FACULTY OF ENGINEERING AND ARCHITECTURE

Augmented Reality visualisation on site: BIM semantics and communication

Linked Data

Master's dissertation submitted in order to obtain the academic degree of
Master of Science in de ingenieurswetenschappen: architectuur

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Short abstract

This is my short abstract.

Abstract

This is my abstract

Chapter 1

Introduction

1.1 Context

1.1.1 3D viewers

-> Applications?

-> Who uses them?

-> What for?

1.1.2 BIM geometry

-> What is Building Information Modeling (BIM)? (short)

-> Extend of BIM geometry?

-> Complexity of BIM geometry?

1.1.3 LDBIM

-> ! Focus on geometry!

-> What is Linked Data BIM (LDBIM)?

-> Why the need / What are the advantages of LDBIM?

-> Context od enrichment and complexity

1.1.4 Computing power dilemma

-> What is the hardware problem?

-> Why is it that important for the Architecture, Engineering and Construction (AEC) industry?

->

1.2 Research questions

-> Why the need for this thesis? (why a LDBIM viewer?)

-> What is the possible solution? (Culling algorithms)

-> Why the need for research questions? (culling algorithms are not new, always progress, see later)

1.2.1 To which extent can LDBIM geometry be culled to be streamed to lightweight viewers?

-> What can be culled exactly?

-> What needs to be streamed?

-> What is the impact of culling on the viewing experience?

1.2.2 Can existing semantic and ontologies be used to feed possible culling algorithms?

-> What are ontologies?

-> Can GIS ontologies be used too?

-> What are the advantages of using ontologies?

1.3 Research objectives

1.3.1 Bring forward the advantages of LDBIM for visualization of big 3D models

-> Showcase that existing models are already mature enough for these usecases.

->

1.3.2 Showcase the fisability of LDBIM for visualization of big 3D models

->

Chapter 2

State of the art

2.1 Software and hardware

-> Both explanation as highlighting the problems

-> About the CPU problem (explanation in following two examples)

-> Overview of on the market software and hardware solutions

-> Why lightweight viewers

2.1.1 Autodesk Atom headset

-> Explanation of the hardware

-> Highlighting the visible problems / limitations

-> Presenting HHD as the solution / alternative

2.1.2 Unreal Engine

-> Explanation of the software

-> Highlighting the RAM problem and how it's related to the aec industry

-> Use cases (model type and size)

2.2 Viewers

2.2.1 File based viewers

-> What I mean by file based viewers

-> Present it as some examples of cutting edge viewers, both from there intensive use in the industry as the quality of the results / technologies

2.2.1.1 BIM360 Autodesk

-> Why I chose this one (why special)

-> Overview of the features / capabilities

-> Probably present it as a goal but in the older framework (for interactivity)

2.2.1.2 Qonic

-> Why I chose this one (why special)

-> LOD streaming principle

-> Probably present it as a goal but in the older framework (for effectiveness(esthetics and performance))

2.2.2 Linked data based viewers

-> What I mean by linked data based viewers

2.2.2.1 ld-bim.web.app

-> Where does it come from

-> Detailed explanation of the features / capabilities

-> Detailed fragmentation of missed opportunities / how this thesis positions itself to it

Chapter 3

Culling approaches

3.1 AEC related ontologies

3.1.1 BOT

3.1.2 FOG and OMG

3.2 GIS related ontologies

3.2.1 geoSPARQL

Chapter 4

Setup

4.1 Participants

This is a diagram:

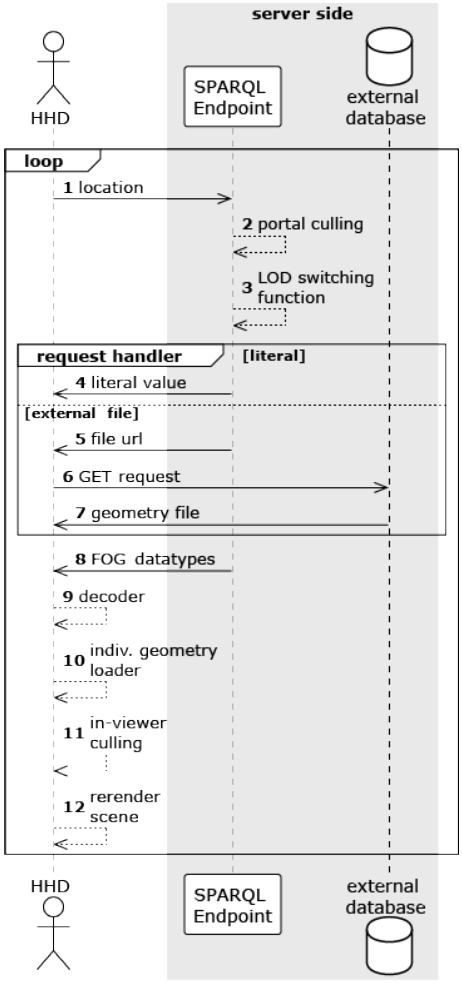

Figure 4.1: Sequence diagram

4.2 Framework

4.2.1 Nextjs

4.3 Querying

4.3.1 Front-end

4.3.2 Back-end

4.4 Rendering

4.4.1 Xeokit SDK

List of Acronyms

AEC	Architecture, Engineering and Construction	7
BIM	Building Information Modeling	6
BOT	Building Topology Ontology	
FOG	File Ontology for Geometry formats	
GIS	Geographic Information System	
LDBIM	Linked Data BIM	6
OMG	Object Management Group	
SDK	Software Development Kit	