Derek Matias

Joseph Martinez

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Milestone Four Narrative

The artifact I selected for this milestone is the Raspberry Pi thermostat that I created during CS 350. This project connects a breadboard circuit, a temperature sensor, LEDs, and an LCD screen to a Raspberry Pi, allowing the system to react to temperature changes through programmed logic. Over the course of this program, the thermostat has evolved from a simple demonstration of sensor control into a more complete embedded system. In this final enhancement, I focused on extending its functionality to include database integration so that data could be stored, tracked, and later reviewed.

I included this artifact in my ePortfolio because it now represents a complete example of design, algorithmic reasoning, and data management. For this milestone, I added a local SQLite database that stores both sensor readings and events. Every thirty seconds, the thermostat records the current temperature, setpoint, and operating state into a table of readings. Button presses and state changes are also logged as events. These updates make the project more sophisticated because the system no longer just reacts to its environment; it now preserves a record of its activity for analysis. I also included safe commit handling, print confirmations under debug mode, and a method for viewing the last few readings directly from the terminal. Together, these additions highlight my understanding of how to structure persistent data and interact with it through reliable, efficient code. The outcome I set out to meet for this milestone involved demonstrating my ability to apply techniques, skills, and tools in computing to achieve industry goals. By integrating SQLite and structuring data through organized tables, I met that outcome. The project now aligns with real-world practices where devices collect and store operational data for monitoring, maintenance, or further analytics. This also complements the design and algorithmic outcomes from the earlier milestones, completing the full range of categories for the ePortfolio.

Enhancing the thermostat with a database taught me how important it is to balance simplicity with functionality. It would have been easy to overcomplicate the design by introducing complex relational models or large-scale frameworks, but I learned that in embedded systems, clarity and reliability matter more than scale. The biggest challenge I faced was ensuring that database operations did not interfere with the timing of the control loop. Since the Raspberry Pi is handling both real-time sensor input and storage writes, a small delay can have visible effects. Solving this required testing the placement of commits and using exception handling carefully to maintain smooth operation. This process reinforced my understanding that even small design choices can have practical consequences when software interacts with physical hardware.