OpenStreetMap3D
Challenges and Technology of a Virtual Globe Model

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OpenStreetMap3D

Goals

1. create and visualize a global landscape and city model based on OpenStreetMap.
2. find out how a Web 3D Service (W3DS) can be combined with a virtual globe model.

http://osm-3d.org

http://w3ds.org
OpenStreetMap3D

Technical issues

1. Precision problem
2. Scene graph transformations
3. LOD implementation
Precision Problem

Single precision matrix calculations may cause jitter

Solved by moving ModelView calculation to software
Scenegraph Transformations

Data as received from W3DS in Map Projection CRS (Spherical Mercator)

Data as displayed in the final application in Cartesian Coordinates
Scenegraph Transformations

Scene Graph Model used in X3D - Concept

Example

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Scenegraph Transformations

World origin = earth center

Map origin

Transform

Tile center

Spherical Mercator (Map Projection)

Cartesian Coordinates (Globe)

Tile center

Transform
**Scenegraph Transformations**

**Procedure**
1. Local to world transform matrix
2. Apply actual coordinate reference transformation
3. Reconstruct the original structure
Scenegraph Transformations

Distortions due to map projection

No projection
Tiles loaded into client
Terrain model has multiple levels

Objects are loaded at the base levels
1. Distance to Tile

2. Normal to viewpoint angle

3. View direction to object angle
Database

- 2.4 million buildings
- 5.6 million point objects
- 150 GB in total

Work on Europe 3D in progress
Will be > 1 TB in size
Map Functions

Routing

POI Search
The End

Thank You

Any Questions?