Graph and Graphics: Combining two powerhouses into one machine

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Abstract

In our industry, BIM models are a valuable source but will never be the "single source of truth", as software vendors like to claim. Combining a graph database that stores geometry as glTF and providing it in a capable 3D viewer can enable a powerful data-driven approach to working with 3D models. Shifting the focus to data and making geometry just another representation of information could be a real game changer. In this approach, 3D models are not stored as separate files, but rather as part of the graph database alongside other types of data, making it easier to manage, query, and analyze the 3D models as part of a larger data ecosystem.

One of the key benefits of using glTF geometry with a graph database is that glTF is a compact, efficient, and widely supported format for 3D models. This means that 3D models can be stored in the database as part of the graph structure, along with other related data, and then easily queried and retrieved as needed. When combined with a capable 3D viewer, this approach enables real-time visualization of the 3D models, allowing users to interact with them in a way that is both intuitive and efficient. This can be particularly useful in fields such as architecture, engineering, and construction, where 3D models are often used to visualize complex structures and systems.

Our solution combines the BIM software Softvise Cadmium and a Neo4j graph database. As a first step, we use Cadmium to access any kind of model. Secondly, we use it to export all objects with all attributes (and possible added attributes) and glTF to Neo4j. Thirdly, we import any kind of document into Neo4j and use Machine Learning to identify AEC-specific entities, like reference designations. All connections between model and documents are built as nodes and edges. This way, objects with or without geometry can coexist and be used during all stages of a project including the long term lifecycle of the building.

After having enhanced all the information in the database we again use Cadmium to display the geometry. View of data and view of geometry become representations of the very same information. Overall, the combination of a graph database with glTF geometry and a capable 3D viewer can enable a more streamlined, data-driven approach to working with 3D models, making it a real "single view of truth" to benefit our industry.

Keywords

Data Integration, Knowledge Graphs, Common Data Environments (CDEs)

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