Project 1: RISC-V RV32I Simulator

Zeyad Usama 900193027

Omar Saleh 900192354

Sherif Sakran 900193609

Brief Description

The source program follows a functional and OOP paradigm. The instructions in the RV32I set are implemented via use of functions, in addition to a function supporting the multiplication instructions of the M extension.. A struct is used to imitate a memory object, where a memory object consists of a value and its associated address. A vector data structure is used to store memory objects. All 40 RV32I instructions are implemented within our program, except for AUIPC.

Design Decisions

Use of functions to implement families of instructions depending on how they are written by the programmer rather than how they are encoded: there is a function for loading and storing, a function for I-format instructions that are similarly written (lw is thus excluded and included in the load-store function), a function for lui. Multiplication is similar to r-format instructions but is not included in their functions.
Use of vectors of objects to store memory data and instructions respectively.
The project is in C++.
Addressing and dealing with the memory considers at as consisting of bytes (the memory vector is a vector of bytes), rather than words or have words. We believe this is easier to accommodate instructions such as lb and lh.

For the file containing the assembly instructions, there are two restrictions on how the instructions should be written so that the simulator could interpret the instructions correctly.

- There should always be at least one space between the instruction keyword and the corresponding registers included in the same instruction.
- Each assembly instruction should be included on a separate line.
- A problem with the use of labels is explained below.

The *program data* contained in the data file follow the following format:

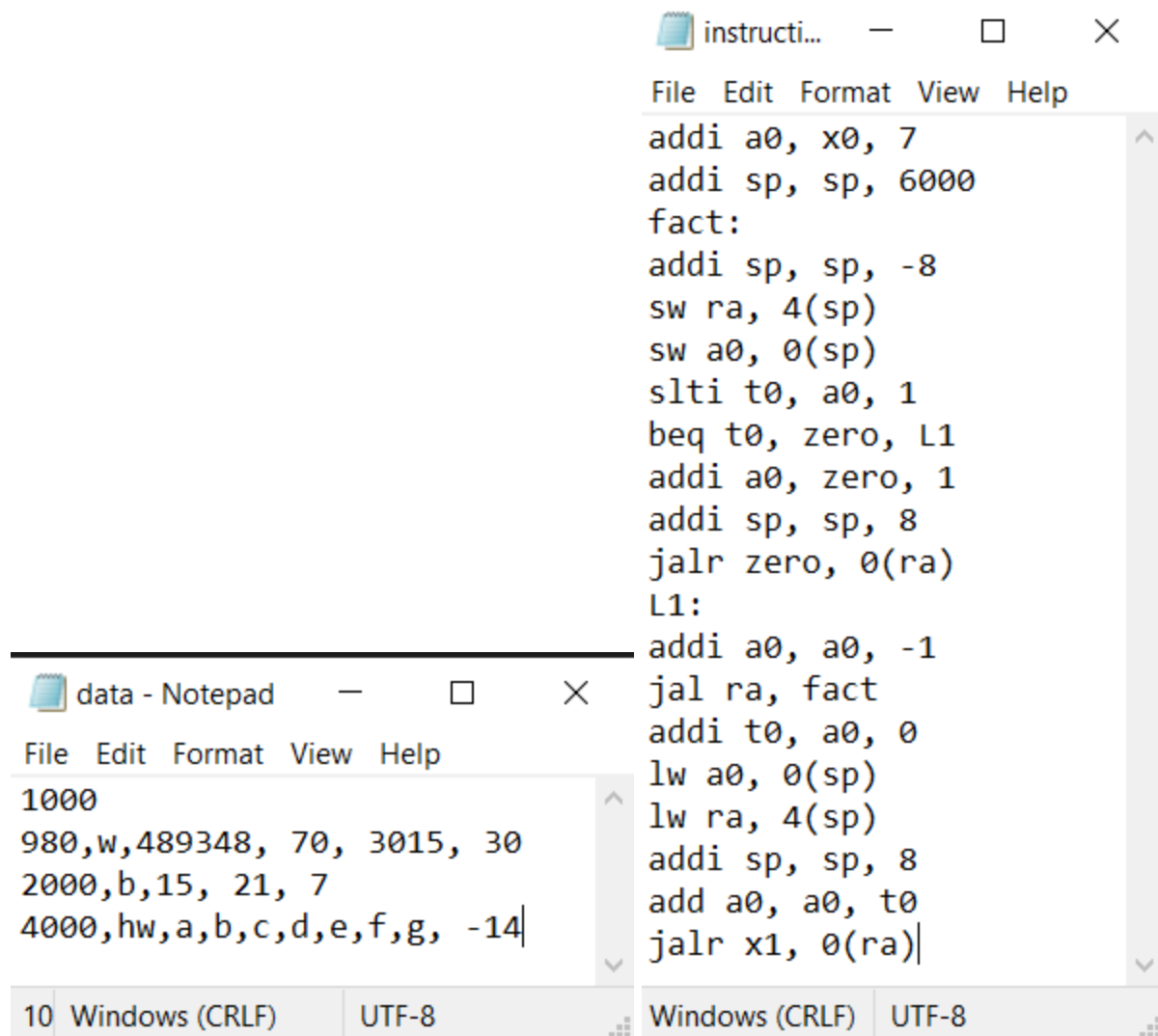- 'address', 'data type ', 'data value(s)'

More on that in the coming sections.

Bonus Features:

- Support for all multiplication instructions.
- Six meaningful programs tested, all are included in the project file; they are: iterative gcd, recursive gcd, factorial, swap, insertion sort, copying contents of array in reverse order.

General Explanation of the Program and Main Functions:

The program starts by reading two files: one include the instructions of the program that will be executed and the other that contains the starting address of the instructions as well as any data in the memory with an indication to how it is stored in the memory (byte, half word, or world) as seen in the following to screenshots.

instructi... [instructions - Notepad]

```
addi a0, x0, 7
addi sp, sp, 6000
fact:
addi sp, sp, -8
sw ra, 4(sp)
sw a0, 0(sp)
slti t0, a0, 1
beq t0, zero, L1
addi a0, zero, 1
addi sp, sp, 8
jalr zero, 0(ra)
L1:
addi a0, a0, -1
jal ra, fact
addi t0, a0, 0
lw a0, 0(sp)
lw ra, 4(sp)
addi sp, sp, 8
add a0, a0, t0
jalr x1, 0(ra)
```

Windows (CRLF)   UTF-8

data - Notepad

```
1000
980,w,489348, 70, 3015, 30
2000,b,15, 21, 7
4000,hw,a,b,c,d,e,f,g, -14
```

10   Windows (CRLF)   UTF-8

Therefore, we needed two main functions before the ones used for instructions' execution: one that generates the memory to include the instructions with their addresses, and that's why we decided to consider the memory that contains the instructions as a vector of (memoryObjects) in which each object contains the instructions as a string along with its address as an integer which is calculated according to the starting address stated by the user in the text file. This function generated a vector that contains the labels along with their addresses as well to make it easier for the branching instructions. The other function is the one that stores the data in the file into the memory such that we keep the data along with its address, and since the data could be bytes or half words, we preferred to keep it into another vector of memory objects different from the one that includes the

instructions as words (4 bytes). We decided to use vectors because it is flexible and easy to use.

For now, we have the instructions stored in a vector (memory) and data in another one (memoryData). The program counter is initialized to the first address of the instructions, and according to the flow of the program, it keeps updated according to the instruction being executed. We also have an array of 32 integers that represents the registers, and we had a function translate that takes the name of the register and returns its index for easier handling of the array.

The execution is done by looping over the instructions, and to recognize which functions will be used for which instructions, (find) was used to search for the names of possible instructions supported by Risc-V, then the corresponding functions is used accordingly. An important note here is that for the similar instructions, we kept searching for the instructions that contains longer keywords before the shorter ones. For example, we search for (jalr) before (jal) because if the program counter was referring to a (jalr) instruction then we searched for (jal) before (jalr), it will recognize the instruction as a (jal) then execute mistakenly.

For each instruction, we needed to split it to be able to parse the registers and offsets, and therefore we had a function sparceCSV that splits any string that contains comma separated values and returns a vector of string that contains each value in an element in the vector.

Functions explained:

- Branching group:

We have one objective which is branching at some condition. Therefore, we need to test the condition, decide to branch or not, then go to the required place as identified by the label. So, we have two main tasks, compare between the two registers, then branch to a specific label based on the result of comparison as following:

  - beq: branches if the two registers are equal
  - bne: branches if the two registers are not equal
  - blt: branches if the first register is less than the second one
  - bge: branches if the first register is greater than or equal to the second one

Since the function needs to return both the decision (branch or not) as well as the label itself, it was implemented such that it returns a boolean value to indicate branching if true, and it has an empty string passed by reference in which it stores the label that will be branched into. The label is used by the function (branch) that searches for the label in the (labelVector) that contains the labels along with the addresses of the first instruction in the block of the label.

- Jumping instruction:

(jal) was implemented similar to the branching, but without a condition and with storing the address of the following instruction. (jalr) was implemented differently from the branching instructions because it jumps to some specific address stored in the destination register included in the instruction. For splitting the instructions:

• jalr: same parsing method as lw and sw [register, offset(register)]

• jal: used the parseCSV function (comma separated register and label)

Load and Store Instructions: They use a search a function that looks for the address in memory and load or store the contents of the specified register. The load word instruction searches 4 bytes, half word 2 bytes, and load byte searched one byte and loads it, extending the sign depending on whether it is unsigned or not. Store instructions work similarly; however: they create a new memory address if the one they are looking for is not found. Load instructions on the other hand will cause an error if the address is not found (does not exist or not used by the user beforehand).

I-format and R-format instructions: they take the registers and the immediates or other operand, using c++ normal instructions to manipulate them.
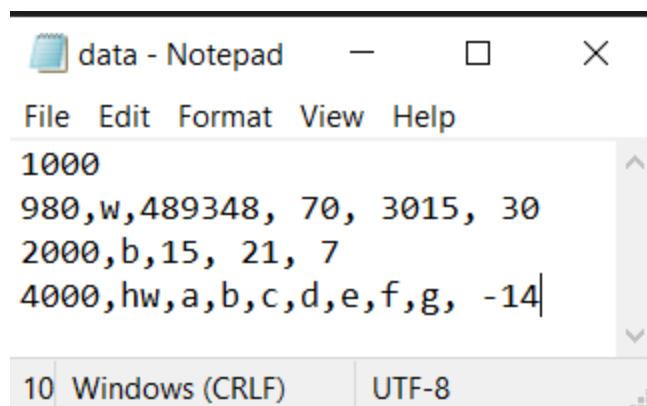
lui instruction: it zeroes the register, stores the integer in the first 20 bits, and then shifts 12 bits, all using the normal c++ bitwise operators.

User Guide
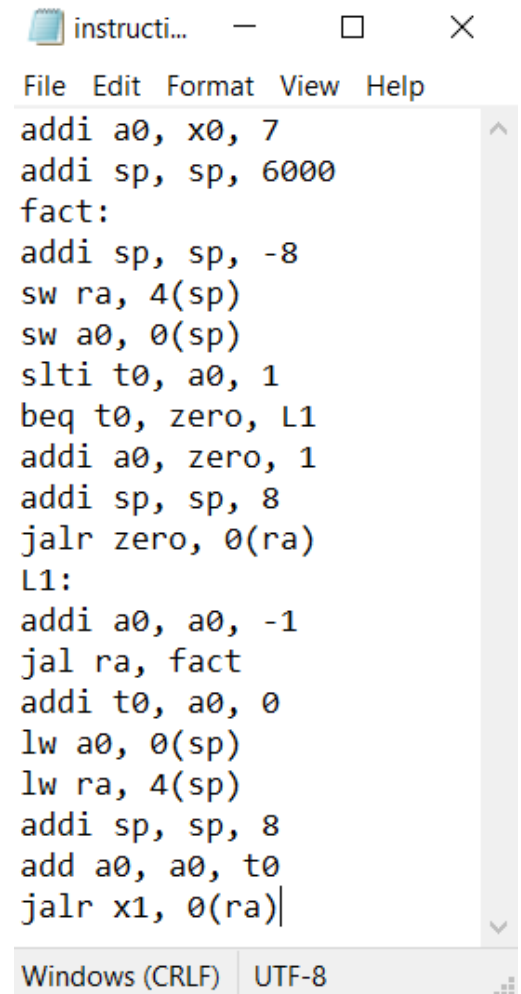
The user can do the following:

- Write the instruction: by writing the instruction in the file (instruction.txt) in which each instruction is written in a separate line. If a label to be entered, it is written before the first instruction in its block and must end with a colon (:) without any extra spaces.
- Specify the starting address, the data (characters or integers), the size in which this data is stored. This could be done by writing in the file (data.txt). The starting address is written in the first line, then the data is specified as following:
  - The first part is the address in which the data will be stored. Then a comma is used.
  - The following part is the size in which the data will be stored. Then a comma is used.
    - "b" for a byte
    - "hw" for half word
    - "w" for word
  - The following part includes the data that could be characters or integers (positive and negative). For multiple data entry from the same size, different values could be added in the same line with commas to separate the values.

Sample:

```
instructi...                    —      □      ✕

File  Edit  Format  View  Help
addi a0, x0, 7
addi sp, sp, 6000
fact:
addi sp, sp, -8
sw ra, 4(sp)
sw a0, 0(sp)
slti t0, a0, 1
beq t0, zero, L1
addi a0, zero, 1
addi sp, sp, 8
jalr zero, 0(ra)
L1:
addi a0, a0, -1
jal ra, fact
addi t0, a0, 0
lw a0, 0(sp)
lw ra, 4(sp)
addi sp, sp, 8
add a0, a0, t0
jalr x1, 0(ra)|

Windows (CRLF)   UTF-8
```

```
data - Notepad        —      □      ✕

File  Edit  Format  View  Help
1000
980,w,489348, 70, 3015, 30
2000,b,15, 21, 7
4000,hw,a,b,c,d,e,f,g, -14|

10 Windows (CRLF)       UTF-8
```

Known Bugs/Issues

- The simulator is sensitive to spaces. Labels must be written in a line that does not contain any instructions located next to the label. The label MUST NOT have a space after its semi-colon.

  Example of a correct use of labels:

  Label1:

  add t0,t0,s0

  Example of wrong use:

  Label1: add t0,t0,s0

- The fibonacci sequence function does not work properly on this simulator.

Detailed Analysis Section:

A detailed analysis of all the contents of the memory and registers instruction by instruction with the value of the program counter displayed. The program itself can be found in the folder of this report, in the text file ("two_arrays). The program stores 2 arrays in the memory at locations specified by the user, and then stores the contents of the first array inside the other in reverse order.

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 0

reg: 6 0

reg: 7 0

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1008   add t0, s0, zeroat i = 2

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001

333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000000

5037   00000000

5038   00000000

5039   00000000

program counter = 1008

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 300

reg: 6 0

reg: 7 0

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1012   addi t1, zero, 9at i = 3

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111

325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000

5007　00000000

5008　00000000

5009　00000000

5010　00000000

5011　00000000

5012　00000000

5013　00000000

5014　00000000

5015　00000000

5016　00000000

5017　00000000

5018　00000000

5019　00000000

5020　00000000

5021　00000000

5022　00000000

5023　00000000

5024　00000000

5025　00000000

5026　00000000

5027　00000000

5028　00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000000

5037   00000000

5038   00000000

5039   00000000

program counter = 1012

register array:

reg: 0 0

reg: 1 0

reg: 2 0

```
reg: 3  0
reg: 4  0
reg: 5  300
reg: 6  9
reg: 7  0
reg: 8  300
reg: 9  5000
reg: 10 0
reg: 11 0
reg: 12 0
reg: 13 0
reg: 14 0
reg: 15 0
reg: 16 0
reg: 17 0
reg: 18 0
reg: 19 0
reg: 20 0
reg: 21 0
reg: 22 0
reg: 23 0
reg: 24 0
```

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1016   slli t1, t1, 2at i = 4

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040　slt t3, t1, s1

1044　beq t3, zero, L1

Memory Data:

300　00000001

301　00000000

302　00000000

303　00000000

304　00000010

305　00000000

306　00000000

307　00000000

308　00000011

309　00000000

310　00000000

311　00000000

312　00000100

313　00000000

314　00000000

315　00000000

316　00000101

317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000000

5033 00000000

5034 00000000

5035 00000000

5036 00000000

5037 00000000

5038 00000000

5039 00000000

program counter = 1016

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 300

reg: 6 36

reg: 7 0

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1020   add t1, t1, s1at i = 5

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000

331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000000

5033 00000000

5034 00000000

5035   00000000

5036   00000000

5037   00000000

5038   00000000

5039   00000000

program counter = 1020

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 300

reg: 6 5036

reg: 7 0

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000

323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000

5005 00000000

5006 00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000000

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 300

reg: 6 5036

reg: 7 1

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032 addi t0, t0, 4

1036 addi t1, t1, -4

1040 slt t3, t1, s1

1044 beq t3, zero, L1

Memory Data:

300 00000001

301 00000000

302 00000000

303 00000000

304 00000010

305 00000000

306 00000000

307 00000000

308 00000011

309 00000000

310 00000000

311 00000000

312 00000100

313 00000000

314 00000000

315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000000

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 300

reg: 6 5036

reg: 7 1

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000

329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 304

reg: 6 5036

reg: 7 1

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003 00000000

5004 00000000

5005 00000000

5006 00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 304

reg: 6 5032

reg: 7 1

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000

335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000
5015	00000000
5016	00000000

```
5017   00000000
5018   00000000
5019   00000000
5020   00000000
5021   00000000
5022   00000000
5023   00000000
5024   00000000
5025   00000000
5026   00000000
5027   00000000
5028   00000000
5029   00000000
5030   00000000
5031   00000000
5032   00000000
5033   00000000
5034   00000000
5035   00000000
5036   00000001
5037   00000000
5038   00000000
```

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 304

reg: 6 5032

reg: 7 1

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000 addi s0,zero,300

1004 addi s1,zero, 5000

1008 add t0, s0, zero

1012 addi t1, zero, 9

1016 slli t1, t1, 2

1020 add t1, t1, s1

1024 lw t2, 0(t0)

1028 sw t2, 0(t1)

1032 addi t0, t0, 4

1036 addi t1, t1, -4

1040 slt t3, t1, s1

1044 beq t3, zero, L1

Memory Data:

300 00000001

301 00000000

302 00000000

303 00000000

304 00000010

305 00000000

306 00000000

307 00000000

308 00000011

309 00000000

310 00000000

311 00000000

312 00000100

313 00000000

314 00000000

315 00000000

316 00000101

317 00000000

318 00000000

319 00000000

320 00000110

321 00000000

322 00000000

323 00000000

324 00000111

325 00000000

326 00000000

327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 304

reg: 6 5032

reg: 7 1

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000000

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 304

reg: 6 5032

reg: 7 2

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

```
5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001
```

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 304

reg: 6 5032

reg: 7 2

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111

325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 308

reg: 6 5032

reg: 7 2

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000
5015	00000000
5016	00000000
5017	00000000
5018	00000000
5019	00000000
5020	00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 308

reg: 6 5028

reg: 7 2

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 308

reg: 6 5028

reg: 7 2

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000

323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000

```
5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000
```

5027   00000000

5028   00000000

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 308

reg: 6 5028

reg: 7 2

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000000

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 308

reg: 6 5028

reg: 7 3

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307 00000000

308 00000011

309 00000000

310 00000000

311 00000000

312 00000100

313 00000000

314 00000000

315 00000000

316 00000101

317 00000000

318 00000000

319 00000000

320 00000110

321 00000000

322 00000000

323 00000000

324 00000111

325 00000000

326 00000000

327 00000000

328 00001000

329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 308

reg: 6 5028

reg: 7 3

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000

5003 00000000

5004 00000000

5005 00000000

5006 00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 312

reg: 6 5028

reg: 7 3

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000

335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000
5015	00000000
5016	00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039   00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 312

reg: 6 5024

reg: 7 3

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000

327　00000000

328　00001000

329　00000000

330　00000000

331　00000000

332　00001001

333　00000000

334　00000000

335　00000000

336　00001010

337　00000000

338　00000000

339　00000000

5000　00000000

5001　00000000

5002　00000000

5003　00000000

5004　00000000

5005　00000000

5006　00000000

5007　00000000

5008　00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000000

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 312

reg: 6 5024

reg: 7 3

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000000

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 312

reg: 6 5024

reg: 7 3

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311 00000000

312 00000100

313 00000000

314 00000000

315 00000000

316 00000101

317 00000000

318 00000000

319 00000000

320 00000110

321 00000000

322 00000000

323 00000000

324 00000111

325 00000000

326 00000000

327 00000000

328 00001000

329 00000000

330 00000000

331 00000000

332 00001001

333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000

5015	00000000
5016	00000000
5017	00000000
5018	00000000
5019	00000000
5020	00000000
5021	00000000
5022	00000000
5023	00000000
5024	00000000
5025	00000000
5026	00000000
5027	00000000
5028	00000011
5029	00000000
5030	00000000
5031	00000000
5032	00000010
5033	00000000
5034	00000000
5035	00000000
5036	00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 312

reg: 6 5024

reg: 7 4

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 312

reg: 6 5024

reg: 7 4

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000

339 00000000

5000 00000000

5001 00000000

5002 00000000

5003 00000000

5004 00000000

5005 00000000

5006 00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 316

reg: 6 5024

reg: 7 4

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000

331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 316

reg: 6 5020

reg: 7 4

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000

323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 316

reg: 6 5020

reg: 7 4

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000000

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 316

reg: 6 5020

reg: 7 4

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

```
1000    addi s0,zero,300

1004    addi s1,zero, 5000

1008    add t0, s0, zero

1012    addi t1, zero, 9

1016    slli t1, t1, 2

1020    add t1, t1, s1

1024    lw t2, 0(t0)

1028    sw t2, 0(t1)

1032    addi t0, t0, 4

1036    addi t1, t1, -4

1040    slt t3, t1, s1

1044    beq t3, zero, L1
```

Memory Data:

```
300    00000001

301    00000000

302    00000000

303    00000000

304    00000010

305    00000000

306    00000000
```

307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000

329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000000

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 316

reg: 6 5020

reg: 7 5

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 316

reg: 6 5020

reg: 7 5

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 320

reg: 6 5020

reg: 7 5

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000

327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000000

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 320

reg: 6 5016

reg: 7 5

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 320

reg: 6 5016

reg: 7 5

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001

333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000

5015   00000000

5016   00000000

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 320

reg: 6 5016

reg: 7 5

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111

325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000

5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000
5015	00000000
5016	00000000
5017	00000000
5018	00000000
5019	00000000
5020	00000101
5021	00000000
5022	00000000
5023	00000000
5024	00000100
5025	00000000
5026	00000000
5027	00000000
5028	00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 320

reg: 6 5016

reg: 7 6

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000

339　00000000

5000　00000000

5001　00000000

5002　00000000

5003　00000000

5004　00000000

5005　00000000

5006　00000000

5007　00000000

5008　00000000

5009　00000000

5010　00000000

5011　00000000

5012　00000000

5013　00000000

5014　00000000

5015　00000000

5016　00000110

5017　00000000

5018　00000000

5019　00000000

5020　00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 320

reg: 6 5016

reg: 7 6

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000

331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 324

reg: 6 5016

reg: 7 6

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000

323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000

5005 00000000

5006 00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027　00000000

5028　00000011

5029　00000000

5030　00000000

5031　00000000

5032　00000010

5033　00000000

5034　00000000

5035　00000000

5036　00000001

5037　00000000

5038　00000000

5039　00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 324

reg: 6 5012

reg: 7 6

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000000

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 324

reg: 6 5012

reg: 7 6

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011 00000000

5012 00000000

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 324

reg: 6 5012

reg: 7 6

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000

5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000000
5013	00000000
5014	00000000
5015	00000000
5016	00000110
5017	00000000
5018	00000000
5019	00000000
5020	00000101
5021	00000000
5022	00000000
5023	00000000
5024	00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 324

reg: 6 5012

reg: 7 7

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000

335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000
5009	00000000
5010	00000000
5011	00000000
5012	00000111
5013	00000000
5014	00000000
5015	00000000
5016	00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 324

reg: 6 5012

reg: 7 7

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000

327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 328

reg: 6 5012

reg: 7 7

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000

5001 00000000

5002 00000000

5003 00000000

5004 00000000

5005 00000000

5006 00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 328

reg: 6 5008

reg: 7 7

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333　00000000

334　00000000

335　00000000

336　00001010

337　00000000

338　00000000

339　00000000

5000　00000000

5001　00000000

5002　00000000

5003　00000000

5004　00000000

5005　00000000

5006　00000000

5007　00000000

5008　00000000

5009　00000000

5010　00000000

5011　00000000

5012　00000111

5013　00000000

5014　00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 328

reg: 6 5008

reg: 7 7

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044 beq t3, zero, L1at i = 11

Program:

Instructions:

1000 addi s0,zero,300

1004 addi s1,zero, 5000

1008 add t0, s0, zero

1012 addi t1, zero, 9

1016 slli t1, t1, 2

1020 add t1, t1, s1

1024 lw t2, 0(t0)

1028 sw t2, 0(t1)

1032 addi t0, t0, 4

1036 addi t1, t1, -4

1040 slt t3, t1, s1

1044 beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111

325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000

5007 00000000

5008 00000000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 328

reg: 6 5008

reg: 7 7

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00000000

5009   00000000

5010   00000000

5011   00000000

5012   00000111

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 328

reg: 6 5008

reg: 7 8

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00001000

5009   00000000

5010   00000000

5011   00000000

5012   00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 328

reg: 6 5008

reg: 7 8

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000

323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000

5005   00000000

5006   00000000

5007   00000000

5008   00001000

5009   00000000

5010   00000000

5011   00000000

5012   00000111

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 332

reg: 6 5008

reg: 7 8

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010

337 00000000

338 00000000

339 00000000

5000 00000000

5001 00000000

5002 00000000

5003 00000000

5004 00000000

5005 00000000

5006 00000000

5007 00000000

5008 00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019　00000000

5020　00000101

5021　00000000

5022　00000000

5023　00000000

5024　00000100

5025　00000000

5026　00000000

5027　00000000

5028　00000011

5029　00000000

5030　00000000

5031　00000000

5032　00000010

5033　00000000

5034　00000000

5035　00000000

5036　00000001

5037　00000000

5038　00000000

5039　00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 332

reg: 6 5004

reg: 7 8

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000

329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00000000
5005	00000000
5006	00000000
5007	00000000
5008	00001000
5009	00000000
5010	00000000

5011   00000000

5012   00000111

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017   00000000

5018   00000000

5019   00000000

5020   00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039 00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 332

reg: 6 5004

reg: 7 8

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003 00000000

5004 00000000

5005 00000000

5006 00000000

5007 00000000

5008 00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 332

reg: 6 5004

reg: 7 8

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00000000

5005   00000000

5006   00000000

5007   00000000

5008   00001000

5009   00000000

5010   00000000

5011   00000000

5012   00000111

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 332

reg: 6 5004

reg: 7 9

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00000000

5001   00000000

5002   00000000

5003   00000000

5004   00001001

5005   00000000

5006   00000000

5007   00000000

5008   00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 332

reg: 6 5004

reg: 7 9

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000

5001 00000000

5002 00000000

5003 00000000

5004 00001001

5005 00000000

5006 00000000

5007 00000000

5008 00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 336

reg: 6 5004

reg: 7 9

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001

333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00001001
5005	00000000
5006	00000000
5007	00000000
5008	00001000
5009	00000000
5010	00000000
5011	00000000
5012	00000111
5013	00000000
5014	00000000

5015	00000000
5016	00000110
5017	00000000
5018	00000000
5019	00000000
5020	00000101
5021	00000000
5022	00000000
5023	00000000
5024	00000100
5025	00000000
5026	00000000
5027	00000000
5028	00000011
5029	00000000
5030	00000000
5031	00000000
5032	00000010
5033	00000000
5034	00000000
5035	00000000
5036	00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 336

reg: 6 5000

reg: 7 9

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111

325 00000000

326 00000000

327 00000000

328 00001000

329 00000000

330 00000000

331 00000000

332 00001001

333 00000000

334 00000000

335 00000000

336 00001010

337 00000000

338 00000000

339 00000000

5000 00000000

5001 00000000

5002 00000000

5003 00000000

5004 00001001

5005 00000000

5006 00000000

5007 00000000

5008 00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 336

reg: 6 5000

reg: 7 9

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00001001
5005	00000000
5006	00000000
5007	00000000
5008	00001000
5009	00000000
5010	00000000
5011	00000000
5012	00000111
5013	00000000
5014	00000000
5015	00000000
5016	00000110
5017	00000000
5018	00000000
5019	00000000
5020	00000101

5021   00000000

5022   00000000

5023   00000000

5024   00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 336

reg: 6 5000

reg: 7 9

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1024   lw t2, 0(t0)at i = 6

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000

331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00000000
5001	00000000
5002	00000000
5003	00000000
5004	00001001
5005	00000000
5006	00000000
5007	00000000
5008	00001000
5009	00000000
5010	00000000
5011	00000000
5012	00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1024

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 336

reg: 6 5000

reg: 7 10

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1028   sw t2, 0(t1)at i = 7

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000

323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00001010
5001	00000000
5002	00000000
5003	00000000
5004	00001001

5005 00000000

5006 00000000

5007 00000000

5008 00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1028

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 336

reg: 6 5000

reg: 7 10

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1032   addi t0, t0, 4at i = 8

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313   00000000

314   00000000

315   00000000

316   00000101

317   00000000

318   00000000

319   00000000

320   00000110

321   00000000

322   00000000

323   00000000

324   00000111

325   00000000

326   00000000

327   00000000

328   00001000

329   00000000

330   00000000

331   00000000

332   00001001

333   00000000

334   00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00001010

5001   00000000

5002   00000000

5003   00000000

5004   00001001

5005   00000000

5006   00000000

5007   00000000

5008   00001000

5009   00000000

5010   00000000

5011   00000000

5012   00000111

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017   00000000

5018   00000000

5019	00000000
5020	00000101
5021	00000000
5022	00000000
5023	00000000
5024	00000100
5025	00000000
5026	00000000
5027	00000000
5028	00000011
5029	00000000
5030	00000000
5031	00000000
5032	00000010
5033	00000000
5034	00000000
5035	00000000
5036	00000001
5037	00000000
5038	00000000
5039	00000000

program counter = 1032

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 340

reg: 6 5000

reg: 7 10

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1036   addi t1, t1, -4at i = 9

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000

329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00001010
5001	00000000
5002	00000000
5003	00000000
5004	00001001
5005	00000000
5006	00000000
5007	00000000
5008	00001000
5009	00000000
5010	00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1036

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 340

reg: 6 4996

reg: 7 10

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 0

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1040   slt t3, t1, s1at i = 10

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300	00000001
301	00000000
302	00000000
303	00000000
304	00000010
305	00000000
306	00000000
307	00000000
308	00000011
309	00000000
310	00000000
311	00000000
312	00000100
313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110

321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000
335	00000000
336	00001010
337	00000000
338	00000000
339	00000000
5000	00001010
5001	00000000
5002	00000000

5003 00000000

5004 00001001

5005 00000000

5006 00000000

5007 00000000

5008 00001000

5009 00000000

5010 00000000

5011 00000000

5012 00000111

5013 00000000

5014 00000000

5015 00000000

5016 00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025   00000000

5026   00000000

5027   00000000

5028   00000011

5029   00000000

5030   00000000

5031   00000000

5032   00000010

5033   00000000

5034   00000000

5035   00000000

5036   00000001

5037   00000000

5038   00000000

5039   00000000

program counter = 1040

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 340

reg: 6 4996

reg: 7 10

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 1

reg: 29 0

reg: 30 0

reg: 31 0

instruction executed : 1044   beq t3, zero, L1at i = 11

Program:

Instructions:

1000   addi s0,zero,300

1004   addi s1,zero, 5000

1008   add t0, s0, zero

1012   addi t1, zero, 9

1016   slli t1, t1, 2

1020   add t1, t1, s1

1024   lw t2, 0(t0)

1028   sw t2, 0(t1)

1032   addi t0, t0, 4

1036   addi t1, t1, -4

1040   slt t3, t1, s1

1044   beq t3, zero, L1

Memory Data:

300   00000001

301   00000000

302   00000000

303   00000000

304   00000010

305   00000000

306   00000000

307   00000000

308   00000011

309   00000000

310   00000000

311   00000000

312   00000100

313	00000000
314	00000000
315	00000000
316	00000101
317	00000000
318	00000000
319	00000000
320	00000110
321	00000000
322	00000000
323	00000000
324	00000111
325	00000000
326	00000000
327	00000000
328	00001000
329	00000000
330	00000000
331	00000000
332	00001001
333	00000000
334	00000000

335   00000000

336   00001010

337   00000000

338   00000000

339   00000000

5000   00001010

5001   00000000

5002   00000000

5003   00000000

5004   00001001

5005   00000000

5006   00000000

5007   00000000

5008   00001000

5009   00000000

5010   00000000

5011   00000000

5012   00000111

5013   00000000

5014   00000000

5015   00000000

5016   00000110

5017 00000000

5018 00000000

5019 00000000

5020 00000101

5021 00000000

5022 00000000

5023 00000000

5024 00000100

5025 00000000

5026 00000000

5027 00000000

5028 00000011

5029 00000000

5030 00000000

5031 00000000

5032 00000010

5033 00000000

5034 00000000

5035 00000000

5036 00000001

5037 00000000

5038 00000000

5039   00000000

program counter = 1044

register array:

reg: 0 0

reg: 1 0

reg: 2 0

reg: 3 0

reg: 4 0

reg: 5 340

reg: 6 4996

reg: 7 10

reg: 8 300

reg: 9 5000

reg: 10 0

reg: 11 0

reg: 12 0

reg: 13 0

reg: 14 0

reg: 15 0

reg: 16 0

reg: 17 0

reg: 18 0

reg: 19 0

reg: 20 0

reg: 21 0

reg: 22 0

reg: 23 0

reg: 24 0

reg: 25 0

reg: 26 0

reg: 27 0

reg: 28 1

reg: 29 0

reg: 30 0

reg: 31 0