

# 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 [p4A: Understanding Caches \(https://canvas.wisc.edu/courses/330348/assignments/1852104\)](https://canvas.wisc.edu/courses/330348/assignments/1852104) 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

	Attempt	Time	Score
KEPT	<a href="#">Attempt 2</a>	5 minutes	20 out of 20
LATEST	<a href="#">Attempt 2</a>	5 minutes	20 out of 20
	<a href="#">Attempt 1</a>	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.

### 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.

### Question 3

1 / 1 pts

**cache1D:**

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.

### 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:

b) 32 bytes:

c) 64 bytes:

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

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**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

### Question 6

1 / 1 pts

**cache2Drows:**

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.

98.42

### Question 7

1 / 1 pts

#### 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-by-one, 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

b) cache2Dcols:

10

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

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**Answer 1:**

1

**Answer 2:**

10

### Question 9

3 / 3 pts

#### 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.

### 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.

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#### Answer 1:

2

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#### Answer 2:

It doesn't replace cache lines as frequently.

Quiz Score: **20** out of 20