Instruction Execution Cycle Simulation

This C++ program simulates the instruction execution cycle of a simple processor. It includes memory units, register files, and an instruction set to execute operations such as memory manipulation, arithmetic, and logical operations.

Description

This program is designed to simulate the instruction execution cycle of a basic processor. It consists of several components:

- **Memory Layout**: A simulated memory unit with a 2D array representing memory cells.
- **Register Array**: A set of registers used for storing data during instruction execution.
- **Instruction Set**: A predefined set of instructions representing various operations.

The program generates random instructions and memory data for testing purposes. It then executes these instructions step by step, simulating the fetch, decode, execute, and write back stages of the instruction execution cycle.

Features

- Simulates the instruction execution cycle of a basic processor.
- Includes operations for memory manipulation, arithmetic, and logical operations.
- Generates random instructions and memory data for testing.
- Provides a user-friendly interface for instruction execution and display.

Prerequisites

- C++ compiler (supporting C++11 or later)
- Standard C++ library
- `clear` command (for clearing the screen)

Output

Output is self explanatory as it contains multiple display messages .Memory display ,register display and much more.

Working

- We opted for an instruction as a 12 bit number whose first 3 bits represent op codes.

OP codes	Instruction
000	Div mem,reg
001	Mov reg,mem
010	Add reg,mem
011	Sub mem,reg
100	And reg,reg
101	Or reg,mem
110	Xor reg,mem
111	Mul mem,reg

- Next 3 bits represent the register number; there are a total 8 registers from (0-7).
- Next 3 bits represent a row of memory.
- And Last 3 bits represent column of memory.
- In case of register to register,rows act as index of second register and the last 3 bits are discarded.

Usage

- Compile and run the program
- Press “Enter” on every input ,it will automatically simulates all instructions and shows all the calculations.
- You can choose to execute more than 1 instruction by pressing continue.

This README provides basic instructions for setting up and using the instruction execution cycle simulation program. You can customize it further with additional sections or information specific to your project's requirements.