“Persistent Realtime Building Interior Generation”

Paper by:
Evan Hahn, Prosenjit Bose, Anthony Whitehead
2006
Carleton University

GTA: San Andreas

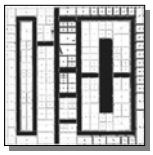
GTA: San Andreas

Entering every building?

- Infeasible
  - The number of building interiors is far to large.
- Worthwhile
  - The environment would feel so much more real if the user knew that something always existed on the other side of a door or window!

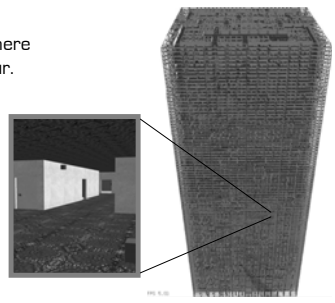
Building Algorithm?

- Book on Building Design
  - Contains a pattern language to aid the design and construction of towns and buildings.
- Example
  - Every region should be accessible.
  - Private rooms accessible through public rooms.
  - Parallel hallways should be separated by rooms.
  - Touching hallways should be connected.



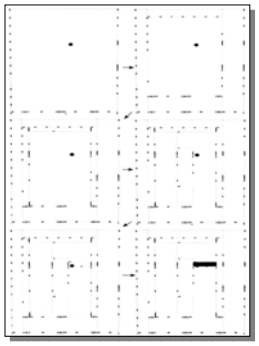
Regions

- Temporary regions
  - Regions of space where generation can occur.
- Built regions
  - Hold geometry for rendering and collision, as well as any visible objects.



Generation Process

- Before generation
  - Initial interior is one temporary region.
- Each generation step
  - Generation will start in a region containing point.
  - Temp region will either split into smaller temp regions or turn into a built region.
  - Continue until only built regions are visible from point.

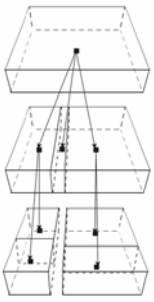


Potentially Visible Set

- Cells and Portals (Luebke & Georges ,1995)

Generation Tree

- Generation tree
  - Provides history so generation process can be quickly reversed.
  - Is also an axis aligned bounding box tree, offering quick calculation of what region a point is in.
- Tree leafs
  - Every leaf is a region of the building.
  - A pointer to every leaf that is a built region is stored in a least recently used cache. These regions are deleted when cache is too big.



Storing Changes

- Change Record
  - Stored changes to a region.
  - Accessed through a hash map.
  - Keyed on midpoints of regions.
- Updates
  - Changes are only stored when the region that contains them is deleted (consider moving objects)
- Uses
  - Looked up when regions are generated, and recalled if they already exist.

"The Continuous World of Dungeon Siege"

Original Presentation and Paper by:
Scott Bilas
2003
Gas Powered Games

The World of Dungeon Siege

The actual paper and presentation are stored here:
http://www.drizzle.com/~scottb/gdc/