

**PRINCE OF SONGKLA UNIVERSITY**  
**FACULTY OF ENGINEERING**

**Midterm Examination:** Semester 2

**Academic Year:** 2003-2004

**Date:** 26<sup>th</sup> February 2004

**Time:** 9.00-12.00 (3 hours)

**Subject Number:** 240-572

**Room:** R300

**Subject Title:** Parallel and Distributed Simulation Systems

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**Exam Duration:** 3 hours

**This paper has 3 pages, 4 questions and 140 marks (30%).**

**Authorised Materials:**

- Writing instruments (e.g. pens, pencils).
- Textbooks, a notebook, handouts, and dictionaries are permitted.

**Instructions to Students:**

- Scan all the questions before answering so that you can manage your time better.
- Attempt all questions.
- Write your answers in the answer book.
- Start your answer to each question on a new page
- Clearly number your answers.
- Any unreadable parts will be considered wrong.

When drawing diagrams or coding, use good layout, and short comments; marks will not be deducted for minor syntax errors.

ทูลจริตในการสอบ

โทษขั้นต่ำ      ปรับลดในรายวิชานั้นและพักการเรียน 1 ภาคการศึกษา

โทษสูงสุด      ให้ออก

**Question 1**

(30 marks; 30 minutes)

Design a simulation of a Pizza company that has three ovens and has a list of ordered Pizzas to be baked. Different dishes require different baking times.

- a) Define state variables, the event list and simulation time clock variable.  
(10 marks)
- b) Program the main event processing loop (simulation executive) and event procedures (simulation applications).  
(10 marks)
- c) Draw the space-time diagram of the events processed in timestamp order, describing the changing state variables.  
(10 marks)

**Question 2**

(70 marks; 70 minutes)

- a) What are the differences between *Global Virtual Time (GVT)* and *lower bound on the time stamp (LBTS)*?  
(4 marks)
- b) What are the differences between *Batch fossil collection* and *On-the-fly fossil collection*?  
(4 marks)
- c) Tell the differences amongst the followings in terms of algorithm and tradeoff.  
(16 marks)
- Copy State Saving
  - Infrequent State Saving
  - Incremental State Saving
  - Reverse Computation
- d) Show the following scenarios using diagrams and give a solution to solve the problems.  
(12 marks)
- Zero Lookahead,
  - Simultaneous Events
  - Repeatability
- e) Tell the differences amongst the followings in terms of algorithm and usage. Use diagrams to help explanation.  
(12 marks)
- Event Retraction
  - Lazy Cancellation
  - Lazy Re-Evaluation
- f) Tell the differences amongst the followings in terms of algorithm and usage. Use diagrams to help explanation.  
(12 marks)
- Message sendback
  - Storage optimal protocols
  - Artificial Rollback
- g) Explain the Time Parallel Simulation and show the tradeoff. (10 marks)

**Question 3**

(20 marks; 20 minutes)

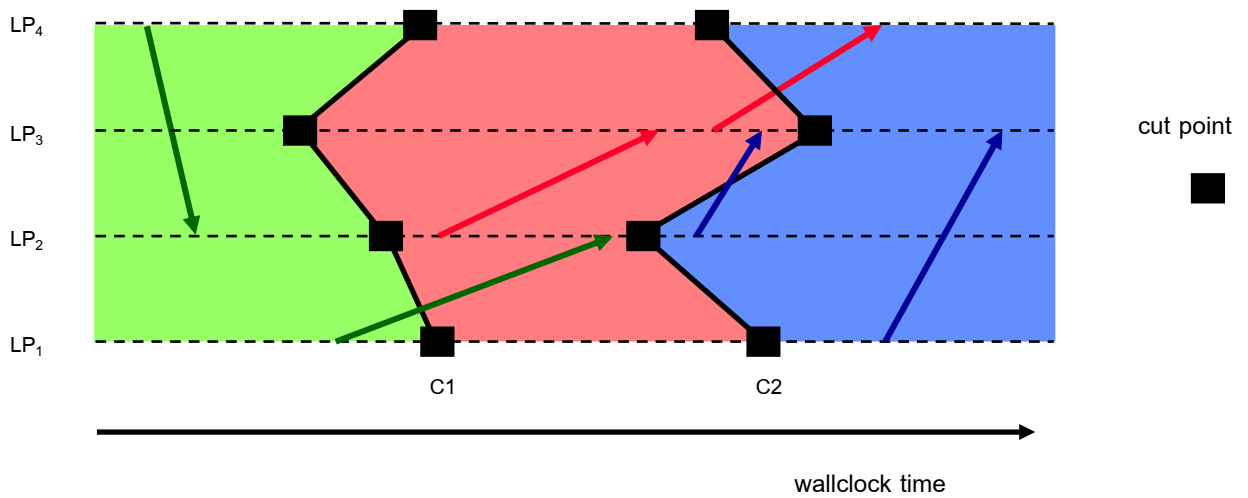
Show solutions to the following problems in *Global Virtual Time* using diagrams.

- a) transient message
- b) simultaneous reporting

**Question 4**

(20 marks; 20 minutes)

- a) From the following picture, explain how each cut is made briefly.



- b) Tell the use of third cut and other cuts.

----End of Examination----

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Lecturer