UVSim - Class Definition Document

This document outlines the object-oriented class structure for the UVSim educational machine language simulator. It is designed to follow modular architecture, supporting future expansion and ease of maintenance.

# Class: UVSim

Main entry point for setting up and executing a BasicML program. Handles coordination between CPU, Memory, and I/O.

## Responsibilities

- Initialize core components.  
- Load program from a file.  
- Start execution cycle.

# Class: CPU

Responsible for executing instructions and maintaining program flow.

## Attributes

- accumulator: holds the result of operations.  
- instruction\_register: current instruction being processed.  
- program\_counter: keeps track of which instruction is next.

## Functions

- fetch(): retrieves the next instruction from memory.  
- decode(instruction): splits instruction into opcode and operand.  
- execute(opcode, operand): calls the right operation based on the opcode.

# Class: Memory

Holds instructions and data in a 100-cell array.

## Functions

- load(address): returns the value at a given address.  
- store(address, value): stores a value at a given address.  
- reset(): clears all memory.

# Class: InstructionSet

Contains logic for executing all BasicML instructions.

## Functions

- read, write, load, store  
- add, subtract, multiply, divide  
- branch, branchneg, branchzero, halt

# Class: FileLoader

Reads and validates a BasicML file, then loads it into memory.

## Functions

- validate\_instruction(line): checks if instruction is valid.  
- load\_file(path): returns list of validated instructions.

# Class: UVSimGUI

User interface that allows interaction with the simulator.

## Functions

- on\_file\_load()  
- on\_run\_clicked()  
- update\_output(log)  
- prompt\_input(prompt)