|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cycle** | **Reset** | **PC** | **Instr** | **(FSM) state** | **SrcA** | **SrcB** | **ALU Result** | **Zero** | **PCWrite** | **MemWrite** | **IRWrite** | **Branch** |
| 1 | 1 | 00 | 0 | FETCH | 00 | 04 | 04 | 0 | 1 | 0 | 1 | 0 |
| 2 | 0 | 04 | addi 20020005 | DECODE | 04 | x | x | x | 0 | 0 | 0 | 0 |
| 3 | 0 | 04 | addi 20020005 | ADDIEX | 00 | 05 | 05 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 04 | addi 20020005 | ADDIWB | x | x | x | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 04 | addi 20020005 | FETCH | 04 | 04 | 08 | 0 | 1 | 0 | 1 | 0 |
| 6 | 0 | 08 | addi 2003000c | DECODE | 08 | x | x | x | 0 | 0 | 0 | 0 |
| 7 | 0 | 08 | addi 2003000c | ADDIEX | 00 | 0c | 0c | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 08 | addi 2003000c | ADDIWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 9 | 0 | 08 | addi 2003000c | FETCH | 08 | 04 | 0c | 0 | 1 | 0 | 1 | 0 |
| 10 | 0 | 0c | addi 2067fff7 | DECODE | 0c | x | x | x | 0 | 0 | 0 | 0 |
| 11 | 0 | 0c | addi 2067fff7 | ADDIEX | 0c | 17 | 03 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0c | addi 2067fff7 | ADDIWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 13 | 0 | 0c | addi 2067fff7 | FETCH | 0c | 04 | 10 | 0 | 1 | 0 | 1 | 0 |
| 14 | 0 | 10 | or 00e22025 | DECODE | 10 | x | x | x | 0 | 0 | 0 | 0 |
| 15 | 0 | 10 | or 00e22025 | RTYPEEX | 03 | 05 | 07 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 10 | or 00e22025 | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 17 | 0 | 10 | or 00e22025 | FETCH | 10 | 04 | 14 | 0 | 1 | 0 | 1 | 0 |
| 18 | 0 | 14 | and 00642824 | DECODE | 14 | x | x | x | 0 | 0 | 0 | 0 |
| 19 | 0 | 14 | and 00642824 | RTYPEEX | 0c | 07 | 04 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 14 | and 00642824 | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 21 | 0 | 14 | and 00642824 | FETCH | 14 | 04 | 18 | 0 | 1 | 0 | 1 | 0 |
| 22 | 0 | 18 | add 00a42820 | DECODE | 18 | x | x | x | 0 | 0 | 0 | 0 |
| 23 | 0 | 18 | add 00a42820 | RTYPEEX | 04 | 07 | 0b | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 18 | add 00a42820 | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 25 | 0 | 18 | add 00a42820 | FETCH | 18 | 04 | 1c | 0 | 1 | 0 | 1 | 0 |
| 26 | 0 | 1c | beq 10a7000a | DECODE | 1c | x | x | x | 0 | 0 | 0 | 0 |
| 27 | 0 | 1c | beq 10a7000a | BRANCH | 0b | 03 | 08 | 0 | 0 | 0 | 0 | 0 |
| 28 | 0 | 1c | beq 10a7000a | FETCH | 1c | 04 | 20 | x | 1 | 0 | 1 | 0 |
| 29 | 0 | 20 | slt 0064202a | DECODE | 20 | x | x | x | 0 | 0 | 0 | 0 |
| 30 | 0 | 20 | slt 0064202a | RTYPEEX | 0c | 07 | 00 | x | 0 | 0 | 0 | 0 |
| 31 | 0 | 20 | slt 0064202a | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 32 | 0 | 20 | slt 0064202a | FETCH | 20 | 04 | 24 | x | 1 | 0 | 1 | 0 |
| 33 | 0 | 24 | beq 10800001 | DECODE | 24 | x | x | x | 0 | 0 | 0 | 0 |
| 34 | 0 | 24 | beq 10800001 | BRANCH | 00 | 00 | 00 | 1 | 0 | 0 | 0 | 1 |
| 35 | 0 | 24 | beq 10800001 | FETCH | 24 | 08 | 2c | x | 1 | 0 | 1 | 0 |
| 36 | 0 | 2c | slt 00e2202a | DECODE | 2c | x | x | x | 0 | 0 | 0 | 0 |
| 37 | 0 | 2c | slt 00e2202a | RTYPEEX | 03 | 05 | 01 | x | 0 | 0 | 0 | 0 |
| 38 | 0 | 2c | slt 00e2202a | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 39 | 0 | 2c | slt 00e2202a | FETCH | 2c | 04 | 30 | x | 1 | 0 | 1 | 0 |
| 40 | 0 | 30 | add 00853820 | DECODE | 30 | x | x | x | 0 | 0 | 0 | 0 |
| 41 | 0 | 30 | add 00853820 | RTYPEEX | 01 | 0b | 0c | 0 | 0 | 0 | 0 | 0 |
| 42 | 0 | 30 | add 00853820 | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 43 | 0 | 30 | add 00853820 | FETCH | 30 | 04 | 34 | 0 | 1 | 0 | 1 | 0 |
| 44 | 0 | 34 | sub 00e23822 | DECODE | 34 | x | x | x | 0 | 0 | 0 | 0 |
| 45 | 0 | 34 | sub 00e23822 | RTYPEEX | 0c | 05 | 07 | 0 | 0 | 0 | 0 | 0 |
| 46 | 0 | 34 | sub 00e23822 | RTYPEWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 47 | 0 | 34 | sub 00e23822 | FETCH | 34 | 04 | 38 | 0 | 1 | 0 | 1 | 0 |
| 48 | 0 | 38 | sw ac670044 | DECODE | 38 | x | x | x | 0 | 0 | 0 | 0 |
| 49 | 0 | 38 | sw ac670044 | MEMADR | 0c | 44 | 50 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 38 | sw ac670044 | MEMWR | x | x | x | x | 0 | 1 | 0 | 0 |
| 51 | 0 | 38 | sw ac670044 | FETCH | 38 | 04 | 3c | 0 | 1 | 0 | 1 | 0 |
| 52 | 0 | 3c | lw 8c020050 | DECODE | 3c | x | x | x | 0 | 0 | 0 | 0 |
| 53 | 0 | 3c | lw 8c020050 | MEMADR | 00 | 50 | 50 | 0 | 0 | 0 | 0 | 0 |
| 54 | 0 | 3c | lw 8c020050 | MEMRD | x | x | x | x | 0 | 0 | 0 | 0 |
| 55 | 0 | 3c | lw 8c020050 | MEMWB | x | x | x | x | 0 | 0 | 0 | 0 |
| 56 | 0 | 3c | lw 8c020050 | FETCH | 3c | 04 | 40 | 0 | 1 | 0 | 1 | 0 |
| 57 | 0 | 40 | j 08000011 | DECODE | 40 | x | x | x | 0 | 0 | 0 | 0 |
| 58 | 0 | 40 | j 08000011 | JUMP | x | x | x | x | 1 | 0 | 0 | 0 |
| 59 | 0 | 40 | j 08000011 | FETCH | 44 | 04 | 48 | 0 | 1 | 0 | 1 | 0 |
| 60 | 0 | 48 | sw ac020054 | DECODE | 48 | x | x | x | 0 | 0 | 0 | 0 |
| 61 | 0 | 48 | sw ac020054 | MEMADR | 00 | 54 | 54 | 0 | 0 | 0 | 0 | 0 |
| 62 | 0 | 48 | sw ac020054 | MEMWR | x | x | x | x | 0 | 1 | 0 | 0 |

Table 1. Expected Instruction Trace