Non-linear Version Control using NoSQL MongoDB

Dr Jozef Doboš
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Dr Jozef Doboš
http://github.com/3drepo
Tier 1 Contractors

Tier 2 Product Suppliers

Logistics Suppliers

Litigators & Arbitrators

Facility, Property & Asset Managers

Clients Advisers Funders

Managers Lawyers Consultants

Architects Engineers Surveyors

Regulators

Town Planners

Professional Institutions

Contract Writers

Educators

Standards Setters

Insurers

Interest Groups

Government

3D Repo

Growth through BIM
Richard G Saxon CBE
3D for everyone
- Collaborative repository
- Open source

Highly scalable
- Cloud for best performance
- Web and mobile accessible

Cost effective
- Freemium access
- Reduced risk
3D Repo
Version: 1.0.0  Memory: 64 MB

3drepo.org
27017
anonymous

............

Connect

house
4.02 MB
Revision: 0 10/30/12 3:02 PM
josef: The very first commit.
northern-hotel-matNoWindows
2.61 MB
UCL_Main_Quad
4.65 MB
admin
76 B
UCL_Campus
486.48 KB
local

Transport
by josef
21 Jun 2012 07:24:46 GMT
is there parking for disabled ppl?

Comment

Topic

General
Design
Environmental
Property
Transport
King’s Cross Redevelopment
Olympic Stadium Transformation
“Most VR experiences are based on Unity which is wrong!”

- Jozef Doboš
Building information modeling

From Wikipedia, the free encyclopedia

This article is about Building information modeling. For other uses, see Bim (disambiguation).

Building information modeling (BIM) is a process involving the generation and management of digital representations of physical and functional characteristics of places. Building information models (BIMs) are files (often but not always in proprietary formats and containing proprietary data) which can be exchanged or networked to support decision-making about a place. Current BIM software is used by individuals, businesses and government agencies who plan, design, construct, operate and maintain diverse physical infrastructures.
Why MongoDB?
Because it’s polymorphic,
scalable
and binary
App level version control
Plain vanilla

1) Scene graph of components
2) Non-linear revision history
3) Streamable 3D geometry
Schemaless schema?
Each component is a logical unit
Properties are key-value pairs
BSON is limited to 16MB
Mesh
Mesh

{  
  _id : BinData(3,"1OXvtFihRm6aH+nh+cioGw=="), // Unique UUID  
  api : 1, // API level  
  bounding_box : [[-1.0, -1.0, -1.0], // Min xyz  
                 [ 1.0,  1.0,  1.0]], // Max xyz  
  faces : BinData(0,"AwAAAAAAAAAABAAAAAAgAAAAAAAA... "), // Faces array  
  faces_byte_count : 192,  
  faces_count : 12,  
  normals : BinData(0,"AAAAAAAAAgL8AAAAAAAAAAAA... "), // Normals  
  outline : [[-1, -1], [1, -1], [1, 1], [-1, 1]],  
  paths : [[BinData(3,"MAU5l5mEVIlCQAAAAAAACA==")]], // Paths from root  
  shared_id : BinData(3,"MAU5l5mEVIlCQAAAAAAACA=="), // Shared UUID  
  type : "mesh",  
  name : "cube",  
  vertices : BinData(0,"AACAPwAAgL8AAIC/AACAPw... "), // Vertices array  
  vertices_byte_count : 288,  
  vertices_count : 36,  
}
Mesh

```json
{
    _id : BinData(3,"1OXvtFihRm6aH+nh+cioGw=="),  // Unique UUID
    api : 1,   // API level
    bounding_box : [[-1.0, -1.0, -1.0],       // Min xyz
                     [1.0, 1.0, 1.0]],     // Max xyz
    faces : BinData(0,"AwAAAAAAAAAAABAAAAGAAAAAAA... "),  // Faces array
    faces_byte_count : 192,
    faces_count : 12,
    normals : BinData(0,"AAAAAAAAAGL8AAAAAAAAAAAA... "),  // Normals
    outline : [[-1, -1], [1, -1], [1, 1], [-1, 1]],
    paths : [[BinData(3,"MAU5l5mEVilCQAAAAAAACA==")]], // Paths from root
    shared_id : BinData(3,"MAU5l5mEVilCQAAAAAAACA=="), // Shared UUID
    type : "mesh",
    name : "cube",
    vertices : BinData(0,"AACAPwAAAgL8AAIC/AACAPw... "),  // Vertices array
    vertices_byte_count : 288,
    vertices_count : 36,
}
```
Vertices

1 [ 
2   [ 1.0,1.0,1.0], [ 1.0,1.0,-1.0], [ 1.0,-1.0,1.0], [ 1.0,-1.0,-1.0],
3   [-1.0,1.0,1.0], [-1.0,1.0,-1.0], [-1.0,-1.0,1.0], [-1.0,-1.0,-1.0] 
4 ]

1 { 
2   0 :
3     { 
4       0 : 1.0,
5       1 : 1.0,
6       2 : 1.0,
7     },
8   1 :
9     { 
10    0 : 1.0,
11    1 : 1.0,

...
Vertices

[ 1.0, 1.0, 1.0], [ 1.0, 1.0, -1.0], [ 1.0, -1.0, 1.0], [ 1.0, -1.0, -1.0],
[-1.0, 1.0, 1.0], [-1.0, 1.0, -1.0], [-1.0, -1.0, 1.0], [-1.0, -1.0, -1.0]

{ 0 :
   { 0 : 1.0,
     1 : 1.0,
     2 : 1.0,
   },
  1 :
    { 0 : 1.0,
      1 : 1.0,
    },
...
Material
Material

```json
{
    _id : BinData(3,"YUHQ09687daqQ+nh+cioGw=="), // Unique UUID
    ambient : [0, 0, 0],
    api : 1,
    diffuse : [0.28, 0.12, 0.06], // API level
    name : "Material",
    opacity : 1,
    paths : [[BinData(3,"MAU5l5mEVIlCQAAAAAAACA==")]], // Paths from root
    shared_id : BinData(3,"MAU5l5mEVIlCQAAAAAAACA=="), // Shared UUID
    shininess : 384.313,
    specular : [ 0.98, 0.98, 0.98],
    two_sided : true,
    type : "material",
    wireframe : true,
}
```
Texture

```
1 {
   _id : BinData(3,"HWQOIJDDF775GQnh+cioGw=="), // Unique UUID
   api : 1, // API level
   data : [[BinData(3,"MAU5l5mEVIlCQAAAAAAAACA==")]], // Texture
   data_byte_cout : 190622,
   height : 894,
   mime : "image/jpeg",
   name : "crate diffuse",
   paths : [[BinData(3,"MAU5l5mEVIlCQAAAAAAAACA==")]], // Paths from root
   shared_id : BinData(3,"MAU5l5mEVIlCQAAAAAAAACA=="), // Shared UUID
   type : "texture",
   width : 894,
}
```
Unique _id (UID) vs shared_id (SID)
Unique _id (UID) vs shared_id (SID)
Revision

```json
{
    _id : BinData(3,"YUHQ09687daqQ+nh+cioGw=="), // Unique UUID
    added : [[BinData(3,"1OXvtFihRm6aH+nh+cioGw==")], ...],
    api : 1, // API level
    author : "jozef",
    current : [[BinData(3,"1OXvtFihRm6aH+nh+cioGw==")], ...],
    name : "master",
    message : "My very first commit.",
    paths : [[BinData(3,"MAU5l5mEVIlCQAAAAAAACA==")]], // Paths from root
    shared_id : BinData(3,"AAAAAAAAAAAAAAAAAAAAAAAAAAAAA"), // Shared UUID
    timestamp : ISODate("2014-11-06T10:02:09Z"),
    type : "revision",
}
```
GridFS

repo.cache.chunks
repo.cache.files
What about the security?
Public/private keys
User roles at the application level
What about the future?
Streaming of geometry from cache