

# **IITB RISC MULTI-CYCLE IMPLEMENTATION**

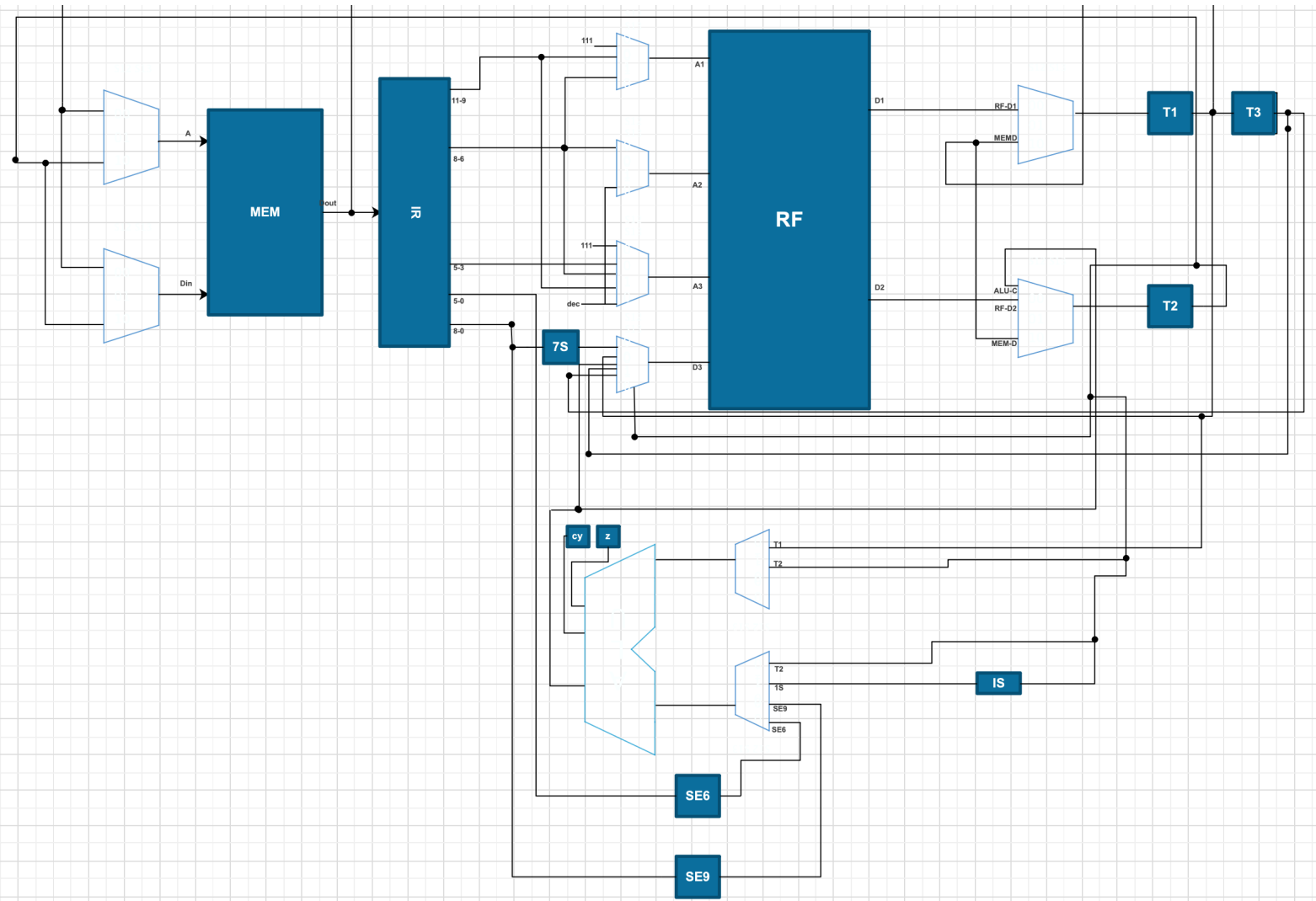
## **TEAM MEMBERS**

- 1) ANUBHAV BHATLA**
- 2) HARSHVARDHAN**
- 3) NEERAJ PRABHU**
- 4) OJAS PATIL**

## **COMPONENTS**

- 1) ALU**
- 2) MEM**
- 3) 1-BIT SHIFTER**
- 4) 7-BIT SHIFTER**
- 5) 6-BIT SIGN EXTENDER**
- 6) 9-BIT SIGN EXTENDER**
- 7) INCREMENTER**
- 8) 3-BIT 2X1 MUX**
- 9) 8-BIT 2X1 MUX**
- 10) 3-BIT 4X1 MUX**
- 11) 8-BIT 4X1 MUX**
- 12) 3-BIT 3X1 MUX**
- 13) 8-BIT 8X1 MUX**
- 14) 1-BIT REGISTER**
- 15) 16-BIT REGISTER**
- 16) REGISTER BANK**
- 17) MEMORY**

# DATAPATH



# HARDWARE FLOWCHARTS

**init**

**NULL**

**S0**

**'111' → RF-A1  
RF-D1 → T1**

**S1**

**T1 → MEM-A  
MEM-D → IR**

**S\_1**

**NULL**

**S2**

**T1 → inc  
inc → RF-D3, T3  
'111' → RF-A3**

**S3**

**IR<sub>11-9</sub> → RF-A1  
IR<sub>8-6</sub> → RF-A2  
RF-D1 → T1  
RF-D2 → T2**

**S4**

**T1 → ALU-A  
T2 → ALU-B  
ALU-c → RF-D3  
IR<sub>5-3</sub> → RF-A3**

**S5**

**T1 → ALU-A  
T2 → IS → ALU-B  
ALU-C → RF-D3  
IR<sub>5-3</sub> → RF-A3**

**S6**

**T1→ALU-A**  
**IR5-0→SE6→ALU-B**  
**ALU-C→RF-D3**  
**IR8-6→RF-A3**

**S7**

**IR8-0→7S→RF-D3**  
**IR11-9→RF-A3**

**S8**

**IR8-6→RF-A1**  
**RF-D1→T1**

**S9**

**T1→ALU-A**  
**IR5-0→SE6→ALU-B**  
**ALU-C→T2**

**S10**

**T2→MEM-A**  
**MEM-D→T1**

**S11**

**T1→RF-D3**  
**IR11-9→RF-A3**

**S12**

**IR11-9→RF-A1**  
**RF-D1→T1**

**S13**

**T2→MEM-A**  
**T1→MEM-D**

**S14**

**T1→MEM-A**  
**MEM-D→T2**

**S15**

**dec→RF-A3**  
**T2→RF-D3**

**S16**

**T1→inc**  
**IR11-9→RF-A3**  
**inc→RF-D3**

**S17**

dec→RF-A2  
RF-D2→T2

**S18**

T1→MEM-A  
T2→MEM-D

**S19**

T1→ALU-A  
T2→ALU-B

**S\_19**

If (z==1) then

**S20**

'111'→RF-A1  
RF-D1→T1

**S21**

T1→ALU-A  
IR<sub>5-0</sub>→SE6→ALU-B  
ALU-C→RF-D3  
'111'→RF-A3

**S22**

T3→RF-D3  
IR<sub>11-9</sub>→RF-A3

**S23**

T1→ALU-A  
IR<sub>8-0</sub>→SE9→ALU-B  
ALU-C→RF-D3  
'111'→RF-A3

**S24**

T2→RF-D3  
'111'→RF-A3

**S25**

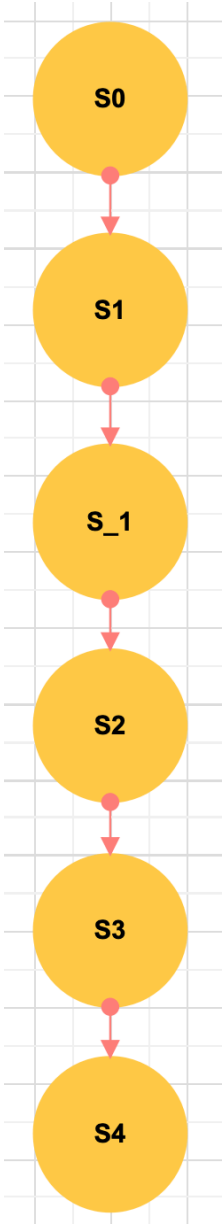
T1→inc  
inc→T3

**S26**

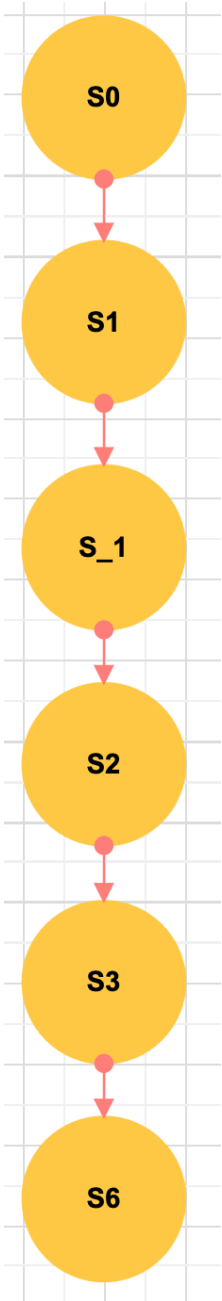
'111'→RF-A3  
T3→RF-D3

# INSTRUCTION SET

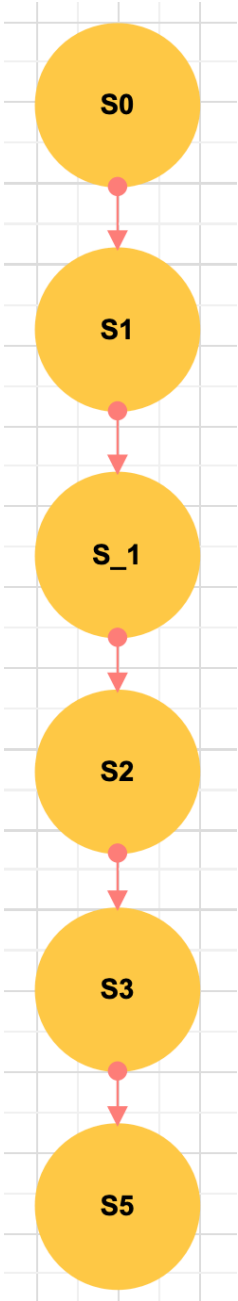
ADD/ ADC/ ADZ/ NDU/ NDC/ NDZ



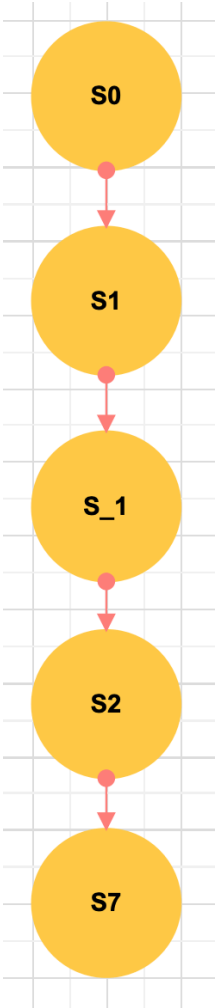
ADI



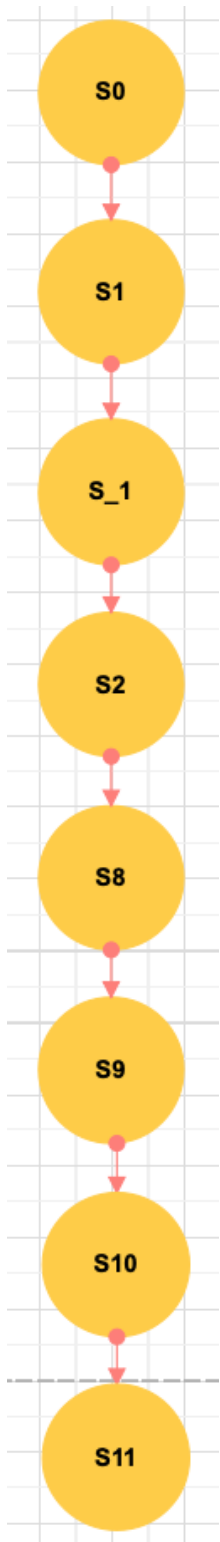
ADL



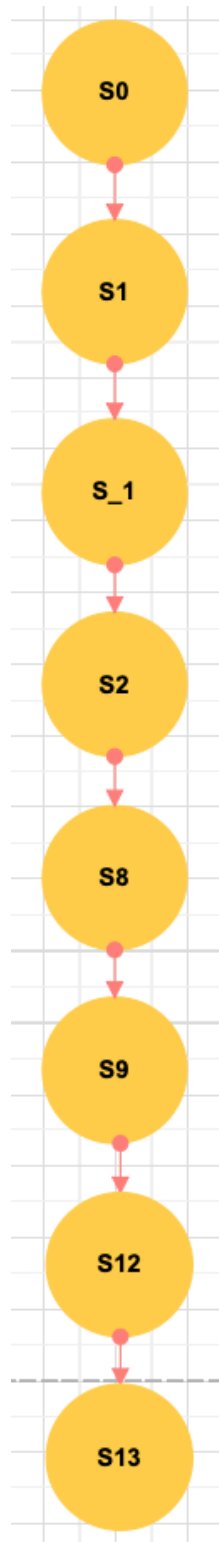
LHI RA, IMM



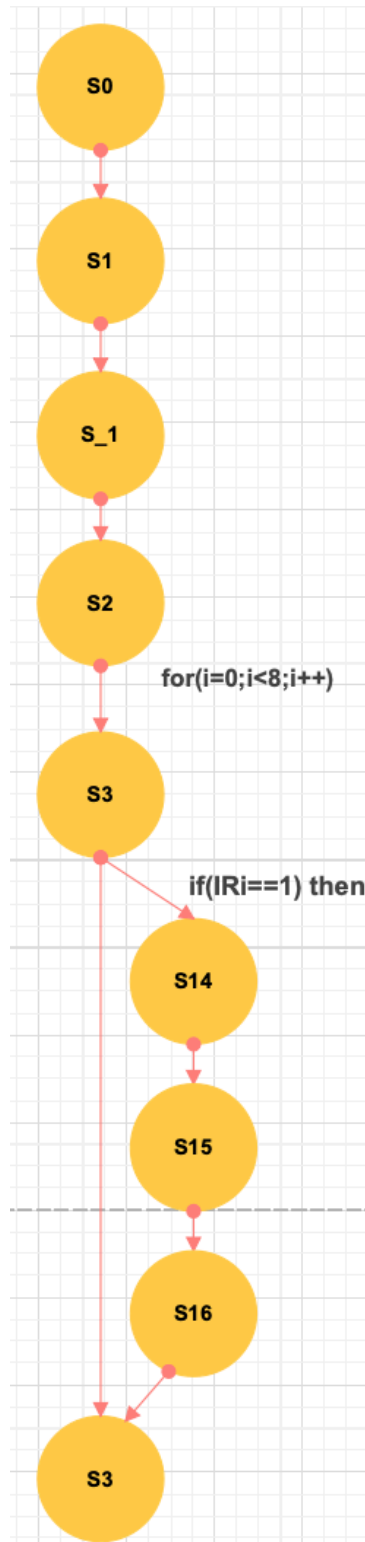
LW



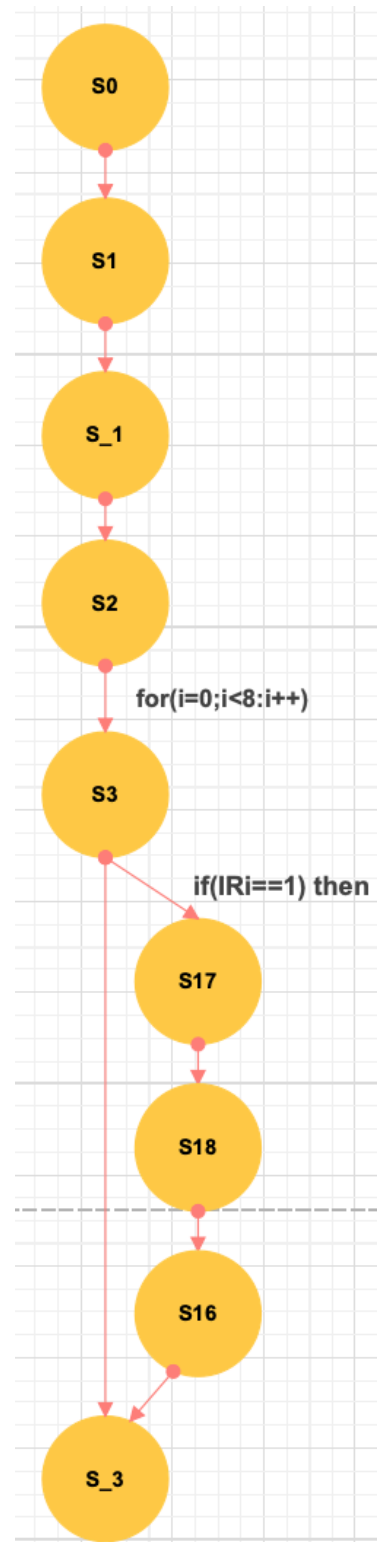
SW



LM

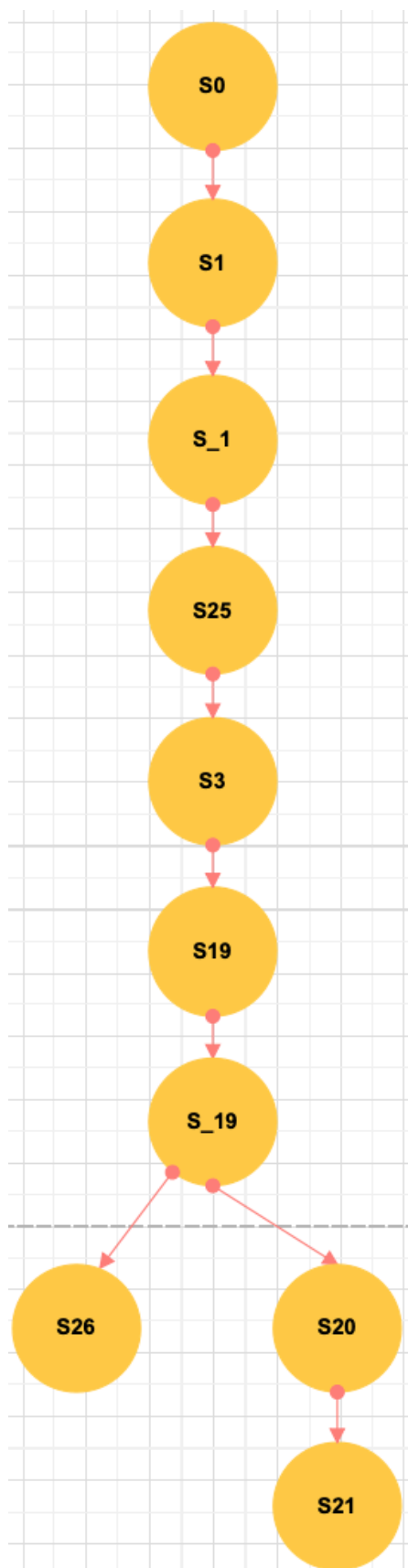


SM

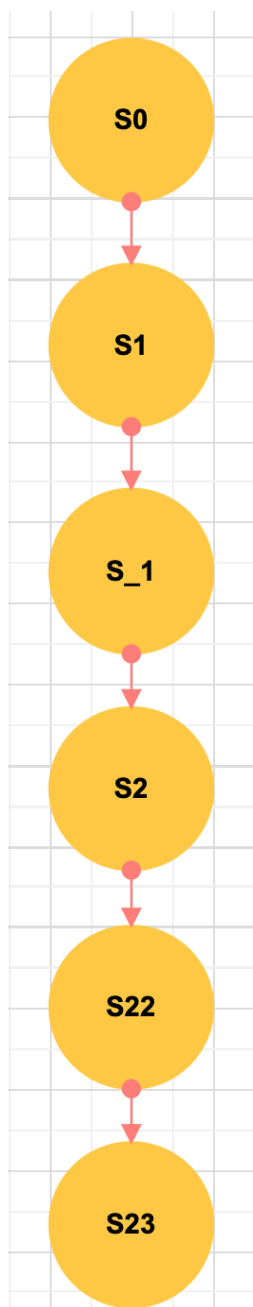




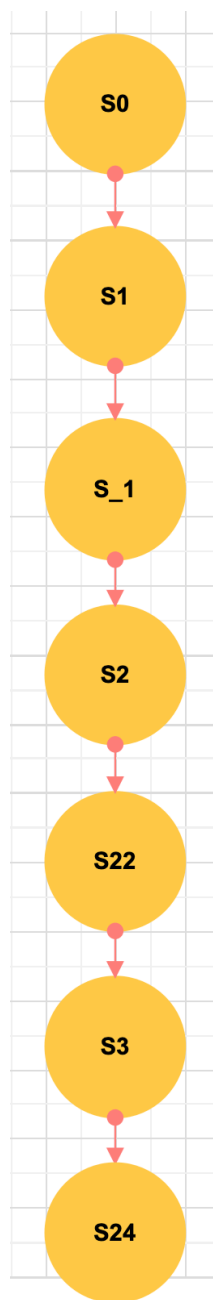
## BEQ



## JAL



## JLR



## JRI

