INSTITUTE OF TECHNOLOGY
BLANCHARDSTOWN

Year	Year 4
Semester	Semester 1
Date of Examination	Wednesday 22nd January 2014
Time of Examination	9.30am – 11.30am

Prog Code	**BN402**	**Prog Title**	Bachelor of Science (Honours) in Computing	**Module Code**	COMP H4023
Prog Code	**BN104**	**Prog Title**	Bachelor of Science (Honours) in Computing	**Module Code**	COMP H4023

Module Title	Enterprise and Cloud Computing

Internal Examiner(s): **Geraldine Gray**
External Examiner(s): **Mr. Michael Barrett**
Dr. Tom Lunney

Instructions to candidates:

1) **To ensure that you take the correct examination, please check that the module and programme which you are following is listed in the tables above.**
2) **The paper consists of five questions. Candidates should complete ANY FOUR of the five questions.**
3) **The paper is worth 100 marks. Each question is worth 25 marks.**

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Question 1.

a) Compare two **distributed application architectures** you are familiar with. In your answer make reference to: ease of set up; scalability; efficiency; and ease of maintenance.

12 marks

b) Explain the term **heterogeneous distributed data.** Why, in practice, are distributed databases often heterogeneous?

5 marks

c) Discuss the role of a **global transaction manager** in guaranteeing transaction atomicity in a distributed database.

8 marks

Question 2.

a) "Cloud computing represents a huge growth opportunity for both the EU and Ireland. A recent report suggests that it could contribute up to €250 billion to EU GDP in 2020 and over 3.8 million jobs."

Dr. Theo Lynn, Cloud Computing Technology, DCU

Discuss this statement in terms of what you believe are the benefits of cloud computing, and it's capacity to create jobs and wealth in our economy.

10 marks

b) As a member of an IT development department, you have been asked to research services offered in the 'Platform as a Service' (PaaS) layer of the cloud-computing stack. Of specific interest is the benefits of using PaaS for a large software development project with multiple developers.

i. Discuss the characteristics of PaaS, and what distinguishes PaaS from IaaS.

8 marks

ii. Explain in what circumstances it would, and would not, be an appropriate choice for a large software development project.

7 marks

Question 3.

```
@Stateless
public class CustomerFacade extends AbstractFacade<Customer> {

    @PersistenceContext(unitName = "CustApp-ejbPU")
    private EntityManager em;
    private Customer entityClass;

    @Override
    protected EntityManager getEntityManager() {
        return em;
    }

    public CustomerFacade() {
        super(Customer.class);
    }
.....
```

a) Answer the following questions based on extract of code above:

i) Is this code extract from an Entity Class, a Session Bean or a Message Bean? Explain the role of this type of bean as part of a Java EE application. **3 marks**

ii) Explain the annotation `@PersistenceContext`. **3 marks**

iii) Explain the annotation `@Stateless`. **3 marks**

not maintatining state with client, light weight , manages busines logic, session bean

iv) What services does an **Entity Manager** offer an Enterprise Java Bean? **4 marks**

handless mapping between java class and relational database, inheritence, handles adds updates deletes queries

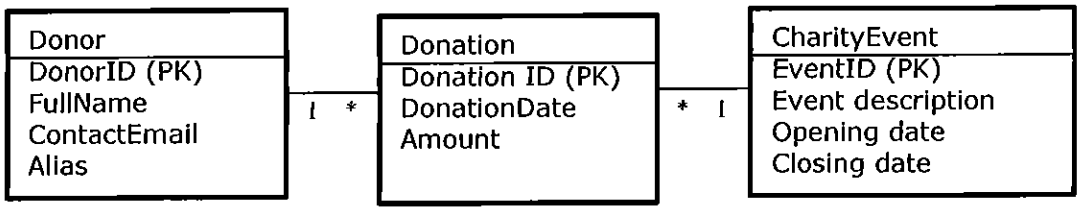
b) You have been asked to implement the following application using Java EE. Apart from the games themselves, identify the entity classes and session beans you would use to implement the functionality described below. Illustrate, with the aid of a diagram, the interactions between application components.

Online game management site:
Initially all users must register with the site, providing a valid email address and password. Once the chosen password is sufficiently secure, the user's details are stored. Shortly afterwards the user receives an email to confirm the user's details. A link on this email will bring the user to a login page. Once logged in, the user can choose a game to play. Following completion of a game, the user's score for that game is recorded. If their score is in the top 10 scores for that game, and user's name is added to the website's score board.

12 marks

Question 4.

a) Define Entity classes to cater for the data requirements of the class diagram given below. You do not need to include get and set methods, or static queries.



Note:
All relationships are bidirectional.

19 marks

b) Write JPQL queries for each of the following. Base your answers on the class diagram from part a) above.

i) A list of donors who donated more than €100 in a single donation.

3 marks

ii) A list of donors who donated to the charity event "MyConcernFast2013"

3 marks

Question 5.

a) The following is an extract of code from a JSF page and its corresponding managed bean. Assume a session façade and entity class are available to support access to a customer database table. Answer the questions below based on this code.

```
<h:dataTable value="#{custController.items}" var="item>
        <h:column>
                <f:facet name="header">
                        <h:outputText value="Customer ID"/>
                </f:facet>
                <h:outputText value="#{item.customerId}"/>
        </h:column>
        <h:column>
                <f:facet name="header">
                        <h:outputText value="Name"/>
                </f:facet>
                <h:outputText value="#{item.name}"/>
        </h:column>
</h:dataTable>
```

```
@Named(value = "custController")
@SessionScoped
public class custController implements Serializable{

   private DataModel items = null;

   @EJB
   private session.CustomerFacade ejbFacade;

  public DataModel getItems() {
     items = new ListDataModel(ejbFacade.findAll());
     return items;
   }
. . . .
```

i. What will the data table display when this JSF page is rendered?

2 marks

ii. Explain how "item.name" is populated with customer names from a database table. Your answer should explain the interactions between the JSF page, the managed bean, the session facade and the entity class.

8 marks

iii. Explain the annotation **@SessionScoped**. Outline <u>two</u> alternative annotations that could have been used instead.

5 marks

Question 5 continues on the next page

b) Explain in detail one type of attack the code below is vulnerable to. What are the possible implications of this type of attack? Recommend amendments to the code which would prevent such an attack.

recommendBook.html	**process.jsp**

<form action="process.jsp">
What was the last album you bought?
<input type="text" name="album"/>
<input type="submit" value="Continue"/>
</form>
	//initial HTML
	<%
	//read input parameters
	%>
	 People who like <%= album %> also purchased the following albums:
	// rest of code. . .

Echoed back to screen XSS cross site scripting. Code that gets run on client machine. preventing it escape dangerous characters. **10 marks**