

**UNIVERSITY OF BOLTON
BSc COMPUTING
COURSEWORK SUBMISSION FORM**

Student/Centre to complete:

SURNAME/FAMILY NAME: FORENAMES:

BOLTON STUDENT ID: EMAIL:

DATE OF SUBMISSION:

MODULE NO./TITLE: ...CPU5008 Data Structures and Algorithms.....

TUTOR'S NAME:.....Abdul Razak.....

COURSEWORK TITLE:Trees Data structures and recursion

Please state if this is your FIRST submission OR REFERRED/DEFERRED submission
OR a REPEAT submission?

Declaration

I hereby declare that this work is my own work. I understand that if I am suspected of plagiarism or another form of cheating, my work be referred to Academic Registrar and/or the Board of Examiners, which may result in me being expelled from the programme. I understand once I submit this work, it will automatically belong to the University of Bolton.

Academic staff to complete:

Feedback:
.....
.....
.....

Date Issued: 15th November 2015..... Hand-In Date: **29th November 2016 @ 12 noon**

Other Relevant Date e.g. Demonstration: **29th November 2016 during the practical session.**

Received: On Time Late (within 5 days of published deadline date)

Mark awarded:% Do not apply mark penalty unless the work was submitted late.

Assessors Name: ...A. Razak..... Signature:.....

Date:.....

Degree Conversions A: 70-100% B: 60-69% C: 50-59% D: 40-49% F: 0-39%
HND Conversions Pass: 40-49% Merit: 50-66% Distinction: 67-100%

Late submission

For late submission see student handbook:

<http://www.bolton.ac.uk/Quality/SE/Student-Handbook/Home.aspx>

Creative Technologies	
Course / Programme:	Computing
Module name and code:	Data Structures and Algorithms CPU5008
Tutor:	Abdul Razak
Assignment Number:	Two (part 1)
Assignment Title:	Trees Data structures and recursion
Issue Date:	15th November 2016
Submission Deadline:	29th November 2016 @12.00 noon.

Learning Outcomes:

LO 3. Evaluate and develop advanced tree data structures and methods of traversal.

Assignment:

Using Trees data structures and recursion.

HE5 – Assessment is set appropriate to level HE5.

Specific Assessment Criteria

- Have solved several problem tasks using the Java language.
- Have shown the ability to decompose a problem and have designed suitable class structures to effect a solution to a given problem.
- Have demonstrated the ability to complete tasks from blank solutions in order to achieve a goal.

Grading

A percentage mark will be provided as feedback. Grading is as follows:

A:	70-100%
B:	60-69%
C:	50-59%
D:	40-49%

Marks below 40% will be classed as fail.

Assignment 2 (part 1)

Create a new Java project called **A2_Donald_Duck** replacing **Donald_Duck** with your name. Use the underscore (_) to replace any space characters.

Scenario

Your employer wants a management organisation chart showing all the company employees. The most appropriate data structure is the tree where each node is an employee.

Program Development Stage 1 (20 marks)

Class name: Employee (Attributes)	
private String forename	Donald
private String surname	Duck
private String title	Sales rep/ Managing Director/ Cleaner
private float salary	24575

Create the employee class so that it has

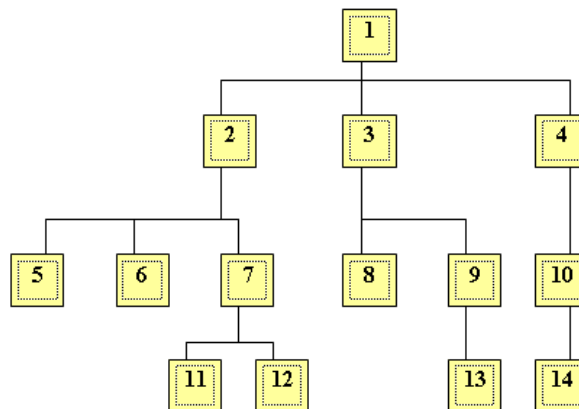
- 1) a default constructor that initialises its attributes to sensible values.
- 2) a parameter constructor that sets all the attribute values based on the parameter values.
- 3) a setter method for each attribute.
- 4) a getter method for each attribute.
- 5) a toString method to return a suitably formatted string of the attribute values.

The class should implement the Cloneable interface so that objects of this class can be copied. You should add any other methods that you decide is necessary.

Program Development Stage 2 (20 marks)

Using the DefaultMutableTreeNode where the user Object attribute refers to an Employee object, create appropriate nodes and link them to get the structure shown below. The employee details to be used are shown on the next page.

Create a class called **DisplayTest001** that makes use of recursion to list the employees in the console window, using tabulation to show the managers/subordinate relationships between nodes.



Node	Forename	Surname	Job Title	Salary(£)
1	Mohammed	Ali	Senior Partner	120000
2	Sara	Johnson	Managing Partner	89000
3	Sandra	Dee	Partner	78500
4	Fred	Dibner	Finance Manager	67900
5	Cleo	Patrar	Junior Partner	45000
6	Irfan	Patel	Junior Partner	45000
7	George	Bush	Office Manager	37000
8	Harry	Potter	Solicitor	52500
9	Ronald	Reagan	Senior Clerk	22000
10	Simon	Templar	Finance Officer	18000
11	Jacob	Heart	Clerk	16000
12	Barry	Dwyer	Clerk	16000
13	Mary	Fritz	Clerk	16000
14	Gordon	Brown	Finance Clerk	16500

Program Development Stage 3 (15 marks)

Create a class called **DisplayTest002** that uses recursion to perform the following tasks:

- Display all people earning over a certain amount (say £ 50000).
- Display only the people who have subordinates and the number of employees that **directly** respond to them. Use DefaultMutableTreeNode methods to accomplish this.

Program Development Stage 4 (15 marks)

Create a DefaultTreeModel object, this tree model should contain the tree created in Stage 2. Add this tree model to a JTree and display the JTree. Demonstrate this code with a class called **DisplayTest003**

Program Development Stage 5 (30 marks)

Add the following to your tree model:

Node	First Name	Surname	Job	Salary (£)	Add to node
15	Paul	Swann	IT Manager	54000	3
16	James	O'Brien	IT Developer	36000	15
17	Mary	Walkden	IT Developer	36000	15
18	Philip	Goodyear	Finance Clerk	16500	10

Find a convenient way of adding nodes to your tree model.

Node 7 now retires and his subordinates now report to node 5.

Demonstrate these changes to your tree model and on JTree with a class called **DisplayTest004**

IMPORTANT

At all stages in the development you should add JavaDoc comments to explain the purpose of the new methods added to the each class. In addition to the JavaDoc comments you should add additional normal style comments where appropriate.

What you must submit

You must submit the assignment in class by 12 noon on the deadline date shown on page 1 of this assignment brief.

Your submission must include:

- 1) This assignment brief completed and signed on the front page, also complete the table below.
- 2) UML class diagram
- 3) Printouts of the code for the classes:
 - Employee
 - Your tree class
 - DisplayTest002
 - DisplayTest003
 - DisplayTest004
 - Additional classes created in stage 4
- 4) The entire Eclipse project on disk (copy the entire project folder from the Eclipse workspace but **do not** change the folder name afterwards)
- 5) The disc should be clearly identified with your name, student ID, module name and assignment title and secured with the above documentation

In this assignment I have achieved the following objectives.			
Tick appropriate box	NA	Part	Full
<i>NA – not attempted : Part – part completed : Full - fully completed</i>			
Stage 1 – Employee class created with shallow copying			
Stage 2 – Used recursion to display employees			
Stage 3 – Used recursion to display employees earning over a certain salary Used recursion to display supervisors and the number of employees working directly for them			
Stage 4 – Display the model as a JTree			
Stage 5 – Modify the tree contents as required			

Failure to submit all the above will result in a loss of marks

Assessment Criteria

The mark you get is based on

- the stage of development you have achieved
 - the quality of the code provided i.e. well structured/good use of identifier names
 - good use of comments (both JavaDoc and normal comments)
- clear concise algorithms that uses appropriate Java programming constructs

NOTE: You need to demonstrate your programs and explain how they work during the practical session. **No demonstration means zero marks.**