

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)