

## C# and .NET Environment Written Exam

Le Vendredi 8 Janvier 2010

Durée / Duration : 2 h

Sans Documents / No documents allowed

Sans Calculatrices / No calculators allowed

The questions are written in English, you can answer in English or French as you prefer; students from the SI English group **must** answer in English.

All answers must be written in the blank spaces left after the questions.

Don't forget to indicate your name (first name and last name) and group

Name

Zhang kai

Group

SJA

## Part 1 : C# language

a) Let X be a class, and let something() be a method of the X class. What's wrong with the following instructions ? (Those instructions are written inside a well written Main() method).

```
X _myXObject;
```

```
_myXObject.something();
```

✓ *-myXObject has been instantiated. There will be a compiling error because \_myXObject is not an existed object of class X. -myXObject need to be initialized.*

b) Let myClass be a class you have written. Why can you use the ToString() method with an object of this class, even if you haven't written it ?

✓ *Because all classes including myclass inherit from the Object class.  
And ToString() is a method of the Object class.  
So the object of myclass can use the method of the class which it inherited.*

c) What are the two functions of the new keyword?

1. Create a new object of a class. Do the instantiation work. Distribute new space for the object.
2. In polymorphism, use "new" key word can override a method and set it as late binding.

d) Here is a sample class code :

```
class sample
{
    private anotherClass _item;

    public sample()
    {
        _item = null;
    }

    public anotherClass item
    {
        get {return _item;}
    }
}
```

What kind of members are \_item, item and sample() ?

- item is a private attribute which belongs to class "anotherClass".
- item is the name of this property which is responsible for read the private \_item.
- sample() is the constructor of this class which is responsible for initializing the \_item.

e) Here is a sample code :

```
class arf
{
    // interesting and well written code
}

class oups : arf
{
}
```

What does class oups : arf mean ?

It means class oups inherits from the class arf.

Is the following instruction correct ? Explain your answer. If the instruction is not correct, what should have been written instead ?

```
arf _a = new oups();
```

✓ It's correct. Since oups inherits from arf, the above just indicates that the new object of oups down cast to its base class arf.

Is the last of the following instructions correct ? Explain your answer. If the instruction is not correct, what should have been written instead ?

```
arf _a = new oups();  
oups _o;  
_o = _a;
```

✓ It's not correct. Since arf \_a = new oups();, \_a is an object of arf. It can't cast to the object whose class inherits from arf. It should be like: oups \_o = new oups();  
arf \_a;  
\_a = \_o;

f) Does polymorphism occur in the following C# code ? (write all the lines displayed by this program before answering by yes or no)

```
class B  
{  
    public B()  
    {  
        System.Console.WriteLine("a new B object");  
    }  
  
    public void method()  
    {  
        System.Console.WriteLine("calling B::method()");  
    }  
}  
  
class D : B  
{  
    public D:base()  
    {  
        System.Console.WriteLine("a new D object");  
    }  
  
    public new void method()  
    {  
        System.Console.WriteLine("calling D::method()");  
    }  
}
```

```
public class test
{
    static void Main(string[] args)
    {
        D obj_der = new D();
        B obj_base = new D();

        obj_der.method();
        obj_base.method();
    }
}
```

a new B object.

a new D object.

a new B object.

a new D object.

calling D :: method()

calling D :: method()

Polymorphism occurs in method().

g) What is an indexer ?

Indexer is ~~used to consider the object as a collection.~~  
 a special kind of property ~~that~~ that can consider the object as a collection.

## Part 2 : .NET features

h) What is the CLR (Common Language Runtime) ?

It is a virtual machine which is responsible for ~~compile~~ compiling the MSIL to the machine language.

i) You compile a C# source file named sample.cs, and obtain a sample.exe file. You then copy this sample.exe file to a USB device and give it to a friend. Your friend copies this file to his computer. The sample.exe file doesn't execute on his computer. Can you explain your friend why ?

This .exe file is not a real .exe file. It is just MSIL. My friend can't run it because he doesn't have the environment for running the MSIL. This .exe needs to be compiled again by CLR so that it becomes a final machine language. Then my friend could run it.

j) In the following declaration, what is \_d ?

```
delegate void _d(object);
```

\_d is a delegate which holds object as its parameter and return type is void.

k) When writing a program with Event transmission, one has a transmittor class that raises events, and a receptor class, reacting to events. The delegate that handles event handling must be an attribute of one of the two classes. Which one, receptor or transmittor ? Explain your answer.

Transmittor.

Because the delegate should subscribe or bind to the method which is responsible for dealing with the event. It is Transmittor who raises the event and uses the delegate to handle it.

l) let the myTh object be an array of threads : (Thread [] myTh = new Thread[5]; for example). All the threads inside myTh are supposed to run the same method, which contains a critical section. How can you ensure that only one thread can access the critical section at one time ? (give an example with C# code).

Class Kf

```
public void method()
{
    lock() { //critical section }
}

/*Main*/ K k = new K();
Thread[] myTh = new Thread[5];
for(int i=0; i<5; i++) { myTh[i].start(k.method()); }
```

m) If you want to ensure clean critical section handling, you can use the `lock()` instruction that uses an object as a flag. Why does this object have to be declared as static?

Static object is the object that all threads and classes share. It has to be unique in the whole space. Otherwise, every thread or class could have a space in memory which holds the value of this object and modify it freely.

1

n) What is a lambda expression?

It is a way to substitute delegate.

0,5

o) What is a strong-named assembly?

It is an assembly which has been signed with a key. We can use `sn.exe` to sign an assembly.

1

### Part 3) ADO.NET and LINQ

p) What are the benefits of using the ADO.NET classes named `xxxDataAdapter` and `DataSet`? Which is the language (here "language" means representation, encoding) used to store the structure of data inside a `DataSet` object?

`xxxDataAdapter` can communicate with `xxx` database to retrieve and update data in database with an associated sql sentence. It's a low level connection between .NET and database.

`DataSet` can store tables or views of the database. It doesn't connect directly with the database. Just store data tables and their relations to improve efficiency.

`DataSet` uses xml format to store the tables and relations.

1

q) Explain briefly what LINQ is

LINQ is Language INtegrated Query which belongs to ".Net 3.5" platform.  
 It has a similar syntax with sql (some key words are same).  
 It can communicate data with database, xml files, etc.

good!

r) What does the following program do ?

```
string temp = Path.GetTempPath();

DirectoryInfo info = new DirectoryInfo(temp);

var query =      from f in info.GetFiles()
                  where f.Length > 1024*10
                  orderby f.Length descending
                  select new {f.Length, f.Name};
```

It selects the name and length of each file in Path.GetTempPath path ~~at~~ whose length is ~~at least~~ bigger than 1024\*10. And then, it stores the results in descending sequence in the variable "query".