“Persistent Realtime Building Interior Generation”

Paper by
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GTA: San Andreas

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Entering every building?

- **Infeasible**
  - The number of building interiors is far too 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 leaves**
  – 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/