

## Job Interview Questions

### Question 1 (C#)

What is the console output of the following program?

```
interface I
{
    int P { get; }
}

class A : I
{
    virtual public int P { get { return 0; } }
}

class B : A
{
    public override int P { get { return 1; } }
}

class C : B, I
{
    public int P { get { return 2; } }
}

...

A a = new A(), b = new B(), c = new C();
I ia = new A(), ib = new B(), ic = new C();

Console.WriteLine("{0}, {1}, {2}, {3}, {4}, {5}", a.P, b.P, c.P, ia.P, ib.P, ic.P);
```

Answers:

1. 0, 1, 1, 0, 1, 1
2. 0, 1, 1, 0, 1, 2
3. 0, 1, 2, 0, 1, 1
4. 0, 1, 2, 0, 1, 2

### Question 2 (Java)

What is the console output of the following program?

```
public class LanguageTest12 {

    public static void main(String... args) {
        System.out.println(foo());
    }

    private static int foo() {
        int a = 1, b = 2;
        try {
            return a + b;
        } finally {
            a = 10;
            b = 20;
            return a + b;
        }
    }
}
```

Answers:

1. 3
2. 30
3. 33

### Question 3 (Java)

What are the problems with this code?

```
class A {
    private int value;

    A(int value) {
        this.value = value;
    }

    @Override
    public boolean equals(Object obj) {
        if (!(obj instanceof A))
            return false;

        return value == ((A)obj).value;
    }
}

class B extends A{
    private int anotherValue;

    B(int value, int anotherValue) {
        super(value);
        this.anotherValue = anotherValue;
    }

    @Override
    public boolean equals(Object obj) {
        if (!(obj instanceof B))
            return false;

        if (!super.equals(obj))
            return false;

        return anotherValue == ((B)obj).anotherValue;
    }
}
```

Answers:

1. `hashCode()` is not overridden
2. Field `value` is not accessible from class `B`
3. `equals()` does not match *Symmetric relation* rule  
(`x.equals(y)` should return true if and only if `y.equals(x)` returns true)
4. Constructor `A()` is not visible from `B`. `A()` should be *protected*.

### Question 4 (C#)

What is the console output of the following program?

```
class A<T>
{
    public static int Value;
}

...
A<int>.Value = 5;
A<int32>.Value = 10;
A<uint>.Value = 15;

Console.WriteLine(A<int>.Value);
Console.WriteLine(A<uint>.Value);
```

Answers:

1. 5, 15
2. 10, 15
3. 15, 15
4. Compilation Error

## Question 5 (C#)

What is the console output of the following program?

Note:

- `Enumerable.Range(0, 10)` creates a sequence of 10 elements starting at 0.
- `Enumerable.Select(Func<TSource, TResult>)` maps each element of a sequence to a new sequence (with possibly different element type) by applying the given function.

```
private int j = 0;

private void Calculate()
{
    var threads = Enumerable.Range(0, 10).Select(x =>
    {
        var thread = new Thread(() =>
        {
            j++;
        });
        return thread;
    });

    foreach (var thread in threads)
    {
        thread.Start();
    }
    foreach (var thread in threads)
    {
        thread.Join();
    }
    Console.WriteLine(j);
}
```

Answers:

1. 0
2. 10
3. Some value in [0, 10]
4. Exception at runtime

## Question 6 (Java)

What is the console output of the following program?

```
import java.util.ArrayList;
import java.util.List;

public class CollectionTest2 {
    public static void main(String... args) {
        List<Integer> items = new ArrayList<Integer>();
        for (int i = 1; i <= 10; i++) {
            items.add(i);
        }

        for (Integer item : items) {
            if (item % 2 == 0){
                items.remove(item);
            }
        }

        System.out.println(items);
    }
}
```

Answers:

1. 1,2,3,4,5,6,7,8,9,10
2. 1, 3, 5, 7, 9
3. Exception at runtime
4. Compilation error

## Question 7 (C#)

MyKey class is a custom dictionary key implementation with the following members:

```
private readonly string _code;

public string Code { get { return _code; } }

public MyKey(string code)
{
    If (code == null) throw new ArgumentNullException("code");
    _code = code;
}

public override int GetHashCode()
{
    return _code.GetHashCode();
}
```

What is the console output of the following program? (Note: **Dictionary** is a hash-table)

```
var myMap = new Dictionary<MyKey, string>();

var key = new MyKey("KeyA");
myMap.Add(key, "Value1");

key = new MyKey("KeyB");
myMap.Add(key, "Value2");
myMap[key] = "Value3";

key = new MyKey("KeyA");
myMap[key] = "Value3";

myMap.Remove(new MyKey("KeyB"));

Console.WriteLine("size = {0}", myMap.Count);
```

Answers:

1. size = 0
2. size = 1
3. size = 2
4. size = 3

## Question 8 (Java)

What combinations of methods are possible to run on the same object **simultaneously** in two different threads?  
Note: on one object, you cannot call >1 synchronized methods in parallel.

```
public class MyClass {
    public synchronized void methodA() { }
    public synchronized void methodB() { }
    public static synchronized void methodC() { }
    public static synchronized void methodD() { }
}
```

Answers:

1. methodA() and methodB()
2. methodA() and methodC()
3. methodC() and methodD()

## Question 9 (Java)

What is the console output of the following program? (Note: **TreeSet** is **ordered**)

```
import java.util.Set;
import java.util.TreeSet;

public class CollectionTest1 {
    public static void main(String ... args){
        Set<Object> s = new TreeSet<Object>();
        s.add(new Object());
        s.add(new Object());
        System.out.println(s.size());
    }
}
```

Answers:

- 1
- 2
- Exception at runtime
- Compilation error

## Question 10 (C#)

Will this code compile without errors?

```
class Base
{ public int a; }
class Derived : Base
{ public int b; }

List<Base> v = new List<Derived>();
```

Answers:

- Yes
- Only starting from C# 4.0
- No