Aploris/TeamSlide coding questions

1. Why is caching used to increase read performance?

- ○ It makes the first read faster.
- ◉ It makes the second and subsequent reads faster.
- ○ It makes even-numbered reads faster.
- ○ It makes odd-numbered reads faster.
- ○ Not answered/I don't know.

2.
Which of the following is used to maintain a user's logged-in state as they browse multiple pages on a website?

- ○ WebSockets
- ○ JavaScript global objects
- ◉ HTTP cookies
- ○ HTTP keep-alive
- ○ Not answered/I don't know.

---

3. Fill in the missing line of code

Language: C#

```
public static int FindMaximum(IEnumerable<int> nums)
{
  int maximum = int.MinValue; // smaller than all other numbers
    foreach (int num in nums)
      if (num > maximum)
        // (Fill in the missing line here)
  return maximum;
}
```

- ○ `num = maximum;`
- ○ `maximum = num;`
- ○ `maximum += num;`
- ○ `maximum += 1;`
- ◉ Not answered/I don't know.

---

4. What kind of SQL statement retrieves data from a table?

- ◉ SELECT
- ○ FETCH
- ○ READ
- ○ LOOKUP
- ○ Not answered/I don't know.

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5. What is the value of z after the following code runs?

Language: JavaScript

```
x = {'foo': 'bar'};
y = {'baz': x};
z = y['baz']['foo'];
```

- ○ `'baz'`
- ◉ `undefined`
- ○ `'bar'`
- ○ `'foo'`
- ○ Not answered/I don't know.

---

6. What does the following method calculate and return?

Language: C#

```
public static bool RectangleOperation(RectangleF r1, RectangleF r2)
{
  return !(r2.Left >= r1.Right || r2.Right <= r1.Left ||
    r2.Bottom <= r1.Top || r2.Top >= r1.Bottom);
}
```

- ○ `true` if the two rectangles overlap or touch
- ◉ `true` if the two rectangles strictly overlap, false if they only touch
- ○ `true` if the first rectangle `r1` is larger than the second `r2`
- ○ Nothing meaningful, the calculation does not make sense
- ○ Not answered/I don't know.

---

7. Which of the following statements regarding binary search is wrong?

- ○ Binary search only works on sorted lists of elements
- ○ If the list is sorted with the wrong direction binary search will change the list and reverse the order
- ○ Binary search starts in the middle of the list
- ◉ In each step binary search halves the number of elements that still need to be searched
- ○ Not answered/I don't know.

---

8. What is the time and space complexity of binary search in the worst case?

- ○ Time complexity O(log n)
- ○ Time complexity O(n)
- ○ Time complexity O(1)
- ◉ Time complexity $O(n^2)$
- ○ Not answered/I don't know.

- ○ Space complexity O(log n)
- ◉ Space complexity O(n)
- ○ Space complexity O(1)

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- ○ Space complexity O(n²)
- ○ Not answered/I don't know.

---

9. Fill in the missing line of code

Language: JavaScript

```
// Get the cumulative sum of a list
// e.g. cumulative_sum([1,2,3,4,5]) => [1,3,6,10,15]
function cumulative_sum(list) {
  let output = [];
  for(let i = 0; i < list.length; i++) {
    if (i == 0) {
      output.push(list[i])
    } else {
      // (Fill in the missing line here)
    }
  }
  return output;
}
```

- ○ `output.push(list[i]);`
- ○ `output.push(list[i] + output[i-1]);`
- ◉ `output.push(list[i-1] + output[i]);`
- ○ `output.push(list[i-1]);`
- ○ Not answered/I don't know.

---

10. Which of the following HTTP request methods should not alter the state of the server?

- ◉ PUT
- ○ POST
- ○ GET
- ○ PATCH
- ○ Not answered/I don't know.

11.
Suppose you're designing a distributed worker library, and would like it to be able to queue jobs using a number of different message queuing services (RabbitMQ, Amazon Simple Queue Service, ZeroMQ). What's a good way to handle making our code work with each of these services?

- ◉ We could design a base interface that defines how our library will interact with the queue service. We can create several implementations of this interface (one for RabbitMQ, one for ZeroMQ, etc). A method that runs when our library loads can look at config details, and instantiate the correct object.
- ○ The best way is actually just to write 3 versions of the library (one for each of the queuing services). We'll end up with simpler (and faster) code in each case.
- ○ As long as all our functions are referentially transparent, this is not really a prob transparency means that the order in which our methods are evaluated is irrele the code for all of our queuing services. The ones that are not set up will not ca
- ○

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We can use a global "queuing_service" variable. This will be initialized to a flag like "rabbit_mq", or "amazon_sqs". Anywhere in our code where we need to interact with the queuing service, then, we can use a switch statement on this variable to make sure that we do the right thing.

- ○ Not answered/I don't know.

---

12. Fill in the missing line of code

Language: C#

```
// Method calls a method on each element
// of a sequence and stores the result in a new enumerable sequence
public static IEnumerable<O> Map<I, O>(
  IEnumerable<I> input, Func<I, O> method)
{
    var resultList = new List<O>();
    foreach (var element in input)
    {
        var value = method(element);
        // (Fill in the missing line here)
    }
    return resultList;
}
```

- ○ `continue;`
- ○ `value.Add(method);`
- ◉ `resultList.Add(value);`
- ○ `value.AddTo(resultList);`
- ○ Not answered/I don't know.

---

13. Assume your code declares the method Map with the signature

Language: C#

```
public static IEnumerable<O> Map<I, O>(
  IEnumerable<I> input, Func<I, O> method)
```

Which of the following calls to the method will not compile?

- ○ `Map(new[] { 1, 2, 3, 4, 5 }, i => i + i);`
- ○ `Map(new int[] { 1, 2, 3, 4, 5 }, i => { return i + i; });`
- ◉ `Map<int, string>(new[] { 1, 2, 3, 4, 5 }, i => i + i);`
- ○ `Map<int, long>(new List<int>() { 1, 2, 3, 4, 5 }, i => i + i);`
- ○ Not answered/I don't know.

14.
You're writing a music editing app. Once a composition is done, the app encodes it specified audio format (.mp3 or .ogg). When the encoding is complete, you'd like to places in the app. Which of the following approaches to this problem makes the mo

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- ◉

This is a perfect place for a factory method. The encoder will be the factory. When it is done with its fabrication (encoding the audio), the assembly line will take it to the UI elements, which can update the UI, before passing the composition further along the chain.

- ○ A spin lock is a good way to do this. The UI code can enter a spin lock, continually checking if the encoding is done. When it is, it can update the UI and exit the lock. As long as the spin lock is not on the main thread, this will work well.
- ○ We can simply have the encoding system take a list of UI elements as parameters. When the encoding is done, it can tell the UI elements to update themselves.
- ○ The important thing here is that we separate the UI update from the actual encoding logic. The encoding system should not know about UI. A good way to do this is a broadcast event. The encoding system can broadcast an event when a song is encoded. The UI code can listen for this event, and update the UI when it sees it.
- ○ Not answered/I don't know.

---

15. Fill in the missing line of code

Language: C#

```
// Method returns index (0-based) of first matching
// element in an array
public static int FirstIndexOfElement(
  object element, object[] array)
{
  for (int i = 0; i < array.Length; )
  {
        // (Fill in the missing line here)
  }
  return -1;
}
```

- ◉ `if (array[++i] == element) return i;`
- ○ `i += 1;`
- ○ `if (array[i++] == element) return i - 1;`
- ○ `if (array[i++] == element) return i;`
- ○ Not answered/I don't know.

---

16. What's the expected output of the following JavaScript code?

Language: JavaScript

```
function foo() {

  function bar() {
    setTimeout(
      () => console.log('Curly'),
      1000);
  }

  console.log('Larry');
  return bar;
```

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```
}

let x = foo();
x();
console.log('Moe');
```

- ○ It won't compile.
- ◉ Larry, Moe, Curly
- ○ Curly, Larry, Moe
- ○ Moe, Larry, Curly
- ○ Not answered/I don't know.

---

17. What is the most true about a garbage collector?

- ◉ It finds dirty leftovers from your containers, frees them and then compacts your containers to save memory.
- ○ It finds previously allocated objects that are now unused by your program and releases them.
- ○ It finds and returns allocated objects that have been released while checking for circular dependencies.
- ○ It locks your program in order to run a breadth-first scan, finding unused objects and marking them for future recycling by the OS.
- ○ Not answered/I don't know.

---

18. When is it safe to trust external parameters received by your web-server?

- ◉ If those parameters are escaped properly by the client, it's safe.
- ○ It's never safe.
- ○ If you whitelist IPs and the request is from a whitelisted IP, it's safe.
- ○ HTTP params aren't safe because they are set by the user. However, HTTP headers are not. Those are the only external parameters that you can consider safe.
- ○ Not answered/I don't know.

---

19. What's wrong with this code?

Language: C#

```
// Take two sorted lists, and return
// both combined in sorted order
public static List<int> MergeSortedLists(List<int> l1, List<int> l2)
{
    var rtn = new List<int>();
    if (l1[0] < l2[0])
        rtn.AddRange(l1);
    rtn.AddRange(l2);
    return rtn;
}
```

- ○ This looks good. No errors.
- ◉ This will break if there are negative values in the lists.
- ○ This assumes the lists are sorted high to low, not low to high.

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- ○ This code makes no sense. It does something, but not merge two sorted lists into one sorted list.
- ○ Not answered/I don't know.

20.
Complete the following method which converts a numeric string to a number (e.g. `ParseInt("42")=42`, `ParseInt("-1234")=-1234`):

Language: C#

```
static int ParseInt(string input)
{
  int result = 0;
  int multiplier = 1;
  for (int i = 0; i < input.Length; i++)
  {
    if (i == 0 && input[i] == '-')
      multiplier = -1;
    else
      // (Fill in the missing line here)
  }
  return result * multiplier;
}
```

Your code here

21.
Say you're building a web forum application, where users can create accounts and post messages on forums about a variety of subjects. What might your relational DB schema look like?

- ○ The schema will likely have a "users" table with info on each registered user (name, password hash, etc), and a "forums" table with info on each forum (like forum name). A "messages" table can then have the text of each message, a foreign key to the users table, and a foreign key to the forums table.
- ○ It's most flexible to use a stored procedure to pull together the data we need dynamically.
- ○ A good schema is to have a "messages" table that contains the text of every message, and a "forums" table for each forum. Because we need a many-to-many relationship between messages and forums, we'll also need an association table between the two (message-postings) associating messages to forums.
- ○ The schema will probably feature a "posts" table with the text of every message posted, the name of the user who posted it, e.g. "John Smith", and the name of the forum to which it was posted.
- ◉ Not answered/I don't know.

---

22. Fill in the missing line of code

Language: C#

```
// Method recursively reverses a string
public static string RecursiveStringReverse(string input)
{
  if (input.Length <= 1)
```

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```
    return input;

  char firstChar = input[0];
  string lastChars = input.Substring(1);
  // (Fill in the missing line here)
}
```

- ○ `return RecursiveStringReverse(lastChars) + firstChar;`
- ○ `return lastChars + firstChar;`
- ○ `return firstChar + RecursiveStringReverse(lastChars);`
- ○ `return RecursiveStringReverse(lastChars);`
- ◉ Not answered/I don't know.

---

23. What does the following code do?

Language: JavaScript

```
str.split("dog").join("cat")
```

- ○ Finds the word "dog" in a string, and appends "cat" at that location
- ○ Replaces every occurrence of the word "dog" in a string with the word "cat"
- ○ Appends "dogcat" to the end of a string
- ○ Creates an iterator from "dog" to "cat" in the string
- ◉ Not answered/I don't know.

---

24. What does the following code do?

Language: C#

```
class A
{
  public void Print()
  {
    Console.Out.Write("A");
  }
}

class B : A
{
  new public void Print()
  {
    Console.Out.Write("B");
  }
}

class Main {
  public static void Main(string[] args) {
    A a = new B();
    a.Print();
```

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```
  }
}
```

- ○ It fails to compile because an object of class B cannot be assigned to an instance of class A without explicit type casting.
- ○ Prints out "A"
- ○ Prints out "B"
- ○ Prints out "AB"
- ◉ Not answered/I don't know.

---

25. What is the value of g after the following code block runs?

Language: JavaScript

```
function f(x) {
  x *= 2;
  return function(y) {
    y *= x;
    return function(z) {
      return z * y;
    }
  }
}

let g = f(3)(4)(5);
```

- ○ 5
- ○ 120
- ○ An error occurs
- ○ 60
- ◉ Not answered/I don't know.

---

26. Why do programs with bad memory leaks often slow down before they crash?

- ○ As the system runs out of memory, swapping increases and swapping is slow.
- ○ As the system runs out of memory, fragmentation increases, and memory access times go up.
- ○ Memory leaks cause buffer overflows, which reduces memory bandwidth available to the CPU.
- ○ The L1 cache runs out of space first, and the CPU has to access main memory more often.
- ◉ Not answered/I don't know.

27.
Which of the following makes the most sense as part of scaling a SQL database to handle increased write load?

- ○ Adding database indices on the columns most often updated
- ○ Adding database replicas (in a master-slave configuration) to scale horizontally
- ○ Writing to a materialized view, rather than to the main table
- ○ Removing little-used indices from the database and batching writes (where pos
- ◉ Not answered/I don't know.

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28. Do two system threads in the same process share the same call stack and heap space?

- ○ They share a single call stack, but access different heap spaces.
- ○ They have different call stacks, but access the same heap space.
- ○ They both share a single call stack and access the same heap space.
- ○ They have different call stacks and access different heap spaces.
- ◉ Not answered/I don't know.

---

29. Fill in the missing line of code

Language: C#

```
// Method returns new list with elements from input list in reversed order
public static List<T> ReverseList<T>(List<T> elems)
{
    var newList = new List<T>();
    for (int i = 1; i <= elems.Count; i++)
    {
        // (Fill in the missing line here)
    }
    return newList;
}
```

- ○ `newList.Add(elems[elems.Count]);`
- ○ `newList.Add(elems[elems.Count - i]);`
- ○ `newList.Add(elems[elems.Count - i - 1]);`
- ○ `newList.Add(elems[i - 1]);`
- ◉ Not answered/I don't know.

30.
You want to make a dynamic set data structure which stores a set of values, but also has a `GetNearest` function. For example, if it had the numbers `[1, 30, 60]` in it, and you called `GetNearest(28.5)`, it would return 30. Which of these implementations would be the fastest, if you call AddItem, RemoveItem, and GetNearest approximately equally often? You expect to have about 40,000 items in your data structure.

- ○ A hash set from numbers to the nearest value to them in the set
- ○ An unsorted linked list of values
- ○ A sorted array of values
- ○ A balanced binary search tree of values
- ◉ Not answered/I don't know.

---

31. What's wrong with this code?

Language: Python

```
# Method returns the length of the longest path
# through a binary tree
def max_height(node):
```

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```
    if not node:
        return 0
    left  = max_height(node.left)
    right = max_height(node.right)
    return max(left, right)
```

- ○ This is calculating the width of the tree, not the height
- ○ This needs to add one to the value it returns
- ○ This is missing a base case. Infinite recursion!
- ○ This method is correct
- ◉ Not answered/I don't know.

32.
You're building a photo editing program. So far your program uses a single thread. You're considering making it multi-threaded. Which of the following statements about threads is accurate?

- ○ Threads will slow down your application. An asynchronous design is better (but might be harder to write).
- ○ Adding multiple threads will allow your program to edit multiple photos at once. Go for it!
- ○ If your program is CPU-bound, adding threads may make it faster on multi-core processors.
- ○ Modern operating systems use a GIL (global interpreter lock). This can limit the efficacy of multi-threading.
- ◉ Not answered/I don't know.

---

33. What's wrong with this code?

Language: C#

```
// Method returns a string with the bits in binary
// of a 32-bit int
public static string GetBitStringForInt(int n)
{
    StringBuilder rtn = new StringBuilder();
    for (int i = 31; i >= 0; i--)
    {
        int v = (1 << i) & n;
        rtn.Append(v == 1 ? "1" : "0");
    }
    return rtn.ToString();
}
```

- ○ The check `v == 1` should be `v != 0`. The non-zero result will have 1 bit set, but in many different positions
- ○ The loop starts at 31, but should start at 32. Off by one
- ○ The code checks the bits from right to left, but appends them from left to right
- ○ Everything's good
- ◉ Not answered/I don't know.

---

34. Which output does the following code print?

Language: C#

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```
class Department
{
  public string Name { get; set; }
  public int Number { get; set; }
  public int BuildingId { get; set; }
}

static void Main(string[] args)
{
  var list = new List<Department>()
  {
    new Department() { Name ="Finance",Number = 1,BuildingId = 15 },
    new Department() { Name ="HR",Number = 2,BuildingId = 3 },
    new Department() { Name ="IT",Number = 3,BuildingId = 15 },
    new Department() { Name ="Sales", Number = 4, BuildingId = 3 }
  };

  var newList = from department in list
    group department by department.BuildingId into dp
    select new { counter = dp.Key, department = dp };

   Console.Out.WriteLine(newList.Count());
}
```

- ○ 0
- ○ 1
- ○ 2
- ○ 4
- ◉ Not answered/I don't know.

---

35. Fill in the missing line of code

Language: C#

```
private bool IsNull(object obj)
{
  // (Fill in the missing line here)
  return false;
}
```

- ○ `if (object = null) return true;`
- ○ `if (null) return true;`
- ○ `if (obj == 0) return true;`
- ○ `if (obj == null) return true;`
- ◉ Not answered/I don't know.

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36.

You are developing an application that will convert data into multiple output formats. You are developing a code segment that will produce tab-delimited output. You need to minimize the completion time of the `GetOutput()` method. Which code segment should you insert?

Language: C#

```
public interface IOutputFormatter<T>
{
  string GetOutput(IEnumerator<T> iterator, int recordSize);
}

public class TabDelimitedFormatter : IOutputFormatter<string>
{
  readonly Func<int, char> suffix = col => col % 2 == 0 ? '\n' : '\t';
  public string GetOutput(IEnumerator<string> iterator, int recordSize)
  {
    // (Fill in the missing segment here)
  }
}
```

- ○
```
string output = null;
for (int i = 1; iterator.MoveNext(); i++)
{
  output = string.Concat(output, interator.Current, suffix(i));
}
return output;
```
- ○
```
var output = new StringBuilder();
for (int i = 1; iterator.MoveNext(); i++)
{
  output.Append(iterator.Current);
  output.Append(suffix(i));
}
return output.ToString();
```
- ○
```
string output = null;
for (int i = 1; iterator.MoveNext(); i++)
{
  output = output + interator.Current + suffix(i)
}
return output;
```
- ○
```
string output = null;
for (int i = 1; iterator.MoveNext(); i++)
{
  output += interator.Current + suffix(i)
}
return output;
```
- ◉ Not answered/I don't know.

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37. Fill in the missing line of code

Language: C#

```
async void WriteFile(string fileName, byte[] data)
{
  using (var file = new System.IO.FileStream(fileName,
    System.IO.FileMode.Create, System.IO.FileAccess.Write,
    System.IO.FileShare.None, 4096, true))
  {
    // (Fill in the missing line here)
  }
}
```

- ○ `await file.Write(data, 0, data.Length);`
- ○ `await file.WriteAsync(data, 0, data.Length);`
- ○ `async file.Write(data, 0, data.Length);`
- ○ `async file.WriteAsync(data, 0, data.Length);`
- ◉ Not answered/I don't know.

Submit

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