UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY
Academic Year 2009/2010 – 2nd Year Examination – Semester 4

IT4103: Programming II
PART 2 - Structured Question Paper

14th August, 2010
(ONE HOUR)

To be completed by the candidate

BIT Examination Index No: _____

Important Instructions:

- The duration of the paper is **1 (one) hour**.

- The medium of instruction and questions is English.

- This paper has **2 questions** and **6 pages**.

- **Answer all 2 questions. Questions do not carry equal marks.**

- **Write your answers** in English using the space provided **in this question paper**.

- Do not tear off any part of this answer book.

- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.

- Note that questions appear on both sides of the paper.
  If a page is not printed, please inform the supervisor immediately.

Questions Answered

Indicate by a cross (✗), (e.g. ✗) the numbers of the questions answered.

	Question Numbers		
To be completed by the candidate by marking a cross (✗).	1	2	
To be completed by the examiners:			

1) **Linked structure is a very widely used data structure in programming and there are different types of it.**

   a)
   i). Write a description describing the important components that make up a linked list. (Use diagrams, when required, to elaborate the significant features of the linked list.)
   ii). Compare an array with a linked list and identify two(02) limitations of an array which can be overcome by using a linked list.

   (30 Marks)

   ANSWER IN THIS BOX

   It has nodes

   Each node has data fields and a reference to another node

   The last node reference a special place - null

   Limitations of an array

   1. **Changing the array requires creating a new array and then copying all data from the array with old size to the array with the new size**

   2. **The data in the array are next to each other sequentially in memory, which means that inserting an item inside the array requires shifting some other data in the array**

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   b) Write a Java program to illustrate a singly linked list where one can clearly identify a singly linked list node which enables to store an integer number. Then write a singly linked list class to show the behaviours of only the following methods.
   i). Adding a new node to the head of the list
   ii). Adding a node to the tail of the list
   iii). Checking to see the emptiness of the list

   (30 marks)

   ANSWER IN THIS BOX

```
public class Node{
public int value;
public Node next;
public Node(int i){ this( I, null);
public Node( int I, Node n){ value =  I;
next = n; }
}


public class LinkedList{
protected Node head, tail;
public LinkedList(){ head = tail = null;}
public boolean isEmpty()}
return head == null;
}

public void addToHead(int element){
head = new Node( element, head);
if( tail == null)
tail = head;
}

pubic void addToTail(int element){
If(!isempty()){
 tail.next = new Node(element);
 tail.tail.next;
}
else head = tail = new Node(element);
}
```

2)

a) Consider the following stream of data which is stored in the array

5 1 9 8 7 0 2 3 4 6

Using an illustration, explain the process of creating a balanced binary search tree with the use of an ordered array.

(10 Marks)

ANSWER IN THIS BOX

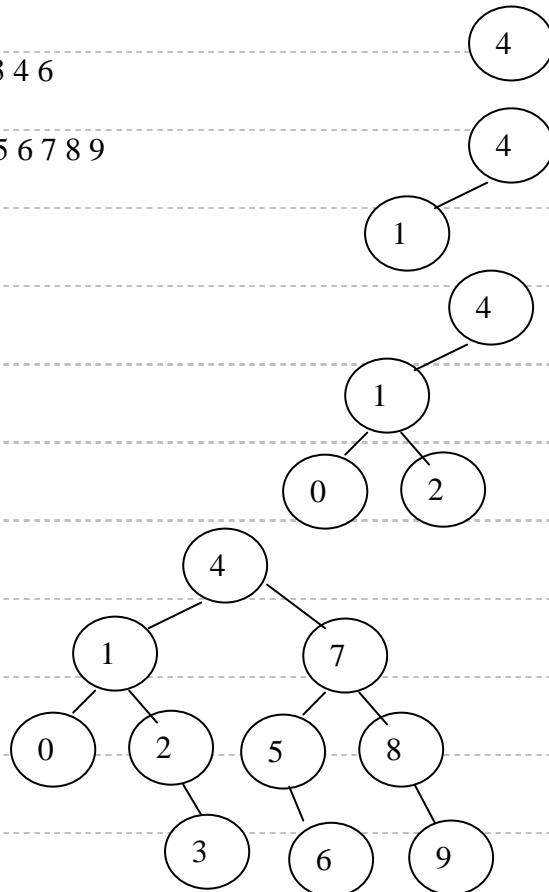**A stream of data** 5 1 9 8 7 0 2 3 4 6

Array of sorted data 0 1 2 3 4 5 6 7 8 9

(a) 0 1 2 3 **4** 5 6 7 8 9

(b) 0 **1** 2 3 **4** 5 6 7 8 9

(c) **0 1 2** 3 **4** 5 6 7 8 9

(d) **0 1 2 3 4 5 6 7 8 9**

4

b) Write an application and an applet to display the following name.

Vimukthi Jayaweera

Discuss 3 differences of applications and applets.

(30 Marks)

ANSWER IN THIS BOX

```
public class Program{
public static void main(String args[]}{
System.out.println("Vimukthi Jayaweera")
}
}


import javax.swing.JApplet;
import java.awt.Graphics;


public class MyFirstApplet extends JApplet{
Public void paint ( Graphics g){
    g.drawString("Vimukthi Jayaweera");
}
}
```

1. **Application needs to have a main method to execute it and an applet doesn't need it**

2. **We embed the applet in a html page to execute an applet and its not like an application**

3. **An applet is a class which is stored in the javax package. We write sub class hing JApplet class to get the applet but an application is not like that.**

(etc)

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