# p4AQuestions

**Due** Apr 3 at 11:59pm **Points** 20 **Questions** 12

Available Mar 17 at 12am - Apr 4 at 11:59pm Time Limit 60 Minutes

**Allowed Attempts** 3

## Instructions

Complete <u>p4A: Understanding Caches (https://canvas.wisc.edu/courses/330348/assignments/1852104)</u> and understand how to run the cache simulator as described in the program assignment before starting this quiz.

Students connected to vm-instunix machines are not getting the same results as those connected to actual machines.

For best results, we recommend connecting to a machine is not a vm-instunix machine.

Try connecting to one of these machines directly.

For example: ssh CSLOGIN@rockhopper-01.cs.wisc.edu

1358	Ubuntu 20.04 LTS Linux	Rockhopper	rockhopper-01.cs.wisc.edu - 09
1366	Ubuntu 20.04 LTS Linux	Royal	royal-01.cs.wisc.edu - 30
1368	Ubuntu 20.04 LTS Linux	Snares	snares-01.cs.wisc.edu - 10

A third attempt has been added. If you were affected by this, please retake after connecting to one of the above machines.

You may make 2 attempts to answer these questions with the highest score being recorded as your grade. There is a 60 minute time limit to complete each attempt. You must complete both attempts by due date or within 24 hours with a late penalty.

Each question pertains to running the particular executable that is named, e.g, cache1D, cache2Drows, cache2Dcols, cache2Dclash.

This quiz was locked Apr 4 at 11:59pm.

# **Attempt History**

Al	tempt	Time	Score
KEPT Att	tempt 2	5 minutes	20 out of 20
LATEST Att	tempt 2	5 minutes	20 out of 20
Att	tempt 1	60 minutes	16.5 out of 20

### (!) Correct answers are hidden.

Score for this attempt: 20 out of 20

Submitted Mar 26 at 3:19pm This attempt took 5 minutes.

### Question 1 1 / 1 pts

#### cache1D:

What is the total hit ratio for the D-cache with a block size of 4 bytes? Provide your answer as a percentage, e.g. 50.5%, but just input a number without the % character.

84.87

# Question 2 1 / 1 pts

#### cache1D:

What is the total hit ratio for the D-cache with a block size of 32 bytes? Provide your answer as a percentage, e.g. 50.5%, but just input a number without the % character.

97.08

Question 3	1 / 1 pts
	the D-cache with a block size of 64 bytes? ercentage, e.g. 50.5%, but just input a number
97.5	
Question 4	2 / 2 pts

#### cache1D:

Answer this question without running pin again. Assume that the 100,000 element integer array that you allocated starts at address 0x50000000 in memory, the size of an integer is 4 bytes and the D-cache is initially empty. As you read the integers in the array one-by-one, starting at index 0, how many D-cache misses will you see for reading the first 40 integers when the cache block size is:

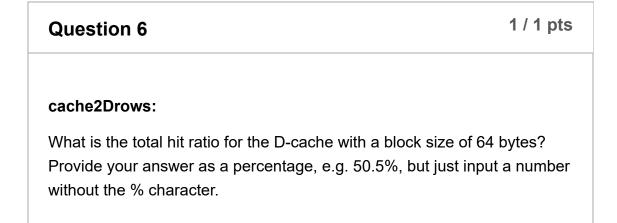
a) 4 bytes:	40
b) 32 bytes:	5
c) 64 bytes:	3

Answer each part by entering an integer between 0 and 40.

#### Answer 1:

40			
Answer 2:			
5			
Answer 3:			
3			

Question 5	3 / 3 pts
cache1D:	
Answer the following for this program:	
Which block size is the best? [Select]	
Why? [Select]	
Answer 1:	
64	
Answer 2:	
Spatial locality	



$\sim$	0	40	
u	×	/ /	
U	v		

Question 7	1 / 1 pts
QUESTION I	

#### cache2Dcols:

What is the total hit ratio for the D-cache with a block size of 64 bytes? Provide your answer as a percentage, e.g. 50.5%, but just input a number without the % character.

86.72

Question 8 2 / 2 pts

### Comparing cache2Drows with cache2Dcols:

Answer this question without running pin again. Assume that the 2-D integer array you allocated starts at address 0x40000000 in memory, the size of an integer is 4 bytes, D-cache block size is 64 bytes and the D-cache is initially empty. As you read the integers in the 2-D array one-byone, starting with element array[0,0], how many D-cache misses will you see for reading the first 10 integers in case of:

a) cache2Drows:	1
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b) cache2Dcols: 10

Answer each part by entering an integer between 0 and 10.

#### Answer 1:

10	
Answer 2:	
1	

Question 9

Comparing cache2Drows with cache2Dcols:
Compare the performance (hit ratio) of the D-cache for the 2 programs.
Which one is better? cache2Drows
Why? Spatial locality

Answer 1:
cache2Drows

Answer 2:
Spatial locality

Question 10 1 / 1 pts

#### cache2Dclash:

What is the total hit ratio for the D-cache with a capacity of 1, an associativity of 1, and a block size of 32 bytes? Provide your answer as a percentage, e.g. 50.5%, but just input a number without the % character.

85.36

Question 11 1 / 1 pts

#### cache2Dclash:

What is the total hit ratio for the D-cache with a capacity of 1, an associativity of 2, and a block size of 32 bytes? Provide your answer as a percentage, e.g. 50.5%, but just input a number without the % character.

86.47

Question 12 3 / 3 pts

### **Understanding Cache Associativity:**

Compare the performance (hit ratio) of the D-cache for the 2 levels of associativity.

Which associativity level results in better performance? 2

Why does that associativity level perform better? It doesn't replace cache lines as frequently.

#### Answer 1:

2

### Answer 2:

It doesn't replace cache lines as frequently.

Quiz Score: 20 out of 20