Design Document

User Stories:

1. As a User

I want to execute a machine language program

So that I can learn about machine language

2. As a User

I want to write and simulate simple machine code

So that I can test logic and control flow without needing real hardware

Use Cases:

1. READ

Actor: User

Method:

Call a read operation to get user input

Include desired memory location in that call

Store the user input in the specified location

Goal:

The value is stored in the specified memory location

2. WRITE

Actor: User

Method:

Call a WRITE operation with a memory address

Output the word in the given memory location

Goal:

The word in the memory location is output to the screen

3. LOAD

Actor: Instruction Processor

Method:

Call LOAD operation with specified memory address

Retrieve value from memory

Place it into the accumulator

Goal:

Accumulator holds the loaded value

4. STORE

Actor: Instruction Processor

Method:

Call STORE operation with specified memory address

Save value from accumulator to that memory location

Goal:

Memory contains the stored value from the accumulator

5. ADD

Actor: Instruction Processor

Method:

Call an ADD method along with a memory location

Add the word stored in the given location with the word currently in the accumulator

Keep the result in the accumulator

Goal:

The result of the addition is present in the accumulator

6. SUBTRACT

Actor: Instruction Processor

Method:

Call the subtract method along with memory location

Subtract the word given in the accumulator

Goal:

The result of the subtraction is present in the accumulator

7. DIVIDE

Actor: Instruction Processor

Method:

Call a DIVIDE operation along with a memory location

Divide the word in the accumulator by the word in the memory location

Keep the results in the accumulator

Goal:

The divide results are present in the accumulator

8. MULTIPLY

Actor: Instruction Processor

Method:

Call a MULTIPLY operation along with memory location

Store results in the accumulator

Goal:

The multiplied results are stored in the accumulator

9. BRANCH

Actor: Instruction Processor

Method:

A BRANCH operation and a memory location are given

The CPU is moved to the memory location to continue reading commands

Goal:

The CPU is moved to the specified location to continue running

10. BRANCHNEG

Actor: Instruction Processor

Method:

Call BRANCHNEG with address

Check accumulator

If true, jumps to given address

If false, continues to next instructions

Goal:

Execution continues from new address if condition is met

11. BRANCHZERO

Actor: Instruction Processor

Method:

Call BRANCHZERO with address

Check if accumulator is zero

Jump to address if true

If false, continues to next instructions

Goal:

Execution continues from new address if condition is met

12. HALT

Actor: Instruction Processor

Method:

Read HALT instruction

Stop instruction cycle

Goal:

Program ends