**Category One Enhancement Narrative – Atomic Mass Calculator**

**Briefly Describe the Artifact**

The artifact is an Atomic Mass Calculator, initially created in Python during my high school years. It is a command-line application that calculates the total atomic mass of a set of chemical elements based on user input. The original Python version was a simple script that took the user’s input for up to three elements and their quantities, then computed the total atomic mass.

**Justify the Inclusion of the Artifact in Your ePortfolio**

I selected this item for inclusion in my ePortfolio because it demonstrates my ability to transition from basic programming in Python to more complex and structured software development in Java. This artifact showcases my skills in converting and enhancing a program from one language to another, a valuable skill in software development. Specific components that showcase my skills and abilities include successfully converting a Python program to Java, demonstrating proficiency in both languages, improving the user interface to make it more interactive and user-friendly, implementing better input validation and error handling to improve program reliability, and using Java's object-oriented features to create a more modular and maintainable codebase.

The artifact was improved by adding features such as allowing the user to input the number of elements they want to add together up to 20, enhanced input validation to handle incorrect or malformed inputs, allowing users to exit at any point by typing “exit,” and improved user prompts and messages for a better user experience.

A new enhancement made to the Atomic Mass Calculator was using a JSON file to hold the elements and their atomic masses. This applies knowledge of separations of concerns (a design principle for separating a computer program into sections, such that each section addresses a separate concern). Using a JSON file also provides scalability and flexibility, enhanced maintainability, and ease of integration.

**Course Objectives Met**

With this enhancement, I believe I have met the following course objectives:

**Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts.**

I met this outcome through coherent communication, technically sound development, and adaptation to specific audiences and contexts. The enhanced Atomic Mass Calculator includes clear and concise prompts and instructions, ensuring that users understand how to interact with the program. Error messages and validation feedback are designed to be easily understood by users, enhancing their experience and interaction with the software. The conversion from Python to Java was performed with attention to maintaining the correctness and accuracy of the atomic mass calculations. The implementation includes thorough input validation and error handling. The program’s interface is designed to be user-friendly for a general audience, including those who may not have a technical background. This adaptability ensures that the software can be used in educational contexts as well as by professionals. Providing clear instructions on how to input data and how to exit the program ensures that users of varying technical skills can operate the software effectively.

**Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals.**

I met this goal through well-founded techniques and skills, using innovative techniques and tools, and delivering value and accomplishing goals. The use of Java, an industry-standard programming language, for implementing the Atomic Mass Calculator showcases proficiency in a key technical skill. The adoption of best practices in coding, such as modular design, input validation, and error handling, demonstrates a solid foundation in software development principles. The transition from Python to Java required innovative thinking to adapt the code structure and leverage Java’s object-oriented features for a more modular and maintainable solution. Enhancing the functionality to allow users to add multiple elements and handle up to 20 molecules of each element demonstrates innovative problem-solving and the ability to extend basic functionality. The enhanced program adds value by making the Atomic Mass Calculator more user-friendly, and versatile, aligning with industry standards for quality and reliability.

**Reflection on the Enhancement Process**

During the process of enhancing and modifying the Atomic Mass Calculator, I learned several valuable lessons: Ensuring that user inputs are correctly validated is crucial for creating reliable software. This was a significant enhancement over the original Python version. Improving the user interface and providing clear instructions and feedback can significantly enhance the user experience. Implementing robust error handling is essential for creating professional-quality software. This includes handling invalid inputs gracefully and allowing users to exit the program at any point.

**Challenges Faced:**

* **Language Differences:** One of the main challenges was adapting to the differences between Python and Java, particularly in terms of syntax and language constructs.
* **Maintaining Accuracy:** Ensuring the accuracy of the atomic mass calculations while adding new features required careful attention to detail.
* **User Interaction:** Designing the program to handle various user inputs and scenarios gracefully was challenging but ultimately rewarding. I had to do a series of tests, trying different inputs to ensure that the program could handle it.

Overall, the process of enhancing this artifact has been a valuable learning experience, reinforcing important principles of software design, user experience, and robust coding practices.