```
==================================================================================================================
 ESE 345 Multimedia Unit
 Reynerio Rubio and John Kim
    -output values from each stage of this three stage pipeline
         -Instruction Fetch
         -Instruction Decode
         -Execution/Write Back
==================================================================================================================


Cycle 0
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   101111111111111111001111

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000000000000000000000
 instruction: nop
    rs2(00000) = 0000000000000000000000000000000000000000000000000000000000000000
    rs1(00000) = 0000000000000000000000000000000000000000000000000000000000000000
    rd (00000) = 0000000000000000000000000000000000000000000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: nop
    rs2        = 0000000000000000000000000000000000000000000000000000000000000000
    rs1        = 0000000000000000000000000000000000000000000000000000000000000000
    rd         = 0000000000000000000000000000000000000000000000000000000000000000

    alu_out    = 0000000000000000000000000000000000000000000000000000000000000000
    write_en   = 0
==================================================================================================================
Cycle 1
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000001000000111101100

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 101111111111111111001111
    instruction: li
    field:       01
    immediate:   1111111111111110
    rd:          01111
```

```
--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: nop
    rs2        = 0000000000000000000000000000000000000000000000000000000000000000
    rs1        = 0000000000000000000000000000000000000000000000000000000000000000
    rd         = 0000000000000000000000000000000000000000000000000000000000000000

    alu_out    = 0000000000000000000000000000000000000000000000000000000000000000
    write_en   = 0
==================================================================================================================
Cycle 2
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000001000011000110001100

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000001000000111101100
 instruction: bcw
    rs2(00000) = 0000000000000000000000000000000000000000000000000000000000000000
    rs1(01111) = 0000000000000000000000000000000011111111111111100000000000000000
    rd (01100) = 0000000000000000000000000000000000000000000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        01
    immediate:    1111111111111110
    rd:           01111

    alu_out    = 0000000000000000000000000000000011111111111111100000000000000000
    write_en   = 1
==================================================================================================================
Cycle 3
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   110111111111111111101111

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000001000011000110001100
 instruction: a
    rs2(01100) = 1111111111111110000000000000000011111111111111100000000000000000
    rs1(01100) = 1111111111111110000000000000000011111111111111100000000000000000
    rd (01100) = 1111111111111110000000000000000011111111111111100000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
```

```
 instruction: bcw
    rs2        = 0000000000000000000000000000000000000000000000000000000000000000
    rs1        = 0000000000000000000000000000000011111111111111100000000000000000
    rd         = 0000000000000000000000000000000000000000000000000000000000000000

    alu_out    = 1111111111111110000000000000000011111111111111100000000000000000
    write_en   = 1
==================================================================================================================================
Cycle 4
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000001001011000111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 110111111111111111101111
    instruction: li
    field:       10
    immediate:   1111111111111111
    rd:          01111

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: a
    rs2        = 1111111111111110000000000000000011111111111111100000000000000000
    rs1        = 1111111111111110000000000000000011111111111111100000000000000000
    rd         = 1111111111111110000000000000000011111111111111100000000000000000

    alu_out    = 1111111111111100000000000000000011111111111111000000000000000000
    write_en   = 1
==================================================================================================================================
Cycle 5
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000010011000111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000001001011000111100001
 instruction: sfw
    rs2(01100) = 1111111111111100000000000000000011111111111111000000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (00001) = 0000000000000000000000000000000000000000000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        10
    immediate:    1111111111111111
    rd:           01111

    alu_out    = 0000000000000000111111111111111111111111111111100000000000000000
    write_en   = 1
==================================================================================================================
Cycle 6
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000011011000111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000010011000111100001
 instruction: and
    rs2(01100) = 1111111111111100000000000000000011111111111111000000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (00001) = 0000000000000000000000000000000000000000000000100000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: sfw
    rs2        = 1111111111111100000000000000000011111111111111000000000000000000
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000000000000000000000000000000000000000000000000000

    alu_out    = 0000000000000000000000000000000000000000000000100000000000000000
    write_en   = 1
==================================================================================================================
Cycle 7
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000100000000111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000011011000111100001
 instruction: or
    rs2(01100) = 1111111111111100000000000000000011111111111111000000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (00001) = 0000000000000000000000000000000011111111111111000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: and
    rs2        = 1111111111111100000000000000000011111111111111000000000000000000
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000000000000000000000000000000000010000000000000000

    alu_out    = 0000000000000000000000000000000011111111111111100000000000000000
    write_en   = 1
==================================================================================================
Cycle 8
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000101000000111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000100000000111100001
 instruction: popcnth
    rs2(00000) = 0000000000000000000000000000000000000000000000000000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (00001) = 1111111111111100111111111111111111111111111111100000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: or
    rs2        = 1111111111111100000000000000000011111111111111100000000000000000
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000000000000000000011111111111111100000000000000000

    alu_out    = 1111111111111100111111111111111111111111111111100000000000000000
    write_en   = 1
==================================================================================================
Cycle 9
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   100000000000000000101101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000101000000111100001
 instruction: clz
    rs2(00000) = 0000000000000000000000000000000000000000000000000000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (00001) = 0000000000000000000000000001000000000000000011110000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: popcnth
    rs2        = 0000000000000000000000000000000000000000000000000000000000000000
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 1111111111111100111111111111111111111111111111110000000000000000

    alu_out    = 0000000000000000000000000001000000000000000011110000000000000000
    write_en   = 1
==================================================================================================================
Cycle 10
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000110011010111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 100000000000000000101101
    instruction: li
    field:       00
    immediate:   0000000000000001
    rd:          01101

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: clz
    rs2        = 0000000000000000000000000000000000000000000000000000000000000000
    rs1        = 0000000000000000111111111111111111111111111111110000000000000000
    rd         = 0000000000000000000000000001000000000000000011110000000000000000

    alu_out    = 0000000000000000000000000001000000000000000000000000000000000000
    write_en   = 1
==================================================================================================================
Cycle 11
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000111011010111100001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000110011010111100001
 instruction: rot
    rs2(01101) = 0000000000000000000000000000000000000000000000000000000000000001
    rs1(01111) = 0000000000000000111111111111111111111111111111110000000000000000
    rd (00001) = 0000000000000000000000000001000000000000000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        00
    immediate:    0000000000000001
    rd:           01101
    alu_out    = 0000000000000000000000000000000000000000000000000000000000000001
    write_en   = 1
================================================================================================================
Cycle 12
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000001010011110000101100

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000111011010111100001
 instruction: shlhi
    rs2(01101) = 0000000000000000000000000000000000000000000000000000000000000001
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (00001) = 0000000000000000011111111111111111111111111111110000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: rot
    rs2        = 0000000000000000000000000000000000000000000000000000000000000001
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000000000000001000000000000000000000000000000000000

    alu_out    = 0000000000000000011111111111111111111111111111110000000000000000
    write_en   = 1
================================================================================================================
Cycle 13
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000001011011110110001101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000001010011110000101100
 instruction: ah
    rs2(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rs1(00001) = 0000000000000000111111111111111011111111111111000000000000000000
    rd (01100) = 1111111111111100000000000000001111111111111100000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: shlhi
    rs2        = 0000000000000000000000000000000000000000000000000000000000000001
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000011111111111111111111111111111110000000000000000
    alu_out    = 0000000000000000111111111111111011111111111111100000000000000000
    write_en   = 1
==================================================================================================================
Cycle 14
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   100100000000000000000001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000001011011110110001101
 instruction: sfh
    rs2(01111) = 0000000000000000111111111111111111111111111111110000000000000000
    rs1(01100) = 0000000000000000111111111111110111111111111111010000000000000000
    rd (01101) = 0000000000000000000000000000000000000000000000000000000000000001

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: ah
    rs2        = 0000000000000000111111111111111111111111111111110000000000000000
    rs1        = 0000000000000000111111111111111011111111111111100000000000000000
    rd         = 1111111111111100000000000000000011111111111111000000000000000000

    alu_out    = 0000000000000000111111111111110111111111111111010000000000000000
    write_en   = 1
==================================================================================================================
Cycle 15
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   101011111111111111000001

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 100100000000000000000001
    instruction: li
    field:       00
    immediate:   1000000000000000
    rd:          00001

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: sfh
    rs2        = 0000000000000000111111111111111111111111111111110000000000000000
    rs1        = 0000000000000000111111111111110111111111111111010000000000000000
    rd         = 0000000000000000000000000000000000000000000000000000000000000001

    alu_out    = 0000000000000000000000000000000000000000000000000000000000000000
    write_en   = 1
==================================================================================================================
Cycle 16
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   101000000000000111101101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 101011111111111111000001
    instruction: li
    field:       01
    immediate:   0111111111111110
    rd:          00001

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        00
    immediate:    1000000000000000
    rd:           00001

    alu_out    = 0000000000000000111111111111111011111111111111001000000000000000
    write_en   = 1
==================================================================================================================
Cycle 17
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000001100011010110001101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 101000000000000111101101
    instruction: li
    field:       01
    immediate:   0000000000001111
    rd:          01101

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        01
    immediate:    0111111111111110
    rd:           00001

    alu_out    = 0000000000000000111111111111111001111111111111101000000000000000
    write_en   = 1
```

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==================================================================================================================
Cycle 18
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0000011010110001111101101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0000011000011010110001101
 instruction: ahs
    rs2(01101) = 0000000000000000000000000000000000000000000011110000000000000000
    rs1(01100) = 0000000000000000111111111111110111111111111111010000000000000000
    rd (01101) = 0000000000000000000000000000000000000000000011110000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        01
    immediate:    0000000000001111
    rd:           01101

    alu_out    = 0000000000000000000000000000000000000000000011110000000000000000
    write_en   = 1
==================================================================================================================
Cycle 19
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   1001010101010101010000010

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0000011010110001111101101
 instruction: sfhs
    rs2(01100) = 0000000000000000111111111111110111111111111111010000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111110000000000000000
    rd (01101) = 0000000000000000111111111111110100000000000010010000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: ahs
    rs2        = 0000000000000000000000000000000000000000000011110000000000000000
    rs1        = 0000000000000000111111111111110111111111111111010000000000000000
    rd         = 0000000000000000000000000000000000000000000011110000000000000000

    alu_out    = 0000000000000000111111111111110100000000000010010000000000000000
    write_en   = 1
==================================================================================================================
Cycle 20
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   1100101010101010100010

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 1001010101010101000010
    instruction: li
    field:       00
    immediate:   1010101010101010
    rd:          00010

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: sfhs
    rs2        = 0000000000000000111111111111110111111111111111010000000000000000
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000111111111111110100000000000010010000000000000000

    alu_out    = 0000000000000000000000000000001000000000000000100000000000000000
    write_en   = 1
==================================================================================================================
Cycle 21
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0000011100001000010000010

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 1100101010101010100010
    instruction: li
    field:       10
    immediate:   0101010101010101
    rd:          00010

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        00
    immediate:    1010101010101010
    rd:           00010

    alu_out    = 0000000000000000000000000000000000000000000000001010101010101010
    write_en   = 1
==================================================================================================================
Cycle 22
```

```
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0000011110000101111101101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0000011100001000010000010
 instruction: mpyu
    rs2(00010) = 0000000000000000010101010101010100000000000000001010101010101010
    rs1(00010) = 0000000000000000010101010101010100000000000000001010101010101010
    rd (00010) = 0000000000000000010101010101010100000000000000001010101010101010

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        10
    immediate:    0101010101010101
    rd:           00010

    alu_out    = 0000000000000000010101010101010100000000000000001010101010101010
    write_en   = 1
==================================================================================================================
Cycle 23
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0000011110111110000101101

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0000011110000101111101101
 instruction: absdb
    rs2(00001) = 0000000000000000111111111111111001111111111111101000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (01101) = 0000000000000000000000000000001000000000000001000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: mpyu
    rs2        = 0000000000000000010101010101010100000000000000001010101010101010
    rs1        = 0000000000000000010101010101010100000000000000001010101010101010
    rd         = 0000000000000000010101010101010100000000000000001010101010101010

    alu_out    = 0001110001110001100011100011100101110001110001100011100011100100
    write_en   = 1
==================================================================================================================
Cycle 24
--------------------INSTRUCTION FETCH STAGE---------------------
```

```
instruction:   10100100000000000001110

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000001111011110000101101
 instruction: absdb
    rs2(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rs1(00001) = 0000000000000000111111111111111001111111111111101000000000000000
    rd (01101) = 0000000000000000000000000000000110000000000000001000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: absdb
    rs2        = 0000000000000000111111111111111001111111111111101000000000000000
    rs1        = 0000000000000000111111111111111111111111111111100000000000000000
    rd         = 0000000000000000000000000000001000000000000001000000000000000000

    alu_out    = 0000000000000000000000000000000110000000000000001000000000000000
    write_en   = 1
==================================================================================================================
Cycle 25
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   01010111001110011100001 0

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 10100100000000000001110
    instruction: li
    field:       01
    immediate:   0010000000000000
    rd:          01110

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: absdb
    rs2        = 0000000000000000111111111111111111111111111111100000000000000000
    rs1        = 0000000000000000111111111111111001111111111111101000000000000000
    rd         = 0000000000000000000000000000000110000000000000001000000000000000

    alu_out    = 0000000000000000000000000000000110000000000000001000000000000000
    write_en   = 1
==================================================================================================================
Cycle 26
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   010101110011100011000010
```

```
--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0101011100111001110000 10
 instruction: MA high
    rs3(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rs2(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rs1(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rd (00010) = 0001110001110001100011100011100101110001110001100011100011100100

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        01
    immediate:    0010000000000000
    rd:           01110

    alu_out    = 0000000000000000000000000000000000100000000000000000000000000000
    write_en   = 1
=================================================================================================================
Cycle 27
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0111011100111000110000 10

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0101011100111000110000 10
 instruction: MA high
    rs3(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rs2(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rs1(00110) = 0000000000000000000000000000000000000000000000000000000000000000
    rd (00010) = 0000000000000000000000000000000000100100000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: MA high
    rs3        = 0000000000000000000000000000000000100000000000000000000000000000
    rs2        = 0000000000000000000000000000000000100000000000000000000000000000
    rs1        = 0000000000000000000000000000000000100000000000000000000000000000
    rd         = 0001110001110001100011100011100101110001110001100011100011100100


    alu_out    = 0000000000000000000000000000000000100100000000000000000000000000
    write_en   = 1
=================================================================================================================
Cycle 28
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   1100000000000000010100110

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0111011100111000110000010
 instruction: MS high
    rs3(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rs2(01110) = 0000000000000000000000000000000000100000000000000000000000000000
    rs1(00110) = 0000000000000000000000000000000000000000000000000000000000000000
    rd (00010) = 0000000000000000000000000000000000000100000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: MA high
    rs3        = 0000000000000000000000000000000000100000000000000000000000000000
    rs2        = 0000000000000000000000000000000000100000000000000000000000000000
    rs1        = 0000000000000000000000000000000000000000000000000000000000000000
    rd         = 0000000000000000000000000000000000100100000000000000000000000000


    alu_out    = 0000000000000000000000000000000000000100000000000000000000000000
    write_en   = 1
==================================================================================================================
Cycle 29
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   1000000000000000011000110

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 1100000000000000010100110
    instruction: li
    field:       10
    immediate:   0000000000000101
    rd:          00110

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: MS high
    rs3        = 0000000000000000000000000000000000100000000000000000000000000000
    rs2        = 0000000000000000000000000000000000100000000000000000000000000000
    rs1        = 0000000000000000000000000000000000000000000000000000000000000000
    rd         = 0000000000000000000000000000000000000100000000000000000000000000
    alu_out    = 0000000000000000000000000000000011111100000000000000000000000000
    write_en   = 1
==================================================================================================================
Cycle 30
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0100001100011000110000010

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 1000000000000000011000110
    instruction: li
    field:       00
    immediate:   0000000000000110
    rd:          00110

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        10
    immediate:    0000000000000101
    rd:           00110

    alu_out    = 0000000000000000000000000000010100000000000000000000000000000000
    write_en   = 1
==================================================================================================================
Cycle 31
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   0110001100011000110000010

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 0100001100011000110000010
 instruction: MA low
    rs3(00110) = 0000000000000000000000000000010100000000000000000000000000000110
    rs2(00110) = 0000000000000000000000000000010100000000000000000000000000000110
    rs1(00110) = 0000000000000000000000000000010100000000000000000000000000000110
    rd (00010) = 0000000000000000000000000000000011111100000000000000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        00
    immediate:    0000000000000110
    rd:           00110
    alu_out    = 0000000000000000000000000000010100000000000000000000000000000110
    write_en   = 1
=================================================================================================
Cycle 32
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   101111111111111111001111

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 011000110001100011000010
 instruction: MS low
    rs3(00110) = 0000000000000000000000000000010100000000000000000000000000000110
    rs2(00110) = 0000000000000000000000000000010100000000000000000000000000000110
    rs1(00110) = 0000000000000000000000000000010100000000000000000000000000000110
    rd (00010) = 0000000000000000000000000010001100000000000000000000000000101010

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: MA low
    rs3        = 0000000000000000000000000000010100000000000000000000000000000110
    rs2        = 0000000000000000000000000000010100000000000000000000000000000110
    rs1        = 0000000000000000000000000000010100000000000000000000000000000110
    rd         = 0000000000000000000000000000000011111100000000000000000000000000


    alu_out    = 0000000000000000000000000010001100000000000000000000000000101010
    write_en   = 1
=================================================================================================
Cycle 33
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000000001000000111101100

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 101111111111111111001111
    instruction: li
    field:       01
    immediate:   1111111111111110
    rd:          01111

--------------------EXECUTE/WRITE BACK STAGE--------------------
 instruction: MS low
    rs3        = 0000000000000000000000000000010100000000000000000000000000000110
    rs2        = 0000000000000000000000000000010100000000000000000000000000000110
    rs1        = 0000000000000000000000000000010100000000000000000000000000000110
    rd         = 0000000000000000000000000010001100000000000000000000000000101010


    alu_out    = 1111111111111111111111111110110011111111111111111111111111100010
    write_en   = 1
==================================================================================================================
Cycle 34
--------------------INSTRUCTION FETCH STAGE---------------------
instruction:   000001000011000110001100

--------------------INSTRUCTION DECODE STAGE--------------------
instruction: 000000001000000111101100
 instruction: bcw
    rs2(00000) = 0000000000000000000000000000000000000000000000000000000000000000
    rs1(01111) = 0000000000000000111111111111111111111111111111100000000000000000
    rd (01100) = 0000000000000000111111111111110111111111111110100000000000000000

--------------------EXECUTE/WRITE BACK STAGE--------------------
    instruction: li
    field:        01
    immediate:    1111111111111110
    rd:           01111

    alu_out    = 0000000000000000111111111111111111111111111111100000000000000000
    write_en   = 1
==================================================================================================================
```