

UNIVERSITY OF BOLTON

**SCHOOL OF BUSINESS & CREATIVE
TECHNOLOGIES**

COMPUTER GAMES SOFTWARE DEVELOPMENT

SEMESTER 2 EXAMINATIONS 2010/2011

ADVANCED GAMES TECHNOLOGY

MODULE NO: CGD3002

Date: Tuesday 31st May 2011

Time: 10:00 – 12:00

INSTRUCTIONS TO CANDIDATES:

There are **FIVE** questions on this paper.

Answer **THREE** questions, **ONE FROM SECTION A** and **TWO FROM SECTION B**.

All questions carry equal marks.

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SECTION A –MULTIPROCESSING AND NETWORKING

Question 1

1 A)

Suppose that you wished to develop a networked driving game, where each participant controlled one car and they all raced together on the same track. Explain in detail how this could be accomplished. You should include explanations of the networking facilities required and also explain how these facilities might be used in the indicated example.

[25 marks]

Question 2

2 A)

Discuss and explain the restrictions on the form of the for loop in an OpenMP #pragma omp parallel for directive

[5 marks]

2 B)

Provide and explain a pseudo-code representation of Dekker's algorithm for implementing mutual exclusion. You should list any obvious weaknesses of the approach.

[20 marks]

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SECTION B – 3D GRAPHICS, GAME ENGINEERING and AI

Question 3 - Rendering

3 A)

Discuss the differences between global illumination and radiosity when it comes to generating lightmaps for a videogame.

[5 Marks]

3 B)

You are asked by your team leader to prepare a document outlining the typical rendering pipeline employed in a high-end first person shooter such as Battlefield 3. Write a short description of the technologies involved in rendering scenes from such a game, paying particular attention to the lighting characteristics and production methods.

[10 marks]

3 C)

How does the use of deferred rendering impact the type of environments that can be rendered using this approach in comparison to forward rendering? Draw a diagram that demonstrates the different approaches used in both methods. Be sure to clearly label diagrams.

[10 marks]

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Question 4 – AI

4 A)

Draw a diagram demonstrating the states and transitions you might typically add to a state machine for a monster in an MMORPG. Be sure to annotate the diagram with appropriate comments to allow the reader to understand what the states are for and how the transitions happen.

[5 Marks]

4 B)

Modified versions of A* pathfinding are often employed in games. Describe two such modifications and how they help the pathfinding process. Be sure to use diagrams where appropriate to demonstrate your understanding.

[10 marks]

4 C)

You are asked by a team lead to develop a system that allows for emotion to be demonstrated for the AI in a game scenario. Describe an example scenario you might use, give a description of the architecture you would implement to enable the scenario and discuss how your example demonstrates the emotions involved. Be sure to reference any academic materials you would rely on in the discussion of your solution.

[10 marks]

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Question 5 - Game engine design

5 A)

What is a smart pointer, how does it work and where would you use one?

[5 marks]

5 B)

You are asked by your lead engineer to devise an architecture for propagating data changes amongst game objects within your game. Describe the architectural problem that this kind of system would encounter, how you would architect a solution and what techniques you would use to ensure that the solution is robust and flexible.

[10 marks]

5 C)

Data oriented design is a buzzword that is running through game development circles currently. How does data oriented design differ from traditional object oriented design, component oriented design and aspect oriented design. Be sure to describe the key features of each approach along with the benefits and drawbacks.

[10 marks]

END OF QUESTIONS