Developing a database for the LADM-IndoorGML model

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Introduction:

In our previous work, we have covered the issues that related to the transformation tool in Enterprise Architect (EA) such as:

- Inheritance (Flat model, Super class and Children class)
- Primary key and a Foreign key
- Attributes Multiplicity and Constraints
- Data Type
- Spatial Data Type
- Code List
- Indexing (B-tree and R-tree)

Also Incomplete UML model For IndoorGML standard
ISO TC211 used to prepare LADM-IndoorGML UML model.
Goal:

Is to investigate all issues that related to generating the database and visualizing the content of the database.
Generating and assessing database for the conceptual model

- Transformation to technical model

Selected classes from the conceptual model of LADM-IndoorGML
Generating Tables Diagram from the UML Diagram

Part of the table diagram
• Generating SQL from UML Table Diagram

```sql
CREATE TABLE La_rrr
(
    Description varchar(50) NULL,
    Share varchar(50) NULL,
    Sharecheck boolean NULL,
    Rid integer NOT NULL,
    Timespec varchar(50) NULL,
    party integer NULL,
    unit integer NOT NULL
);

CREATE TABLE La_spatialunit
(
    Extaddressid varchar(50) NULL,
    Area varchar(50) NULL,
    Dimension varchar(50) NULL,
    Label varchar(50) NULL,
    Referencepoint geometry(point) NULL,
    Surfacerelation varchar(50) NULL,
    Suid integer NOT NULL,
    Volume varchar(50) NULL,
    su2 integer NULL,
    space integer NOT NULL
);
```

SQL code for creating LA_RRR and LA_SpatialUnit tables
• Generating Database and visualizing the data

There are three steps to create database for the conceptual model of LADM-IndoorGML

First step (Integration model to database)
Generating Database and visualizing the data

**Second step** (Semantic and schedule information)
• Generating Database and visualizing the data

**Third step** (extract Spaces)
Generating Database and visualizing the data

First step

Second step

Third step

Combine the result of the three steps into one database
Populate database in PostgreSQL

LA_Party Table in PostgreSQL database


- Populate database in PostgreSQL

SpaceGeometry Table in PostgreSQL database
Populate database in PostgreSQL

GeneralSpace Table in PostgreSQL database
Accessible spaces for student (private rights)
• Visualization Result

```
select *
from generalspace
where usage = 'staff';
```

Accessible spaces for staff (private rights)
CONCLUSION

• This paper has presented the development of a database for the conceptual model of LADM-IndoorGML.

• Most of the issues that have been discussed in our previous work has been solved.

• This experiment has also illustrated a workflow for import of data into LADM-IndoorGML relational tables.

• The software package Revit is able to exports all textual data to Postgre/PostGIS with out the geometry.

• An ODBC importer was developed to import the 3D geometry of ifcSpace.

• Most of the tables of the schema have been populated in automated way.
Future work

• We will explore WebGL to develop a web user interface to provide interactive 3D visualizations within web browsers.

• Two web applications will be considered: maintenance and navigation (on a mobile device).

• The web user interface will be used to explore the relationship between the indoor spaces and the users to determine the rights of use for the indoor spaces.

• The subdivision of the indoor space will be examined to assess the accessibility of the indoor spaces based on the rights, restrictions, and responsibilities (RRRs).
Thank you