

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway
Autumn Examinations 2008 / 2009

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Exam Code(s) 3IF1
Exam(s) Third B.Sc. (Information Technology)

Module Code(s) CT331
Module(s) Programming Paradigms

Paper No. I

External Examiner(s) Prof. J.A. Keane
Internal Examiner(s) Prof. Gerard Lyons
Dr. Jim Duggan

Instructions: Answer any THREE Questions

Duration 2 HOURS
No. of Pages 3
Department(s) Information Technology
Course Co-ordinator(s) Dr. Des Chambers

Requirements:

OLLSCOIL NA hÉIREANN
NATIONAL UNIVERSITY OF IRELAND, GALWAY

AUTUMN 2008-2009 EXAMINATION

Third Year Examination in Information Technology

Programming Paradigms (CT331)

Professor J.A. Keane
Prof. Gerard J. Lyons
Dr. Jim Duggan

Time Allowed: 2 hours

Answer any THREE questions

1. (a) On the .NET platform, distinguish between *managed code* and *unmanaged code*. (40% of marks).

(b) For a Student class, define a property that can set or retrieve the *studentID*. Summarise the benefits of properties in object-oriented languages. (30% of marks).

(c) In C#, write a class method that takes in three integers, and returns (by reference) the sum and product of the numbers. Explain why this would be difficult to implement in Java. (30% of marks).
2. (a) Describe an event, and explain how an event can play an important role in building modern software applications. Distinguish between an event and a delegate. (30% of marks).

(b) Make use of events to code a simple publisher/subscriber system that broadcasts football scores to registered clients. Subscribers should have a way of registering, and as they register, they should provide a callback function. This function will receive the update in string format. The publisher should keep an archive of all football scores, using an ArrayList. (70% of marks).

3. (a) Draw a diagram showing the main classes in the .NET Reflection API, and describe the main purpose of each class. (30% of marks).
- (b) For a given Type t, show how you would list (1) all methods of the type, (2) all constructors of the type. (40% of marks).
- (c) Given a string representation of a class, clearly show the steps you would take in order to instantiate an object of that class. Outline the advantages that this facility provides for software developers. (30% of marks).
4. (a) Define an iterator, and summarise why it is a useful feature of C#. (25% of marks).
- (b) For a student with a collection of exam result objects, use the default iterator to return each result in reverse order from the collection. (35% of marks).
- (c) Extend the solution in (b) by developing custom iterators that implement the IEnumerator interface (e.g. public Object Current; public bool MoveNext(); public void Reset()). (40% of marks).
5. Use an abstract class to create a proxy solution for access to a Bank Account object. The Bank Account (attributes Id, Password and Balance) can be viewed as the original, and the proxy contains a reference to the original. When a *GetBalance(Id, Password)* request arrives at the proxy, the id and password are authorised. If the authorisation fails, the original is not invoked. If the authorisation is a success, the original is invoked, and the balance passed back. As well as coding the solution, show the design using a class diagram.