

INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN

Year	Year 3
Semester	1
Date of Examination	Thursday 15 th January 2009
Time of Examination	3.30pm – 5.30pm

Programme Title	Bachelor of Science in Computing in Information Technology
Programme Code	BN302
Module Title	Network Distributed Computing
Banner Module Code	COMP H3013

Programme Title	Bachelor of Science in Computing in Information Technology
Programme Code	BN013
Module Title	Network Distributed Computing
Banner Module Code	COMP H3013

Programme Title	Bachelor of Science (honors) in Computing
Programme Code	BN104
Module Title	Network Distributed Computing
Banner Module Code	COMP H3013

Internal Examiner(s): *Dr. Anthony Keane*

External Examiner(s): *Dr. Richard Studard*
Mr. John Dunnion

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) **Answer question 1 and any two of the other questions.**
- 3) Question 1 is worth 40 marks and all other questions are worth 30 marks each.

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

- (a) What is a **Distributed System** and explain the **three basic characteristics** of such systems.

(8 marks)

- (b) Briefly describe the following **four issues** in distributed systems:

- Heterogeneity
- Concurrency
- Scalability
- Transparency

(8 marks)

- (c) In any two of the following examples, briefly explain how **openness** and **failure handling** would be important to the successful operation of the application:

- Electronic Mail
- Distributed Information System
- Distributed File System
- Trading Floor System

(8 marks)

- (d) What is **Mobile and Ubiquitous Systems** and how are they related to Distributed Systems. Give some examples in your answer.

(8 marks)

- (e) Describe the advantage and disadvantages offered by **Peer-to-Peer** systems over **Client-Server** applications. Give some examples of each type of system in your answer.

(8 marks)

Question 2:**Worth 30 marks**

- (a) What is a **Socket** and how can it be used with distributed applications?
(6 marks)
- (b) Describe in detail, how can connections from **multiple clients** be handled at the same time by an application using with sockets?
(8 marks)
- (c) What advantages does **Servlets** have over Sockets as a development technology? Illustrate your answer with an example.
(8 marks)
- (d) Describe the **components** needed to develop a distributed application using **Java Server Pages technology**.
(8 marks)

Question 3:**Worth 30 marks**

- (a) Explain how **Local and Wide Area Wireless communications** place different demands on their applications?
(4 marks)
- (b) What are the **two main market areas** for wireless applications and give examples.
(8 marks)
- (c) Describe the steps in creating a Java application designed to run on a mobile device and in your answer explain any terms used like **MIDlet**, **CLDC** and **MIDP**.
(12 marks)
- (d) Describe any practical method for deploying wireless Java applications on physical devices and outline any advantages or disadvantages of using the method.
(6 marks)

Question 4:

Worth 30 marks

- (a) What are the main issues for distributed applications in using **time clocks** on a computer and using a GPS time source directly?

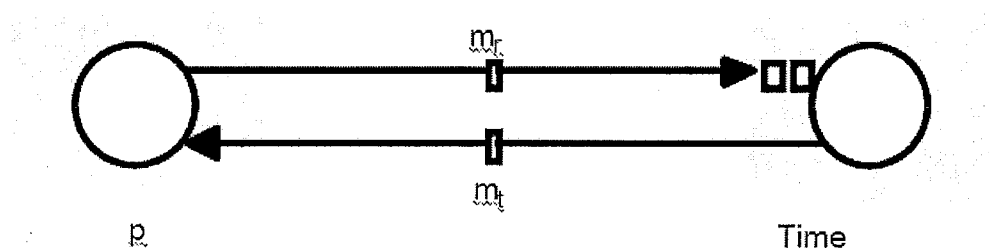
(4 marks)

- (b) Identify the terms in the following equation and explain how it is used to describe a software clock that approximates real physical time for a process.

$$C_i(t) = \alpha H_i(t) + \beta$$

(8 marks)

- (c) Describe **Cristian's method** for synchronizing clocks, as illustrated in the figure below. In your answer, give a simple estimate of the time to which p should set its clock to.



(12 marks)

- (d) A client attempts to synchronise with a time server. It records the round-trip times and timestamps returned by the server in the table below.

- Which of these times should it use to set its clock?
- To what time should it set it?
- Estimate the accuracy of the setting with respect to the server's clock.

Round-trip(ms)	Time (hr:min:sec)
32	16:34:23.789
35	16:34:25.456
30	16:34:28.123

(6 marks)