INSTITUTE OF TECHNOLOGY
BLANCHARDSTOWN

Year	Year 4
Semester	Semester 1
Date of Examination	
Time of Examination	

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): **Dr. 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.**

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Question 1

a) Discuss three technical challenges that a JEE based solution is designed to solve. You may reference case studies you are familiar with to illustrate points made.

15 marks

b) Discuss the implications of the Glassfish EJB container supporting an Enterprise Service Bus (ESB) architecture. Your answer should explain what an ESB is, covering its support for distributed applications, workflow and heterogeneous environments.

10 marks

Question 2.

a) *"The [Irish] Government believes that between our climate, skills base, telecoms connectivity and existing strengths in ICT, we have the potential to reap substantial benefits in terms of jobs and growth from the global expansion of the [cloud computing] sector"* [ref: Irish Independent, April 2012].

Discuss this statement in terms of what you believe are the benefits to Ireland Inc. from the government's investment in, and promotion of, cloud computing in Ireland, both from the perspective of providers and consumers.

15 marks

b) As a member of an IT development department, you have been asked to research the potential of using services offered in the 'Software as a Service' (SaaS) layer of the cloud-computing stack. Of specific interest is the potential of SAAS for two applications areas: the company's payroll; and collaboration software to support teams across different geographic locations.

Report on your findings, including an explanation of SaaS, both when it is, and is not, an appropriate choice, and your recommendation for the two applications above.

10 marks

Question 3.

```
@PersistenceContext(unitName = "MyApp-ejbPU")
private EntityManager em;

public NewMessage() {
}

public void onMessage(Message message) {
    ObjectMessage msg = null;

    if (message instanceof ObjectMessage) {
        msg = (ObjectMessage) message;
        NewsEntity e = (NewsEntity) msg.getObject();
        em.persist(e);
   }
 }
```

a) Read the extract of code above, and answer the following questions:

i) Is this code extract from an Entity Bean, a Session Bean or a Message Bean? In one sentence, state what is the role of this type of bean as part of a JEE application. **2 marks**

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

iii) What is the role of the Entity Manager in the context of the code given above? **2 marks**

iv) How is the method **`public void onMessage(…)`** called? **2 marks**

v) Discuss the implications of the statement **`em.persist(e)`** on the life cycle events of an entity bean. **4 marks**

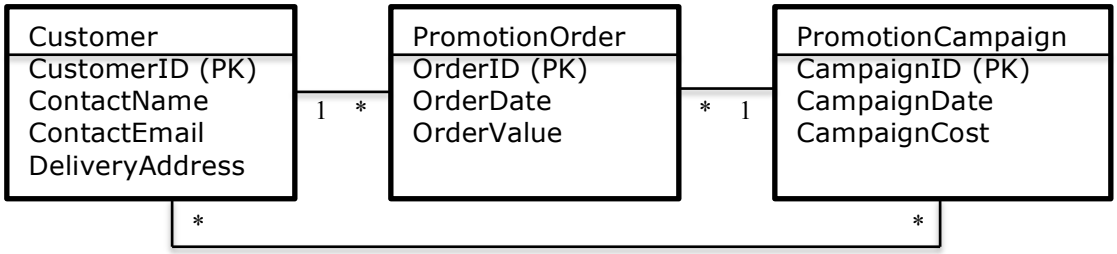
b) You have been asked to implement the following application using JEE. Identify the entity beans, session beans and message beans you would use. Illustrate, with the aid of a diagram, the interactions between applications components.

Automatic check-in:
A passenger is identified by scanning their boarding card, and passport photo. Once validated, the passenger's status is updated to 'checked-in'. If travelling with luggage, a passenger's luggage is accepted one piece at a time. Each piece of luggage is weighed, and a sticker is printed to stick to the luggage handle. If luggage is overweight, the customer is requested to pay a fee before the luggage is accepted.
If for some reason a piece of luggage does not make it onto the plane, the passenger will be notified by text.

12 marks

Question 4.

a) Define Entity Beans 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.
OrderID should be automatically generated in the Order table.

20 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 Customers who have an OrderValue in a PromotionOrder that is greater than €10.00 **2 marks**

ii) A list of orders showing CustomerID, orderValue and OrderDate for orders relating to CampaignID "Dec2012". **3 marks**

Question 5.

a) "In 2011, SQL injection was responsible for the compromises of many high-profile organizations, including Sony Pictures, PBS, MySQL.com, security company HBGary Federal, and many others." [ref: http://cwe.mitre.org/top25/]

Discuss the statement above with reference to:

(i) What is SQL injection **5 marks**

(ii) Ways in which SQL injection can be used to compromise data. **3 marks**

(iii) How to detect a SQL injection vulnerability. **4 marks**

(iv) Coding to prevent SQL injection. **6 marks**

b) Explain Roles as used in JEE security. In your answer, make reference to the access control annotations used in the session bean code extract below.

```
@Stateless
@RolesAllowed("javaee")
public class HelloEJB implements Hello {
@PermitAll
public String method1(String msg)
{ . . . }
public String method2(String msg)
{ . . . }
@DenyAll
public String method3(String msg)
{ . . . }
}
```

7 marks