**CS 499 Computer Science Capstone**

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CS499: Enhancement Two Narrative

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**Artifact Description**

The second artifact I selected for my ePortfolio is part of the core logic system used to manage entity behavior in a procedurally generated 2D survival game. Originally developed during the early stages of the CS 499 capstone project, this component has since evolved to include sophisticated behavior logic, interaction systems, and decision-making pathways for in-game creatures. It was created to demonstrate advanced use of data structures and algorithms applied to gameplay systems, particularly within AI movement, predator-prey detection, and environmental simulation.

I chose this artifact because it effectively showcases my ability to apply algorithmic thinking to solve dynamic problems in real time. Specifically, components such as the shouldFlee method, predator-prey mapping, and behavior switching logic demonstrate my understanding of both spatial reasoning and algorithmic efficiency. The enhancement included the integration of interfaces like Predator, Prey, and Herdable and involved implementing systems to detect threats and make escape decisions based on runtime data using Map structures, spatial tile comparisons, and vector calculations. These improvements show my proficiency in applying algorithms to simulate intelligent behavior.

With this enhancement, I successfully met the course outcomes I planned for in Module One. I designed and evaluated computing solutions using algorithmic principles (Outcome 3) and demonstrated the ability to implement industry-relevant techniques and tools in computing (Outcome 4). No updates to my outcome-coverage plan are necessary at this point, as the enhancements to this artifact align well with my intended goals for showcasing depth in algorithms and data structures.

Through enhancing this artifact, I deepened my understanding of runtime optimization, interface-driven architecture, and how seemingly simple behaviors (like wandering or fleeing) require careful coordination of movement logic, distance calculation, and state transitions. One of the challenges I faced was balancing behavioral flexibility with performance, ensuring that decision-making logic runs efficiently even as the number of entities scales up. Another hurdle was ensuring tile-based distance comparisons accurately reflected the game's world structure, especially when converting floating-point world coordinates to discrete tile positions.

This artifact serves as a strong representation of my ability to create scalable, extensible systems using core computer science principles. It has given me confidence in tackling AI-driven systems and designing modular, algorithmically sound behaviors for complex environments.