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1. **Briefly describe the artifact. What is it? When was it created?**

The artifact that I will use comes from a previous class, CS 350: Emerging Systems Architectures and Technologies. This project is a thermostat that uses external sensors to tell the temperature, and it can be turned up or down depending on the button pressed. It uses an LCD to display the temperature, time, and date. This project was created and worked on throughout July 2025. However, this enhancement was recently created in September 2025 for the purpose of this to feature create an automated project.

1. **Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in algorithms and data structure? How was the artifact improved?**

Since this is the same project, I will justify the inclusion of the binary search tree for the enhancement. I chose to add a binary search tree (BST) to this project so it can pull the data logged file. I added this because it shows real world knowledge in demonstrating algorithmic thinking. But using a BTS we show our understanding the tree traversal in-order, pre-order, post-order with efficient search logic. This makes our project more technical, highlights efficiency and will open doors to more advanced concepts in future enhancements if you come back to it. Another reason I added this was to impress potential future in employers. A lot of coding interview have the BST problem with them on it, because the company wants to test your core computer science knowledge and it shows your problem-solving skills.

1. **Did you meet the course outcomes you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**

I do believe I met the course outcome that I planned with implementing this enhancement. I designed a code that added a Binary Search Tree (BTS) to this project it was designed to demonstrate the design and evaluation of a computing solution using algorithmic principles and computer science practices. I also demonstrated my ability to incorporate different techniques into a project to further advance the development of the project while adhering to coding best practices.

The course outcomes I chose were:

**Course Outcome** - Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices.

1. **Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?**

The was a little challenging since I haven’t worked closely with a BST in some months I had to look back on some previous pieces of work. I used W3Schools to refreshen up on the subject a little bit. I learned that by doing this enhancement that if I plan later on adding more fields to the logging feature such as location, humidity, sensor ID, and/or thermostat ID it would be better to use a Json file instead. This is for cases where I have multiple thermostats chained together so I can get more accurate logging data. I haven’t switched to the Json file because for this project there’s only one so the .txt file is good since I’m just logging the basics.

The challenge I faced is my information was the Binary Search Tree (BST) was becoming skewed, and I couldn’t figure out why it wasn’t working as intended. After researching the issue, I realized that you can’t have the templog.txt auto logging as you try to build the tree. For the BST to build correct, I realized that I would have to disable the auto logging feature or stop the thermostat from running. For the demonstration of this project, I have the temperatures being logged every 30 seconds which is causing the issue. But if I was in a normal setting, I would set this thermostat logging temperature every few hours or so. So, building a BST between these time wouldn’t cause an issue.

**Resources:**

*W3Schools.com*. (n.d.). <https://www.w3schools.com/dsa/dsa_data_binarysearchtrees.php>