

Task 2:

Scenario 1:

1): Venus setup for Scenario 1 showing Program parameters, Cache parameters etc. Program parameters are:

```
Active File: null Save Close
9 #      /* Step through the selected array segment with the given step size. */
10 #      for (index = 0; index < arraysize; index += stepsize) {
11 #          if(option==0)
12 #              array[index] = 0;                      // Option 0: One cache access - write
13 #          else
14 #              array[index] = array[index] + 1; // Option 1: Two cache accesses - read AND write
15 #      }
16 #  }
17
18 .data
19 array: .word    2048                                # max array size specified in BYTES (DO NOT CHANGE)
20
21 .text
22 #####
23 main:  li  a0, 128      # array size in BYTES (power of 2 < array size)
24      li  a1, 8          # step size  (power of 2 > 0)
25      li  a2, 4          # rep count  (int > 0)
26      li  a3, 0          # 0 - option 0, 1 - option 1
27 # You MAY change the code above this section
28 #####
```

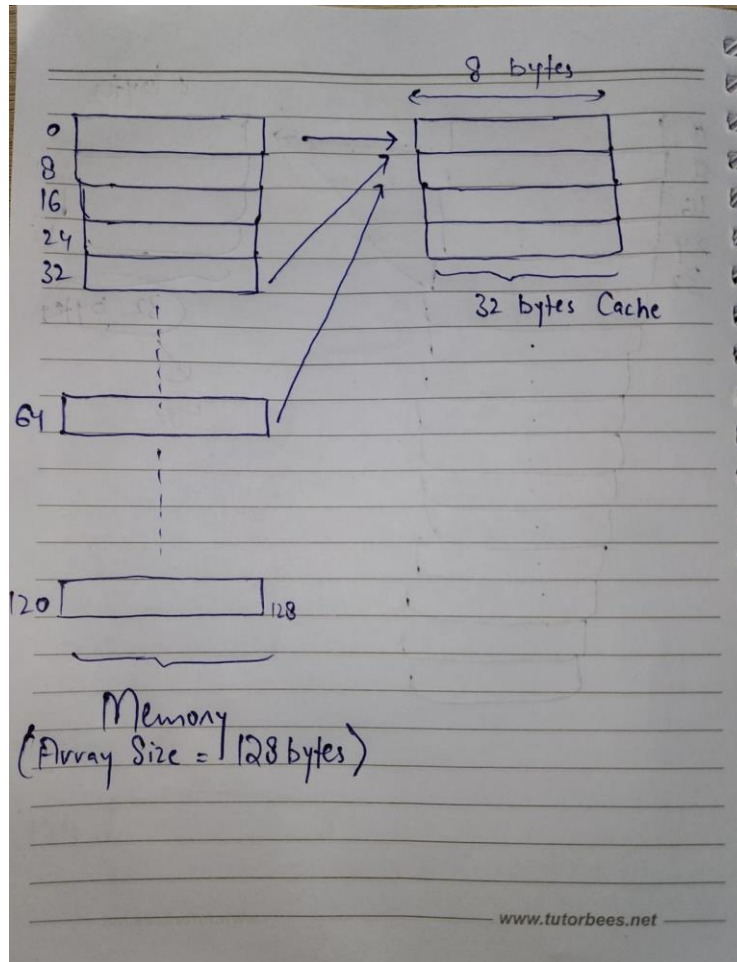
Cache parameters are:

Registers Memory <u>Cache</u> VDB									
Cache Levels	1								
Block Size (Bytes)	8								
Number of Blocks	4								
Associativity	1								
Cache Size (Bytes)	32								
<input type="button" value="Enable?"/>	Enables current selected level of the cache.								
Direct Mapped <input type="button" value="v"/>									
LRU <input type="button" value="v"/>	L1 <input type="button" value="v"/>								
Hit Count	0								
Accesses	0								
Hit Rate	???								
<table><tbody><tr><td>0)</td><td>EMPTY</td></tr><tr><td>1)</td><td>EMPTY</td></tr><tr><td>2)</td><td>EMPTY</td></tr><tr><td>3)</td><td>EMPTY</td></tr></tbody></table>		0)	EMPTY	1)	EMPTY	2)	EMPTY	3)	EMPTY
0)	EMPTY								
1)	EMPTY								
2)	EMPTY								
3)	EMPTY								
NOTE: This is a write through, write allocate cache.									
Seed	6700548278339674178								
Display Settings	Hex <input type="button" value="v"/>								

.....

2): What hit rate did you think it will be **BEFORE** running the code?

I think that there will be a hit rate of 0%. The reason for that is because firstly the program wants to write at 0th index which is not in the cache so there is first miss. Then program wants to write at offset of 32 bytes which is not again present in the cache so there is also a miss and the same goes on.



3): Answers to tasks 1, 2, 3

1. What combination of parameters is producing the hit rate you observe?

Parameter A: Step Size

Parameter B: Block Size

“Because Step Size in bytes is exactly equal to Block Size in bytes.”

2. What is the hit rate if we increase Rep Count arbitrarily?

There will be no effect on hit rate if we increase Rep Count arbitrarily.

“Answer as a decimal is: 0.0.”

3. How could we modify one program parameter to get an increased hit rate?

“[parameter], [value]” = “a1, 1”

The reason for that is because as the block size is 8 bytes means two consecutive words of an array can be fitted in a block of cache. So when there is a miss two words are fetched from memory to cache so if we access the other word that is already available in cache in the next iteration of the loop then certainly our hit rate will increase. So setting step size to 1 means accessing the next element in the array. That's why hit rate increases to 0.5 if we set step size to 1.
