**SRS Requirements**

**Functional:**

1. The system shall allow the user to input BasicML programs into memory.
2. The system shall allow the user to modify the contents of memory before execution.
3. The system shall provide a GUI displaying memory, accumulator, program counter, and execution logs.
4. The system shall allow the user to execute a BasicML program fully with a Run button.
5. The system shall allow the user to execute a BasicML program step-by-step with a Step Execution button.
6. The system shall provide an input field for users to enter data when prompted by a READ (10) instruction.
7. The system shall display program output in a console area when a WRITE (11) instruction is executed.
8. The system shall update and display the current value of the accumulator in real-time.
9. The system shall update and display the current program counter value as execution progresses.
10. The system shall detect and halt execution if an invalid opcode is encountered.
11. The system shall allow users to reset the simulation, clearing memory and resetting registers.
12. The system shall detect infinite loops and halt execution after 1000 iterations.
13. The system shall provide error messages when invalid memory access occurs.
14. The system shall allow users to load and save programs from and to a file.
15. The system shall log execution steps and errors in the console output area.

**Non-Functional**

1. The system shall execute instructions with minimal delay (less than 100ms per instruction).
2. The system shall provide an intuitive and user-friendly GUI with clearly labeled buttons and sections.
3. The system shall prevent crashes by handling all user input errors and execution exceptions gracefully.