**1. What is the identification and description of each technology?**

The first technology is Open Source AI. This includes artificial intelligence tools and models that anyone can use, study, and improve without needing to pay for them. Well-known examples are OpenAI’s GPT models, Meta’s LLaMA, and popular machine learning platforms like TensorFlow and PyTorch. These tools give the public access to powerful AI technology that used to be limited to big tech companies. Open Source AI allows people around the world to build new apps, solve problems, or improve existing systems more quickly because they don’t have to start from scratch.

The second technology is Advanced Simulation Technology. This involves using very powerful computers to run detailed simulations that can handle thousands to millions of tasks at the same time. These simulations are used in fields like medicine, weather forecasting, engineering, and disaster planning. For example, instead of testing a new drug in real life right away, scientists can simulate how the drug might affect the human body. Simulations help us understand complicated systems and predict what might happen under different conditions. They are much faster, safer, and cheaper than running physical tests.

**2. What are the likely impacts on computer science or your career?**

Open Source AI is already changing how people learn and work in computer science. Because these tools are free to use and constantly improving, students like me can use them to explore real-world problems, build useful applications, or take part in team projects without needing a large budget. These tools could be used to create smart features like voice assistants, chatbots, or apps that adapt to user behavior. Open Source AI also helps us learn best practices from a global community of developers who share their code and ideas.

Advanced Simulation Technology opens doors to exciting careers in areas that need complex analysis and planning. If I work in a field like health care, transportation, or environmental technology, knowing how to use simulations could help me build systems that test different scenarios before they’re used in the real world. For example, I could help design a traffic system that adjusts based on traffic flow patterns or work on weather alert systems. Being able to use simulation tools would give me an edge in any job that values problem-solving, efficiency, and precision.

**3. How might the two technologies impact humans, communities, or the world?**

Open Source AI has the power to help people in many parts of the world, especially in underserved communities. By making AI tools free and easy to use, people can create apps for education, health tracking, and much more. For example, in a remote village, a teacher could use a simple AI-powered app to help students learn languages or math. But with this power comes responsibility. AI can also be misused, such as spreading false information or creating biased systems, so developers need to build these tools ethically and fairly.

Advanced Simulation Technology could make a big difference in solving global problems. Scientists can use it to simulate how diseases spread, how cities might react to flooding, or how to design safer cars. These tools save lives by helping us plan better, respond faster, and avoid costly mistakes. For example, simulating an earthquake in a city could help leaders build safer buildings before disaster strikes. However, this technology requires a lot of data, power, and expertise to use correctly. It’s important that the benefits of simulations are shared with everyone.

**4. Which course outcomes have you achieved so far, and which ones remain?**

So far in this capstone course, I believe I’ve successfully achieved all five course outcomes through a variety of hands-on projects and collaborative experiences. One of the key outcomes was to engage in collaborative work and apply strategies that support diverse perspectives and decision-making. I did this by contributing to discussions and assignments where we shared feedback, ideas, and made design choices. These experiences helped me grow and improve my ability to work in a professional setting.

I also demonstrated the ability to create clear written reports and presentations by building a professional portfolio that showcases my technical work in an organized and visually accessible format. Each section of my portfolio explains the project purpose, methods used, and skills gained, which makes it easy for both technical and non-technical viewers to understand. In addition, I’ve applied algorithmic thinking by designing and evaluating multiple coding solutions, like in my Course Planner project where I used advanced data structures (AVL Trees and DAGs) and algorithms (DFS and topological sorting) to solve course sequencing problems effectively.

Another key outcome was to apply innovative tools and techniques to build software solutions. I showed this in my TestRunnerUI project, where I created a Windows Forms application that integrates with a testing framework to provide real-time results with a clean UI. I’ve also used tools like Google Test to practice test-driven development, ensuring that the code I write is both reliable and maintainable. Finally, I’ve practiced a security-first mindset by learning to identify system vulnerabilities and apply secure coding practices throughout my design. For example, I included input validation, error handling, and exception filtering in my C# UI project to protect against misuse and crashes.

Overall, this portfolio reflects how I’ve grown in my understanding of software development, testing, security, and design. It’s a complete picture of my readiness to step into the professional world with both the technical knowledge and the practical experience needed to succeed in computer science.

# CS 499 Sample Exemplar Status Checkpoints for All Categories

## Status Checkpoints for All Categories

| **Checkpoint** | **Software Design and Engineering** | **Algorithms and Data Structures** | **Databases** |
| --- | --- | --- | --- |
| **Name of Artifact Used** | **Artifact name:** Googletest, with display  **Origin:** CS 405: Secure Coding | **Artifact name:** BST to AVL tree  **Origin:** CS 260: Data Structures and Algorithms | **Artifact name:** Warehouse Inventory App, with FireCloud  **Origin:** CS 360: Mobile Architecture and Programming |
| **Status of Initial Enhancement** | Completed | Completed | Completed |
| **Submission Status** | Completed | Completed | Completed |
| **Status of Final Enhancement** | Completed | Completed | Finish |
| **Uploaded to ePortfolio** | Have upload, will make changes (don’t know what changes but will change) | Have upload, will make changes (don’t know what changes but will change) | Started, will upload. Also, will make changes. |
| **Status of Finalized ePortfolio** | started | started | started |