Lab 10

**Question 1**

What is a potentially visible set, and how does this approach differ from static zones?

* **Potentially Visible Set (PVS):**
  + A Potentially Visible Set (PVS) is a collection of objects or areas within a game world that are potentially visible from a specific point of view.
  + The PVS approach dynamically determines which objects or areas are visible to a player at any given moment based on factors such as the player's position, line of sight, and occlusion.
  + PVS systems typically use techniques like spatial partitioning, occlusion culling, and visibility testing to efficiently compute and update the set of potentially visible objects.
* **Static Zones:**
  + Static zones are predefined regions or areas within a game world that remain constant regardless of a player's position or viewpoint.
  + These zones are typically designed and placed manually by level designers or developers during the creation of the game.
  + Static zones do not dynamically adapt to changes in the player's perspective or visibility requirements.

**Difference:**

* The key difference between PVS and static zones lies in their adaptability and dynamic nature:
  + PVS dynamically computes and updates the set of visible objects based on the player's viewpoint, resulting in more efficient rendering and resource usage.
  + Static zones, on the other hand, remain fixed and do not change based on the player's perspective, which can lead to inefficiencies in rendering and potentially unnecessary resource consumption.

**Question 2**

In multiplayer online games, interest management cuts down the bandwidth usage by filtering irrelevant updates. Describe two common techniques of interest management. How do these interest management approaches benefit the game?

* **1. Spatial Partitioning:**
  + Spatial partitioning divides the game world into smaller regions or cells, such as grids, octrees, or BSP trees.
  + Players receive updates only for objects within their current partition or neighbouring partitions, reducing bandwidth usage by filtering out irrelevant updates.
  + This technique benefits the game by minimizing the amount of data sent over the network, improving network performance, and reducing server load.
* **2. Proximity-Based Updates:**
  + Proximity-based updates prioritize sending updates for objects that are near the player's current position.
  + Objects outside the player's vicinity are either not updated or updated less frequently, conserving bandwidth, and reducing network traffic.
  + This approach benefits the game by focusing network resources on relevant gameplay elements, ensuring that players receive timely updates for nearby objects while minimizing the transmission of redundant data for distant objects.

**Benefits of Interest Management Approaches:**

* **Bandwidth Optimization:** Interest management techniques reduce the amount of data transmitted over the network by filtering out updates for irrelevant objects or areas, leading to bandwidth savings.
* **Improved Network Performance:** By minimizing unnecessary data transmission, interest management improves network performance, reduces latency, and enhances the overall multiplayer experience.
* **Scalability:** Interest management allows multiplayer games to scale efficiently to support a large number of players without overloading network resources or server capacity.
* **Enhanced Gameplay Experience:** By focusing network resources on relevant gameplay elements, interest management ensures that players receive timely updates for nearby objects, enhancing immersion and gameplay realism.