LADM SPECIFICATION OF A RELATIONAL DATABASE FOR THE REPUBLIC OF CAPE VERDE

- Alex J. B ANDRADE, Cape Verde (alexgeogis@gmail.com)
- Andrea F.T CARNEIRO, Brazil (aftc@ufpe.br)
- Juciela C. DOS SANTOS Brazil (jucielasantos@gmail.com)
1. INTRODUCTION

Considering that:
• the objective of the LADM is to provide an extensive base for the development and improvement of an effective and efficient cadastral system, and
• In the Republic of Cape Verde, the municipal cadastres began to receive greater attention with the publication of the Decree-law n° 29/2009, which establishes the judicial regime of the cadastre of the municipalities of Cape Verde,

The objectives of this research was to propose a conceptual model to Cape Verde based on the LADM and to test its application in a specific database model. For that, the study of a platform was carried out for its specification in a relational database.
2. CAPE VERDE

The Archipelago holds 10 islands and 5 main islets. The islands are divided into two groups: the windward islands and the leeward islands.
3. THE CADASTRE OF CAPE VERDE

- Rural Cadastre: is of state responsibility, through the Rural Ministry, the General Directory of Agriculture, Forestry and Livestock.

- Urban Cadastre: is the responsibility of the municipalities, with guidelines from the Ministry of Habitation and Territorial Ordinance and Urban Planning, through the sector of cadastre.

- Parcel (predio): the bounded part of the judicially autonomous land, including waters, plantations, buildings and constructions of any nature present on them or with any characteristic of permanence and any autonomous fraction in the horizontal property regime (Cabo Verde, 2009).
4. MODELING OF THE LADM_CV

4.1 CV_Party Package
4.2 CV_Administrative Package
The package of the CV_SpatialUnit is the essential element of this model and it is subdivided into the cadastral units: CV_LegalSpaceBuildingUnit and CV_LegalSpaceUtilityNetwork.

The concepts of the law decree 29/2009 were considered.
The LADM_CV only contemplates modeling in 2D, represented by the subclass CV_BoundaryFacingString, which describes the CV_SpatialUnit, which is associated to CV_Point for the documentation of all its geometry.
5. SPECIFICATION OF THE LADM_CV INTO A RELATIONAL DATABASE

- The implementation of the conceptual model demands the study of the most adequate platform for the implementation of the model.

- In this study, the option was to test a platform that allowed the specification of the conceptual and abstract model into a relational database using VP-UML. This platform has capacity of executing the whole modeling cycle, from the construction of the UML diagrams until its implementation in a database.

- For this modeling, the MDA (Model Driven Architecture) technique was used, supported by CASE (Computer-Aided Software Engineering) tools, being implemented in the IDE (Integrated Development Environment), denominated as Visual Paradigm for UML.
5. SPECIFICATION OF THE LADM_CV INTO A RELATIONAL DATABASE

The steps of the specification of the LADM_CV in a relational database.

The steps include:
1. Design of the LADM_CV in UML Diagrams
2. Relational Entity Model (REM)
3. Synchronization
4. Creation of a project in Postgres
5. Connection of the VP-UML with Postgres
6. Generation of the SQL Command
7. Manipulation of database
   - DDL
   - DML
8. Exportation of the LADM_CV to Postgres
9. Application of shp2pgsql
5.1 Design of the LADM_CV in UML Diagrams

Modeling of the LADM_CV in the Visual Paradigm: a CASE tool which has various modeling options with the UML 2.0 diagrams, and also offers support to Relational Entity Diagrams.
Creation of the Database Project of the LADM.CV in the Postgres e its connection with VP-UML

```
CREATE DATABASE "LADM.CV"
WITH ENCODING='UTF8'
OWNER=postgres
TEMPLATE=template_postgis
CONNECTION LIMIT=-1;
```

Command SQL for the creation of the Database Project

Configuration of the Visual Paradigm connection with the Postgres.
Generation of SQL in the Visual Paradigm for the database in the Postgres.
Exportation of the LADM_CV to Postgres
6. CONCLUSIONS

- The results showed that the LADM standard was considered adequate for the land administration system of Cape Verde, regulated by the Law-Decree 29/2009.

- The Visual Paradigm platform of this CASE tool supplies a direct solution for the specification of the UML model into a relational database.

- The UML is a standardization of the OMG (Object Management Group), and one of its main advantages is the fact that it is entirely extensible and adaptable.

- The relational database model presents as contributions a greater level of data independence than conventional models (of networks and hierarchies), and the unification of the representation of these models through the graphic formalism of the Entity-Relation Diagram.
7. REFERENCES

Andrade, A.J. B, e Carneiro, A F.T (2012), Desafios Para implementação do cadastro Predial na República de Cabo Verde, Florianópolis, COBRAC,
Cabo Verde (Decreto-Lei 29/2009, 12 de agosto (2009) - estabelece o regime jurídico do Cadastro Predial, Cabo Verde,
FIG,(1995) - Fédération Internationale des Geomètres. Statement on the Cadastre. International Federation of Surveyors, FIG Bureau, Canberra, Australia
Sucaya, I, G, A (2009)- Application and validation the Land Administration Domain Model in a real life situation (A case study in Indonesia), The Netherlands.
THANK YOU VERY MUCH:

To the City Council of S. Filipe (Cape Verde), thanks for making the information for the research study available.

To the UC-CP, *(Unidade de Coordenação do Cadastro Predial)*

To the LADM 2013 organization committee, for the opportunity to present this work, in special Prof. J.P. Hespanha;

For your attention!
Alex Andrade, Andrea Carneiro, Juciela Santos