

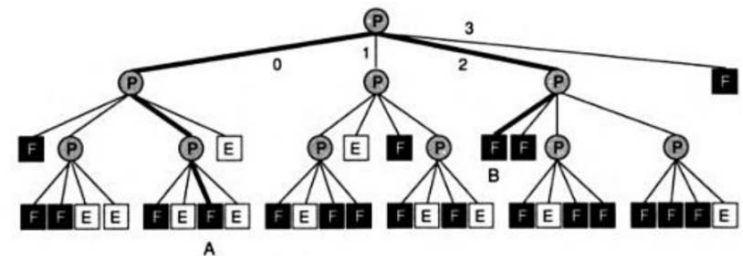
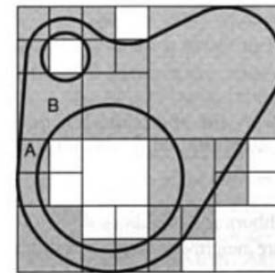
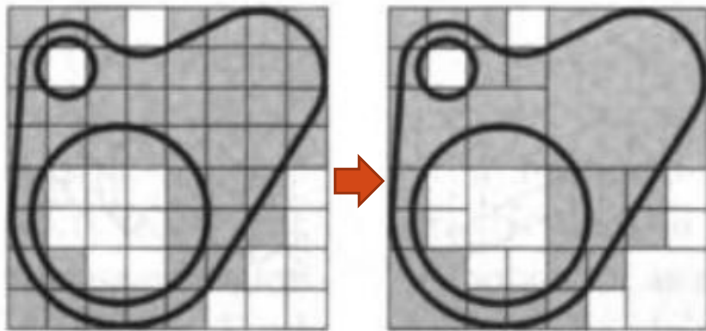
Spatial Partitioning Representation

A few common approaches

- Grid representation
- Hierarchical Representations
 - 2D: Quad-tree
 - 3D: Oct-tree
 - ...

Quadtree Rep.

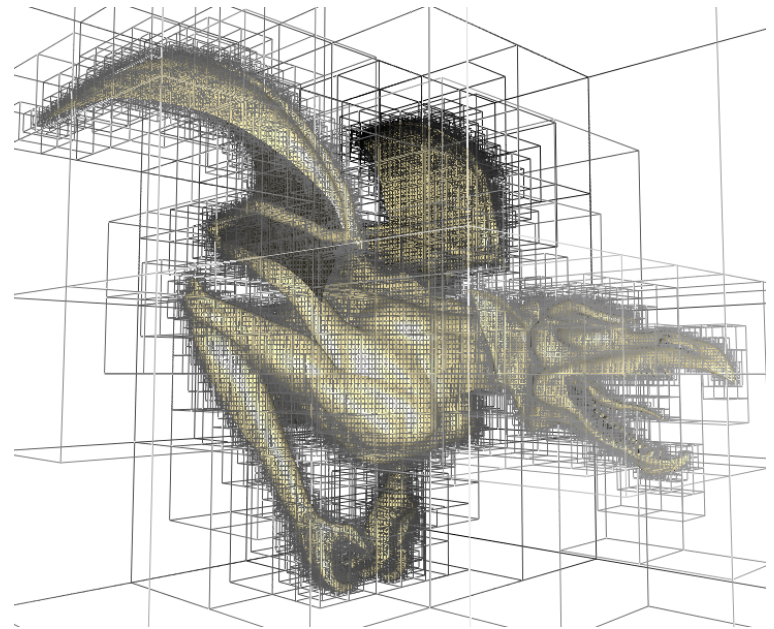
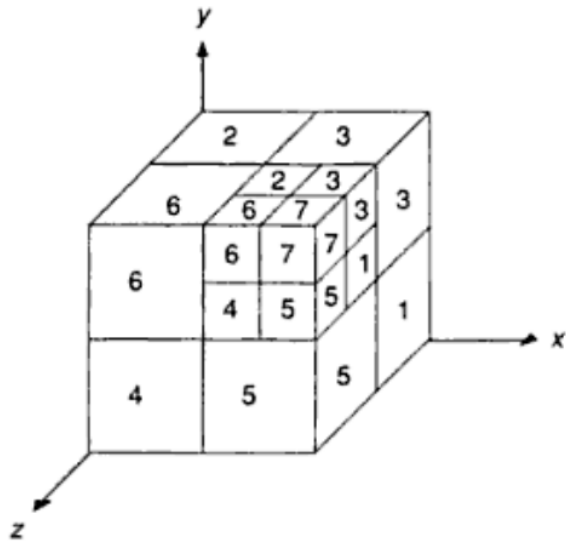
- A hierarchical structure based on divide-and-conquer subdivision for 2D shapes
 - A quadtree → hierarchically represent a shape in the plane
 - Each cell may be full, partially full, or empty (depending on how much of the cell intersects the shape)
 - A partially full cell is recursively subdivided into sub-cells
 - Continue the subdivision until
 - all quadrants are homogeneous (either full or empty), or
 - a predetermined cutoff depth is reached



J. Warnock, “A Hidden-Surface Algorithm for Computer Generated Half-Tone Pictures”, Technical Report, Univ. of Utah, 1969.

Octree Rep.

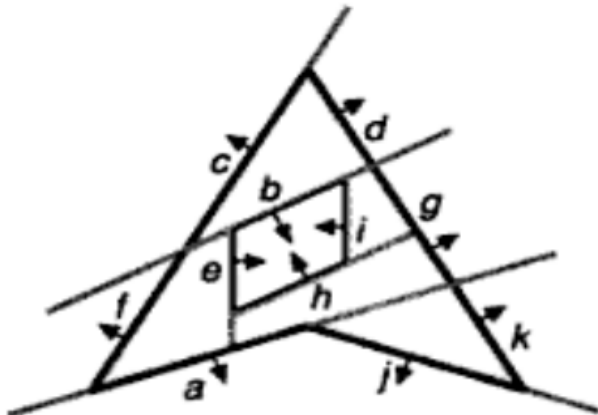
- Similar to the quadtree, but in 3D
 - Each cell \rightarrow 8 children
- Much research on efficiently storing and processing quadtrees and octrees
 - e.g. Boolean operations; Neighbor finding...



Binary space-partitioning tree

Quadtree/Octree:

- ❑ Only horizontal/vertical cutting?
- ❑ BSP-Tree: a variant method
 - divide the space into pairs of subspaces by an arbitrary plane



← A 2D BSP tree