Multimedia Service Design (448430) Spring 2009 Midterm Exam – April 20th, 2009

Dankook University, College of Engineering, Computer Division, Multimedia Engineering

Major _____   Identification# _____   Name _____

1. What is the definition of Metaverse? Describes the characteristics of the following Metaverse scenarios: virtual worlds, mirror worlds, augmented reality, lifelogging. (extra 10 points)
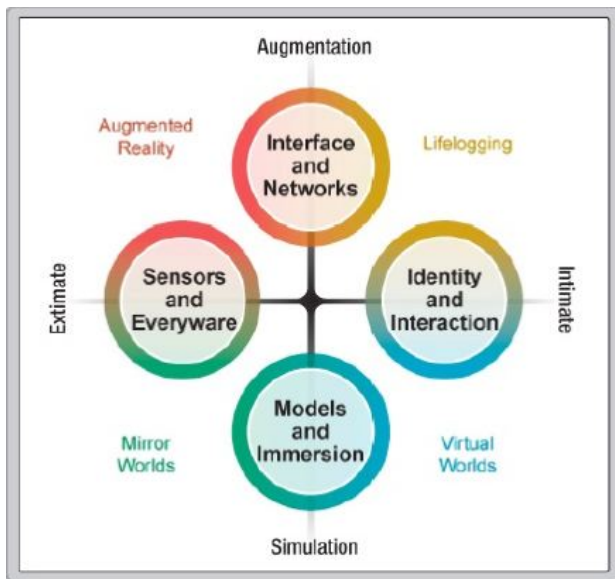
2. A networked virtual environment (NVE) is defined as 'a software system in which multiple users interact with each other in real-time, even though those users may be physically located around the world.' Describe the following NVE features: a shared sense of space, presence, time, communication, and share. (10 points)

3. The core of the DIS network software architecture is the protocol data unit (PDU). Describes PDU (how they are used in distributed simulators) and some example of PDU. (10 points).

4. DIS used peer-to-peer heartbeat approach and dead reckoning algorithm. What is the "heartbeat"? (10 points)

5. Explain the concept of 'dead reckoning' algorithm that is widely used in networked virtual environments. What are the advantages and limitations of this algorithm? (10 points).

6. Describe the three convergence methods (snap convergence, linear convergence, spline convergence) to correct inexact prediction in dead-reckoning algorithm. (10 points)

7. Compare and Contrast the 'dead reckoning' with other dynamic shared state methods: shared repository and blind broadcasts. (10 points)

8. Describe the benefits and limitations of centralized, distributed, and hybrid network model used in networked virtual environments. (10 points)

9. Shortly explain the characteristics of TCP, UDP, IP Multicasting, and IP Broadcasting network protocol. Describes which network protocol should be used for NVE? (10 points)

10. What is scene graph? Explains some benefits of putting NVE world into a scene graph. (10 points)

11. Suppose that you are designing a networked virtual environment to be placed in the 6th grade science classroom focused on geology and life on Mars. The students in the classroom can navigate Mars surface, collect Martian (and asteroids) rock properties, and visualize the collected data. Describe your system design with the consideration of NVE design challenges: distributed, real-time graphics, user interactivity. Highlight your important points. Justify your choices. (10 points)