

STATE SEMANTICS

STATE 0:

Write the instruction into the Instruction Register(IR) and store $pc+1$ into ALU Register.

STATE 1:

Store $pc+1$ into pc register.

STATE 2:

Store the value at the register with address RB into A Register and the value at the register with address RC into B Register.

STATE 3:

Perform required ALU operation with operands as values of A Register and B Register and store the result in ALU Register.

STATE 4:

Store appropriate value into register with address RA.

STATE 5:

Perform ALU addition with operands as values of A Register and value obtained after a left shift of value at B Register and store the result in ALU Register.

STATE 6:

Store the value at the register with address RA into B Register. Also, perform ALU addition with operands as values of A Register and sign-extended immediate 6 value and store the result in ALU Register.

STATE 7:

Access the value at the memory address whose value is given by ALU Register and store it in Memory Data Register.

STATE 8:

Store the value stored in the B register into the memory address given by the ALU Register.

STATE 9:

Store the value at the register with address RA into B Register. Also, initialize the Register address and memory address to (000) and (value of B Register) inside the LMSM register.

STATE 10:

If zero bit is set then perform ALU Addition with operands as pc and sign-extended immediate 6 value and store the result in pc register.

STATE 11:

If the corresponding bit in immediate is 1 then depending on whether the instruction is LM or SM store the value from memory in Memory Data Register or value from the register in Register B. Here register and memory address are given by LMSM Register.

STATE 12:

If the instruction is LM then store the value from Memory Data Register into Register whose address is given by LMSM Register. If the instruction is SM then store the value from Register B into the memory location whose address is given by LMSM Register.

STATE 13:

Modify the memory and Register addresses stored inside LMSM Register and branch back to STATE 11 or branch to end (STATE 20) depending on whether all register conditions have been checked or not.

STATE 14:

Store at the register with address RA the value of pc register. Also, perform ALU addition with operands as values of pc register and sign-extended immediate 9 value and store the result in ALU Register.

STATE 15:

Store the value stored in ALU Register inside pc register.

STATE 16:

Store the value at the register with address RB into A Register. Also, Store at the register with address RA the value of pc register.

STATE 17:

Store the value stored in A Register inside pc register.

STATE 18:

Store the value at the register with address RA into A Register.

STATE 19:

Perform ALU addition with operands as values of A register and sign-extended immediate 9 value and store the result in pc register.

STATE 20:

Store the value inside pc register into register R7.

STATE 31:

State during reset where all the write signals are assigned 0.

