UNIVERSITY OF BOLTON

SCHOOL OF CREATIVE TECHNOLOGIES

BSC (HONS) GAMES PROGRAMMING

SEMESTER ONE EXAMINATIONS 2023/2024

GAMES HARDWARE DEVELOPMENT

MODULE NO: GAP5005

Date: Tuesday 9th January 2024   **Time: 2:00 – 4:00pm**

INSTRUCTIONS TO CANDIDATES:

Section A:

You must **ANSWER ALL THREE** questions.
These are worth 20 marks each and are technically based questions.

Section B:

There are TWO questions. You must **ONLY ANSWER ONE** question.
This is worth 40 marks and is an essay style question.

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SECTION A

ANSWER ALL THREE QUESTIONS

Question 1:

Mobile Development

a) In cross-platform development, highlight input method discrepancies, often stemming from menu system feedback. Propose solutions to mitigate these issues.

[4 Marks]

b) In mobile devices, explain how gyroscopes work and explain what they measure. You are expected to use diagrams to illustrate your answer.

[4 Marks]

c) Elaborate on the practical limitations and challenges encountered by game developers working on cross-platform projects for both Desktop (Windows, MacOS, and Linux) and Mobile (Android and iOS) platforms. Describe how developers can identify and tackle some of these challenges.

Your answer should cover technical and design considerations for developers.

[12 Marks]

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Question 2:

Virtual Reality

a) List and explain the difference between 3DoF and 6DoF in the context of virtual reality devices.

[4 Marks]

b) Pinpoint three causes of typical symptoms associated with virtual reality sickness and suggest relevant solutions.

[4 Marks]

c) Compare and contrast in detail the strength and weakness between the mainstream virtual reality headsets currently on the market. Mainstream virtual reality headsets are split into four categories: **Holder** (Google's Cardboard), **No Tether – Mobile** (Samsung Gear VR), **Tethered to Console** (PlayStation VR), and **Tethered to PC** (Oculus Rift).

[12 Marks]

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Question 3:

Data Persistence

a) Using the .NET Binary Formatter, explain the process used to save/load data in games. You should take the time to detail what is happening in each step.

[5 Marks]

b) Draw a diagram to illustrate the process of serialization and deserialization for the .NET Binary Formatter.

[5 Marks]

c) When dealing with custom parsing for game data serialization and deserialization, challenges emerge when certain data types, like Vector3, lack native support. Using Vector3 as an illustration, outline steps to address this limitation through a customized parsing technique.

[4 Marks]

d) Discuss the advantages of using Binary files over JSON files to create data persistence systems in games.

[4 Marks]

e) Discuss a scenario where it would be beneficial to save data to JSON files on the user's computer instead of saving to binary and highlight why it could be problematic to save all of your data using this method.

[2 Marks]

END OF SECTION A

PLEASE TURN THE PAGE FOR SECTION B

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SECTION B

ANSWER <u>ONE</u> QUESTION FROM THIS SECTION

The questions below are worth 40 marks each and a long-form response is expected.

Question 4:
Computer Hardware Architecture

John Von Neumann revolutionized the technology sector by changing how computers were built, demonstrating that computers could serve as general-purpose devices.

As a programmer, explain why the Von Neumann architecture is important for today's computers. Describe the stored program concept, sketch, and discuss the key parts of the Von Neumann Architecture. Also, talk about how buses work, the role and speed of the clock, and the impact of multi-core processing. Lastly, look into the Von Neumann Bottleneck, and suggest ways to overcome it.

[40 Marks]

Question 5:
Game Engines

In the world of video game development, Unity and Unreal stand out as the dominant commercial game engines, catering to developers across various skill levels, from aspiring students to industry giants like Lucid Games, with a substantial workforce exceeding one hundred developers.

As a representative of a major game development studio who develops for multiple resolutions and platforms, analyse the advantages and drawbacks associated with the decision to adopt either Unity or Unreal as the primary game engine. Additionally, explore alternative options available to these studios and delve into the potential implications of choosing a non-commercial alternative on the dynamics of the development team.

[40 Marks]

END OF QUESTIONS
END OF PAPER