ESE 345 Final Project Report

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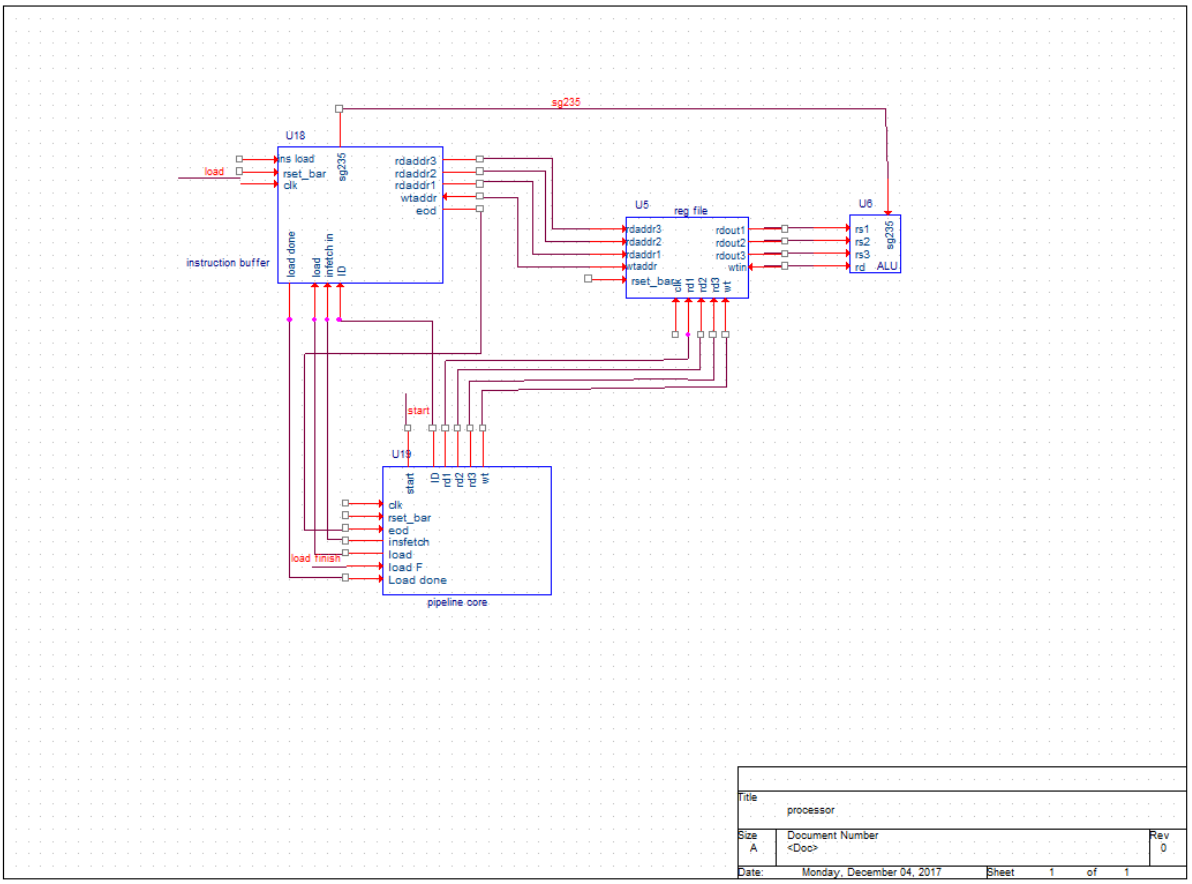
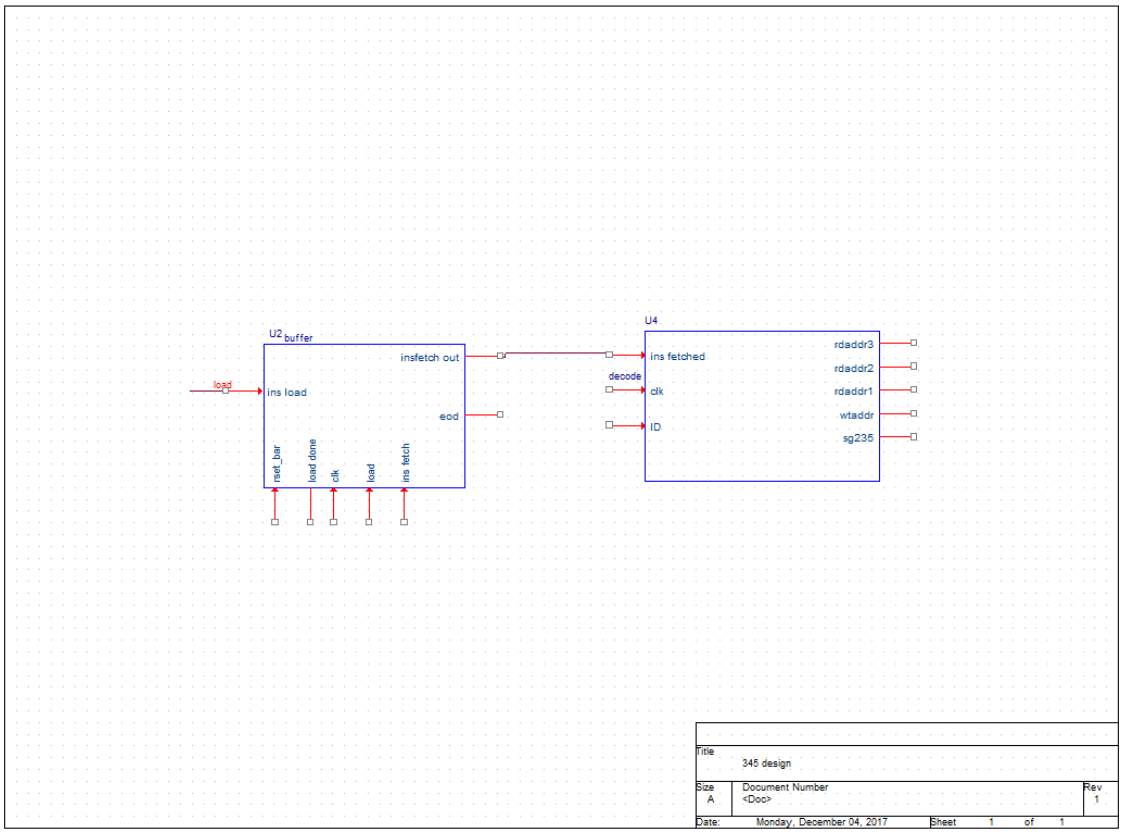
Project goal:

To learn a use of VHDL/Verilog hardware description language and modern CAD tools for the structural and behavioral design of the triple-stage pipelined multimedia unit with a reduced set of multimedia instructions similar to those in the Sony Cell SPU and Intel SSE architectures.

Unit block diagram:




U2 buffer
load
ins load
insfetch out
eod
rset_bar
load done
clk
load
ins fetch
U4
ins fetched
decode
clk
ID
rdaddr3
rdaddr2
rdaddr1
wtaddr
sg235
Title
345 design
Size
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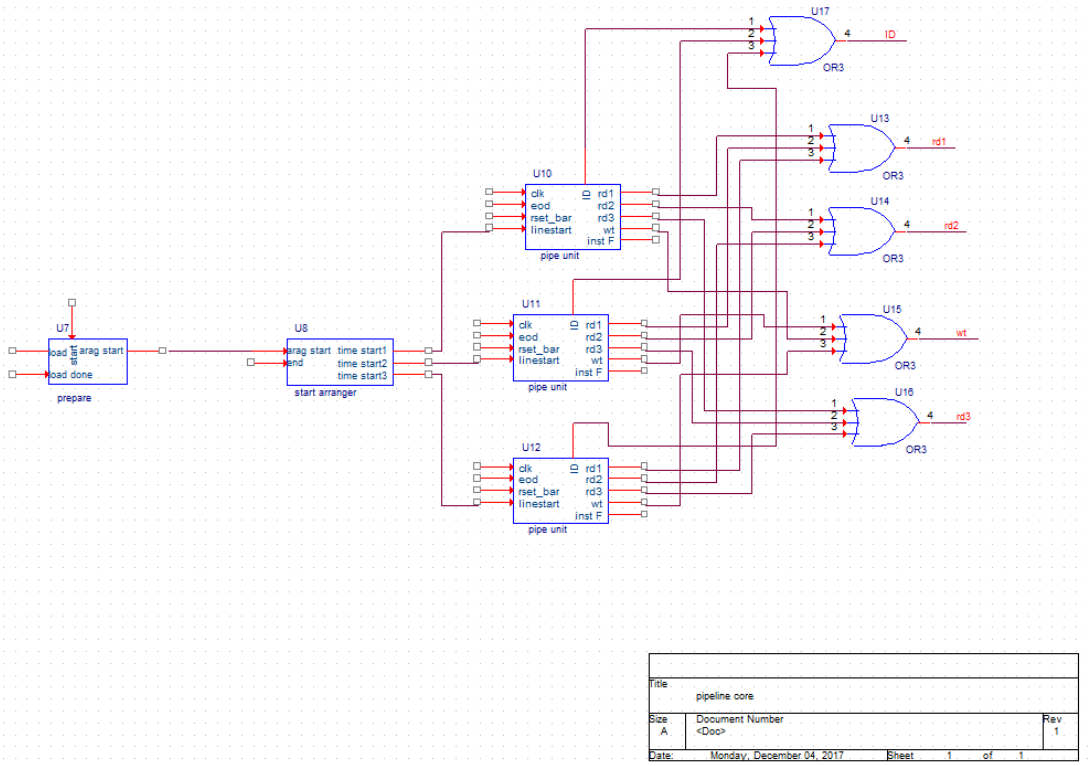
U17
OR3
ID
U13
rd1
U14
rd2
U15
wt
U16
rd3
U10
U11
U12
clk
eod
rset_bar
linestart
rd1
rd2
rd3
wt
inst F
pipe unit
U7
load
load done
arag start
prepare
U8
arag start
end
time start1
time start2
time start3
start arranger
Title
pipeline core
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Design procedure:

1. Read the design material and understand the whole structure and function of the final design.
2. Design started with draft diagram. We determine how many and what kind of input and output each component have. We determine what kind of subunit should the instruction buffer and pipeline core hold. We combined the IF/ID register and EX/WB register with time sequence. instruction buffer will fetch instruction and hold for one clock cycle. A Decode register was implemented to decode a fetched instruction and send to register file and. It is also driven by clock edge, so it allows the register file and the pipeline core to hold same decoded instruction for one clock cycle. These two designs act as the same way as IF/ID register and EX/WB register. After designed the block diagram of each unit and the time sequence relationship between each unit, we start to code each unit in Active HDL with VHDL language. The register file was coded first. Instruction buffer followed. Then the ALU. Instruction buffer and register file were tested using simulator. Every single instruction was tested using simulator for ALU. The pipeline core was coded in the last. A preparer and a start arranger were coded first. Preparer was used to control the instruction loading and response to the instruction loading finish. The start arranger was used to arrange the start sequence of three pipe line stages. Three pipe line unit was designed using finite state machine. At last, a structural architecture was used to combine three pipeline units and a preparer and a start arranger together to become the pipeline core. After we got all units, we used structural architecture to combine them all together to get the processor. Small helper entity like edge detector and 3to1 or gate was designed to help control signals delivered properly.
3. An instruction convertor was designed to convert hand typed instruction in certain format into machine code for the processor to use. We used python to code the instruction convertor.
4. To test and print the result of the processor, we designed a testbench. The testbench load instruction file in machine language (the output of instruction convertor), start the processor and print processor running status each 0.5ns after the first pipeline started. Our processor clock frequency was set at 1 GHZ. So one clock period is 1ns. The reason why we choose to print status each 0.5 ns is because that we set the write register file each half clock period. It is needed for our design to complete the write back and ALU calculation within one clock cycle. Since at the beginning of EXE stage, ALU immediately calculate the result according to opcode and oprands and place the result on wtout output. While at the start of EXE stage, the register also write the value on wtout output into register, and that value was the value of last clock cycle. So we changed the register file writing frequency, to allow it write again during the EXE stage to complete the correct write back process.
5. Proper instruction sequence was designed to test the performance of our processor. We used the matrix multiplication to test the MA, li, bcw instructions and parallel data processing ability as professor recommended during the lecture. We also used another instruction file to test all of other instructions provided by this processor. And for some special instruction with signed number and value limitation, we designed a third instruction file to test those ability of the processor. When design the instruction combanations, we can’t use instruction like MA to use a value from a resigter and write back to the same register. Since the processor we implement realized the dataforwarding function to allow the read and write to same register within the same cycle read out the new written value.

All VHDL source code and testbenches:

Instruction buffer:

```
--Xiaomin Yuanchang
library IEEE;
use IEEE.STD_LOGIC_1164.all;
use ieee.numeric_std.all;

entity instruction_buffer is
	port(
	rset_bar: in std_logic;
	clk: in std_logic;
	eod: out std_logic;
	load: in std_logic;
	loaddone: out std_logic;
	instructionLoad: in std_logic_vector(23 downto 0);
	instructionFetched: out std_logic_vector(23 downto 0);
	insfetch: in std_logic
	);
end;

architecture behavior of instruction_buffer is

type memory is array(0 to 31) of std_logic_vector(23 downto 0);
signal mem : memory;
begin
	process(clk,rset_bar)
	variable PC : integer range 0 to 32;
	variable loadCount: integer range 0 to 32;
	begin

			if rset_bar = '0'then
				PC := 0;
				loadCount :=0;


			elsif rising_edge(clk) then
				if load = '1'then
					eod <= '0';
					mem(loadCount) <= instructionLoad;
					loadCount := loadCount + 1;
						if loadCount = 32 then

						  loaddone <= '1';
						else
```

```
                    loaddone <= '0';
                end if;

            elsif    insfetch = '1' then

                instructionFetched <= mem(PC);
                PC := PC + 1;

                if PC = loadCount - 2 then
                    eod <= '1';
                end if;

                if PC = loadCount then

                    PC := 0;
                    loadCount := 0;
                end if;
            elsif loadCount > 0 then
                loaddone <= '1';
            end if;
        end if;
    end process;
    end;
```

decode:

```
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

entity decode is
    port(
    instructionFetched: in std_logic_vector(23 downto 0);
    ID: in std_logic;
    clk: in std_logic;
    sg235: out std_logic_vector(18 downto    0);
    rdaddr3: out std_logic_vector(4 downto 0);
    rdaddr2: out std_logic_vector(4 downto 0);
    rdaddr1: out std_logic_vector(4 downto 0);
    wtaddr: out std_logic_vector(4 downto 0)

    );
end;
```

```
architecture behavioral of decode is
begin
	process(clk)
	variable inskeep : std_logic_vector(23 downto 0);
	begin
		if rising_edge(clk) then

			if ID = '1' then
				inskeep := instructionFetched;
			end if;

			sg235 <= inskeep(23 downto 5);
			rdaddr3 <= inskeep(19 downto 15);
			rdaddr2 <= inskeep(14 downto 10);
			rdaddr1 <= inskeep(9 downto 5);
			wtaddr <= inskeep(4 downto 0);
		end if;
	end process;
end;
```

instructionBuffer:

```
library ieee;
use ieee.std_logic_1164.all;
use pack.all;
entity InstructionBuffer is
	port(
		rset_bar: in std_logic;
		clk: in std_logic;
		eod: out std_logic;
		load: in std_logic;
		loaddone: out std_logic;
		instructionLoad: in std_logic_vector(23 downto 0);
		insfetch: in std_logic;
		ID: in std_logic;
		sg235: out std_logic_vector(18 downto    0);
		rdaddr3: out std_logic_vector(4 downto 0);
		rdaddr2: out std_logic_vector(4 downto 0);
		rdaddr1: out std_logic_vector(4 downto 0);
		wtaddr: out std_logic_vector(4 downto 0)
	);
end;

architecture structural of InstructionBuffer is
signal instruction: std_logic_vector(23 downto 0);
```

```
begin

	instruction_buffer: entity instruction_buffer
		port map(
			rset_bar=>rset_bar,
			clk=>clk,
			eod=>eod,
			load=>load,
			loaddone=>loaddone,
			instructionLoad=>  instructionLoad,
			instructionFetched=>instruction,
			insfetch=>insfetch
		);

	decode: entity decode
		port map(
			instructionFetched=>instruction,
			ID=>ID,
			clk=>clk,
			sg235=>sg235,
			rdaddr3=>rdaddr3,
			rdaddr2=>rdaddr2,
			rdaddr1=>rdaddr1,
			wtaddr=>wtaddr
		);

		--probes
		instructionp <= instruction;
end architecture;
```

Registerfile:

```
--Xiaomin Yuanchang
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

entity registerfile is
	port(
	check: in std_logic;
	checkout: out std_logic_vector(63 downto 0);
	wt: in std_logic;
	wtin: in std_logic_vector(63 downto 0);
	rd1: in std_logic;
```

```
        rd2: in std_logic;
        rd3: in std_logic;
        rdout1:out std_logic_vector(63 downto 0);
        rdout2:out std_logic_vector(63 downto 0);
        rdout3:out std_logic_vector(63 downto 0);
        rdaddr1: in std_logic_vector (4 downto 0);
        rdaddr2: in std_logic_vector (4 downto 0);
        rdaddr3: in std_logic_vector (4 downto 0);
        wtaddr: in std_logic_vector (4 downto 0);
        clk: in std_logic;
        rset_bar:in std_logic
        );
end;

architecture behavioral of registerfile is
type memory is array(0 to 31) of std_logic_vector(63 downto 0);
signal regfile : memory;
begin
        process( rset_bar,clk)
        variable checkcount: integer range 0 to 32;
        begin
                if rset_bar = '0' then
                        checkcount:= 0;
                        for i in regfile'range loop
                                regfile(i)<=(others => '0');
                        end loop;
                  end if;
                --elsif rising_edge(clk) then
                        if wt = '1' then
                                regfile(to_integer(unsigned(wtaddr)))<= wtin;
                        end if;

                        if rd1 = '1' then
                                rdout1 <= regfile(to_integer(unsigned(rdaddr1)));
                        end if;

                        if rd2 = '1' then
                                rdout2 <= regfile(to_integer(unsigned(rdaddr2)));
                        end if;

                        if rd3 = '1' then
                                rdout3 <= regfile(to_integer(unsigned(rdaddr3)));
                        end if;
                --end if;
```

```
            if check = '1' then
                checkout <= regfile(checkcount);
                checkcount := checkcount + 1;
            end if;


        end process;

end;
```

ALU:

```
--Xiaomin Yuanchang
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

entity alu is
        port(

        clk: in std_logic;      --not used
        rs3: in std_logic_vector(63 downto 0);
        rs2: in std_logic_vector(63 downto 0);
        rs1: in std_logic_vector(63 downto 0);
        sg235: in std_logic_vector(18 downto    0);
        rd: out std_logic_vector(63 downto 0)
        );
end alu;

architecture behavioral of alu is

begin
        process(rs1,rs2,rs3,sg235)


            variable rs3s: signed(63 downto 0);
            variable rs2s: signed(63 downto 0);
            variable rs1s: signed(63 downto 0);
            variable rs3us: unsigned(63 downto 0);
            variable rs2us: unsigned(63 downto 0);
            variable rs1us: unsigned(63 downto 0);
            variable rs3std: std_logic_vector(63 downto 0);
            variable rs2std: std_logic_vector(63 downto 0);
            variable rs1std: std_logic_vector(63 downto 0);
```

```
        variable tmp16_3s: signed(15 downto 0);
        variable tmp16_2s: signed(15 downto 0);
        variable tmp16_1s: signed(15 downto 0);

        variable tmp16_1std: std_logic_vector(15 downto 0);
        variable tmp32_1std: std_logic_vector(31 downto 0);

        variable tmp16_2us: unsigned(15 downto 0);
        variable tmp16_1us: unsigned(15 downto 0);

        variable products: signed(31 downto 0);
        variable productus: unsigned(31 downto 0);

        variable tempouts: signed(63 downto 0);
        variable tempoutus: unsigned(63 downto 0);
        variable addsub: signed(31 downto 0);
        variable count: integer;
        variable rightout: std_logic;
        variable shiftcount: integer;

        constant add32_0: signed(addsub'range):= (others => '0');
        constant compareleft32: signed(addsub'range):= add32_0 + (-2)**31;
        constant compareright32: signed(addsub'range):= add32_0 + (2**31)-1;
        constant add16_0: signed(15 downto 0):= (others => '0');

        constant top : unsigned (7 downto 0) := "11111111";
        constant off : unsigned (7 downto 0) := "00000001";
    begin


        if sg235(18) = '1' then
            if sg235(17 downto 16) = "00" then
            rd(15 downto 0) <= sg235(15 downto 0); --li
            elsif sg235(17 downto 16) = "01" then
            rd(31 downto 16) <= sg235(15 downto 0);
            elsif sg235(17 downto 16) = "10" then
            rd(47 downto 32) <= sg235(15 downto 0);
            elsif sg235(17 downto 16) = "11" then
            rd(63 downto 48) <= sg235(15 downto 0);
            end if;
        elsif sg235(17) = '1' then
            if sg235(16 downto 15) = "00" then                                  --MA
                rs3s := signed(rs3);
```

```
        rs2s := signed(rs2);
        rs1s := signed(rs1);
        tmp16_3s := rs3s(15 downto 0);
        tmp16_2s := rs2s(15 downto 0);
        products := tmp16_3s * tmp16_2s;
        addsub   := rs1s(31 downto 0) + products;
        if products > 0 and rs1s(31 downto 0) >0 and addsub <0   then
            tempouts(31 downto 0) := compareright32;
        elsif products < 0 and rs1s(31 downto 0) <0 and addsub >0 then
            tempouts(31 downto 0) := compareleft32;
        else
            tempouts(31 downto 0) := addsub;
        end if;

        tmp16_3s := rs3s(47 downto 32);
        tmp16_2s := rs2s(47 downto 32);
        products := tmp16_3s * tmp16_2s;
        addsub   := rs1s(63 downto 32) + products;
        if products > 0 and rs1s(63 downto 32) >0 and addsub <0   then
            tempouts(63 downto 32) := compareright32;
        elsif products < 0 and rs1s(63 downto 32) <0 and addsub >0 then
            tempouts(63 downto 32) := compareleft32;
        else
            tempouts(63 downto 32) := addsub;
        end if;

        rd <= std_logic_vector(tempouts);

    elsif sg235(16 downto 15) = "01" then                                --MS
        rs3s := signed(rs3);
        rs2s := signed(rs2);
        rs1s := signed(rs1);
        tmp16_3s := rs3s(31 downto 16);
        tmp16_2s := rs2s(31 downto 16);
        products := tmp16_3s * tmp16_2s;
        addsub   := rs1s(31 downto 0) + products;
        if products > 0 and rs1s(31 downto 0) >0 and addsub <0   then
            tempouts(31 downto 0) := compareright32;
        elsif products < 0 and rs1s(31 downto 0) <0 and addsub >0 then
            tempouts(31 downto 0) := compareleft32;
        else
            tempouts(31 downto 0) := addsub;
        end if;
```

```
        tmp16_3s := rs3s(63 downto 48);
        tmp16_2s := rs2s(63 downto 48);
        products := tmp16_3s * tmp16_2s;
        addsub   := rs1s(63 downto 32) + products;
        if products > 0 and rs1s(63 downto 32) >0 and addsub <0    then
            tempouts(63 downto 32) := compareright32;
        elsif products < 0 and rs1s(63 downto 32) <0 and addsub >0 then
            tempouts(63 downto 32) := compareleft32;
        else
            tempouts(63 downto 32) := addsub;
        end if;


        rd <= std_logic_vector(tempouts);
    elsif sg235(16 downto 15) = "10" then                                  --I
        rs3s := signed(rs3);
        rs2s := signed(rs2);
        rs1s := signed(rs1);
        tmp16_3s := rs3s(15 downto 0);
        tmp16_2s := rs2s(15 downto 0);
        products := tmp16_3s * tmp16_2s;
        addsub   := rs1s(31 downto 0) - products;
        if products < 0 and rs1s(31 downto 0) >0 and addsub <0    then
            tempouts(31 downto 0) := compareright32;
        elsif products > 0 and rs1s(31 downto 0) <0 and addsub >0 then
            tempouts(31 downto 0) := compareleft32;
        else
            tempouts(31 downto 0) := addsub;
        end if;


        tmp16_3s := rs3s(47 downto 32);
        tmp16_2s := rs2s(47 downto 32);
        products := tmp16_3s * tmp16_2s;
        addsub   := rs1s(63 downto 32) - products;
        if products < 0 and rs1s(63 downto 32) >0 and addsub <0    then
            tempouts(63 downto 32) := compareright32;
        elsif products > 0 and rs1s(63 downto 32) <0 and addsub >0 then
            tempouts(63 downto 32) := compareleft32;
        else
            tempouts(63 downto 32) := addsub;
        end if;
```

```
            rd <= std_logic_vector(tempouts);
        elsif sg235(16 downto 15) = "11" then                                   --h
            rs3s := signed(rs3);
            rs2s := signed(rs2);
            rs1s := signed(rs1);
            tmp16_3s := rs3s(31 downto 16);
            tmp16_2s := rs2s(31 downto 16);
            products := tmp16_3s * tmp16_2s;
            addsub    := rs1s(31 downto 0) - products;
            if products < 0 and rs1s(31 downto 0) >0 and addsub <0    then
                tempouts(31 downto 0) := compareright32;
            elsif products > 0 and rs1s(31 downto 0) <0 and addsub >0 then
                tempouts(31 downto 0) := compareleft32;
            else
                tempouts(31 downto 0) := addsub;
            end if;

            tmp16_3s := rs3s(63 downto 48);
            tmp16_2s := rs2s(63 downto 48);
            products := tmp16_3s * tmp16_2s;
            addsub    := rs1s(63 downto 32) - products;
            if products < 0 and rs1s(63 downto 32) >0 and addsub <0    then
                tempouts(63 downto 32) := compareright32;
            elsif products > 0 and rs1s(63 downto 32) <0 and addsub >0 then
                tempouts(63 downto 32) := compareleft32;
            else
                tempouts(63 downto 32) := addsub;
            end if;


            rd <= std_logic_vector(tempouts);
        end if;
    elsif sg235(13 downto 10) = "0001" then          --bcw
            rs1s := signed(rs1);
            tempouts(31 downto 0) := rs1s(31 downto 0);
            tempouts(63 downto 32) := rs1s(31 downto 0);
            rd <= std_logic_vector(tempouts);
    elsif sg235(13 downto 10) = "0010" then                 --and
        rs1std := rs1;
        rs2std := rs2;
        rs1std := rs1std and rs2std;
        rd <= rs1std;
    elsif sg235(13 downto 10) = "0011" then      --or
        rs1std := rs1;
```

```
        rs2std := rs2;
        rs1std := rs1std or rs2std;
        rd <= rs1std;
    elsif sg235(13 downto 10) = "0100" then       --popcnth
        rs1std := rs1;
        --15-0
        tmp16_1std := rs1std(15 downto 0);
        count := 0;
        for i in tmp16_1std' range loop
            if tmp16_1std(i) = '1' then
                count := count + 1;
            end if;
        end loop;
        tempouts(15 downto 0) := to_signed(count, 16);
        --31-16
        tmp16_1std := rs1std(31 downto 16);
        count := 0;
        for i in tmp16_1std' range loop
            if tmp16_1std(i) = '1' then
                count := count + 1;
            end if;
        end loop;
        tempouts(31 downto 16) := to_signed(count, 16);
        --47-32
        tmp16_1std := rs1std(47 downto 32);
        count := 0;
        for i in tmp16_1std' range loop
            if tmp16_1std(i) = '1' then
                count := count + 1;
            end if;
        end loop;
        tempouts(47 downto 32) := to_signed(count, 16);
        --63-48
        tmp16_1std := rs1std(63 downto 48);
        count := 0;
        for i in tmp16_1std' range loop
            if tmp16_1std(i) = '1' then
                count := count + 1;
            end if;
        end loop;
        tempouts(63 downto 48) := to_signed(count, 16);

        rd <= std_logic_vector(tempouts);
```

```
elsif sg235(13 downto 10) = "0101" then      --clz
        rs1std := rs1;
        --31-0
        tmp32_1std := rs1std(31 downto 0);
        count := 0;
        for i in tmp32_1std' range loop
                if tmp32_1std(i) = '1' then
                        exit;
                else
                count := count + 1;
                end if;
        end loop;
        tempouts(31 downto 0) := to_signed(count, 32);
        --63-32
        tmp32_1std := rs1std(63 downto 32);
        count := 0;
        for i in tmp32_1std' range loop
                if tmp32_1std(i) = '1' then
                        exit;
                else
                count := count + 1;
                end if;
        end loop;
        tempouts(63 downto 32) := to_signed(count, 32);

        rd <= std_logic_vector(tempouts);

elsif sg235(13 downto 10) = "0110" then      --rot
        rs1std := rs1;
        rs2std := rs2;
        shiftcount := to_integer(unsigned(rs2std(5 downto 0)));

        for i in 0 to shiftcount - 1 loop
                rightout := rs1std(0);
                for j in 0 to 62 loop
                        rs1std(j) := rs1std(j+1);
                end loop;
                rs1std(63) := rightout;
        end loop;

        rd <= rs1std;

elsif sg235(13 downto 10) = "0111" then      --shlhi
        rs1std := rs1;
```

```
        shiftcount := to_integer(unsigned(sg235(9 downto 5)));
        for i in 0 to shiftcount - 1 loop
            tmp16_1std := rs1std(63 downto 48);
            rs1std(63 downto 48) := rs1std(47 downto 32);
            rs1std(47 downto 32) := rs1std(31 downto 16);
            rs1std(31 downto 16) := rs1std(15 downto 0);
            rs1std(15 downto 0) := tmp16_1std;
        end loop;
        rd <= rs1std;

    elsif sg235(13 downto 10) = "1000" then      --a
        rs1us := unsigned(rs1);
        rs2us := unsigned(rs2);
        tempoutus(63 downto 32) := rs1us(63 downto 32) + rs2us(63 downto 32);
        tempoutus(31 downto 0) := rs1us(31 downto 0) + rs2us(31 downto 0);
        rd <= std_logic_vector(tempoutus);

    elsif sg235(13 downto 10) = "1001" then      --sfw
        rs1us := unsigned(rs1);
        rs2us := unsigned(rs2);
        tempoutus(63 downto 32) := rs1us(63 downto 32) - rs2us(63 downto 32);
        tempoutus(31 downto 0) := rs1us(31 downto 0) - rs2us(31 downto 0);
        rd <= std_logic_vector(tempoutus);

    elsif sg235(13 downto 10) = "1010" then      --ah
        rs1us := unsigned(rs1);
        rs2us := unsigned(rs2);
        tempoutus(63 downto 48) := rs1us(63 downto 48) + rs2us(63 downto 48);
        tempoutus(47 downto 32) := rs1us(47 downto 32) + rs2us(47 downto 32);
        tempoutus(31 downto 16) := rs1us(31 downto 16) + rs2us(31 downto 16);
        tempoutus(15 downto 0) := rs1us(15 downto 0) + rs2us(15 downto 0);
        rd <= std_logic_vector(tempoutus);

    elsif sg235(13 downto 10) = "1011" then      --sfh
        rs1us := unsigned(rs1);
        rs2us := unsigned(rs2);
        tempoutus(63 downto 48) := rs1us(63 downto 48) - rs2us(63 downto 48);
        tempoutus(47 downto 32) := rs1us(47 downto 32) - rs2us(47 downto 32);
        tempoutus(31 downto 16) := rs1us(31 downto 16) - rs2us(31 downto 16);
        tempoutus(15 downto 0) := rs1us(15 downto 0) - rs2us(15 downto 0);
        rd <= std_logic_vector(tempoutus);

    elsif sg235(13 downto 10) = "1100" then      --ahs
        rs1s :=     signed(rs1);
```

```
                rs2s := signed(rs2);
                tempouts(63 downto 48) := rs1s(63 downto 48) + rs2s(63 downto 48);
                if rs1s(63 downto 48)>0 and rs2s(63 downto 48)>0 and tempouts(63 downto 48)<0
then
                    tempouts(63 downto 48) := add16_0 + (32767);
                elsif rs1s(63 downto 48)<0 and rs2s(63 downto 48)<0 and tempouts(63 downto
48)>0 then
                    tempouts(63 downto 48) := add16_0 + (-32768);
                end if;
                tempouts(47 downto 32) := rs1s(47 downto 32) + rs2s(47 downto 32);
                if rs1s(47 downto 32)>0 and rs2s(47 downto 32)>0 and tempouts(47 downto 32)<0
then
                    tempouts(47 downto 32) := add16_0 + (32767);
                elsif rs1s(47 downto 32)<0 and rs2s(47 downto 32)<0 and tempouts(47 downto
32)>0 then
                    tempouts(47 downto 32) := add16_0 + (-32768);
                end if;
                tempouts(31 downto 16) := rs1s(31 downto 16) + rs2s(31 downto 16);
                if rs1s(31 downto 16)>0 and rs2s(31 downto 16)>0 and tempouts(31 downto 16)<0
then
                    tempouts(31 downto 16) := add16_0 + (32767);
                elsif rs1s(31 downto 16)<0 and rs2s(31 downto 16)<0 and tempouts(31 downto
16)>0 then
                    tempouts(31 downto 16) := add16_0 + (-32768);
                end if;
                tempouts(15 downto 0) := rs1s(15 downto 0) + rs2s(15 downto 0);
                if rs1s(15 downto 0)>0 and rs2s(15 downto 0)>0 and tempouts(15 downto 0)<0 then
                    tempouts(15 downto 0) := add16_0 + (32767);
                elsif rs1s(15 downto 0)<0 and rs2s(15 downto 0)<0 and tempouts(15 downto 0)>0
then
                    tempouts(15 downto 0) := add16_0 + (-32768);
                end if;
                rd <= std_logic_vector(tempouts);

            elsif sg235(13 downto 10) = "1101" then      --sfhs
                rs1s :=     signed(rs1);
                rs2s := signed(rs2);
                tempouts(63 downto 48) := rs1s(63 downto 48) - rs2s(63 downto 48);
                if rs1s(63 downto 48)>0 and rs2s(63 downto 48)<0 and tempouts(63 downto 48)<0
then
                    tempouts(63 downto 48) := add16_0 + (32767);
                elsif rs1s(63 downto 48)<0 and rs2s(63 downto 48)>0 and tempouts(63 downto
48)>0 then
                    tempouts(63 downto 48) := add16_0 + (-32768);
```

```
                end if;
                tempouts(47 downto 32) := rs1s(47 downto 32) - rs2s(47 downto 32);
                if rs1s(47 downto 32)>0 and rs2s(47 downto 32)<0 and tempouts(47 downto 32)<0
then
                    tempouts(47 downto 32) := add16_0 + (32767);
                elsif rs1s(47 downto 32)<0 and rs2s(47 downto 32)>0 and tempouts(47 downto
32)>0 then
                    tempouts(47 downto 32) := add16_0 + (-32768);
                end if;
                tempouts(31 downto 16) := rs1s(31 downto 16) - rs2s(31 downto 16);
                if rs1s(31 downto 16)>0 and rs2s(31 downto 16)<0 and tempouts(31 downto 16)<0
then
                    tempouts(31 downto 16) := add16_0 + (32767);
                elsif rs1s(31 downto 16)<0 and rs2s(31 downto 16)>0 and tempouts(31 downto
16)>0 then
                    tempouts(31 downto 16) := add16_0 + (-32768);
                end if;
                tempouts(15 downto 0) := rs1s(15 downto 0) - rs2s(15 downto 0);
                if rs1s(15 downto 0)>0 and rs2s(15 downto 0)<0 and tempouts(15 downto 0)<0 then
                    tempouts(15 downto 0) := add16_0 + (32767);
                elsif rs1s(15 downto 0)<0 and rs2s(15 downto 0)>0 and tempouts(15 downto 0)>0
then
                    tempouts(15 downto 0) := add16_0 + (-32768);
                end if;
                rd <= std_logic_vector(tempouts);

            elsif sg235(13 downto 10) = "1110" then      --mpyu
                rs1us := unsigned(rs1);
                rs2us := unsigned(rs2);
                tmp16_1us := rs1us(47 downto 32);
                tmp16_2us := rs2us(47 downto 32);
                productus := tmp16_1us * tmp16_2us;
                tempoutus(63 downto 32) := productus;

                tmp16_1us := rs1us(15 downto 0);
                tmp16_2us := rs2us(15 downto 0);
                productus := tmp16_1us * tmp16_2us;
                tempoutus(31 downto 0) := productus;

                rd <= std_logic_vector(tempoutus);

            elsif sg235(13 downto 10) = "1111" then      --absdb
                rs1us := unsigned(rs1);
                rs2us := unsigned(rs2);
```

```
                tempoutus(63 downto 56) := rs1us(63 downto 56) - rs2us(63 downto 56);
                if rs1us(63 downto 56) < rs2us(63 downto 56) then
                tempoutus(63 downto 56) := top - tempoutus(63 downto 56) + off;
                end if;
                tempoutus(55 downto 48) := rs1us(55 downto 48) - rs2us(55 downto 48);
                if rs1us(55 downto 48) < rs2us(55 downto 48) then
                tempoutus(55 downto 48) := top - tempoutus(55 downto 48) + off;
                end if;
                tempoutus(47 downto 40) := rs1us(47 downto 40) - rs2us(47 downto 40);
                if rs1us(47 downto 40) < rs2us(47 downto 40) then
                tempoutus(47 downto 40) := top - tempoutus(47 downto 40) + off;
                end if;
                tempoutus(39 downto 32) := rs1us(39 downto 32) - rs2us(39 downto 32);
                if rs1us(39 downto 32) < rs2us(39 downto 32) then
                tempoutus(39 downto 32) := top - tempoutus(39 downto 32) + off;
                end if;
                tempoutus(31 downto 24) := rs1us(31 downto 24) - rs2us(31 downto 24);
                if rs1us(31 downto 24) < rs2us(31 downto 24) then
                tempoutus(31 downto 24) := top - tempoutus(31 downto 24) + off;
                end if;
                tempoutus(23 downto 16) := rs1us(23 downto 16) - rs2us(23 downto 16);
                if rs1us(23 downto 16) < rs2us(23 downto 16) then
                tempoutus(23 downto 16) := top - tempoutus(23 downto 16) + off;
                end if;
                tempoutus(15 downto 8) := rs1us(15 downto 8) - rs2us(15 downto 8);
                if rs1us(15 downto 8) < rs2us(15 downto 8) then
                tempoutus(15 downto 8) := top - tempoutus(15 downto 8) + off;
                end if;
                tempoutus(7 downto 0) := rs1us(7 downto 0) - rs2us(7 downto 0);
                if rs1us(7 downto 0) < rs2us(7 downto 0) then
                tempoutus(7 downto 0) := top - tempoutus(7 downto 0) + off;
                end if;
                rd <= std_logic_vector(tempoutus);
--          else
--              rd <= (others => '0');
            end if;

        end process;
end;
```

prepare:

```
library ieee;
use ieee.std_logic_1164.all;
```

```
use ieee.numeric_std.all;

entity prepare is
	port(
	start: in std_logic;
	loaddone: in std_logic;
	load: out std_logic;
	aragstart: out std_logic;
	clk: in std_logic;
	loadFinish:in std_logic

	);
end;

architecture behavioral of prepare is
begin
	process(loaddone,start,loadFinish)
	begin
		--if rising_edge(clk) then
			if start = '1' then
				load <= '1';
			elsif loadFinish = '1' then
				load <= '0';
			elsif loaddone = '1' then
				load <= '0';
				aragstart <= '1';
			else
				aragstart <= '0';
			end if;
		--end if;
	end process;
end;
```

startarag:

```
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

entity startarag is
	port(
	aragstart: in std_logic;
	linestart1: out std_logic;
	linestart2: out std_logic;
	linestart3: out std_logic;
	clk: in std_logic;
```

```
    eod: in std_logic
    );
end;

architecture behavioral of startarag is

begin
    process(clk)
    variable hold: std_logic;
    variable clkcount: integer range 0 to 4;
    begin
        if rising_edge(clk) then
            if aragstart = '1' then
                hold := '1';
                clkcount := 0;
            end if;

            if eod = '1' then
                hold := '0';
                linestart1 <= '0';
                linestart2 <= '0';
                linestart3 <= '0';
            end if;

            if hold = '1' then
                clkcount := clkcount + 1;
            end if;

            if clkcount = 1 and hold = '1'then
                linestart1 <= '1';
            elsif clkcount = 2 and hold = '1'then
                linestart2 <= '1';
            elsif clkcount = 3 and hold = '1'then
                linestart3 <= '1';
            elsif clkcount = 4 then
                clkcount := 0;
            end if;

        end if;
    end process;

end;
```

edge_det:

```
library ieee;
use ieee.std_logic_1164.all;

entity edge_det is
	port(

	rset_bar : in std_logic;
	sig: in std_logic;
	clk: in std_logic;
	sig_edge: out std_logic
	);
end;

architecture behavior of edge_det is
begin
	process(clk,rset_bar)
	variable memory: std_logic := '0';
	begin
		if rset_bar = '0' then
			sig_edge <= '0';
			memory := '0';
		elsif rising_edge(clk) then


				if memory = '0' and sig = '1' then
				sig_edge <= '1';
				elsif memory = '1' and    sig = '1' then
				sig_edge <= '0';
				end if;

				memory := sig;


		end if;
	end process;
end;
```

or3to1:

```
library IEEE;
use IEEE.STD_LOGIC_1164.all;

entity or3to1 is
	port(
```

```
            a : in STD_LOGIC;
            b : in STD_LOGIC;
            c : in std_logic;
            output : out STD_LOGIC
            );
end;

--}} End of automatically maintained section

architecture dataflow of or3to1 is
begin
    output <= a or b or c;
end dataflow;
```

pipelineunit:

```
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

use global_signal.all;

entity pipelineunit is
    port(
        status: out std_logic_vector(1 downto 0);
        clk:in std_logic;
        rset_bar:in std_logic;
        eod: in std_logic;
        linestart: in std_logic;
        InstructionF: out std_logic;
        ID: out std_logic;
        rd1: out std_logic;
        rd2: out std_logic;
        rd3: out std_logic;
        wt: out std_logic
    );
end;

architecture behaviroal of pipelineunit is
    --type state is (Idle,InsF,InsD,Exe);
    signal present_state, next_state : std_logic_vector (1 downto 0);
    -- Idle 00, InsF 01, InsD 10, Exe 11
begin
    state_reg: process (clk)
    begin
```

```
        if      rising_edge(clk) then

                if rset_bar = '0' then
                        present_state <= "00";
                else
                        present_state <= next_state;
                end if;

                status <= present_state;

        end if;
end process;

outputs: process(present_state)
begin
        case present_state is
                when "01" =>
                InstructionF<='1';
                ID <= '0';
                rd1<='0';
                rd2<='0';
                rd3<='0';
                wt<='0';
                when "10" =>
                InstructionF<='0';
                ID <= '1';
                rd1<='0';
                rd2<='0';
                rd3<='0';
                wt<='0';
                when "11"=>
                InstructionF<='0';
                ID <= '0';
                rd1<='1';
                rd2<='1';
                rd3<='1';
                wt<='1';
                when others =>
                InstructionF<='0';
                ID <= '0';
                rd1<='0';
                rd2<='0';
                rd3<='0';
                wt<='0';
```

```
        end case;
    end process;

    nxt_state: process (present_state, eod, linestart)
    begin
        case present_state is
            when "00" =>
            if linestart = '1'then
                next_state <= "01";
            else
                next_state <= "00";
            end if;

            when "01" =>
            next_state <= "10";

            when "10" =>
            next_state <= "11";

            when "11" =>
            if eod = '1' then
                next_state <= "00";
            else
                next_state <= "01";
            end if;

            when others =>
            next_state <= "00";

            end case;
        end process;
    end;
```

pipelineCore:

```
library ieee;
use ieee.std_logic_1164.all;

use pack.all;

entity pipelineCore is
    port(
    rset_bar : in std_logic;
    clk: in std_logic;
    eod: in std_logic;
```

```
        loaddone: in std_logic;
        start: in std_logic;
        loadFinish: in std_logic;  -- set , when instruction < 32 finished loading
        load: out std_logic;
        insfetch: out std_logic;
        ID: out std_logic;
        rd1: out std_logic;
        rd2: out std_logic;
        rd3: out std_logic;
        wt: out std_logic
        );
end;

architecture structural of pipelineCore is
signal aragstart: std_logic;
signal aragstartO: std_logic;
signal linestart1: std_logic;
signal linestart2: std_logic;
signal linestart3: std_logic;
signal linestart11: std_logic;
signal linestart22: std_logic;
signal linestart33: std_logic;
signal insfetch1: std_logic;
signal ID1 : std_logic;
signal rd11      : std_logic;
signal rd21      : std_logic;
signal rd31 : std_logic;
signal wt1       : std_logic;
signal insfetch2: std_logic;
signal ID2 : std_logic;
signal rd12      : std_logic;
signal rd22      : std_logic;
signal rd32 : std_logic;
signal wt2       : std_logic;
signal insfetch3: std_logic;
signal ID3 : std_logic;
signal rd13      : std_logic;
signal rd23      : std_logic;
signal rd33 : std_logic;
signal wt3       : std_logic;
begin

        prepare: entity prepare
                port map(
```

```
            start => start,
            loaddone=> loaddone,
            load=>load,
            aragstart=>aragstart,
            clk=>clk,
            loadFinish=> loadFinish
        );

    startarag: entity startarag
        port map(
            aragstart=>aragstartO,
            linestart1=>linestart1,
            linestart2=>linestart2,
            linestart3=>linestart3,
            clk=>clk,
            eod=>eod
        );

    pipelineunit1: entity pipelineunit
        port map(
            status=> status1,
            clk=>clk,
            rset_bar=>rset_bar,
            eod=>eod,
            linestart=>linestart1,
            InstructionF=>insfetch1,
            ID=>ID1,
            rd1=>rd11,
            rd2=>rd21,
            rd3=>rd31,
            wt=>wt1
        );

    pipelineunit2: entity pipelineunit
        port map(
            status=>status2,
            clk=>clk,
            rset_bar=>rset_bar,
            eod=>eod,
            linestart=>linestart2,
            InstructionF=>insfetch2,
            ID=>ID2,
            rd1=>rd12,
            rd2=>rd22,
```

```
            rd3=>rd32,
            wt=>wt2
        );
    pipelineunit3: entity pipelineunit
        port map(
            status=>status3,
            clk=>clk,
            rset_bar=>rset_bar,
            eod=>eod,
            linestart=>linestart3,
            InstructionF=>insfetch3,
            ID=>ID3,
            rd1=>rd13,
            rd2=>rd23,
            rd3=>rd33,
            wt=>wt3
        );
    edgeD1: entity edge_det
        port map(

            rset_bar=>rset_bar,
            sig=>aragstart,
            clk=>clk,
            sig_edge=>aragstartO
        );

    edgeD2: entity edge_det
        port map(
            rset_bar=>rset_bar,
            sig=>linestart1,
            clk=>clk,
            sig_edge=>linestart11
        );
    edgeD3: entity edge_det
        port map(
            rset_bar=>rset_bar,
            sig=>linestart2,
            clk=>clk,
            sig_edge=>linestart22
        );
    edgeD4: entity edge_det
        port map(
            rset_bar=>rset_bar,
            sig=>linestart3,
```

```
            clk=>clk,
            sig_edge=>linestart33
        );
    or3to11: entity or3to1
        port map(
             a => ID1,
             b => ID2,
             c => ID3,
             output => ID
        );
    or3to12: entity or3to1
        port map(
             a =>insfetch1,
             b =>insfetch2,
             c =>insfetch3,
             output =>insfetch
        );
    or3to13: entity or3to1
        port map(
             a =>wt1,
             b =>wt2,
             c =>wt3,
             output =>wt
        );
    or3to14: entity or3to1
        port map(
             a =>rd11,
             b =>rd12,
             c =>rd13,
             output =>rd1
        );
    or3to15: entity or3to1
        port map(
             a => rd21,
             b => rd22,
             c => rd23,
             output => rd2
        );
    or3to16: entity or3to1
        port map(
             a => rd31,
             b => rd32,
             c => rd33,
             output => rd3
```

```
        );
    --probes
        wt1p<=wt1;
        wt2p<=wt2;
        wt3p<=wt3;

end architecture;
```

Processor:

```
library ieee;
use ieee.std_logic_1164.all;

use pack.all;

entity Processor is
    port(
    check: in std_logic;
    checkout: out std_logic_vector(63 downto 0);
    instructionLoad: in std_logic_vector(23 downto 0);
    start: in std_logic;
    loadFinish: in std_logic;  -- set , when instruction < 32 finished loading
    clk: in std_logic;
    rset_bar: in std_logic;
    eodo: out std_logic
    --registerRead: in std_logic;
    --registerData: out std_logic_vector(63 downto 0)
    );
end;

architecture structural of Processor is
signal eod : std_logic;
signal load : std_logic;
signal loaddone : std_logic;
signal insfetch : std_logic;
signal ID : std_logic;
signal sg235: std_logic_vector(18 downto    0);
signal rdaddr3: std_logic_vector(4 downto 0);
signal rdaddr2: std_logic_vector(4 downto 0);
signal rdaddr1: std_logic_vector(4 downto 0);
signal      wtaddr: std_logic_vector(4 downto 0);

signal      wt: std_logic;
signal      wtin: std_logic_vector(63 downto 0);
signal      rd1: std_logic;
```

```
signal      rd2: std_logic;
signal      rd3: std_logic;
signal      rdout1: std_logic_vector(63 downto 0);
signal      rdout2: std_logic_vector(63 downto 0);
signal      rdout3: std_logic_vector(63 downto 0);


begin


    InstructionBuffer: entity InstructionBuffer
        port map(
            rset_bar=>rset_bar,
            clk=>clk,
            eod=>eod,
            load=>load,
            loaddone=>loaddone,
            instructionLoad=>instructionLoad,
            insfetch=>insfetch,
            ID=>ID,
            sg235=>sg235,
            rdaddr3=>rdaddr3,
            rdaddr2=>rdaddr2,
            rdaddr1=>rdaddr1,
            wtaddr=>wtaddr
        );

    registerfile: entity registerfile
        port map(
            check=>check,
            checkout=>checkout,
            wt=>wt,
            wtin=>wtin,
            rd1=>rd1,
            rd2=>rd2,
            rd3=>rd3,
            rdout1=>rdout1,
            rdout2=>rdout2,
            rdout3=>rdout3,
            rdaddr1=>rdaddr1,
            rdaddr2=>rdaddr2,
            rdaddr3=>rdaddr3,
            wtaddr=>wtaddr,
            clk=>clk,
```

```
            rset_bar=>rset_bar
        );

    alu: entity alu
        port map(
            clk=>clk,
            rs3=>rdout3,
            rs2=>rdout2,
            rs1=>rdout1,
            sg235=>sg235,
            rd=>wtin
        );

    PipelineCore: entity pipelineCore
        port map(
            rset_bar=>rset_bar,
            clk=>clk,
            eod=>eod,
            loaddone=>loaddone,
            start => start,
            loadFinish => loadFinish,-- set , when instruction < 32 finished loading
            load=>load,
            insfetch=>insfetch,
            ID=>ID,
            rd1=>rd1,
            rd2=>rd2,
            rd3=>rd3,
            wt=>wt
        );
--probes
        eodo <= eod;
        opcode <= sg235(13 downto 10);
        r1addrp <= rdaddr1;
        r2addrp <= rdaddr2;
        r3addrp <= rdaddr3;
        r1value <=rdout1;
        r2value <=rdout2;
        r3value <=rdout3;
        writeaddr <= wtaddr;
        writevalue <= wtin;
        wtp <= wt;
end architecture;
```

pack:

```
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;
package pack is
	signal status1: std_logic_vector(1 downto 0);
	signal wt1p: std_logic;
	signal status2: std_logic_vector(1 downto 0);
	signal wt2p:std_logic;
	signal status3: std_logic_vector(1 downto 0);
	signal wt3p: std_logic;
	signal wtp:std_logic;
	signal opcode: std_logic_vector(3 downto 0);
	signal r1addrp: std_logic_vector(4 downto 0);
	signal r2addrp: std_logic_vector(4 downto 0);
	signal r3addrp: std_logic_vector(4 downto 0);
	signal r1value: std_logic_vector(63 downto 0);
	signal r2value: std_logic_vector(63 downto 0);
	signal r3value: std_logic_vector(63 downto 0);
	signal writeaddr: std_logic_vector(4 downto 0);
	signal writevalue: std_logic_vector(63 downto 0);
	signal instructionp: std_logic_vector(23 downto 0);
end pack;
```

processor_tb:

```
library ieee;
use ieee.std_logic_1164.all;
use ieee.numeric_std.all;

library std;
use std.standard.all;
use STD.TEXTIO.ALL;

use pack.all;

entity processor_tb is
end processor_tb;


architecture tb of processor_tb is
	signal simulationend: std_logic := '0';
	signal start: std_logic;
	signal loadFinish: std_logic;    -- set , when instruction < 32 finished loading
	signal rset_bar: std_logic;
```

```
    signal clk:                 std_logic := '0';
    constant clk_period:        time := 1 ns;
    constant period : time := 1ns;
    signal timecount : real := 0.0;


file file_VECTORS : text;
file file_RESULTS : text;
signal fileopen : std_logic := '0';
signal startwrite: std_logic := '0';

constant c_WIDTH : natural := 24;
signal instructionLoad: std_logic_vector(c_WIDTH-1 downto 0) := (others => '0');
signal eodo : std_logic := '0';
signal check: std_logic :='0';
signal checkout: std_logic_vector (63 downto 0);

    type memory is array(0 to 31) of std_logic_vector(63 downto 0);
    signal regfile : memory;



function chr(sl: std_logic) return character is
variable c: character;
begin
case sl is
when 'U' => c:= 'U';
when 'X' => c:= 'X';
when '0' => c:= '0';
when '1' => c:= '1';
when 'Z' => c:= 'Z';
when 'W' => c:= 'W';
when 'L' => c:= 'L';
when 'H' => c:= 'H';
when '-' => c:= '-';
end case;
return c;
end chr;


function str(slv: std_logic_vector) return string is
variable result : string (1 to slv'length);
variable r : integer;
begin
```

```
r := 1;
for i in slv'range loop
result(r) := chr(slv(i));
r := r + 1;
end loop;
return result;
end str;

   begin

      target: entity Processor
            port map(
            eodo=>eodo,
            check=>check,
            checkout=>checkout,
            instructionLoad=>instructionLoad,
            start=>start,
            loadFinish=>loadFinish,  -- set , when instruction < 32 finished loading
            clk=>clk,
            rset_bar=>rset_bar
            );


--**********************************************************read file

go:process

      variable v_ILINE     : line;
      variable v_OLINE     : line;
      variable v_oppoInstruction : std_logic_vector(c_WIDTH-1 downto 0);
      variable v_Instruction : std_logic_vector(c_WIDTH-1 downto 0);


      begin
      wait until rset_bar = '1';
      file_open(file_VECTORS, "instruction.txt",    read_mode);
      file_open(file_RESULTS, "output_results_Wu_Xu.txt", write_mode);
      fileopen<='1';

      start <= '0';
      wait for period;

      start <= '1';
      wait for period;
```

```
        while not endfile(file_VECTORS) loop
            readline(file_VECTORS, v_ILINE);

            for i in v_ILINE'range loop
                v_oppoInstruction(i-1 downto i-1) :=
std_logic_vector(to_unsigned(character'pos(v_ILINE(i)),1));
            end loop;

            for i in v_oppoInstruction'range loop
                v_Instruction(23-i) := v_oppoInstruction(i);
            end loop;

            -- Pass the variable to a signal to allow the ripple-carry to use it
            instructionLoad <= v_Instruction;
            -- r_ADD_TERM2 <= v_ADD_TERM2;
            if start = '1' then
                start <= '0';
            end if;

            wait for period;



        end loop;

        loadFinish<= '1';
        wait for period;
        loadFinish<= '0';

        file_close(file_VECTORS);


        wait until    eodo = '1';
        wait for 5*period;

        check <= '1';

        for i in 0 to 31 loop
            wait for period/2;
            regfile(i) <= checkout;

        end loop;
        check<='0';
```

```
        wait for period;
        for i in 0 to 31 loop
                report "Register "&integer'image(i)&" value: "&str(regfile(i));
        end loop;
                write(v_OLINE,"Program execution result in Register file:");
                writeline(file_RESULTS, v_OLINE);
        for i in 0 to 31 loop
                write(v_OLINE,"Register "&integer'image(i)&" value: "&str(regfile(i)));
                writeline(file_RESULTS, v_OLINE);
        end loop;

        file_close(file_RESULTS);
        fileopen<='0';

        wait;
    end process;

--
**************************************************************************
****
writestart: process(status1, status2, status3)
begin
        if status1 = status2 and status1 = status3 and status2 = status3 then
                startwrite <= '0';
        else
                startwrite <= '1';
        end if;

end process;



track: process
variable v_OLINE         : line;
begin
        wait until startwrite = '1';
        loop
        wait for period/2;
        if fileopen = '1' then
        --      if ((status1 = "11" and wt1p = '0')) or ((status2 = "11" and wt2p = '0')) or ((status3 = "11"
and wt3p = '0')) then

                write(v_OLINE,"PERIOD: "&real'image(timecount)&" ns ");
                writeline(file_RESULTS, v_OLINE);
```

```
        if status1 = "00"    then
            write(v_OLINE,"Pipeline stage 1 status: Idle");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"waiting to start");
            writeline(file_RESULTS, v_OLINE);
        elsif status1 ="01"   then
            write(v_OLINE,"Pipeline stage 1 status: InsF");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"next instruction fetched, will be decoded in next cycle");
            writeline(file_RESULTS, v_OLINE);
        elsif status1 = "10" then
            write(v_OLINE,"Pipeline stage 1 status: InsD");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"current instruction "&str(instructionp)&" decoded, generate
opcode and oprands for next cycle");
            writeline(file_RESULTS, v_OLINE);
        elsif status1 = "11" then
            write(v_OLINE,"Pipeline stage 1 status: Exe");
            writeline(file_RESULTS, v_OLINE);

            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);

            write(v_OLINE,"value: "&str(writevalue)&" wrote in address "&str(writeaddr));
            writeline(file_RESULTS, v_OLINE);
        end if;




        if status2 = "00"    then
            write(v_OLINE,"Pipeline stage 2 status: Idle");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"waiting to start");
            writeline(file_RESULTS, v_OLINE);
        elsif status2 ="01"   then
            write(v_OLINE,"Pipeline stage 2 status: InsF");
            writeline(file_RESULTS, v_OLINE);
```

```
            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"next instruction fetched, will be decoded in next cycle");
            writeline(file_RESULTS, v_OLINE);
        elsif status2 = "10" then
            write(v_OLINE,"Pipeline stage 2 status: InsD");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"current instruction "&str(instructionp)&" decoded, generate
opcode and oprands for next cycle");
            writeline(file_RESULTS, v_OLINE);
        elsif status2 = "11" then
            write(v_OLINE,"Pipeline stage 2 status: Exe");
            writeline(file_RESULTS, v_OLINE);

            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);

            write(v_OLINE,"value: "&str(writevalue)&" wrote in address "&str(writeaddr));
            writeline(file_RESULTS, v_OLINE);
        end if;



        if status3 = "00"    then
            write(v_OLINE,"Pipeline stage 3 status: Idle");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"waiting to start");
            writeline(file_RESULTS, v_OLINE);
        elsif status3 ="01"   then
            write(v_OLINE,"Pipeline stage 3 status: InsF");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"next instruction fetched, will be decoded in next cycle");
            writeline(file_RESULTS, v_OLINE);
        elsif status3 = "10" then
            write(v_OLINE,"Pipeline stage 3 status: InsD");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"Exe result: ");
            writeline(file_RESULTS, v_OLINE);
            write(v_OLINE,"current instruction "&str(instructionp)&" decoded, generate
opcode and oprands for next cycle");
```

```
        writeline(file_RESULTS, v_OLINE);
elsif status3 = "11" then
        write(v_OLINE,"Pipeline stage 3 status: Exe");
        writeline(file_RESULTS, v_OLINE);

        write(v_OLINE,"Exe result: ");
        writeline(file_RESULTS, v_OLINE);

        write(v_OLINE,"value: "&str(writevalue)&" wrote in address "&str(writeaddr));
        writeline(file_RESULTS, v_OLINE);
end if;


        write(v_OLINE,"This cycle writing register? "&chr(wtp));
        writeline(file_RESULTS, v_OLINE);

--instruction
write(v_OLINE,"current cycle instruction: "&str(instructionp));
writeline(file_RESULTS, v_OLINE);

--opcode
write(v_OLINE,"current cycle opcode: "&str(opcode));
writeline(file_RESULTS, v_OLINE);

--r1
write(v_OLINE,"current cycle Register Read 1 address: "&str(r1addrp));
writeline(file_RESULTS, v_OLINE);
write(v_OLINE,"current cycle Register Read 1 value: "&str(r1value));
writeline(file_RESULTS, v_OLINE);

--r2
write(v_OLINE,"current cycle Register Read 2 address: "&str(r2addrp));
writeline(file_RESULTS, v_OLINE);
write(v_OLINE,"current cycle Register Read 2 value: "&str(r2value));
writeline(file_RESULTS, v_OLINE);

--r3
write(v_OLINE,"current cycle Register Read 3 address: "&str(r3addrp));
writeline(file_RESULTS, v_OLINE);
write(v_OLINE,"current cycle Register Read 3 value: "&str(r3value));
writeline(file_RESULTS, v_OLINE);


--line brker
```

```
            write(v_OLINE,"***********************************************");
            writeline(file_RESULTS, v_OLINE);
        --end if;
        end if;
        exit when startwrite = '0';
        end loop;

        wait;
end process;


rset: process
            begin
                rset_bar <='0';
                wait until rising_edge(clk);
                wait until rising_edge(clk);
                rset_bar<='1';
                wait;
end process;

clock: process
            begin
                clk <= '0';
                loop
                    wait for period/2;
                    clk <= not clk;
                    timecount <= timecount + 0.5;
                    exit when simulationend = '1';
                end loop;
                wait;
end process;

        end architecture;
```

Instruction convertor in python:

```
#Xiaomin Yuanchang
import sys

file_name = 'C:/Users/wxm/Desktop/input.txt'
file_input = open(file_name, "r")
output =""
for line in file_input:
        line=line.strip('\n')
        tempList = line.split(",")
```

```
    result = ""

    if tempList[0] == "li":
            result = result + "1"
            temp = str(bin(int(tempList[1])))[2:]
            temp = temp.zfill(2)
            result = result + str(temp)
            temp = str(bin(int(tempList[2])))[2:]
            temp = temp.zfill(16)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
  # output = output + result + '\n'
#           print (output)
            #print (result)
    if tempList[0] == "MA":
            result = result + "0100"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[4][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
  # output =output + result + '\n'
    #       print (output)
          # print (result)
    if tempList[0] == "MS":
            result = result + "0101"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
```

```
            temp = str(bin(int(tempList[4][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    # output =output + result + '\n'
    #          print (output)
        #     print (result)
      if tempList[0] == "l":
            result = result + "0110"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[4][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    # output =output + result + '\n'
       #       print (output)
         #     print (result)
      if tempList[0] == "h":
            result = result + "0111"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[4][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    # output =output + result + '\n'
       #       print (output)
         #     print (result)
      if tempList[0] == "bcw":
            result = result + "000000001"
            result = result + "00000"
            temp = str(bin(int(tempList[2][1:])))[2:]
```

```
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    if tempList[0] == "nop":
            result = result + "00000000000000000000000000"

    # output =output + result + '\n'
    #       print (output)
      #       print (result)
    if tempList[0] == "and":
            result = result + "000000010"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
#     output =output + result + '\n'
      #       print (output)
      #       print (result)
    if tempList[0] == "or":
            result = result + "000000011"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    # output =output + result + '\n'
      #       print (output)
      #       print (result)
    if tempList[0] == "popcnth":
            result = result + "000000100"
            result = result + "00000"
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
```

```
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    #    output =output + result + '\n'
        #      print (output)
          #    print (result)
        if tempList[0] == "clz":
            result = result + "000000101"
            result = result + "00000"
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    #      output =output + result + '\n'
        #        print (output)
          #    print (result)
        if tempList[0] == "rot":
            result = result + "000000110"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
    #    output =output + result + '\n'
        #      print (output)
        #      print (result)
        if tempList[0] == "shlhi":
            result = result + "000000111"
            temp = str(bin(int(tempList[1][0:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
```

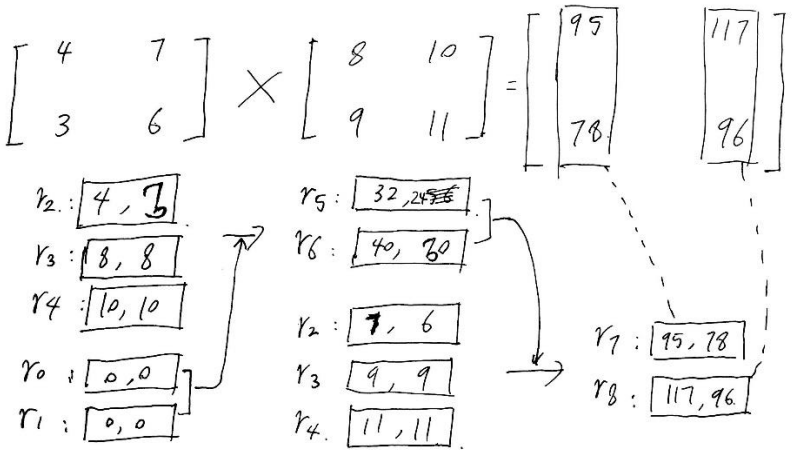
```
#    output =output + result + '\n'
 #          print (output)
      #    print (result)
   if tempList[0] == "a":
          result = result + "000001000"
          temp = str(bin(int(tempList[1][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
          temp = str(bin(int(tempList[2][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
          temp = str(bin(int(tempList[3][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
#    output =output + result + '\n'
     #      print (output)
     #      print (result)
   if tempList[0] == "sfw":
          result = result + "000001001"
          temp = str(bin(int(tempList[1][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
          temp = str(bin(int(tempList[2][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
          temp = str(bin(int(tempList[3][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
#    output =output + result + '\n'
     #      print (output)
    #       print (result)
   if tempList[0] == "ah":
          result = result + "000001010"
          temp = str(bin(int(tempList[1][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
          temp = str(bin(int(tempList[2][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
          temp = str(bin(int(tempList[3][1:])))[2:]
          temp = temp.zfill(5)
          result = result + str(temp)
#    output =output + result + '\n'
     #      print (output)
```

```
    #       print (result)
    if tempList[0] == "sfh":
            result = result + "000001011"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
#    output =output + result + '\n'
     #      print (output)
    #       print (result)
    if tempList[0] == "ahs":
            result = result + "000001100"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)


    #       print (output)
       #    print (result)
#    output =output + result + '\n'
    if tempList[0] == "sfhs":
            result = result + "000001101"
            temp = str(bin(int(tempList[1][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[2][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
            temp = str(bin(int(tempList[3][1:])))[2:]
            temp = temp.zfill(5)
            result = result + str(temp)
#  output =output + result + '\n'
    #       print (output)
       #    print (result)
```

```
        if tempList[0] == "mpyu":
                result = result + "000001110"
                temp = str(bin(int(tempList[1][1:])))[2:]
                temp = temp.zfill(5)
                result = result + str(temp)
                temp = str(bin(int(tempList[2][1:])))[2:]
                temp = temp.zfill(5)
                result = result + str(temp)
                temp = str(bin(int(tempList[3][1:])))[2:]
                temp = temp.zfill(5)
                result = result + str(temp)
    # output =output + result + '\n'
    #          print (output)
            #    print (result)
        if tempList[0] == "absdb":
                result = result + "000001111"
                temp = str(bin(int(tempList[1][1:])))[2:]
                temp = temp.zfill(5)
                result = result + str(temp)
                temp = str(bin(int(tempList[2][1:])))[2:]
                temp = temp.zfill(5)
                result = result + str(temp)
                temp = str(bin(int(tempList[3][1:])))[2:]
                temp = temp.zfill(5)
                result = result + str(temp)

        output =output + result + '\n'

          #      print (result)

def save(filename, contents):
    fh = open(filename, 'w')
    fh.write(contents)
    fh.close()
save('C:/My_Designs/ese345/ese345/instruction.txt', output)
```

Testing 1: matrix multiplication

Math principle:



Codes load in:

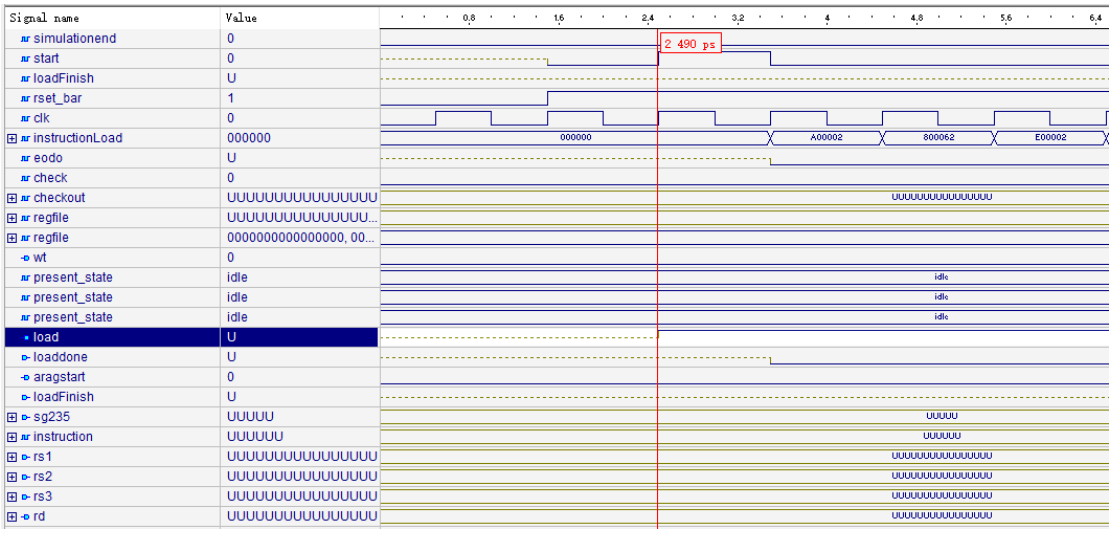
li,1,0,r2	--clear second half word of r2
li,0,3,r2	--load 3 into first half word of r2
li,3,0,r2	--clear fourth (most left) half word of r2
li,2,4,r2	--load 4 into third half word of r2
li,0,8,r3	--load 8 into first half word of r3
li,1,0,r3	--load 0 into second half word of r3
bcw,r0,r3,r3	--bcw r3 right word to both left and right word
li,0,10,r4	--load 10 into first half word of r4
li,1,0,r4	--load 0 into second half word of r4
bcw,r0,r4,r4	--bcw r4 right word to both left and right word
MA,r2,r3,r0,r5	--multiply r2,r3 each word and add them on each word in r0 save r5
MA,r2,r4,r1,r6	--multiply r2,r4 each word and add them on each word in r1 save r6
li,2,7,r2	--load 7 into third HW of r2
li,1,0,r2	--load 0 into second HW of r2
li,0,6,r2	--load 6 into first HW of r2
li,3,0,r2	--load 0 into fourth HW of r2
li,0,9,r3	--load 9 into first HW of r3
li,1,0,r3	--load 0 into second HW of r3
bcw,r0,r3,r3	--bcw r3 right word to both left and right word
li,0,11,r4	--load 11 into first HW of r4
li,1,0,r4	--load 0 into second HW of r4
bcw,r0,r4,r4	--bcw r4 right word to both left and right word
MA,r2,r3,r5,r7	--multiply r2,r3 each word and add them on each word in r5 save r7
MA,r2,r4,r6,r8	--multiply r2,r4 each word and add them on each word in r6 save r8

Expected result:

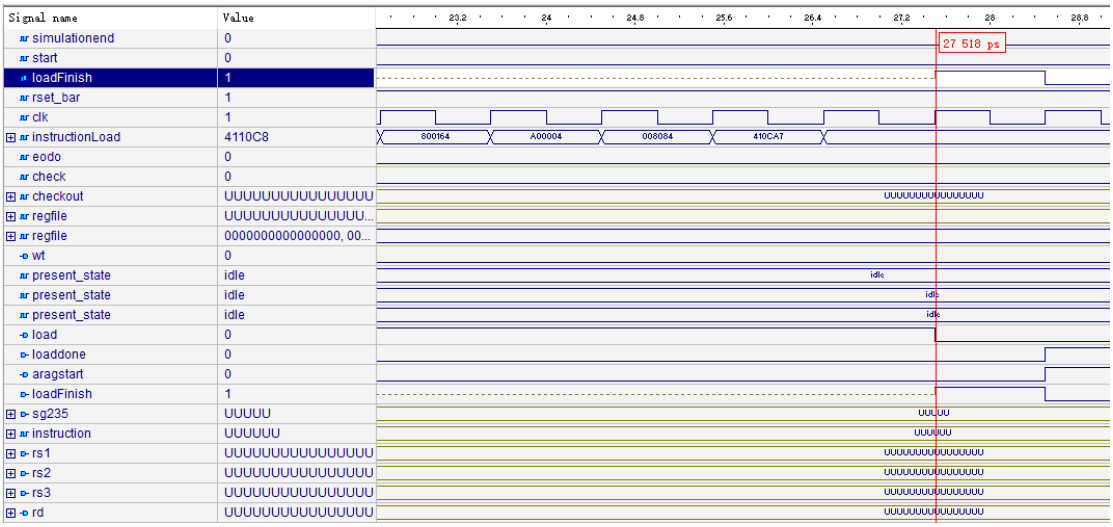
R7 holds first column : 95d(5Fh) 78d(4Eh)
R8 holds second column : 117d(75h) 96d(60h)

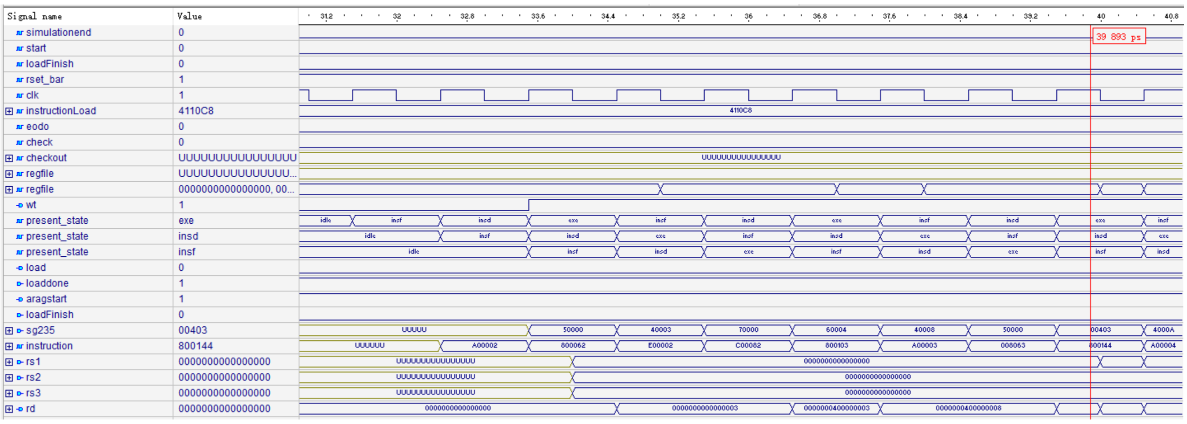
Time sequence:
2.5ns:
Start = ‘1’ load = ‘1’
Pipeline1 = idle
Pipeline2 = idle
Pipeline3 = idle

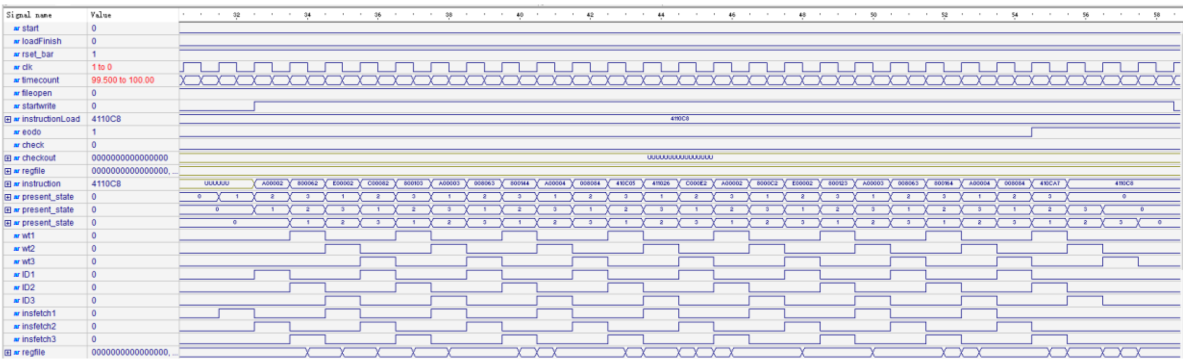
Instruction start loading into instruction buffer



27.5ns:
Instruction loading complete, start to sequencing pipeline







Printed running status and result:

PERIOD: 3.250000e+001 ns

Pipeline stage 1 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 2 status: Idle

waiting to start

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 0

current cycle instruction: 1010000000000000000000010

current cycle opcode: UUUU

current cycle Register Read 1 address: UUUUU

current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

current cycle Register Read 2 address: UUUUU

current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

current cycle Register Read 3 address: UUUUU

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

****

PERIOD: 3.300000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 101000000000000000000010
current cycle opcode: UUUU
current cycle Register Read 1 address: UUUUU
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 2 address: UUUUU
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 3 address: UUUUU
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
****
PERIOD: 3.350000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 100000000000000001100010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 100000000000000001100010
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

UUU
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
****
PERIOD: 3.400000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 100000000000000001100010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 100000000000000001100010
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value:
0000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
0000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.450000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000000000000000000000011
wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 111000000000000000000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 111000000000000000000010
current cycle opcode: 0000

current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 3.500000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000000000000000000000011
wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 11100000000000000000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 11100000000000000000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 3.550000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 0000000000000000UUUUUUUUUUUUUUUU00000000000000000000000000000011
wrote in address 00010
Pipeline stage 3 status: InsD

Exe result:
current instruction 11000000000000010000010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11000000000000010000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.600000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 0000000000000000UUUUUUUUUUUUUUUU00000000000000000000000000000011
wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 11000000000000010000010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11000000000000010000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.650000e+001 ns
Pipeline stage 1 status: InsD
Exe result:

current instruction 10000000000000100000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000000011 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10000000000000100000011
current cycle opcode: 0000
current cycle Register Read 1 address: 00100
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.700000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000100000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000000011 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10000000000000100000011
current cycle opcode: 0000
current cycle Register Read 1 address: 00100
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000

current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.750000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000001000000000000000000000000000001000 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000011
current cycle opcode: 0000
current cycle Register Read 1 address: 01000
current cycle Register Read 1 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.800000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000001000000000000000000000000000001000 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000011
current cycle opcode: 0000
current cycle Register Read 1 address: 01000

current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 3.850000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001000 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000001100011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000001100011
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 3.900000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001000 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:

current instruction 00000000100000000011000011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000000011000011
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.950000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000101000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 10000000000000101000100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.000000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000101000100 decoded, generate opcode and oprands for next

cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001000 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 10000000000000101000100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000010000000000000000000000000000001000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.050000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001010 wrote in address 00100
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000100
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:

00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.100000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001010 wrote in address 00100
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000100
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.150000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001010 wrote in address 00100
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000001000100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000001000100
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value:

00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.200000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010000000000000000000000000000001010 wrote in address 00100
Pipeline stage 3 status: InsD
Exe result:
current instruction 000000001000000010000100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000010000100
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.250000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 010000010000110000000101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in

address 00100
This cycle writing register? 1
current cycle instruction: 01000001000011000000101
current cycle opcode: 0001
current cycle Register Read 1 address: 00100
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.300000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 01000001000011000000101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000010100000000000000000000000000001010 wrote in address 00100
This cycle writing register? 1
current cycle instruction: 01000001000011000000101
current cycle opcode: 0001
current cycle Register Read 1 address: 00100
current cycle Register Read 1 value: 00000000000000000000000000010000000000000000000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.350000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00101

Pipeline stage 2 status: InsD
Exe result:
current instruction 01000001000100000100110 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 01000001000100000100110
current cycle opcode: 0010
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.400000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000001000000000000000000000000000000011000 wrote in address 00101
Pipeline stage 2 status: InsD
Exe result:
current instruction 01000001000100000100110 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 01000001000100000100110
current cycle opcode: 0010
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000000000000000000001000000000000000000000000000000001000
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000001000000000000000000000000000000000011

****
PERIOD: 4.450000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000001000000000000000000000000000000011000 wrote in address 00110
Pipeline stage 3 status: InsD
Exe result:
current instruction 11000000000000011100010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11000000000000011100010
current cycle opcode: 0010
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00100
current cycle Register Read 2 value: 00000000000000000000000001000000000000000000000000000001000
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000010000000000000000000000000000011
****
PERIOD: 4.500000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000001010000000000000000000000000011110 wrote in address 00110
Pipeline stage 3 status: InsD
Exe result:
current instruction 11000000000000011100010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11000000000000011100010
current cycle opcode: 0010
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 2 address: 00100
current cycle Register Read 2 value: 00000000000000000000000000010100000000000000000000000000001010
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000001000000000000000000000000000000011
****
PERIOD: 4.550000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10100000000000000000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000011110 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10100000000000000000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000010100000000000000000000000000001010
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000001000000000000000000000000000000011
****
PERIOD: 4.600000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10100000000000000000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000011110 wrote in address 00010

This cycle writing register? 1
current cycle instruction: 10100000000000000000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.650000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000011110 wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 10000000000000011000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10000000000000011000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.700000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000011110 wrote in address 00010
Pipeline stage 2 status: InsD

Exe result:
current instruction 10000000000000011000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10000000000000011000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.750000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000000110 wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 11100000000000000000010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11100000000000000000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 4.800000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000000110 wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 11100000000000000000010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11100000000000000000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000001010000000000000000000000000000011110
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.850000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000100100011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000000110 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10000000000000100100011
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000001010000000000000000000000000000011110
current cycle Register Read 2 address: 00000

current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 3 address: 00000

current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000000

****

PERIOD: 4.900000e+001 ns

Pipeline stage 1 status: InsD

Exe result:

current instruction 10000000000000100100011 decoded, generate opcode and oprands for next cycle

Pipeline stage 2 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 3 status: Exe

Exe result:

value: 00000000000000000000000000011100000000000000000000000000000110 wrote in address 00010

This cycle writing register? 1

current cycle instruction: 10000000000000100100011

current cycle opcode: 0000

current cycle Register Read 1 address: 00000

current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 2 address: 00000

current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 3 address: 00000

current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000000

****

PERIOD: 4.950000e+001 ns

Pipeline stage 1 status: Exe

Exe result:

value: 00000000000000000000000000011100000000000000000000000000001001 wrote in address 00011

Pipeline stage 2 status: InsD

Exe result:

current instruction 10100000000000000000011 decoded, generate opcode and oprands for next cycle

Pipeline stage 3 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

This cycle writing register? 1

current cycle instruction: 10100000000000000000011
current cycle opcode: 0000
current cycle Register Read 1 address: 01001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.000000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000001001 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000011
current cycle opcode: 0000
current cycle Register Read 1 address: 01001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.050000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000001001 wrote in

address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000000011100011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000000011100011
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.100000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000011100000000000000000000000000001001 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000000011100011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000000011100011
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.150000e+001 ns

Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000101100100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000000 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 10000000000000101100100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.200000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000101100100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000001001000000000000000000000000000001001 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 10000000000000101100100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000001110000000000000000000000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:

00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.250000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000010010000000000000000000000000001011 wrote in address 00100
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000100
current cycle opcode: 0000
current cycle Register Read 1 address: 01011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.300000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000010010000000000000000000000000001011 wrote in address 00100
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000000000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000000000100

current cycle opcode: 0000
current cycle Register Read 1 address: 01011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.350000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010010000000000000000000000000001011 wrote in address 00100
Pipeline stage 3 status: InsD
Exe result:
current instruction 000000001000000010000100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000010000100
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.400000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010010000000000000000000000000001011 wrote in address 00100

Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000010000100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000010000100
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.450000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 01000001000011001010011 1 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00100
This cycle writing register? 1
current cycle instruction: 01000001000011001010011 1
current cycle opcode: 0001
current cycle Register Read 1 address: 00100
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.500000e+001 ns
Pipeline stage 1 status: InsD

Exe result:
current instruction 01000001000011001010011 1 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000010110000000000000000000000000000001011 wrote in address 00100
This cycle writing register? 1
current cycle instruction: 01000001000011001010011 1
current cycle opcode: 0001
current cycle Register Read 1 address: 00100
current cycle Register Read 1 value: 00000000000000000000000000010010000000000000000000000000000001011
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.550000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00111
Pipeline stage 2 status: InsD
Exe result:
current instruction 01000001000100001100100 0 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 01000001000100001100100 0
current cycle opcode: 0010
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.600000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000010111110000000000000000000000000001001110 wrote in address 00111
Pipeline stage 2 status: InsD
Exe result:
current instruction 01000001000100001100100 0 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 01000001000100001100100 0
current cycle opcode: 0010
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000001000000000000000000000000000000011000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000000000000000000000010010000000000000000000000000001001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000001110000000000000000000000000000000110
****
PERIOD: 5.650000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000010111110000000000000000000000000001001110 wrote in address 01000
Pipeline stage 3 status: InsD
Exe result:
current instruction 01000001000100001100100 0 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 01000001000100001100100 0
current cycle opcode: 0010
current cycle Register Read 1 address: 00110

current cycle Register Read 1 value: 00000000000000000000000010000000000000000000000000000011000
current cycle Register Read 2 address: 00100
current cycle Register Read 2 value: 00000000000000000000000000010010000000000000000000000000001001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000001110000000000000000000000000000110
****

PERIOD: 5.700000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000001110101000000000000000000000001100000 wrote in address 01000
Pipeline stage 3 status: InsD
Exe result:
current instruction 010000010001000011001000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 010000010001000011001000
current cycle opcode: 0010
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000000101000000000000000000000000000011110
current cycle Register Read 2 address: 00100
current cycle Register Read 2 value: 00000000000000000000000000010110000000000000000000000000001011
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000001110000000000000000000000000000110
****

PERIOD: 5.750000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000001110101000000000000000000000001100000 wrote in address 01000
This cycle writing register? 0
current cycle instruction: 010000010001000011001000

current cycle opcode: 0010
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000001010000000000000000000000000000011110
current cycle Register Read 2 address: 00100
current cycle Register Read 2 value: 00000000000000000000000000010110000000000000000000000000001011
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000011100000000000000000000000000000110
****
PERIOD: 5.800000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000011101010000000000000000000000001100000 wrote in address 01000
This cycle writing register? 0
current cycle instruction: 01000001000100001100100 0
current cycle opcode: 0010
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000001010000000000000000000000000000011110
current cycle Register Read 2 address: 00100
current cycle Register Read 2 value: 00000000000000000000000000010110000000000000000000000000001011
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000000000000000011100000000000000000000000000000110
****
PERIOD: 5.850000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 01000001000100001100100 0
current cycle opcode: 0010
current cycle Register Read 1 address: 00110

current cycle Register Read 1 value:
00000000000000000000000010100000000000000000000000000011110
current cycle Register Read 2 address: 00100
current cycle Register Read 2 value:
00000000000000000000000000010110000000000000000000000000001011
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value:
00000000000000000000000000011100000000000000000000000000000110
****

Program execution result in Register file:
Register 0 value: 00000000000000000000000000000000000000000000000000000000000000000000
Register 1 value: 00000000000000000000000000000000000000000000000000000000000000000000
Register 2 value: 00000000000000000000000000011100000000000000000000000000000110
Register 3 value: 00000000000000000000000000010010000000000000000000000000001001
Register 4 value: 00000000000000000000000000010110000000000000000000000000001011
Register 5 value: 00000000000000000000000000010000000000000000000000000000011000
Register 6 value: 00000000000000000000000000010100000000000000000000000000011110
Register 7 value: 00000000000000000000000001011111000000000000000000000001001110
Register 8 value: 00000000000000000000000011101010000000000000000000000001100000
Register 9 value: 00000000000000000000000000000000000000000000000000000000000000000000
Register 10 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 11 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 12 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 13 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 14 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 15 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 16 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 17 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 18 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 19 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 20 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 21 value:
00000000000000000000000000000000000000000000000000000000000000000000

Register 22 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 23 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 24 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 25 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 26 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 27 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 28 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 29 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 30 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 31 value:
00000000000000000000000000000000000000000000000000000000000000000

Conclusion:
Real result:
R7:
00000000000000000000000010111110000000000000000000000001001110

R8:
00000000000000000000000011101010000000000000000000000001100000

Result correct.

Testing 2, General operation testing:

Instruction loaded:

li,1,10,r0

li,0,5,r0

li,3,101,r0

li,2,5,r0

li,1,15,r1

li,0,9,r1

li,3,102,r1

li,2,7,r1

li,1,10,r3

li,0,10,r3

bcw,r3,r3,r3

MS,r0,r1,r3,r4

l,r0,r1,r3,r5

h,r0,r1,r3,r6

and,r1,r0,r7

or,r1,r0,r8

popcnth,r0,r1,r9

clz,r0,r1,r10

rot,r0,r1,r11

shlhi,3,r1,r12

a,r0,r1,r13

sfw,r0,r1,r14

ah,r0,r1,r15

sfh,r0,r1,r16

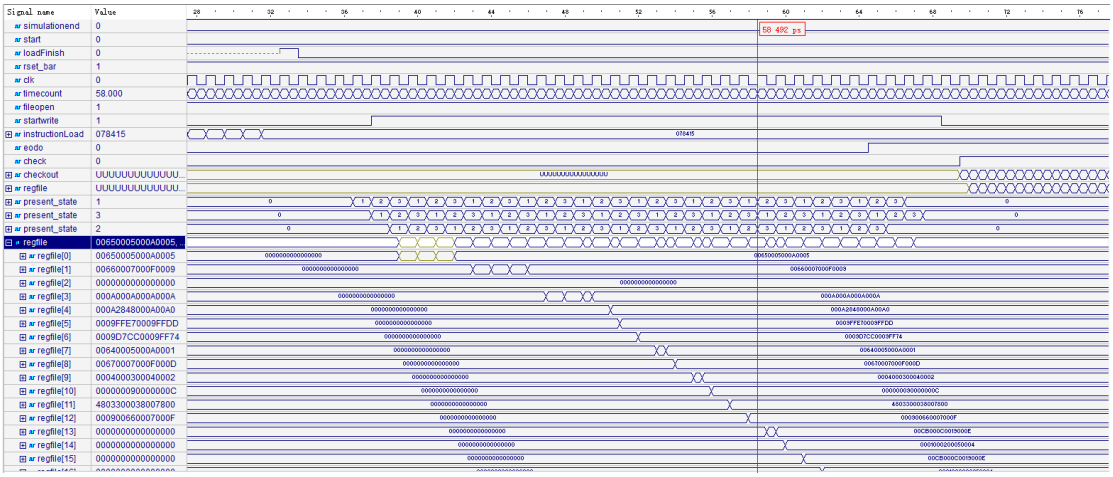
ahs,r0,r1,r17

sfhs,r0,r1,r18

mpyu,r0,r1,r19

absdb,r0,r1,r20

absdb,r1,r0,r21



Printed running status and result:

PERIOD: 3.750000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 1010000000000000101000000
current cycle opcode: UUUU
current cycle Register Read 1 address: UUUUU
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 2 address: UUUUU
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 3 address: UUUUU
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
****
PERIOD: 3.800000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 1010000000000000101000000
current cycle opcode: UUUU
current cycle Register Read 1 address: UUUUU
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 2 address: UUUUU
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
current cycle Register Read 3 address: UUUUU

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

****

PERIOD: 3.850000e+001 ns

Pipeline stage 1 status: InsD

Exe result:

current instruction 1000000000000000010100000 decoded, generate opcode and oprands for next cycle

Pipeline stage 2 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 1

current cycle instruction: 1000000000000000010100000

current cycle opcode: 0000

current cycle Register Read 1 address: 01010

current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

current cycle Register Read 2 address: 00000

current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

current cycle Register Read 3 address: 00000

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

****

PERIOD: 3.900000e+001 ns

Pipeline stage 1 status: InsD

Exe result:

current instruction 1000000000000000010100000 decoded, generate opcode and oprands for next cycle

Pipeline stage 2 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 1

current cycle instruction: 1000000000000000010100000

current cycle opcode: 0000

current cycle Register Read 1 address: 01010

current cycle Register Read 1 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 3.950000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000010100000000000000101
wrote in address 00000
Pipeline stage 2 status: InsD
Exe result:
current instruction 11100000000110010100000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 11100000000110010100000
current cycle opcode: 0000
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000001010UUUUUUUUUUUUUUUU
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000001010UUUUUUUUUUUUUUUU
****

PERIOD: 4.000000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000010100000000000000101
wrote in address 00000
Pipeline stage 2 status: InsD
Exe result:
current instruction 11100000000110010100000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF

Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 11100000000110010100000
current cycle opcode: 0000
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000001010UUUUUUUUUUUUUUUU
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000001010UUUUUUUUUUUUUUUU
****
PERIOD: 4.050000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001O1UUUUUUUUUUUUUUUU00000000000010100000000000000101
wrote in address 00000
Pipeline stage 3 status: InsD
Exe result:
current instruction 11000000000000010100000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11000000000000010100000
current cycle opcode: 0000
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000001010000000000000101
****
PERIOD: 4.100000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle

Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001010UUUUUUUUUUUUUUU00000000000010100000000000000101 wrote in address 00000
Pipeline stage 3 status: InsD
Exe result:
current instruction 11000000000000010100000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 11000000000000010100000
current cycle opcode: 0000
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU00000000000010100000000000000101
****
PERIOD: 4.150000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10100000000000111100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001010000000000000101000000000000101000000000000000101 wrote in address 00000
This cycle writing register? 1
current cycle instruction: 10100000000000111100001
current cycle opcode: 0000
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:

0000000001100101UUUUUUUUUUUUUUUU00000000000010100000000000000101
****
PERIOD: 4.200000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 101000000000000111100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 0000000001100101000000000000010100000000000010100000000000000101 wrote in address 00000
This cycle writing register? 1
current cycle instruction: 101000000000000111100001
current cycle opcode: 0000
current cycle Register Read 1 address: 00101
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 0000000001100101UUUUUUUUUUUUUUUU00000000000010100000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 0000000001100101UUUUUUUUUUUUUUUU00000000000010100000000000000101
****
PERIOD: 4.250000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 0000000001100101000000000000010100000000000011110000000000000101 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 100000000000000100100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 100000000000000100100001
current cycle opcode: 0000
current cycle Register Read 1 address: 01111
current cycle Register Read 1 value:

00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.300000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000011001010000000000001010000000000001111000000000000101 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 10000000000000100100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10000000000000100100001
current cycle opcode: 0000
current cycle Register Read 1 address: 01111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.350000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001010000000000001010000000000001111000000000001001 wrote in address 00001
Pipeline stage 3 status: InsD
Exe result:
current instruction 11100000000011001100001 decoded, generate opcode and oprands for next

cycle
This cycle writing register? 1
current cycle instruction: 111000000000110011000001
current cycle opcode: 0000
current cycle Register Read 1 address: 01001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.400000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001010000000000001010000000000001111000000000001001 wrote in address 00001
Pipeline stage 3 status: InsD
Exe result:
current instruction 111000000000110011000001 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 111000000000110011000001
current cycle opcode: 0000
current cycle Register Read 1 address: 01001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.450000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 110000000000000011100001 decoded, generate opcode and oprands for next cycle

Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001100000000000001010000000000001111000000000001001 wrote in address 00001
This cycle writing register? 1
current cycle instruction: 11000000000000011100001
current cycle opcode: 0000
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.500000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 11000000000000011100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001100000000000001010000000000001111000000000001001 wrote in address 00001
This cycle writing register? 1
current cycle instruction: 11000000000000011100001
current cycle opcode: 0000
current cycle Register Read 1 address: 00110
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101

****
PERIOD: 4.550000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000011001100000000000001110000000000001111000000000001001 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000101000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000101000011
current cycle opcode: 0000
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000010100000000000000101
****
PERIOD: 4.600000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000011001100000000000001110000000000001111000000000001001 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 10100000000000101000011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000101000011
current cycle opcode: 0000
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.650000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001100000000000001110000000000001010000000000001001 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 100000000000000101000011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 100000000000000101000011
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.700000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001100000000000001110000000000001010000000000001001 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 100000000000000101000011 decoded, generate opcode and oprands for next cycle

This cycle writing register? 1
current cycle instruction: 10000000000000101000011
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.750000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000000001000110001100011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001100000000000000111000000000001010000000000001010 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 000000001000110001100011
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.800000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000000001000110001100011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF

Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001100000000000001110000000000001010000000000001010 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 000000001000110001100011
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 4.850000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 01010000000010001100100 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 0101000000010001100100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****

PERIOD: 4.900000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010100000000000001010000000000000101000000000000001010 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 01010000000010001100100 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 01010000000010001100100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000101000000000000001010
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 00000000011001100000000000000111000000000000101000000000000001010
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000011001100000000000000111100000000000011110000000000001001
****
PERIOD: 4.950000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00100
Pipeline stage 3 status: InsD
Exe result:
current instruction 01100000000010001100101 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 01100000000010001100101
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00001

current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001100000000000001110000000000001111000000000001001
****
PERIOD: 5.000000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000010100010100001001000000000000001010000000010100000 wrote in address 00100
Pipeline stage 3 status: InsD
Exe result:
current instruction 011000000000010001100101 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 011000000000010001100101
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000010100000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000101
****
PERIOD: 5.050000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 011100000000010001100110 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000010011111111111110011100000000000010011111111111011101 wrote in address 00101
This cycle writing register? 1

current cycle instruction: 01110000000010001100110
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000000001001
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000000101
****
PERIOD: 5.100000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 01110000000010001100110 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000010011111111111100111000000000000100111111111111011101 wrote in address 00101
This cycle writing register? 1
current cycle instruction: 01110000000010001100110
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000000001001
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000000101
****
PERIOD: 5.150000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010011101011111001100000000000000100111111111101110100 wrote in address 00110
Pipeline stage 2 status: InsD
Exe result:

current instruction 000000010000010000000111 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000010000010000000111
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000000001001
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000000101
****
PERIOD: 5.200000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010011101011111001100000000000000010011111111101110100 wrote in address 00110
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000010000010000000111 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000010000010000000111
current cycle opcode: 0000
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000000001001
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000000101
****
PERIOD: 5.250000e+001 ns

Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000001000000000000001000000000000010100000000000001000 wrote in address 00111
Pipeline stage 3 status: InsD
Exe result:
current instruction 000000011000010000001000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000000011000010000001000
current cycle opcode: 0010
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000011001010000000000001010000000000001010000000000000000101
****
PERIOD: 5.300000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000011001000000000000001010000000000001010000000000000000001 wrote in address 00111
Pipeline stage 3 status: InsD
Exe result:
current instruction 000000011000010000001000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000000011000010000001000
current cycle opcode: 0010
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001010000000000001010000000000001010000000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value:

00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.350000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000000100000000000101001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001110000000000001110000000000001111000000000001101 wrote in address 01000
This cycle writing register? 1
current cycle instruction: 000000100000000000101001
current cycle opcode: 0011
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value:
00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value:
00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.400000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000000100000000000101001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000011001110000000000001110000000000001111000000000001101 wrote in address 01000
This cycle writing register? 1
current cycle instruction: 000000100000000000101001

current cycle opcode: 0011
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value: 00000000000010100000000000001010000000000001010000000000001010
****
PERIOD: 5.450000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000001000000000000000010000000000000001000000000000010 wrote in address 01001
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000010100000000101010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000010100000000101010
current cycle opcode: 0100
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 3 address: 00100
current cycle Register Read 3 value: 00000000000010100000000000001010000000000001010000000000001010
****
PERIOD: 5.500000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000001000000000000000011000000000000001000000000000010 wrote in address 01001
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000010100000000101010 decoded, generate opcode and oprands for next

cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000010100000000000101010
current cycle opcode: 0100
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101
current cycle Register Read 3 address: 00100
current cycle Register Read 3 value: 00000000000010100010100000100100000000000000010100000000010100000
****
PERIOD: 5.550000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000001001000000000000000000000000000001100 wrote in address 01010
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000011000000000101011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000011000000000101011
current cycle opcode: 0101
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101
current cycle Register Read 3 address: 00101
current cycle Register Read 3 value: 00000000000010100010100000100100000000000000010100000000010100000
****
PERIOD: 5.600000e+001 ns
Pipeline stage 1 status: InsF

Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000010010000000000000000000000000001100 wrote in address 01010
Pipeline stage 3 status: InsD
Exe result:
current instruction 000000110000000000101011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000000110000000000101011
current cycle opcode: 0101
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101
current cycle Register Read 3 address: 00101
current cycle Register Read 3 value: 00000000000010011111111111100111000000000000100111111111111011101
****
PERIOD: 5.650000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000000111000110000101100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 01001000000000110011000000000000001110000000000001111000000000000 wrote in address 01011
This cycle writing register? 1
current cycle instruction: 000000111000110000101100
current cycle opcode: 0110
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101

current cycle Register Read 3 address: 00110
current cycle Register Read 3 value: 00000000000010011111111111100111000000000000100111111111111011101
****
PERIOD: 5.700000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000000111000110000101100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 010010000000001100110000000000000111000000000000111100000000000 wrote in address 01011
This cycle writing register? 1
current cycle instruction: 000000111000110000101100
current cycle opcode: 0110
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101
current cycle Register Read 3 address: 00110
current cycle Register Read 3 value: 00000000000010011101011111001100000000000000100111111111101110100
****
PERIOD: 5.750000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010010000000001100110000000000000011100000000000001111 wrote in address 01100
Pipeline stage 2 status: InsD
Exe result:
current instruction 000001000000000000101101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000001000000000000101101
current cycle opcode: 0111

current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 0000000001100110000000000000011100000000000011110000000000001001
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 0000000001100101000000000000010100000000000010100000000000000101
current cycle Register Read 3 address: 00111
current cycle Register Read 3 value: 0000000000001001110101111100110000000000000010011111111101110100
****
PERIOD: 5.800000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 0000000000001001000000001100110000000000000011100000000000001111 wrote in address 01100
Pipeline stage 2 status: InsD
Exe result:
current instruction 000001000000000000101101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000001000000000000101101
current cycle opcode: 0111
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 0000000001100110000000000000011100000000000011110000000000001001
current cycle Register Read 2 address: 00011
current cycle Register Read 2 value: 0000000000001010000000000000101000000000000010100000000000001010
current cycle Register Read 3 address: 00111
current cycle Register Read 3 value: 0000000001100100000000000000010100000000000010100000000000000001
****
PERIOD: 5.850000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 0000000001110000000000000001000100000000000110010000000000010011 wrote in address 01101
Pipeline stage 3 status: InsD

Exe result:
current instruction 00000100100000000000101110 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000100100000000000101110
current cycle opcode: 1000
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 3 address: 01000
current cycle Register Read 3 value: 00000000011001000000000000001010000000000001010000000000000000001
****
PERIOD: 5.900000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000110010110000000000001100000000000001100100000000000001110 wrote in address 01101
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000100100000000000101110 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000100100000000000101110
current cycle opcode: 1000
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000000101
current cycle Register Read 3 address: 01000
current cycle Register Read 3 value: 00000000011001110000000000000111000000000000111100000000000001101
****
PERIOD: 5.950000e+001 ns
Pipeline stage 1 status: InsD
Exe result:

current instruction 00000101000000000000101111 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 0000000000000001000000000000001000000000000000101000000000000100 wrote in address 01110
This cycle writing register? 1
current cycle instruction: 00000101000000000000101111
current cycle opcode: 1001
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 0000000001100110000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 0000000001100101000000000000010100000000000010100000000000000101
current cycle Register Read 3 address: 01001
current cycle Register Read 3 value: 0000000001100111000000000000111000000000000111100000000000001101
****
PERIOD: 6.000000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000101000000000000101111 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 0000000000000001000000000000001000000000000000101000000000000100 wrote in address 01110
This cycle writing register? 1
current cycle instruction: 00000101000000000000101111
current cycle opcode: 1001
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 0000000001100110000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 0000000001100101000000000000010100000000000010100000000000000101
current cycle Register Read 3 address: 01001

current cycle Register Read 3 value: 00000000000001000000000000000011000000000000010000000000000010
****
PERIOD: 6.050000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000110010110000000000001100000000000001100100000000000001110 wrote in address 01111
Pipeline stage 2 status: InsD
Exe result:
current instruction 000001011000000000110000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000001011000000000110000
current cycle opcode: 1010
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101
current cycle Register Read 3 address: 01010
current cycle Register Read 3 value: 00000000000001000000000000000011000000000000010000000000000010
****
PERIOD: 6.100000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000110010110000000000001100000000000001100100000000000001110 wrote in address 01111
Pipeline stage 2 status: InsD
Exe result:
current instruction 000001011000000000110000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000001011000000000110000
current cycle opcode: 1010
current cycle Register Read 1 address: 00001

current cycle Register Read 1 value: 00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01010
current cycle Register Read 3 value: 00000000000000000000000000010010000000000000000000000000001100
****

PERIOD: 6.150000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10000
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000110000000000110001 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000110000000000110001
current cycle opcode: 1011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01011
current cycle Register Read 3 value: 00000000000000000000000000010010000000000000000000000000001100
****

PERIOD: 6.200000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10000
Pipeline stage 3 status: InsD
Exe result:

current instruction 00000110000000000110001 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000110000000000110001
current cycle opcode: 1011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 0000000001100110000000000000011100000000000011110000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 0000000001100101000000000000010100000000000010100000000000000101
current cycle Register Read 3 address: 01011
current cycle Register Read 3 value: 0100100000000011001100000000000000111000000000000111100000000000
****
PERIOD: 6.250000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110100000000000110010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 0000000011001011000000000000011000000000000001100100000000000001110 wrote in address 10001
This cycle writing register? 1
current cycle instruction: 00000110100000000000110010
current cycle opcode: 1100
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 0000000001100110000000000000011100000000000011110000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 0000000001100101000000000000010100000000000010100000000000000101
current cycle Register Read 3 address: 01100
current cycle Register Read 3 value: 0100100000000011001100000000000000111000000000000111100000000000
****
PERIOD: 6.300000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110100000000000110010 decoded, generate opcode and oprands for next

cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000110010110000000000001100000000000001100100000000000001110 wrote in address 10001
This cycle writing register? 1
current cycle instruction: 00000110100000000110010
current cycle opcode: 1100
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000001111000000000001111000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01100
current cycle Register Read 3 value: 00000000000010010000000011001100000000000000011100000000000001111
****
PERIOD: 6.350000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10010
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000111000000000110011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000111000000000110011
current cycle opcode: 1101
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000001111000000000001111000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value:

0000000000001001000000001100110000000000000011100000000000001111
****
PERIOD: 6.400000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10010
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000111000000000110011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000111000000000110011
current cycle opcode: 1101
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000000101000000000000101000000000000000101
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 00000000110010110000000000001100000000000001100100000000000001110
****
PERIOD: 6.450000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000100011000000000000000000000000000101101 wrote in address 10011
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000111100000000110100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000111100000000110100
current cycle opcode: 1110
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value:

00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000010100000000000000101
current cycle Register Read 3 address: 01110
current cycle Register Read 3 value: 00000000011001011000000000001100000000000011001000000000001110
****
PERIOD: 6.500000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000010001100000000000000000000000000101101 wrote in address 10011
Pipeline stage 3 status: InsD
Exe result:
current instruction 000001111000000000110100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000001111000000000110100
current cycle opcode: 1110
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000011100000000000011110000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000010100000000000000101
current cycle Register Read 3 address: 01110
current cycle Register Read 3 value: 00000000000000010000000000000100000000000000101000000000000100
****
PERIOD: 6.550000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000001111000010000010101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000010000000000000100000000000000101000000000000100 wrote in

address 10100
This cycle writing register? 1
current cycle instruction: 00000111100001000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000000000010000000000000100000000000000101000000000000100
****
PERIOD: 6.600000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000111100001000010101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000010000000000000100000000000000101000000000000100 wrote in address 10100
This cycle writing register? 1
current cycle instruction: 00000111100001000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000110010110000000000001100000000000001100100000000000001110
****
PERIOD: 6.650000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000010000000000000100000000000000101000000000000100 wrote in address 10101

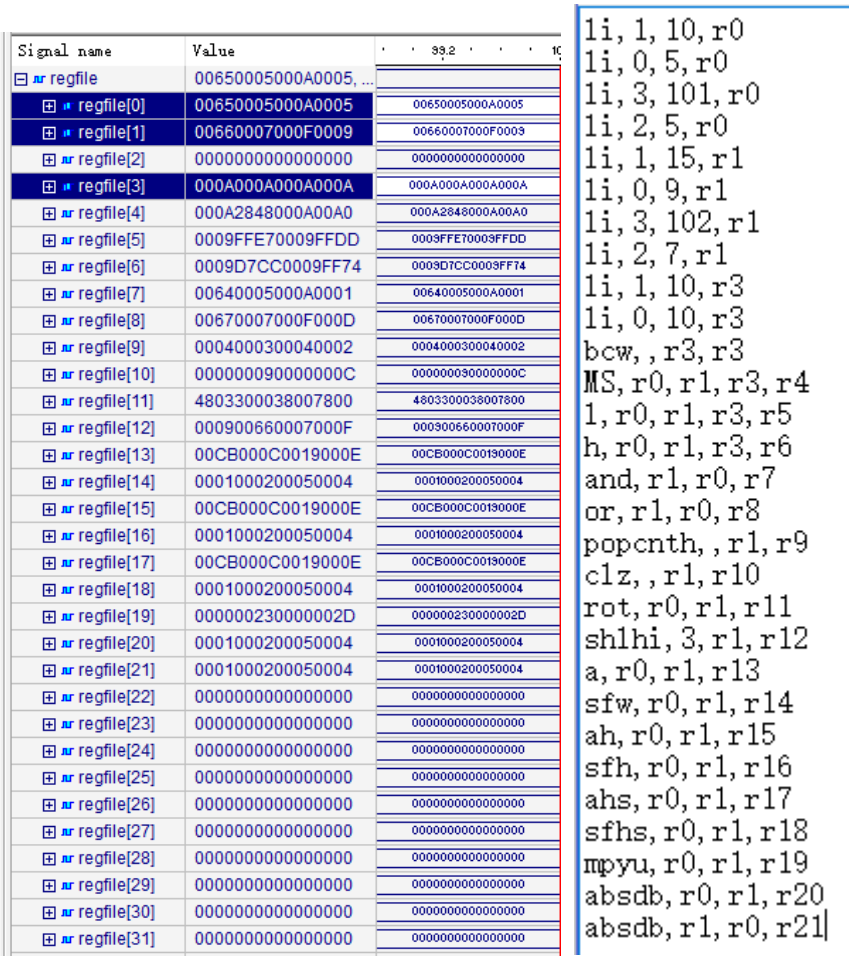
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000111100001000010101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 00000111100001000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000011001011000000000000110000000000000110010000000000001110
****
PERIOD: 6.700000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10101
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000111100001000010101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 00000111100001000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000000111000000000000111100000000000001001
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000011001011000000000000110000000000000110010000000000001110
****
PERIOD: 6.750000e+001 ns

Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10101
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 00000111100001000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001010000000000000101000000000000010100000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000000111000000000000011110000000000001001
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000110010110000000000001100000000000000110010000000000001110
****
PERIOD: 6.800000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000010000000000000010000000000000010100000000000000100 wrote in address 10101
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 00000111100001000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001010000000000000101000000000000010100000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000000111000000000000011110000000000001001
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000110010110000000000001100000000000000110010000000000001110
****
PERIOD: 6.850000e+001 ns

Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 000001111000010000010101
current cycle opcode: 1111
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000011001010000000000001010000000000001010000000000000101
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 00000000011001100000000000001110000000000001111000000000001001
current cycle Register Read 3 address: 01111
current cycle Register Read 3 value: 00000000110010110000000000001100000000000001100100000000000001110
****
Program execution result in Register file:
Register 0 value: 00000000011001010000000000001010000000000001010000000000000101
Register 1 value: 00000000011001100000000000001110000000000001111000000000001001
Register 2 value: 00000000000000000000000000000000000000000000000000000000000000
Register 3 value: 00000000000010100000000000001010000000000001010000000000001010
Register 4 value: 00000000000010100010100001001000000000000000101000000000010100000
Register 5 value: 00000000000010011111111111001110000000000001001111111111011101
Register 6 value: 00000000000010011101011111001100000000000001001111111101110100
Register 7 value: 00000000011001000000000000001010000000000001010000000000000001
Register 8 value: 00000000011001110000000000001110000000000001111000000000001101
Register 9 value: 00000000000001000000000000000011000000000000010000000000000010
Register 10 value: 00000000000000000000000000010010000000000000000000000000001100
Register 11 value: 01001000000000110011000000000000011100000000000011110000000000
Register 12 value: 00000000000010010000000011001100000000000000011100000000000001111
Register 13 value: 00000000110010110000000000001100000000000001100100000000000001110
Register 14 value: 00000000000000010000000000000010000000000000010100000000000000100
Register 15 value: 00000000110010110000000000001100000000000001100100000000000001110
Register 16 value: 00000000000000010000000000000010000000000000010100000000000000100

Register 17 value:
00000000110010110000000000011000000000000011001000000000000001110
Register 18 value:
00000000000000010000000000000100000000000000101000000000000000100
Register 19 value:
00000000000000000000000000100011000000000000000000000000000101101
Register 20 value:
00000000000000010000000000000100000000000000101000000000000000100
Register 21 value:
00000000000000010000000000000100000000000000101000000000000000100
Register 22 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 23 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 24 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 25 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 26 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 27 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 28 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 29 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 30 value:
00000000000000000000000000000000000000000000000000000000000000000
Register 31 value:
00000000000000000000000000000000000000000000000000000000000000000

Conclution:



Signal name	Value
regfile	00650005000A0005, ...
regfile[0]	00650005000A0005
regfile[1]	00660007000F0009
regfile[2]	0000000000000000
regfile[3]	000A000A000A000A
regfile[4]	000A2848000A00A0
regfile[5]	0009FFE70009FFDD
regfile[6]	0009D7CC0009FF74
regfile[7]	00640005000A0001
regfile[8]	00670007000F000D
regfile[9]	0004000300040002
regfile[10]	000000090000000C
regfile[11]	4803300038007800
regfile[12]	000900660007000F
regfile[13]	00CB000C0019000E
regfile[14]	0001000200050004
regfile[15]	00CB000C0019000E
regfile[16]	0001000200050004
regfile[17]	00CB000C0019000E
regfile[18]	0001000200050004
regfile[19]	000000230000002D
regfile[20]	0001000200050004
regfile[21]	0001000200050004
regfile[22]	0000000000000000
regfile[23]	0000000000000000
regfile[24]	0000000000000000
regfile[25]	0000000000000000
regfile[26]	0000000000000000
regfile[27]	0000000000000000
regfile[28]	0000000000000000
regfile[29]	0000000000000000
regfile[30]	0000000000000000
regfile[31]	0000000000000000

```
li, 1, 10, r0
li, 0, 5, r0
li, 3, 101, r0
li, 2, 5, r0
li, 1, 15, r1
li, 0, 9, r1
li, 3, 102, r1
li, 2, 7, r1
li, 1, 10, r3
li, 0, 10, r3
bcw, , r3, r3
MS, r0, r1, r3, r4
l, r0, r1, r3, r5
h, r0, r1, r3, r6
and, r1, r0, r7
or, r1, r0, r8
popcnth, , r1, r9
clz, , r1, r10
rot, r0, r1, r11
shlhi, 3, r1, r12
a, r0, r1, r13
sfw, r0, r1, r14
ah, r0, r1, r15
sfh, r0, r1, r16
ahs, r0, r1, r17
sfhs, r0, r1, r18
mpyu, r0, r1, r19
absdb, r0, r1, r20
absdb, r1, r0, r21
```

Comparing the register value result in hex with the input instructions, all instruction results are correct. R20 r21 shows the function of absdb, which is giving the absolute difference of two register's half words.

Special instruction testing 1:

Instruction loaded:

```
li,1,65535,r0
li,0,65535,r0
bcw,,r0,r0
li,1,65535,r1
li,0,65535,r1
bcw,,r1,r1
li,1,10,r2
li,0,10,r2
bcw,,r2,r2
MA,r0,r1,r2,r3
MS,r0,r1,r2,r4
l,r0,r1,r2,r5
h,r0,r1,r2,r6
li,1,32768,r7
li,0,32768,r7
bcw,,r7,r7
li,1,32767,r8
li,0,32767,r8
bcw,,r8,r8
ahs,r8,r2,r9
sfhs,r2,r7,r10
sfhs,r7,r2,r11
ahs,r0,r2,r12
sfhs,r0,r2,r13
```

printed running status and register result:

PERIOD: 3.350000e+001 ns

Pipeline stage 1 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 2 status: Idle

waiting to start

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 0

current cycle instruction: 1011111111111111111100000

current cycle opcode: UUUU

current cycle Register Read 1 address: UUUUU

current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

current cycle Register Read 2 address: UUUUU

current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

current cycle Register Read 3 address: UUUUU

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

****

PERIOD: 3.400000e+001 ns

Pipeline stage 1 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 1011111111111111111100000
current cycle opcode: UUUU
current cycle Register Read 1 address: UUUUU
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
current cycle Register Read 2 address: UUUUU
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
current cycle Register Read 3 address: UUUUU
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
****
PERIOD: 3.450000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 1001111111111111111100000 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 1001111111111111111100000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value:

UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUU
****
PERIOD: 3.500000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 1001111111111111111100000 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 1001111111111111111100000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 0000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 0000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.550000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU11111111111111111111111111111111
wrote in address 00000
Pipeline stage 2 status: InsD
Exe result:
current instruction 0000000010000000000000000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 0000000010000000000000000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 0000000000000000000000000000000000000000000000000000000000000000

current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.600000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU11111111111111111111111111111111 wrote in address 00000
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000000100000000000000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000000000000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.650000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000000 wrote in address 00000
Pipeline stage 3 status: InsD
Exe result:
current instruction 10111111111111111100001 decoded, generate opcode and oprands for next cycle

This cycle writing register? 1
current cycle instruction: 10111111111111111100001
current cycle opcode: 0001
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.700000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00000
Pipeline stage 3 status: InsD
Exe result:
current instruction 10111111111111111100001 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10111111111111111100001
current cycle opcode: 0001
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU11111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU11111111111111111111111111111111
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.750000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10011111111111111100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF

Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00001
This cycle writing register? 1
current cycle instruction: 10011111111111111100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.800000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10011111111111111100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00001
This cycle writing register? 1
current cycle instruction: 10011111111111111100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 3.850000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000000100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000000100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.900000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000000100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000000100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111

current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.950000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00001
Pipeline stage 3 status: InsD
Exe result:
current instruction 10100000000000101000010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10100000000000101000010
current cycle opcode: 0001
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 4.000000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00001
Pipeline stage 3 status: InsD
Exe result:
current instruction 10100000000000101000010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1

current cycle instruction: 10100000000000101000010
current cycle opcode: 0001
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****

PERIOD: 4.050000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000101000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 11111111111111111111111111111100000000000010101011111111111111111 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10000000000000101000010
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****

PERIOD: 4.100000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10000000000000101000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:

next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 11111111111111111111111111111100000000000010101111111111111111 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10000000000000101000010
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.150000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 11111111111111111111111111111100000000000010100000000000001010 wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000000100000001000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000001000010
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.200000e+001 ns

Pipeline stage 1 status: Exe
Exe result:
value: 11111111111111111111111111111100000000000001010000000000000001010 wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000001000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000001000010
current cycle opcode: 0000
current cycle Register Read 1 address: 01010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.250000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 010000000000010001000011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 010000000000010001000011
current cycle opcode: 0001
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:

11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.300000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000010100000000000001010000000000000101000000000000001010 wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 010000000000010001000011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 010000000000010001000011
current cycle opcode: 0001
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 11111111111111111111111111111110000000000001010000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.350000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 010100000000010001000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000010000000000000000000000000000000001 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 010100000000010001000100

current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.400000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 01010000000010001000100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000010100000000000001011000000000000101000000000000001011 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 01010000000010001000100
current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.450000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010100000000000001011000000000000101000000000000001011 wrote in address 00100
Pipeline stage 2 status: InsD
Exe result:
current instruction 01100000000010001000101 decoded, generate opcode and oprands for next

cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 011000000000010001000101
current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.500000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010100000000000001011000000000000101000000000000001011 wrote in address 00100
Pipeline stage 2 status: InsD
Exe result:
current instruction 011000000000010001000101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 011000000000010001000101
current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.550000e+001 ns
Pipeline stage 1 status: InsF

Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000010100000000000001001000000000000101000000000000001001 wrote in address 00101
Pipeline stage 3 status: InsD
Exe result:
current instruction 011100000000010001000110 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 011100000000010001000110
current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.600000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000010100000000000001001000000000000101000000000000001001 wrote in address 00101
Pipeline stage 3 status: InsD
Exe result:
current instruction 011100000000010001000110 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 011100000000010001000110
current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111

current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.650000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10110000000000000000111 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000010100000000000001001000000000000101000000000000001001 wrote in address 00110
This cycle writing register? 1
current cycle instruction: 10110000000000000000111
current cycle opcode: 0000
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.700000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10110000000000000000111 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000010100000000000001001000000000000101000000000000001001 wrote in address 00110
This cycle writing register? 1
current cycle instruction: 10110000000000000000111
current cycle opcode: 0000

current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00001
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.750000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010100000000000001001100000000000000000000000000001001 wrote in address 00111
Pipeline stage 2 status: InsD
Exe result:
current instruction 10010000000000000000111 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10010000000000000000111
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.800000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010100000000000001001100000000000000000000000000001001 wrote in address 00111
Pipeline stage 2 status: InsD
Exe result:
current instruction 10010000000000000000111 decoded, generate opcode and oprands for next cycle

Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10010000000000000000111
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.850000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000010100000000000001001100000000000000010000000000000000 wrote in address 00111
Pipeline stage 3 status: InsD
Exe result:
current instruction 000000001000000011100111 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000011100111
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.900000e+001 ns
Pipeline stage 1 status: InsF
Exe result:

next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000010100000000000001001100000000000000010000000000000000 wrote in address 00111
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000011100111 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000011100111
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.950000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10101111111111111101000 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 00111
This cycle writing register? 1
current cycle instruction: 10101111111111111101000
current cycle opcode: 0001
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00001

current cycle Register Read 3 value:
11111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 5.000000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10101111111111111101000 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 1000000000000001000000000000001000000000000001000000000000000 wrote in address 00111
This cycle writing register? 1
current cycle instruction: 10101111111111111101000
current cycle opcode: 0001
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value:
0000000000001010000000000001001100000000000001000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
11111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value:
11111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 5.050000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 1000000000000001000000000000000011111111111111110000000000000 wrote in address 01000
Pipeline stage 2 status: InsD
Exe result:
current instruction 10001111111111111101000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10001111111111111101000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111

current cycle Register Read 1 value:
1111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value:
1111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value:
1111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 5.100000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 1000000000000001000000000000000011111111111111110000000000000000 wrote in address 01000
Pipeline stage 2 status: InsD
Exe result:
current instruction 10001111111111111101000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 10001111111111111101000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value:
0000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value:
0000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value:
0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.150000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 1000000000000001000000000000000011111111111111101111111111111111 wrote in address 01000
Pipeline stage 3 status: InsD
Exe result:

current instruction 00000000100000100001000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000100001000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.200000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 1000000000000001000000000000000011111111111111101111111111111111 wrote in address 01000
Pipeline stage 3 status: InsD
Exe result:
current instruction 00000000100000100001000 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000100001000
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.250000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110001000000001001001 decoded, generate opcode and oprands for next

cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 01000
This cycle writing register? 1
current cycle instruction: 00000110001000000001001001
current cycle opcode: 0001
current cycle Register Read 1 address: 01000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.300000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110001000000001001001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 01111111111111110111111111111111011111111111111101111111111111111 wrote in address 01000
This cycle writing register? 1
current cycle instruction: 00000110001000000001001001
current cycle opcode: 0001
current cycle Register Read 1 address: 01000
current cycle Register Read 1 value: 10000000000000001000000000000000111111111111111101111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value:

11111111111111111111111111111111111111111111111111111111111111111
****

PERIOD: 5.350000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111 wrote in address 01001
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000110100010001101010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000110100010001101010
current cycle opcode: 1100
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 01000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01100
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****

PERIOD: 5.400000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 01111111111111110111111111111111011111111111111101111111111111111 wrote in address 01001
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000110100010001101010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000110100010001101010
current cycle opcode: 1100
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value:

0000000000001010000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 01000
current cycle Register Read 2 value: 0111111111111110111111111111111011111111111111101111111111111111
current cycle Register Read 3 address: 01100
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.450000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 1000000000001011100000000001011100000000001011100000000001011 wrote in address 01010
Pipeline stage 3 status: InsD
Exe result:
current instruction 000001101001110001001011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000001101001110001001011
current cycle opcode: 1101
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 0000000000001010000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 0111111111111110111111111111111011111111111111101111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.500000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 1000000000000000100000000000000010000000000000001000000000000000 wrote in address 01010
Pipeline stage 3 status: InsD
Exe result:
current instruction 000001101001110001001011 decoded, generate opcode and oprands for next

cycle
This cycle writing register? 1
current cycle instruction: 00000110100111000010010 11
current cycle opcode: 1101
current cycle Register Read 1 address: 00111
current cycle Register Read 1 value: 1000000000000000100000000000000010000000000000001000000000000000
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 0000000000001010000000000000101000000000000010100000000000001010
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.550000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110000000000001001100 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 1000000000000000100000000000000010000000000000001000000000000000 wrote in address 01011
This cycle writing register? 1
current cycle instruction: 00000110000000000001001100
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 1000000000000000100000000000000010000000000000001000000000000000
current cycle Register Read 2 address: 00111
current cycle Register Read 2 value: 0000000000001010000000000000101000000000000010100000000000001010
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.600000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110000000000001001100 decoded, generate opcode and oprands for next cycle

Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 0111111111111111011111111111111101111111111111110111111111111111 wrote in address 01011
This cycle writing register? 1
current cycle instruction: 00000110000000001001100
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 0000000000001010000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 00111
current cycle Register Read 2 value: 1000000000000001000000000000001000000000000001000000000000000
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.650000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 1000000000001010100000000001010100000000001010100000000001010 wrote in address 01100
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000110100000001001101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000110100000001001101
current cycle opcode: 1100
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 0000000000001010000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 1000000000000001000000000000001000000000000001000000000000000
current cycle Register Read 3 address: 01100
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000

****
PERIOD: 5.700000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 0000000000001001000000000001001000000000001001000000000001001 wrote in address 01100
Pipeline stage 2 status: InsD
Exe result:
current instruction 000001101000000001001101 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000001101000000001001101
current cycle opcode: 1100
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 0000000000001010000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01100
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.750000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 0000000000001011000000000001011000000000001011000000000001011 wrote in address 01101
Pipeline stage 3 status: InsD
Exe result:
current instruction 000001101000000001001101 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000001101000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 0000000000001010000000000001010000000000001010000000000001010

current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 1111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 1000000000001010100000000000101010000000000010100000000000001010
****
PERIOD: 5.800000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 0000000000001011000000000000101100000000000010110000000000001011 wrote in address 01101
Pipeline stage 3 status: InsD
Exe result:
current instruction 000001101000000001001101 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 000001101000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 0000000000001010000000000001010000000000001010000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 1111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 0000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 5.850000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 000001101000000001001101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Exe
Exe result:
value: 0000000000001011000000000000101100000000000010110000000000001011 wrote in address 01101
This cycle writing register? 1

current cycle instruction: 00000110100000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 00000000000010110000000000001011000000000000101100000000000001011
****
PERIOD: 5.900000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 00000110100000000001001101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000010110000000000001011000000000000101100000000000001011 wrote in address 01101
This cycle writing register? 1
current cycle instruction: 00000110100000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 00000000000010110000000000001011000000000000101100000000000001011
****
PERIOD: 5.950000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010110000000000001011000000000000101100000000000001011 wrote in address 01101
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle

waiting to start
This cycle writing register? 0
current cycle instruction: 00000110100000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 00000000000010110000000000001011000000000000101100000000000001011
****
PERIOD: 6.000000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000010110000000000001011000000000000101100000000000001011 wrote in address 01101
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 00000110100000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 00000000000010100000000000001010000000000000101000000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 11111111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value: 00000000000010110000000000001011000000000000101100000000000001011
****
PERIOD: 6.050000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0

current cycle instruction: 00000110100000000001001101
current cycle opcode: 1101
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value:
00000000000010100000000000010100000000000010100000000000001010
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
11111111111111111111111111111111111111111111111111111111111111
current cycle Register Read 3 address: 01101
current cycle Register Read 3 value:
00000000000010110000000000010110000000000010110000000000001011
****
Program execution result in Register file:
Register 0 value: 11111111111111111111111111111111111111111111111111111111111111
Register 1 value: 11111111111111111111111111111111111111111111111111111111111111
Register 2 value: 00000000000010100000000000010100000000000010100000000000001010
Register 3 value: 00000000000010100000000000010110000000000010100000000000001011
Register 4 value: 00000000000010100000000000010110000000000010100000000000001011
Register 5 value: 00000000000010100000000000010010000000000010100000000000001001
Register 6 value: 00000000000010100000000000010010000000000010100000000000001001
Register 7 value: 10000000000000001000000000000000100000000000000010000000000000
Register 8 value: 01111111111111101111111111111110111111111111111011111111111111
Register 9 value: 01111111111111101111111111111110111111111111111011111111111111
Register 10 value:
10000000000000001000000000000000100000000000000010000000000000
Register 11 value:
01111111111111101111111111111110111111111111111011111111111111
Register 12 value:
00000000000010010000000000010010000000000010010000000000001001
Register 13 value:
00000000000010110000000000010110000000000010110000000000001011
Register 14 value:
00000000000000000000000000000000000000000000000000000000000000
Register 15 value:
00000000000000000000000000000000000000000000000000000000000000
Register 16 value:
00000000000000000000000000000000000000000000000000000000000000
Register 17 value:
00000000000000000000000000000000000000000000000000000000000000
Register 18 value:
00000000000000000000000000000000000000000000000000000000000000
Register 19 value:
00000000000000000000000000000000000000000000000000000000000000
Register 20 value:

00000000000000000000000000000000000000000000000000000000000000000000
Register 21 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 22 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 23 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 24 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 25 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 26 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 27 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 28 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 29 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 30 value:
00000000000000000000000000000000000000000000000000000000000000000000
Register 31 value:
00000000000000000000000000000000000000000000000000000000000000000000

Conclusion:

```
li, 1, 65535, r0
li, 0, 65535, r0
bcw, , r0, r0
li, 1, 65535, r1
li, 0, 65535, r1
bcw, , r1, r1
li, 1, 10, r2
li, 0, 10, r2
bcw, , r2, r2
MA, r0, r1, r2, r3
MS, r0, r1, r2, r4
1, r0, r1, r2, r5
h, r0, r1, r2, r6
li, 1, 32768, r7
li, 0, 32768, r7
bcw, , r7, r7
li, 1, 32767, r8
li, 0, 32767, r8
bcw, , r8, r8
ahs, r8, r2, r9
sfhs, r2, r7, r10
sfhs, r7, r2, r11
ahs, r0, r2, r12
sfhs, r0, r2, r13
```

regfile	FFFFFFFFFFFFFFFF, ...	
regfile[0]	FFFFFFFFFFFFFFFF	FFFFFFFFFFFFFFFF
regfile[1]	FFFFFFFFFFFFFFFF	FFFFFFFFFFFFFFFF
regfile[2]	000A000A000A000A	000A000A000A000A
regfile[3]	000A000B000A000B	000A000B000A000B
regfile[4]	000A000B000A000B	000A000B000A000B
regfile[5]	000A0009000A0009	000A0009000A0009
regfile[6]	000A0009000A0009	000A0009000A0009
regfile[7]	8000800080008000	8000800080008000
regfile[8]	7FFF7FFF7FFF7FFF	7FFF7FFF7FFF7FFF
regfile[9]	7FFF7FFF7FFF7FFF	7FFF7FFF7FFF7FFF
regfile[10]	8000800080008000	8000800080008000
regfile[11]	7FFF7FFF7FFF7FFF	7FFF7FFF7FFF7FFF
regfile[12]	0009000900090009	0009000900090009
regfile[13]	000B000B000B000B	000B000B000B000B

We can see from the instruction and result in hex that the MA,MS,l,h,abs,sfhs,ahs,sfhs can perform signed math operation well. And the abs and sfhs are limited with minimum value -32768 and maximum value 32767.

Special instruction testing 2:

Instruction loaded:

```
li, 1, 32768, r0
li, 0, 0, r0
bcw, , r0, r0
li, 0, 65535, r1
li, 1, 32767, r1
bcw, , r1, r1
li, 0, 1, r2
li, 1, 1, r2
bcw, , r2, r2
li, 0, 65535, r3
li, 1, 65535, r3
bcw, , r3, r3
MA, r2, r2, r1, r4
MS, r3, r2, r0, r5
1, r2, r2, r0, r6
h, r3, r2, r1, r7
```

Printed running status and register result:

PERIOD: 2.450000e+001 ns

Pipeline stage 1 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 2 status: Idle

waiting to start

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 0

current cycle instruction: 10110000000000000000000

current cycle opcode: UUUU

current cycle Register Read 1 address: UUUUU

current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

current cycle Register Read 2 address: UUUUU

current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

current cycle Register Read 3 address: UUUUU

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

****

PERIOD: 2.500000e+001 ns

Pipeline stage 1 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 2 status: Idle

waiting to start

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 0

current cycle instruction: 1011000000000000000000000

current cycle opcode: UUUU

current cycle Register Read 1 address: UUUUU

current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

current cycle Register Read 2 address: UUUUU

current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

current cycle Register Read 3 address: UUUUU

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

****

PERIOD: 2.550000e+001 ns

Pipeline stage 1 status: InsD

Exe result:

current instruction 1000000000000000000000000 decoded, generate opcode and oprands for next cycle

Pipeline stage 2 status: InsF

Exe result:

next instruction fetched, will be decoded in next cycle

Pipeline stage 3 status: Idle

waiting to start

This cycle writing register? 1

current cycle instruction: 1000000000000000000000000

current cycle opcode: 0000

current cycle Register Read 1 address: 00000

current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

current cycle Register Read 2 address: 00000

current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UUU

current cycle Register Read 3 address: 00000

current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

UUU
****
PERIOD: 2.600000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 100000000000000000000000 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 1
current cycle instruction: 100000000000000000000000
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 2.650000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
wrote in address 00000
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000000000000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000000000000
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000UUUUUUUUUUUUUUUU
current cycle Register Read 2 address: 00000

current cycle Register Read 2 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000UUUUUUUUUUUUUUUU
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000UUUUUUUUUUUUUUUU
****
PERIOD: 2.700000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
wrote in address 00000
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000000000000 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000000000000
current cycle opcode: 0000
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000UUUUUUUUUUUUUUUU
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000UUUUUUUUUUUUUUUU
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value:
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000UUUUUUUUUUUUUUUU
****
PERIOD: 2.750000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 10000000000000000000000000000001000000000000000000000000000000 wrote in address 00000
Pipeline stage 3 status: InsD
Exe result:
current instruction 100111111111111111100001 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1

current cycle instruction: 10011111111111111100001
current cycle opcode: 0001
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
****
PERIOD: 2.800000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 10000000000000000000000000000001000000000000000000000000000000 wrote in address 00000
Pipeline stage 3 status: InsD
Exe result:
current instruction 10011111111111111100001 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10011111111111111100001
current cycle opcode: 0001
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU10000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 2.850000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10101111111111111100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:

next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 10000000000000000000000000000010000000000000001111111111111111 wrote in address 00001
This cycle writing register? 1
current cycle instruction: 10101111111111111100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 2.900000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10101111111111111100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 10000000000000000000000000000010000000000000001111111111111111 wrote in address 00001
This cycle writing register? 1
current cycle instruction: 10101111111111111100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 2.950000e+001 ns

Pipeline stage 1 status: Exe
Exe result:
value: 10000000000000000000000000000001111111111111111111111111111111 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000000100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000000100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.000000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 10000000000000000000000000000001111111111111111111111111111111 wrote in address 00001
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000000100001 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000000100001
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value:

00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.050000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000000 wrote in address 00001
Pipeline stage 3 status: InsD
Exe result:
current instruction 10000000000000000100010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10000000000000000100010
current cycle opcode: 0001
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value:
00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value:
00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value:
00000000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.100000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111111111111111111111 wrote in address 00001
Pipeline stage 3 status: InsD
Exe result:
current instruction 10000000000000000100010 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10000000000000000100010

current cycle opcode: 0001
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 10000000000000000000000000000001111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000001000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 10000000000000000000000000000001111111111111111111111111111111
****
PERIOD: 3.150000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10100000000000000100010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111110000000000000001 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10100000000000000100010
current cycle opcode: 0000
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000001000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.200000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10100000000000000100010 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle

Pipeline stage 3 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111110000000000000001 wrote in address 00010
This cycle writing register? 1
current cycle instruction: 10100000000000000100010
current cycle opcode: 0000
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000100000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 10000000000000000000000000000100000000000000000000000000000000
****

PERIOD: 3.250000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 01111111111111111111111111111100000000000000010000000000000001 wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000001000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000001000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000100000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 10000000000000000000000000000100000000000000000000000000000000
****

PERIOD: 3.300000e+001 ns
Pipeline stage 1 status: Exe

Exe result:
value: 01111111111111111111111111111110000000000000000100000000000000001 wrote in address 00010
Pipeline stage 2 status: InsD
Exe result:
current instruction 000000001000000001000010 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 000000001000000001000010
current cycle opcode: 0000
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 3 address: 00000
current cycle Register Read 3 value: 10000000000000000000000000000010000000000000000000000000000000
****
PERIOD: 3.350000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111111111111111111111 wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 10011111111111111100011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10011111111111111100011
current cycle opcode: 0001
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000010000000000000000000000000000000

current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 10000000000000000000000000000010000000000000000000000000000000
****
PERIOD: 3.400000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 0000000000000010000000000000010000000000000001000000000000001 wrote in address 00010
Pipeline stage 3 status: InsD
Exe result:
current instruction 10011111111111111100011 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 10011111111111111100011
current cycle opcode: 0001
current cycle Register Read 1 address: 00010
current cycle Register Read 1 value: 01111111111111111111111111111100000000000000010000000000000001
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 01111111111111111111111111111101111111111111111111111111111111
****
PERIOD: 3.450000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10111111111111111100011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 0000000000000010000000000000010000000000000001111111111111111 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 10111111111111111100011
current cycle opcode: 1111

current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 01111111111111111111111111111101111111111111111111111111111111
****
PERIOD: 3.500000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 10111111111111111100011 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000010000000000000001000000000000000111111111111111111 wrote in address 00011
This cycle writing register? 1
current cycle instruction: 10111111111111111100011
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.550000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000010000000000000001111111111111111111111111111111111 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000000100000000001100011 decoded, generate opcode and oprands for next cycle

Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000001100011
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.600000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 00000000000000010000000000000001111111111111111111111111111111111 wrote in address 00011
Pipeline stage 2 status: InsD
Exe result:
current instruction 00000000100000001100011 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 00000000100000001100011
current cycle opcode: 1111
current cycle Register Read 1 address: 11111
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 11111
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 11111
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.650000e+001 ns
Pipeline stage 1 status: InsF
Exe result:

next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000000 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 010000010000100000100100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 010000010000100000100100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 00000000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 3 address: 00001
current cycle Register Read 3 value: 00000000000000000000000000000000000000000000000000000000000000000000
****
PERIOD: 3.700000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 11111111111111111111111111111111111111111111111111111111111111111111 wrote in address 00011
Pipeline stage 3 status: InsD
Exe result:
current instruction 010000010000100000100100 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 010000010000100000100100
current cycle opcode: 0001
current cycle Register Read 1 address: 00011
current cycle Register Read 1 value: 00000000000000010000000000000001111111111111111111111111111111111111
current cycle Register Read 2 address: 00000
current cycle Register Read 2 value: 10000000000000000000000000000001000000000000000000000000000000000000
current cycle Register Read 3 address: 00001

current cycle Register Read 3 value: 01111111111111111111111111111110111111111111111111111111111111
****
PERIOD: 3.750000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 010100011000100000000101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 00000000000000000000000000000000000000000000000000000000000000000 wrote in address 00100
This cycle writing register? 1
current cycle instruction: 010100011000100000000101
current cycle opcode: 0010
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 00000000000000000000000000000000000000000000000000000000000000000
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 10000000000000000000000000000001000000000000000000000000000000000
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 01111111111111111111111111111110111111111111111111111111111111111
****
PERIOD: 3.800000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 010100011000100000000101 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 3 status: Exe
Exe result:
value: 01111111111111111111111111111110111111111111111111111111111111111 wrote in address 00100
This cycle writing register? 1
current cycle instruction: 010100011000100000000101
current cycle opcode: 0010
current cycle Register Read 1 address: 00001

current cycle Register Read 1 value:
01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value:
00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value:
00000000000000010000000000000001000000000000000100000000000000001
****

PERIOD: 3.850000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111111111111111111111 wrote in address 00101
Pipeline stage 2 status: InsD
Exe result:
current instruction 011000010000100000000110 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 011000010000100000000110
current cycle opcode: 0011
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value:
01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value:
00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value:
00000000000000010000000000000001000000000000000100000000000000001
****

PERIOD: 3.900000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 10000000000000000000000000000001000000000000000000000000000000000 wrote in address 00101
Pipeline stage 2 status: InsD
Exe result:
current instruction 011000010000100000000110 decoded, generate opcode and oprands for next cycle
Pipeline stage 3 status: InsF

Exe result:
next instruction fetched, will be decoded in next cycle
This cycle writing register? 1
current cycle instruction: 01100001000010000000110
current cycle opcode: 0011
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 10000000000000000000000000000001000000000000000000000000000000000
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 3.950000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle
Pipeline stage 2 status: Exe
Exe result:
value: 10000000000000000000000000000011000000000000000000000000000000001 wrote in address 00110
Pipeline stage 3 status: InsD
Exe result:
current instruction 011100011000100000100111 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 01110001100010000100111
current cycle opcode: 0010
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 10000000000000000000000000000001000000000000000000000000000000000
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.000000e+001 ns
Pipeline stage 1 status: InsF
Exe result:
next instruction fetched, will be decoded in next cycle

Pipeline stage 2 status: Exe
Exe result:
value: 10000000000000000000000000000010000000000000000000000000000000 wrote in address 00110
Pipeline stage 3 status: InsD
Exe result:
current instruction 011100011000100000100111 decoded, generate opcode and oprands for next cycle
This cycle writing register? 1
current cycle instruction: 011100011000100000100111
current cycle opcode: 0010
current cycle Register Read 1 address: 00000
current cycle Register Read 1 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 00000000000000010000000000000010000000000000010000000000000001
current cycle Register Read 3 address: 00010
current cycle Register Read 3 value: 00000000000000010000000000000010000000000000010000000000000001
****
PERIOD: 4.050000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 011100011000100000100111 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Exe
Exe result:
value: 10000000000000000000000000000010000000000000000000000000000000 wrote in address 00111
This cycle writing register? 1
current cycle instruction: 011100011000100000100111
current cycle opcode: 0011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 10000000000000000000000000000010000000000000000000000000000000
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 00000000000000010000000000000010000000000000010000000000000001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value: 00000000000000010000000000000010000000000000010000000000000001

****
PERIOD: 4.100000e+001 ns
Pipeline stage 1 status: InsD
Exe result:
current instruction 011100011000100000100111 decoded, generate opcode and oprands for next cycle
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111111111111111111111 wrote in address 00111
This cycle writing register? 1
current cycle instruction: 011100011000100000100111
current cycle opcode: 0011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value: 11111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.150000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111111111111111111111 wrote in address 00111
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 011100011000100000100111
current cycle opcode: 0011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value: 01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value: 00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00011

current cycle Register Read 3 value:
11111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.200000e+001 ns
Pipeline stage 1 status: Exe
Exe result:
value: 01111111111111111111111111111101111111111111111111111111111111 wrote in address 00111
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 011100011000100000100111
current cycle opcode: 0011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value:
01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value:
00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value:
11111111111111111111111111111111111111111111111111111111111111
****
PERIOD: 4.250000e+001 ns
Pipeline stage 1 status: Idle
waiting to start
Pipeline stage 2 status: Idle
waiting to start
Pipeline stage 3 status: Idle
waiting to start
This cycle writing register? 0
current cycle instruction: 011100011000100000100111
current cycle opcode: 0011
current cycle Register Read 1 address: 00001
current cycle Register Read 1 value:
01111111111111111111111111111101111111111111111111111111111111
current cycle Register Read 2 address: 00010
current cycle Register Read 2 value:
00000000000000010000000000000001000000000000000100000000000000001
current cycle Register Read 3 address: 00011
current cycle Register Read 3 value:
11111111111111111111111111111111111111111111111111111111111111

****

Program execution result in Register file:

Register 0 value: 10000000000000000000000000000010000000000000000000000000000000

Register 1 value: 01111111111111111111111111111101111111111111111111111111111111

Register 2 value: 00000000000000010000000000000010000000000000001000000000000001

Register 3 value: 11111111111111111111111111111111111111111111111111111111111111

Register 4 value: 01111111111111111111111111111101111111111111111111111111111111

Register 5 value: 10000000000000000000000000000010000000000000000000000000000000

Register 6 value: 10000000000000000000000000000010000000000000000000000000000000

Register 7 value: 01111111111111111111111111111101111111111111111111111111111111

Register 8 value: 00000000000000000000000000000000000000000000000000000000000000

Register 9 value: 00000000000000000000000000000000000000000000000000000000000000

Register 10 value:
00000000000000000000000000000000000000000000000000000000000000

Register 11 value:
00000000000000000000000000000000000000000000000000000000000000

Register 12 value:
00000000000000000000000000000000000000000000000000000000000000

Register 13 value:
00000000000000000000000000000000000000000000000000000000000000

Register 14 value:
00000000000000000000000000000000000000000000000000000000000000

Register 15 value:
00000000000000000000000000000000000000000000000000000000000000

Register 16 value:
00000000000000000000000000000000000000000000000000000000000000

Register 17 value:
00000000000000000000000000000000000000000000000000000000000000

Register 18 value:
00000000000000000000000000000000000000000000000000000000000000

Register 19 value:
00000000000000000000000000000000000000000000000000000000000000

Register 20 value:
00000000000000000000000000000000000000000000000000000000000000

Register 21 value:
00000000000000000000000000000000000000000000000000000000000000

Register 22 value:
00000000000000000000000000000000000000000000000000000000000000

Register 23 value:
00000000000000000000000000000000000000000000000000000000000000

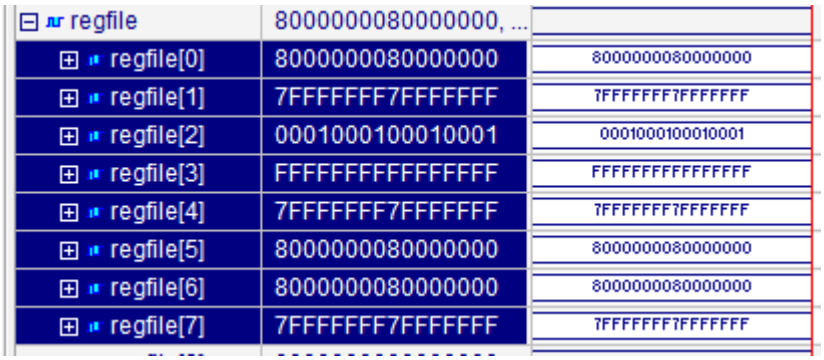
Register 24 value:
00000000000000000000000000000000000000000000000000000000000000

Register 25 value:
00000000000000000000000000000000000000000000000000000000000000

Register 26 value:
0000000000000000000000000000000000000000000000000000000000000000
Register 27 value:
0000000000000000000000000000000000000000000000000000000000000000
Register 28 value:
0000000000000000000000000000000000000000000000000000000000000000
Register 29 value:
0000000000000000000000000000000000000000000000000000000000000000
Register 30 value:
0000000000000000000000000000000000000000000000000000000000000000
Register 31 value:
0000000000000000000000000000000000000000000000000000000000000000

Conclusion:

```
li, 1, 32768, r0
li, 0, 0, r0
bcw, , r0, r0
li, 0, 65535, r1
li, 1, 32767, r1
bcw, , r1, r1
li, 0, 1, r2
li, 1, 1, r2
bcw, , r2, r2
li, 0, 65535, r3
li, 1, 65535, r3
bcw, , r3, r3
MA, r2, r2, r1, r4
MS, r3, r2, r0, r5
l, r2, r2, r0, r6
h, r3, r2, r1, r7
```



Comparing the instruction loaded with the register result in hex, we can easily see that the MA,MS,l,h operations operating under limation -2^31 to +2^31 well. it also shows the ability of MA,MS,l,h to do signed math operation.