INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN

Year	Year 4
Semester	Semester 1 REPEAT
Date of Examination	Thursday 22nd August 2013
Time of Examination	10.00am – 12.00pm

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.

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

Question 1

a) You have been asked by a company to review their current integration architecture, and recommend an alternative approach. Their current architecture is point to point, which has served them well in the past, but they are worried about it's limitations as the company grows.

Write a report reviewing the strengths and weaknesses of their current architecture, and give details of an alternative solution to address their architecture's weaknesses. Justify why your recommendation will serve the company into the future as they continue to expand and acquire new businesses.

11 marks

b) Discuss the benefits of using JEE to develop a web-based application. Your discussion should cover JEE's n-tier architecture and the services available to an Enterprise Java Bean. Also comment on when JEE might not be an appropriate solution.

14 marks

Question 2

a) Explain each of the following in the context of implementing a Session Bean:

i. Dependency Injection. **4 marks**

ii. Instance Pooling. **6 marks**

iii. Accessing container services. **4 marks**

b) Read the extract of code below, and answer the related questions following the code:

```
@MessageDriven(mappedName = "jms/NewMessage", activationConfig =  {
                                .......     })
public class NewsMessage implements MessageListener {

    @Resource
    private MessageDrivenContext mdc;
    @PersistenceContext(unitName = "MyApp ")
    private EntityManager em;

    public NewMessage() {
    }

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

        if (message instanceof ObjectMessage) {
            msg = (ObjectMessage) message;
            MyEntity e = (MyEntity) msg.getObject();
            save(e);
    }

    public void save(Object object) {
        em.persist(object);
    }
}
```

i) Explain what type of Bean this is, and give an example of when it would be appropriate to use such a bean as part of a JEE application.

4 marks

ii) Explain the line of code: `MyEntity e = (MyEntity) msg.getObject();`.

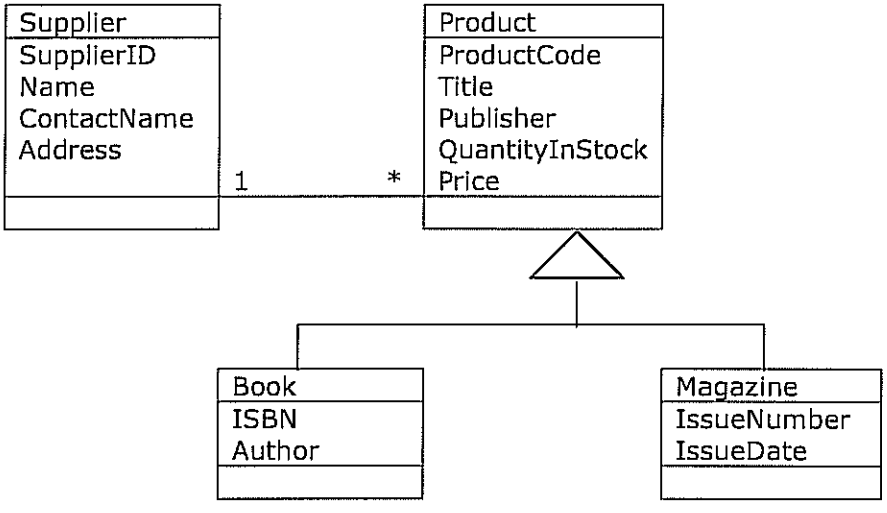
2 marks

iii) Explain why this bean needs to access a Persistence Context and create an instance of an Entity Manager.

5 marks

Question 3

a) Define Entity Beans to cater for the data requirements of a book shop as given in the class diagram below. Justify your choice of method for handling inheritance, taking into account that this business hopes to extend their range of products in the future.
You do not need to include set and get methods, or static queries in your answer.



Note:
Relationships are one to many and bidirectional.
Book and Magazine inherit from Product.

20 marks

b) Explain the Entity Bean life cycle events that occur when the following statements are executed. Assume **em** is an instance of a JPA Entity Manager, and **Book** is an Entity Bean:

i. Book book = new Book();

ii. book = em.find(Book.class, 1234);

iii. em.remove(book)

5 marks

Question 4.

a) Explain why, in practice, distributed databases tend to be heterogeneous rather than homogeneous. Your answer should also explain **heterogeneous distributed data**.

8 marks

b) Why might a transaction use 2-Phase Commit when updating data in a heterogeneous distributed database? Explain how the protocol works.

12 marks

c) Is 2-Phase Commit sufficient to guarantee all ACID properties in a heterogeneous distributed database environment, assuming local DBMS's are ACID compliant? Explain your answer.

5 marks

Question 5.

a) Give an overview of the three layers of the cloud computing stack, and discuss the relevance of each layer when considering options for application development based on JEE's three tier architecture.

15 marks

b) Discuss in what circumstances it may <u>not</u> be appropriate to avail of services in the cloud.

6 marks

c) Advise a company on <u>four</u> things to look out for in a service level agreement with a cloud-based provider.

4 marks