Module 2 Quiz

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Module 2 Quiz
Graded Quiz • 33 min

Due Dec 21, 12:59 AM MST

Module 2 Quiz
Total points 11
1.
Question 1

Consider the following example algorithm, taken from the lecture video:

Thread 1 {

   MYBAL = MYBAL - 100

   FAMILY(W1) = FAMILY(R1) + 100

}

Thread 2 {

   FAMILY(W2) = FAMILY(R2) - 100

   DBAL = DBAL + 100

}

We denote the read and write for FAMILY in thread 1 as R1 and W1, and the read and write for FAMILY in thread 2 as R2 and W2. Which of the following is **<u>not</u>** a possible ordering of reads and writes for the family's account balance (FAMILY)?

1 point

A. R1, W1, R2, W2

B. R1, R2, W2, W1

C. R2, W1, R1, W2

D. R1, R2, W1 W2

E. R2, W2, R1, W1

2.
Question 2

Consider the following example algorithm, taken from the lecture video:

Thread 1 {

  MYBAL = MYBAL - 100

  FAMILY(W1) = FAMILY(R1) + 100

}

Thread 2 {

  FAMILY(W2) = FAMILY(R2) - 100

  DBAL = DBAL + 100

}

The beginning balance of the FAMILY account is 1000. We denote the read and write for FAMILY in thread 1 as R1 and W1, and the read and write for FAMILY in thread 2 as R2 and W2. Which of the following is **<u>not</u>** a possible value that the family account can end up with?
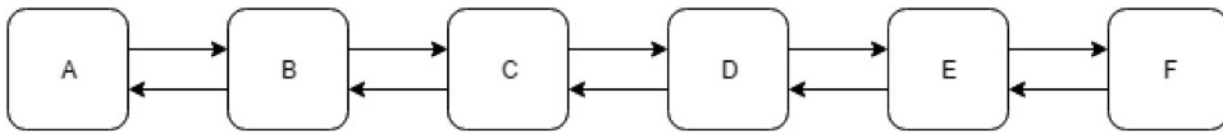
1 point

A.800

B. 900

C. 1000

D. 1100

3.
Question 3

Assume we have the doubly-linked list shown below. Using object-based isolation, which sets of object deletions can occur simultaneously?

Please choose all options that are correct.

1 point ; A & C is incorrect

A. (A, D)

B. (A, C, F)

C. (B, C, F)

D. (B, E)

4.
Question 4

Assume we are using the provided bank transaction code. We have six accounts: A, B, C, D, E, F We make eight transfers, all asynchronously:

1. $100 from A to B

2. $50 from B to C

3. $30 from B to C

4. $20 from B to A

5. $70 from D to A

6. $40 from B to D

7. $30 from E to D

8. $20 from D to F

Each transaction requires one computation step worth of time, but multiple transactions can run in parallel in the same computation step. Given enough processors, what is the minimum number of computation steps needed to run these eight transactions without causing a data race?

1. **A to B, E to D**
2. **B to C, D to A**
3. **B to C, D to F**
4. **B to A**
5. **B to D**

Please enter an integer for your response.

5

5.
Question 5

Consider the following pseudocode snippet for computing the spanning tree in parallel. You may assume that for every vertex in the graph, parent is initialized to null.

```
compute(v) {
  for each neighbor n of v {
    if makeParent(v, n) {
      async compute(n)
    }
  }
}


boolean makeParent(v, c) {
  isolated(c) {
    if c.parent == null {
      doWork(1)
      c.parent = v
      return true
    } else {
      return false
    }
  }
}


finish {
  root.parent = root;
  root.compute();
}
```

For a complete graph with 4 vertices, what is the WORK of this algorithm?

A. 3

B. 4

C. It depends on the order the node neighbors are selected.

D. It depends on what gets executed in parallel.

6.
Question 6

If we re-run the algorithm from Question 5 on the spanning tree (which is also a graph) that is produced in Question 5, what will be the total WORK of the algorithm?

A. 3

B. 4

C. It depends on which vertex is selected to start the tree.

D. It depends on what gets executed in parallel.

7.
Question 7

Consider the following pseudocode snippet:

finish {

  AtomicReference r = new AtomicReference()

  async {

    println(r.get())

  }

  forall i in 0..1000 {

    r.compareAndSet(null, i)

  }

}

What is most accurate statement regarding the value of r.get() printed by the async?

A. The string is null

B. Any value between 0 and 1000.

C. The string is null or any value between 0 and 1000.

8.
Question 8

Now, consider the pseudocode snippet below. Recall that a "forall" loop creates a separate async for every iteration of the loop.

```
finish {

  AtomicReference r = new AtomicReference()

  forall i in 0..1000 {

    r.compareAndSet(null, i)

  }

  async {

    println(r.get())

  }

}
```

What is most accurate statement regarding the value of r.get() printed by the async?

1 point

A. The string null

B. Any value between 0 and 1000.

C. The string is null or any value between 0 and 1000.

9.
Question 9

Assume we have defined objects x and y. The following pseudo-code uses **object isolation** on three blocks of code, A, B, and C.

```
async {

  isolated (x)  A

}
async {

  isolated (x)  B

}
async {

  isolated (y)  C

}
```

Which code blocks can run simultaneously?

Please choose all options that are correct.

1 point ; A & C is incorrect

A. A and B, but not also C

B. A and C, but not also B

C. B and C, but not also A

D. A, B, and C

10.
Question 10

Assume we have defined object y. The following pseudo-code uses object isolation on three blocks of code, D, E, and F.

async {

  isolated (read(y)) D

}

async {

  isolated (read(y)) E

}

async {

  isolated (y) F

}

Which code blocks can run simultaneously?

1 point

A. D and E, but not also F

B. D and F, but not also E

C. E and F, but not also D

D. D, E, and F

11.
Question 11

Let's say that you have some additional information: blocks D and E actually **write** y and block F **only reads** y. However, we are leaving the isolated declarations as is. How does this change the previous answer?

1 point

A. No change.

B. It reverses all the True/False answers.

C. The code is erroneous and won't run.

Honor Code Agreement
I, **Mark P Mullally**, understand that submitting work that isn't my own may result in permanent failure of this course or deactivation of my Coursera account.