UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2002/2003

September 2002

CIT502 – Object-Oriented Programming and Software Engineering

Duration : 3 hours

INSTRUCTION TO CANDIDATE:

- Please ensure that this examination paper contains **FOUR** questions in **SIX** printed pages before you start the examination.

- Answer **ALL** questions.

- You can choose to answer either in Bahasa Malaysia or English.

ENGLISH VERSION OF THE QUESTION PAPER

1. (a) Explain the difference between the terms of each of the following:

(i) Application and applet.

(ii) Compiling and running a program.

(iii) Method definition and method invocation.

(6/25)

(b) For the following unindented statements, first draw a flow chart and then determine its output assuming that isWalking is true and isTalking is false. Then rewrite the statements using proper indentation techniques.

```
if ( isWalking  == true)
if ( isTalking  == true)
System.out.print ("One");
else
System.out.println("Two");
System.out.println("Three");
```

(7/25)

(c) The following program segment is for part 1(c)(i) and 1(c)(ii):

```
for (int i=1; i <=9; i++)
{
    for (int j=1; j <=(9-1); j++)
    System.out.print( "   " );
    for (int j=1; j<=i; j++) {
    System.out.print(j);
    for (int j=i-1; j>=1; j--)
    System.out.print(j);
    System.out.println();
}
```

(i) Draw a flowchart for the program segment above.

(ii) Trace the program segment above, and determine the exact output.

(iii) For the program segment below, write a **while** and a **do**….**.while** loop that have the same output.

```
k=2;
for (int x=1; x <=5; x++)
{
    System.out.print( k );
    k=k+5;
}
System.out.println();
```

(12/25)

2. (a) Determine the output for the following program:

```
public class Mystery
{
    public String myMethod(String s)
    {
        return ("Hello"  + s);
    }
    public static void main (String args[])
    {
        Mystery  mystery = new Mystery ();

        System.out.println(mystery.myMethod("dolly"));
    }
}
```

(2/25)

(b) Consider the following declaration:

```
int beta[3][3];
```

What is stored in `beta` after each of the following statements executes?

(i)
```
for (int i=0; i <3; i++)
    for (int j=0; j <3; j++)
        beta[i][j] = 0;
```

(ii)
```
for (int i=0; i <3; i++)
    for (int j=0; j <3; j++)
        beta[i][j] = i+j;
```

(iii)
```
for (int i=0; i <3; i++)
    for (int j=0; j <3; j++)
        beta[i][j] = i*j;
```

(iv)
```
for (int i=0; i <3; i++)
    for (int j=0; j <3; j++)
        beta[i][j] =2 *(i+j) %4;
```

(8/25)

(c) Suppose you have the following method, `myMethod` which contains a boolean parameter and a `CyberPet` parameter:

```
public void myMethod (CyberPet p, boolean b)
{
    b = false;
    p.sleep();
}
```

`CyberPet` is defined below:

```
public class CyberPet
{
    private boolean isEating  = true;
    private boolean isSleeping  = false;
    private String name  = "no name";

    public  CyberPet (String str)
    {
        name = str;
    }

public void setName(String str)
{
        name=str;
}

public String getname()
{
        return name;
}

public void eat()
{
    isEating = true;
    isSleeping = false;
    return;
}

public void sleep()
{
    isSleeping = true;
    isEating = false;
    return;
}

public String getState()
{
    if (isEating)
        return "Eating";
    if (isSleeping)
        return "Sleeping";
    return "Error in State";
    }
}
```

What output would be produced by the following statements?

```
CyberPet pet1 = new CyberPet ("Socrates");
boolean isSocrates = true;
System.out.println(pet1.getState());
myMethod (pet1, isSocrates);
if  (Socrates ==true)
    System.out.println("Socrates");
else
    System.out.println("NotSocrates");
System.out.println(Socrates.getState());
```

(4/25)

(d) Write a program that reads in a set of positive integers and outputs how many times a particular number appears in the list. You may assume that the data set has at most 100 numbers and -999 marks the end of the input data. The numbers must be output in increasing order. For example for the data:

15 40 28 62 95 15 28 13 62 65 48 95 65 62 65 95 95

the output is:

```
Number        Count

  13            1
  15            2
  28            2
  40            1
  48            1
  62            3
  65            3
  95            4
```

(11/25)

3. (a) List and explain **four (4)** main activities of software engineering.

(5/25)

(b) What characteristics do well-structured modular system share?

(5/25)

(c) At the end of project CIT502, each group needs to do a presentation. Head of the group presents the project overview and he needs collaboration from other members. First member prepares slides by choosing the layout and design of the slides. He also needs content of analysis and design from second member and content of testing and implementation from third member.

Draw CRC cards to represent responsibilities and collaboration in this case.

(8/25)

(d) What are the advantages of OO system life cycle compared to the waterfall model?

(7/25)

4. (a) Read the following scenario and draw a sequence diagram to represent what happens in the paragraph below:

Ali sits on a chair
He switches on a TV
He selects the channel
Telephone rings
He tunes down the volume of the TV

(6/25)

(b) TV is an electrical device that consists of two speakers, one screen and one control panel. The control panel can control the volume of the two speakers and the color of the screen. The speakers have 1000 watt output, 4 types of sound control, and surround features. The screen is 29 inch wide, super flat and 3 types of picture control.

Draw a class diagram that shows some attributes, methods and relationships to represent this information.

(6/25)

(c) TV can have several states for example, off, ready, on and out of order. Draw a state diagram to represent the transition of each state.

(6/25)

(d) Write a simple OO JAVA program to define a class for speaker and control panel. Show the communication of a control panel with two speakers for adjusting the balance of left and right.

(7/25)

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