Processor Architecture ASSIGNMENT-1

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INPUT INSTRUCTIONS:

LW R3, 0(R2) 00000000000000001001000011

DIV R2, R3, R4 00000010010000011100000100110011

MUL R1, R5, R6 0000001001100010100000010110011

ADD R3, R7, R8 0000000011010000011110011

MUL R1, R1, R3 00000010001100001000000010110011

SUB R4, R1, R5 010000001010000100001000110011

ADD R1, R4, R2 000000000010110011

INSTRUCTION BY INSTRUCTION RESULT:

```
load_store_rs: [['00000000000000010010000110000011', 1, 'ROB1', 0, 2]]
RAT: [12, 16, 'ROB1', 5, 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8]]
ROB table: [['ROB1', 'LOAD', 3, 15]]
```

```
mul_div_rs: [['00000010010000011100000100110011', 1, 'ROB2', 3, 4, 'ROB1', 5]]
  RAT: [12, 'ROB2', 'ROB1', 5, 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49]]
ROB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0]]
mul_div_rs: [['00000010010000011100000100110011', 1, 'ROB2', 3, 4, 'ROB1', 5], ['0000001001100010100 0000010110011', 1, 'ROB3', 5, 6, 3, 4]]
RAT: ['ROB3', 'ROB2', 'ROB1', 5, 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50]]
ROB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0], ['ROB3', 'MUL', 1, 12]]
add_sub_rs: [['00000000100000111000000110110011', 1, 'ROB4', 7, 8, 1, 2]]
RAT: ['ROB3', 'ROB2', 'ROB4', 5, 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51]]
ROB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0], ['ROB3', 'MUL', 1, 12], ['ROB4', 'ADD'
  , 3, 3]]
mul_div_rs: [['00000010010000011100000100110011', 1, 'ROB2', 3, 4, 'ROB1', 5], ['0000001001100010100 00000101110011', 1, 'ROB3', 5, 6, 3, 4], ['0000001000100001000000010110011', 1, 'ROB5', 1, 3, 'ROB3',
'ROB4']]
RAT: ['ROB5', 'ROB2', 'ROB4', 5, 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51], [5, 1]
5, 24, 25, 52]]
ROB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0], ['ROB3', 'MUL', 1, 12], ['ROB4', 'ADD', 3, 3], ['ROB5', 'MUL', 1, 36]]
add_sub_rs: [['00000000100000111000000110110011', 1, 'ROB4', 7, 8, 1, 2], ['010000000101000010000010 00110011', 1, 'ROB6', 1, 5, 'ROB5', 3]]
RAT: ['ROB5', 'ROB2', 'ROB4', 'ROB6', 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51], [5, 1 5, 24, 25, 52], [6, 26, 26, 27, 53]]
ROB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0], ['ROB3', 'MUL', 1, 12], ['ROB4', 'ADD', 3, 3], ['ROB5', 'MUL', 1, 36], ['ROB6', 'SUB', 4, 33]]
 add_sub_rs: [['00000000100000111000000110110011', 1, 'ROB4', 7, 8, 1, 2], ['010000000101000010000010 00110011', 1, 'ROB6', 1, 5, 'ROB5', 3], ['0000000000100010000000001110011', 1, 'ROB7', 4, 2, 'ROB6',
  00110011', 1,
 'ROB2']]
RAT: ['ROB7', 'ROB2', 'ROB4', 'ROB6', 3, 4, 1, 2, 2, 3]
Instruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51], [5, 1 5, 24, 25, 52], [6, 26, 26, 27, 53], [7, 49, 49, 50, 54]]
ROB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0], ['ROB3', 'MUL', 1, 12], ['ROB4', 'ADD', 3, 3], ['ROB5', 'MUL', 1, 36], ['ROB6', 'SUB', 4, 33], ['ROB7', 'ADD', 1, 36.0]]
```

FINAL VALUES:

```
Final RS entries
LOAD STORE RS:
['000000000000000010010000110000011', 1, 'ROB1', 0, 'R2']
ADD SUB RS
['00000000101000011100000110110011', 1, 'ROB4', 7, 8, 1, 2]
['01000000010100001000001000110011', 1, 'ROB6', 1, 5, 'ROB5', 3]
['00000000001000100000000010110011', 1, 'ROB7', 4, 2, 'ROB6', 'ROB2']
MUL DIV RS
['00000010010000001110000100110011', 1, 'ROB2', 3, 4, 'ROB1', 5]
['000000100011000011000000010110011', 1, 'ROB5', 1, 3, 'ROB3', 'ROB4']
```

```
Final ROB table entries
['ROB1', 'LOAD', 'R3', 15]
['ROB2', 'DIV', 'R2', 3.0]
['ROB3', 'MUL', 'R1', 12]
['ROB4', 'ADD', 'R3', 3]
['ROB5', 'MUL', 'R1', 36]
['ROB6', 'SUB', 'R4', 33]
['ROB7', 'ADD', 'R1', 36.0]
```

```
Final Instruction Table:
[1, 2, 6, 7, 8]
[2, 8, 47, 48, 49]
[3, 4, 13, 14, 50]
[4, 5, 5, 6, 51]
[5, 15, 24, 25, 52]
[6, 26, 26, 27, 53]
[7, 49, 49, 50, 54]
```

```
Final RAT: ['ROB7', 'ROB2', 'ROB4', 'ROB6', 3, 4, 1, 2, 2, 3]

Final ARF:
36.0
3.0
3
33
4
1
2
2
2
3
```

FULL SCREENSHOT

```
oad_store_rs: [['00000000000000001010000011', 1, 'ROB1', 0, 2]]
AT: [12, 16, 'ROB1', 5, 3, 4, 1, 2, 2, 3]
struction Table: [[1, 2, 6, 7, 8]]
OB table: [['ROB1', 'LOAO', 3, 15]]
 ul_div_rs: [['00000010010000011100000100110011', 1, 'ROB2', 3, 4, 'ROB1', 5]]
AT: [12, 'ROB2', 'ROB1', 5, 3, 4, 1, 2, 2, 3]
nstruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49]]
OB table: [['ROB1', 'LOAD', 3, 15], ['ROB2', 'DIV', 2, 3.0]]
  ul_div_rs: [['00000010010000011100000100110011', 1, 'R082', 3, 4, 'R081', 5], ['00000010011000101000000010110011', 1, 'R083', 5, 6, 3, 4]]
AT: ['R083', 'R082', 'R081', 5, 3, 4, 1, 2, 2, 3]
STATE (['0, 2, 6, 7, 6], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50]]
Be table: [['R081', 'L080', 3, 15], ['R082', 'D1V', 2, 3.6], ['R083', 'MUL', 1, 12]]
ndd_sub_rs: [['000000001000001101000000110110011', 1, 'R0084', 7, 8, 1, 2]]
AT: ['R0083', 'R0082', 'R0084', 5, 3, 4, 1, 2, 2, 3]
nstruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51]]
OB table: [['R0081', 'L00A0', 3, 15], ('R002', 'D1V', 2, 3.0], ['R0083', 'MUL', 1, 12], ['R0084', 'A00', 3, 3]]
ul_div_rs: [['0000001000001100000100100011', 1, 'R0B2', 3, 4, 'R0B1', 5], ['00000010011000101000000010110011', 1, 'R0B3', 5, 6, 3, 4], ['000000100010000100000001110011', 1, 'R0B5', 1, 3, 'R0B3', R0B2', 'R0B2', 'R0B4', 5, 3, 4, 1, 2, 2, 3]
nstruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51], [5, 15, 24, 25, 52]]
nob table: [['R0B1', 'LOAD', 3, 15], ['R0B2', 'DIV', 2, 3.0], ['R0B3', 'MUL', 1, 12], ['R0B4', 'ADD', 3, 3], ['R0B5', 'MUL', 1, 36]]
  dd sub.rs: [['0000000010000011100000011100000011', 1, 'R084', 7, 8, 1, 2], ['0100000001010000100001000110011', 1, 'R086', 1, 5, 'R085', 3]]
AT. ['R085', 'R082', 'R084', 'R086', 3, 4, 1, 2, 2, 3]
AT. ['R085', 'R082', 'R084', 'R086', 'R084', 'R084'
                                                                                                                                                                                                                                                                    avik@avik-Inspiron-5570: ~/SEM 6/PA/Assignment-1
dd_sub_rs: [['00000000001110000000110110011', 1, 'R084', 7, 8, 1, 2], ['010000000100000000100110011', 1, 'R086', 1, 5, 'R085', 3], ['00000000001001000000000100110011', 1, 'R087', 4, 2, 'R086', R082']
AT: ['R087', 'R082', 'R084', 'R086', 3, 4, 1, 2, 2, 3]
nstruction Table: [[1, 2, 6, 7, 8], [2, 8, 47, 48, 49], [3, 4, 13, 14, 50], [4, 5, 5, 6, 51], [5, 15, 24, 25, 52], [6, 26, 26, 27, 53], [7, 49, 49, 50, 54]]
08 table: [['R081', 'L0A0', 3, 15], ['R082', 'DIV', 2, 3.0], ['R083', 'MUL', 1, 12], ['R084', 'A00', 3, 3], ['R085', 'MUL', 1, 36], ['R086', 'SUB', 4, 33], ['R087', 'A00', 1, 36.0]]
                                 RS:
00000010010000110000011', 1, 'ROB1', 0, 'R2']
   0000000000100100100100100100110011', 1, 'ROB2', 3, 4, 'ROB1', 5]
0000001001001000011100000100110011', 1, 'ROB5', 1, 3, 'ROB3', 'ROB4']
  inal Instruction Table:

1, 2, 6, 7, 8]

2, 8, 47, 48, 49]

3, 4, 13, 14, 50]

4, 5, 5, 6, 51]

5, 15, 24, 25, 52]

5, 26, 26, 27, 53]

7, 49, 49, 50, 54]
  inal RAT: ['ROB7', 'ROB2', 'ROB4', 'ROB6', 3, 4, 1, 2, 2, 3]
```