CSIT6000P Spatial and Multimedia Databases

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Spatial Indexing Exercises

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Spatial Indexing Review

- Hashing and Spatial Hashing
- Quad-tree. Space-filling Curves and Z-values
- R-tree and its variations

+ Spatial Hashing

Region	Pointer to data

Bucket:
- Capacity
- High water mark
- Low water mark

Some important questions:
- How to repent a region?
- How to search?
- How to deal with overflow and underflow?

Some observations:
- Regions can be organised as a list, or a hierarchy
- Target regions can often be computed, instead of following a sequential search

Quadtree and Z-values

- Base-10 numbers
  - Counting following Peano-order
- Base-2 numbers
  - Bit-interleaving
- Base-4 numbers
  - Quad-tree decomposition
- Base-5 numbers
  - As above, but starting from 1 to avoid ambiguity of “0”
- Z-values work for both points and polygons

R-Tree, R*-Tree and R^+-Tree

- All based on grouping objects into a single node that represents the entire space
- The difference is if MBR overlapping of the nodes at the same level of a tree is allowed
- Work for both points and polygons

- Both Z-vale-based methods and R-tree based approach can work for any dimensions
  - 1D? 2D? 3D? … kD?