CS529
Fundamentals of Game Development

Lecture 8

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Questions?

- Animated Circular Object and Stationary Circular Object
- Collision Response (Reflection)

Overview

- Space Partitioning

What is it? what is it used for?

- A data structure used to store geometric information and it is used to accelerate spatial related operations.

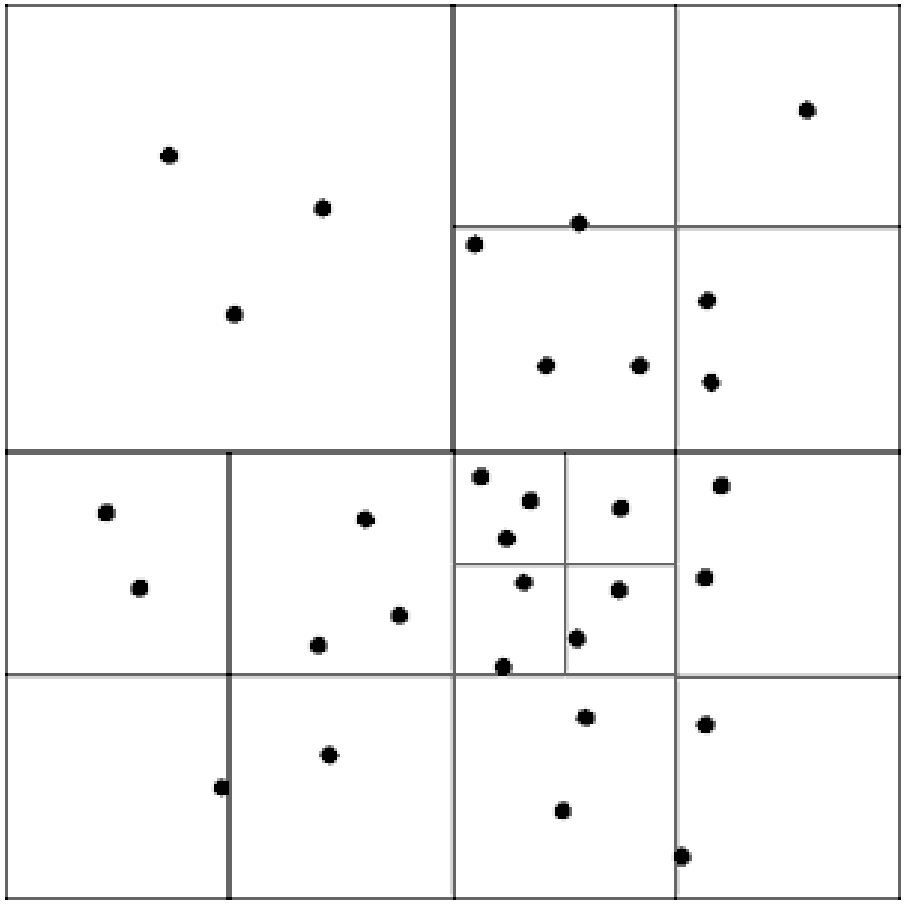
How does it accelerate spatial operations?

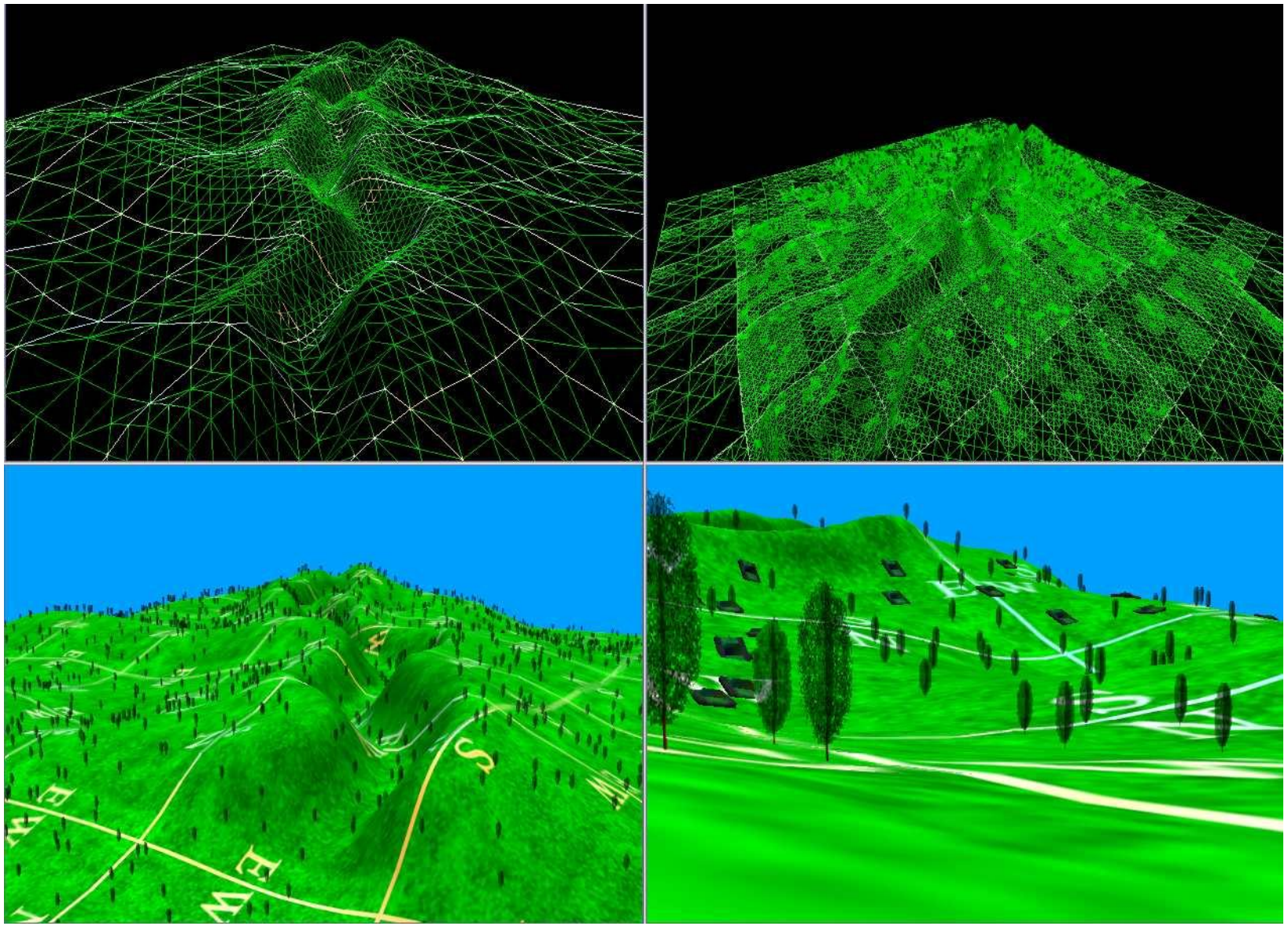
- By partitioning the space into regions, the spatial operation can minimize the amount of data it needs to process.

Applications

- In collision detection, spatial data structures can reduce the amount of pair-wise comparison that needs to be done.
- In rendering process, it can be used to efficiently cull objects.

Quadtree (1/4)





Quadtree (2/4)

- 2D Space Partitioning
- Spatial partitioning technique that recursively subdivide a space into quads
- The recursion stops according to a threshold

Quadtree (3/4)

- Some criteria to stop recursion
  - Maximum depth is reach
  - The number of object associated with the node is less than a certain threshold
  - Subdividing further does not reduce the number of object associated with each children volume
  - Memory requirement
  - Etc…

Quadtree (4/4)

```
// Quadtree node data structure
struct Node
{
  Point2D center;
  float halfWidth;
  Node *pChild[4];
  Object *pObjList;
};
```

Octree

- 3D version of quadtree