
# Graduation Project 2

## Land Information System
## “Sarra village”

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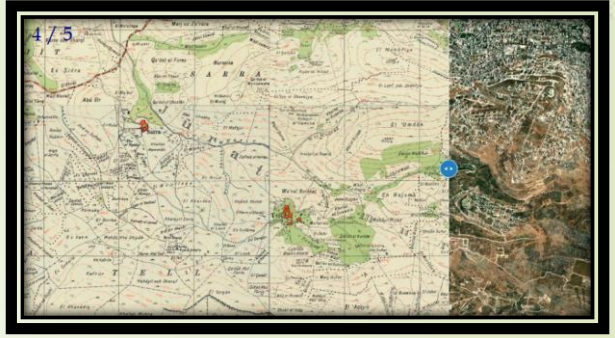
# overview



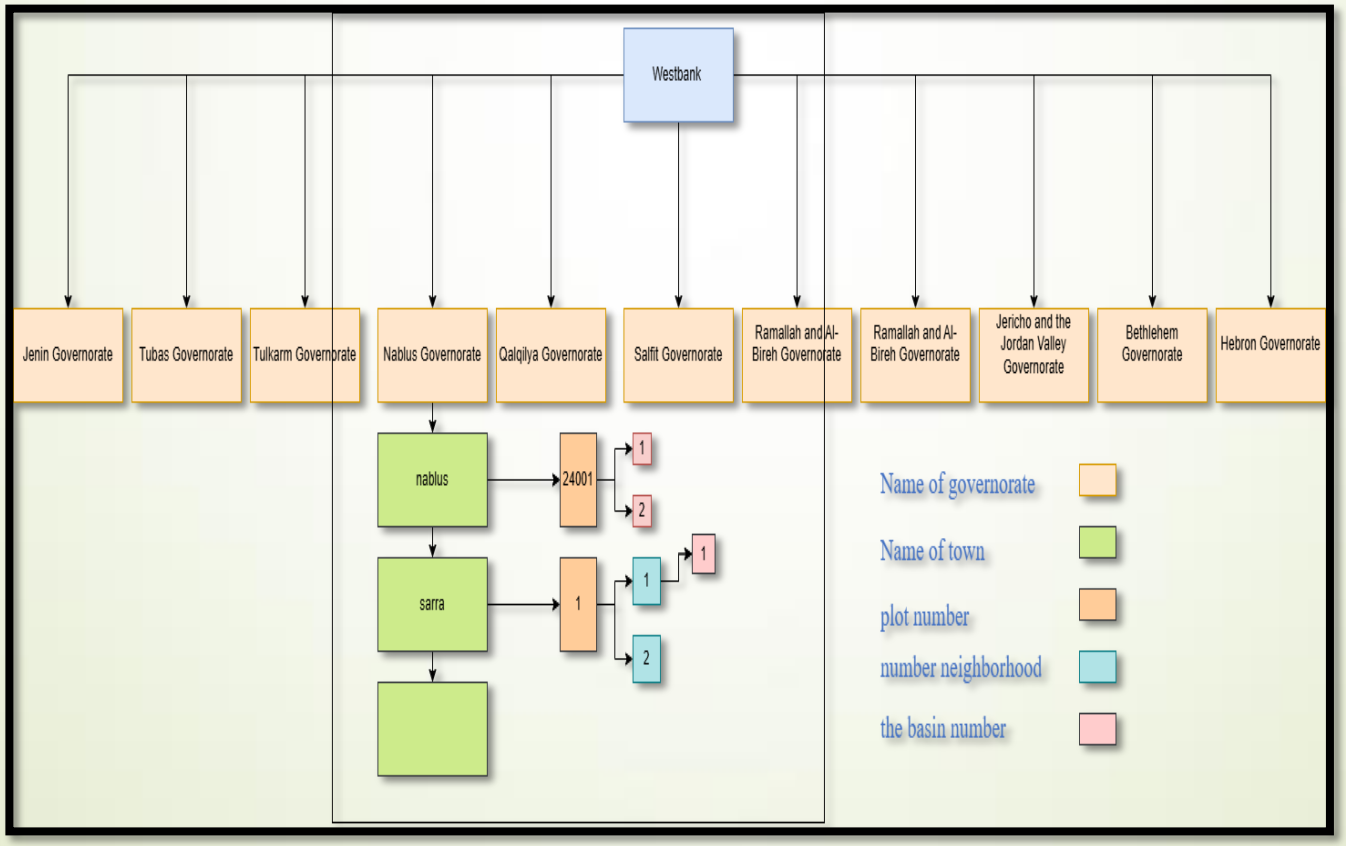
UML classes

- Party
- RRR
- Spatial Unit
- Basic Administration Unit

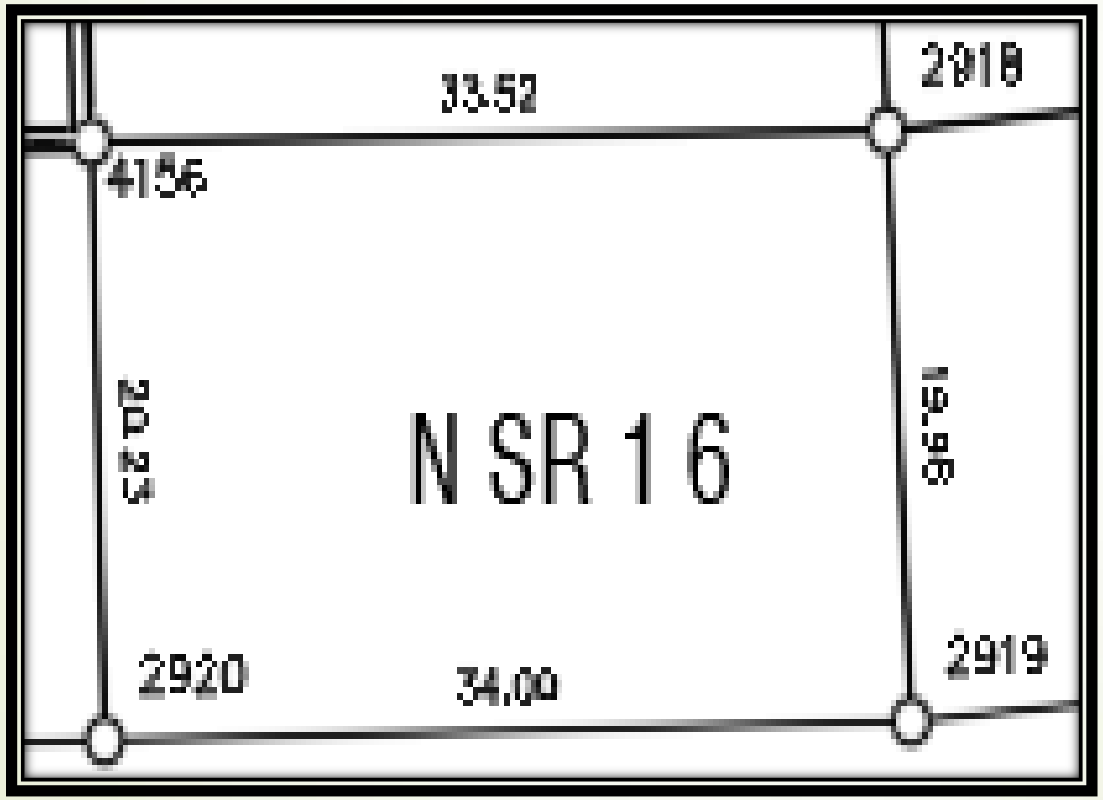
Computer Information Systems

# IDENTIFIERS

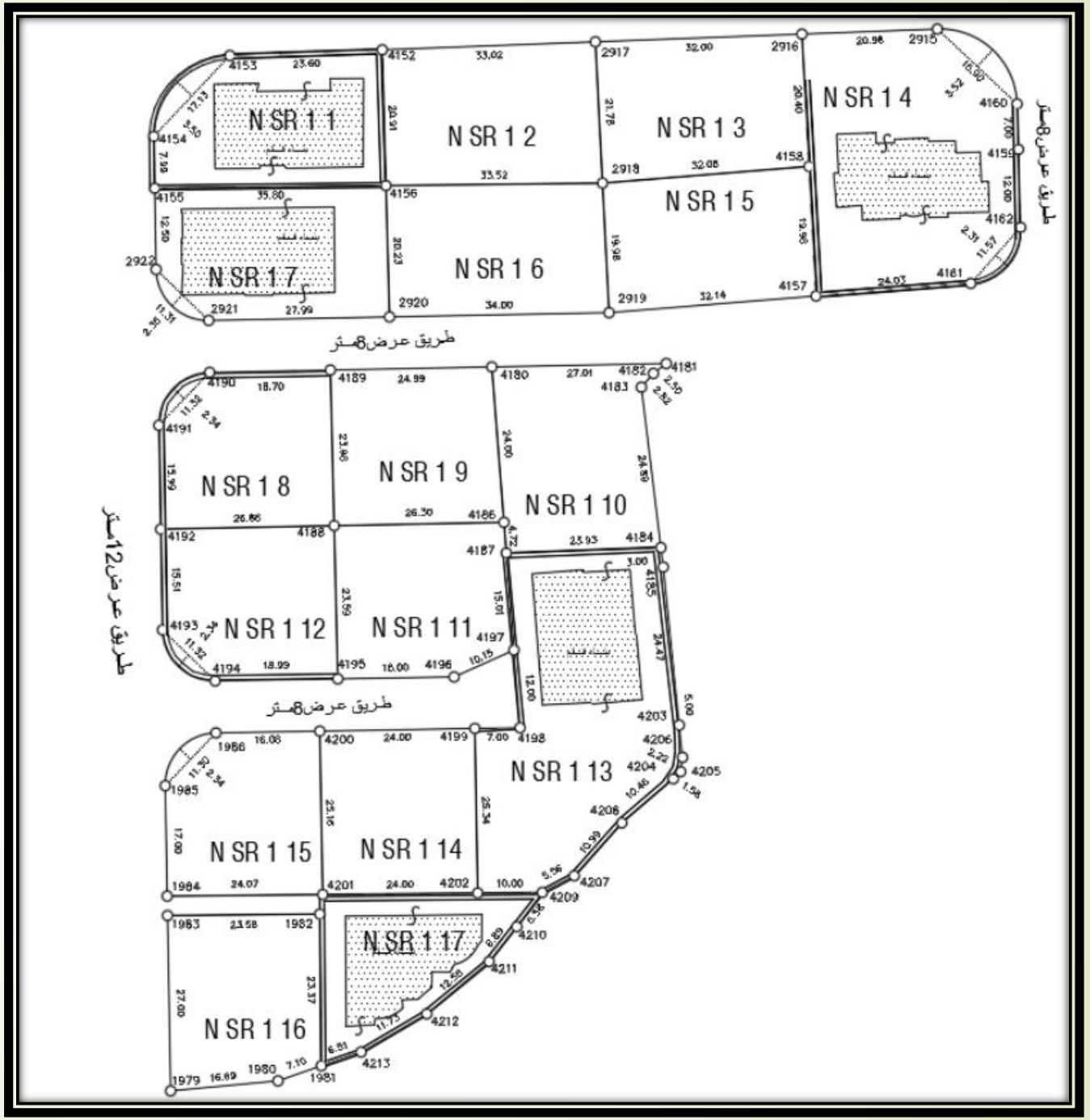
The land in Palestine is identified by the Block number, the Parcel number, the name of the governorate and then the town to which the Block belongs.



# Example of ID Identifiers



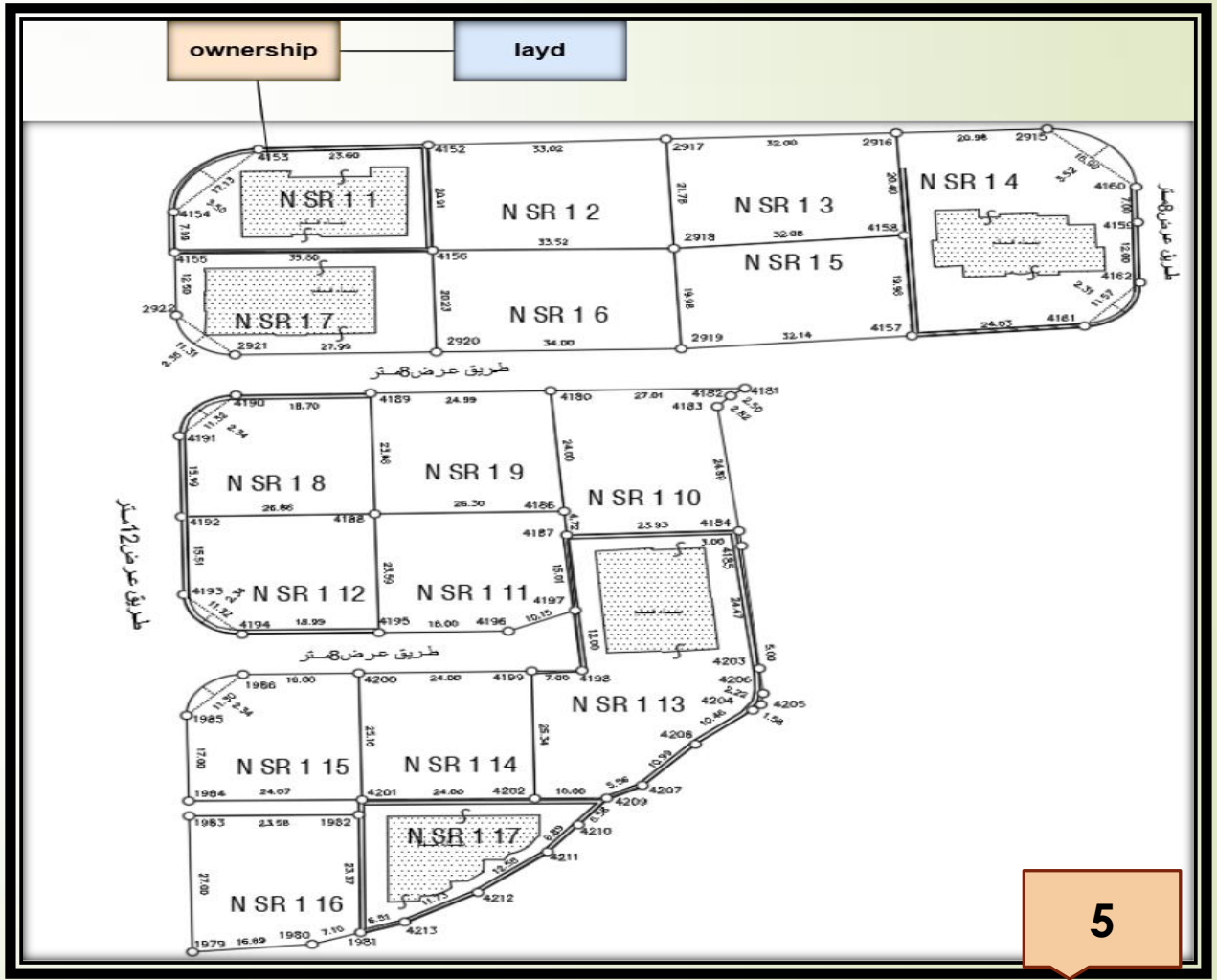
# People to land relationships

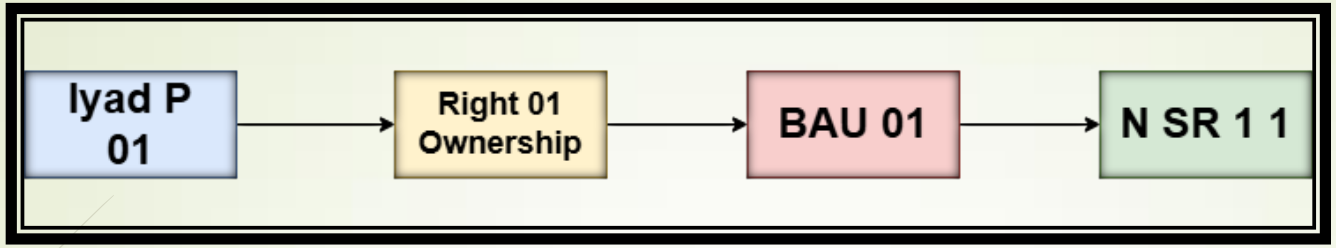


# Case studies using Land administration domain model (LADM)

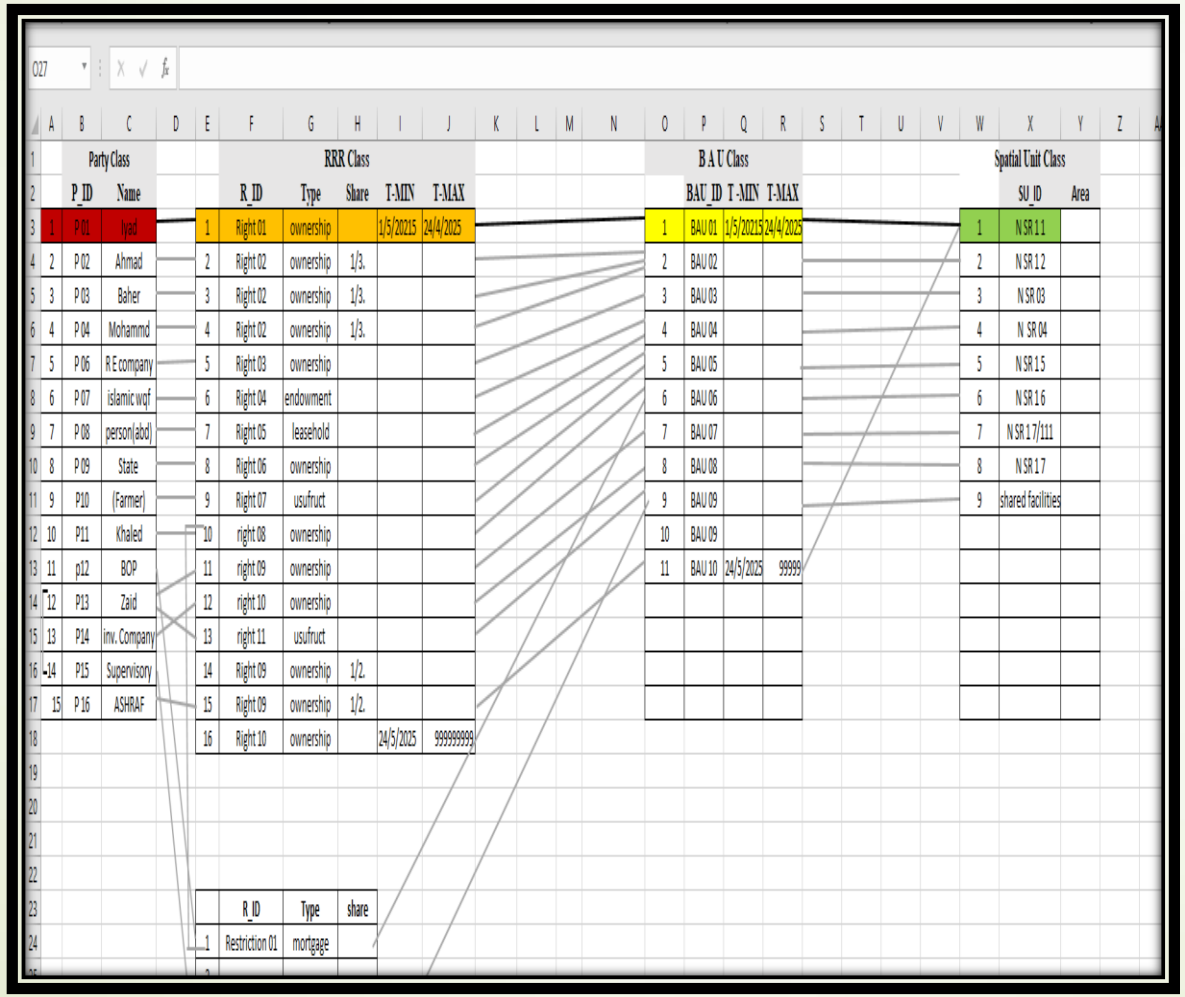
***Cases 1*: *landowner is one person or more***

**Land registration cases based on ownership type: 1.Sole proprietorship**






*Instance level (LADM-Based)*



| Party Class | | |
|---|---|---|
| P_ID | Name | |
| P01 | Iyad | |
| P02 | Ahmad | |
| P03 | Baher | |
| P04 | Mohammd | |
| P06 | R E company | |
| P07 | islamic waqf | |
| P08 | person(abd) | |
| P09 | State | |
| P10 | (Farmer) | |
| P11 | Khaled | |
| p12 | BOP | |
| P13 | Zaid | |
| P14 | inv. Company | |
| P15 | Supervisory | |
| P16 | ASHRAF | |

| RRR Class | | | | |
|---|---|---|---|---|
| R_ID | Type | Share | T-MIN | T-MAX |
| Right 01 | ownership | | 1/5/2015 | 24/4/2025 |
| Right 02 | ownership | 1/3. | | |
| Right 02 | ownership | 1/3. | | |
| Right 02 | ownership | 1/3. | | |
| Right 03 | ownership | | | |
| Right 04 | endowment | | | |
| Right 05 | leasehold | | | |
| Right 06 | ownership | | | |
| Right 07 | usufruct | | | |
| right 08 | ownership | | | |
| right 09 | ownership | | | |
| right 10 | ownership | | | |
| right 11 | usufruct | | | |
| Right 09 | ownership | 1/2. | | |
| Right 09 | ownership | 1/2. | | |
| Right 10 | ownership | | 24/5/2025 | 99999999 |

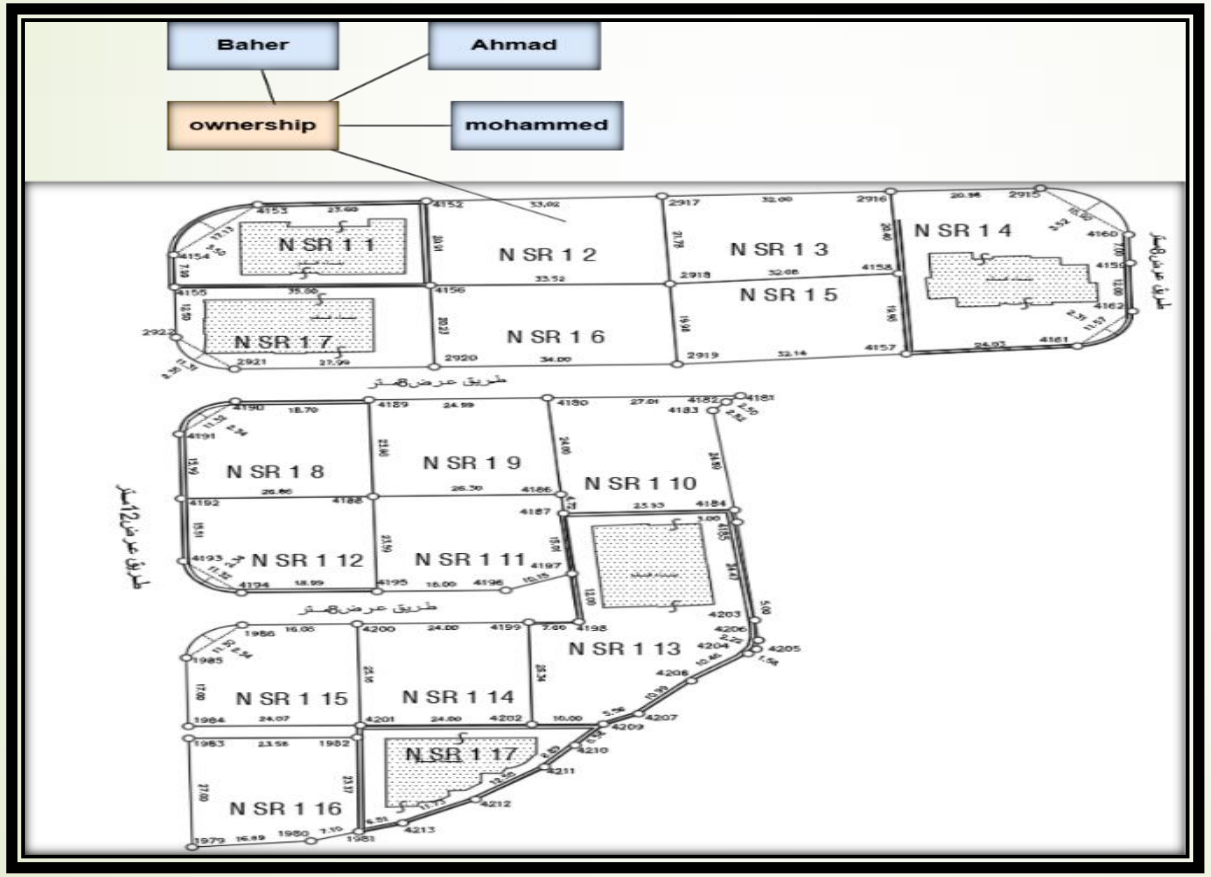
| B A U Class | | | |
|---|---|---|---|
| BAU_ID | T-MIN | T-MAX | |
| BAU 01 | 1/5/2015 | 24/4/2025 | |
| BAU 02 | | | |
| BAU 03 | | | |
| BAU 04 | | | |
| BAU 05 | | | |
| BAU 06 | | | |
| BAU 07 | | | |
| BAU 08 | | | |
| BAU 09 | | | |
| BAU 09 | | | |
| BAU 10 | 24/5/2025 | 99999 | |

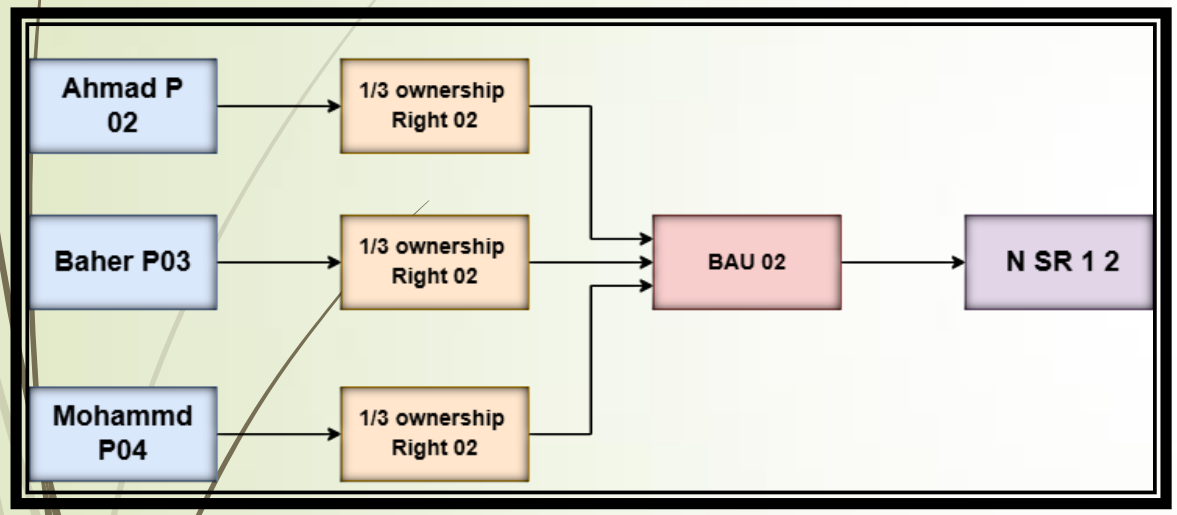
| Spatial Unit Class | | |
|---|---|---|
| SU_ID | Area | |
| N SR 1 1 | | |
| N SR 1 2 | | |
| N SR 03 | | |
| N SR 04 | | |
| N SR 1 5 | | |
| N SR 1 6 | | |
| N SR 1 7/111 | | |
| N SR 1 7 | | |
| shared facilities | | |

| R_ID | Type | share |
|---|---|---|
| Restriction 01 | mortgage | |

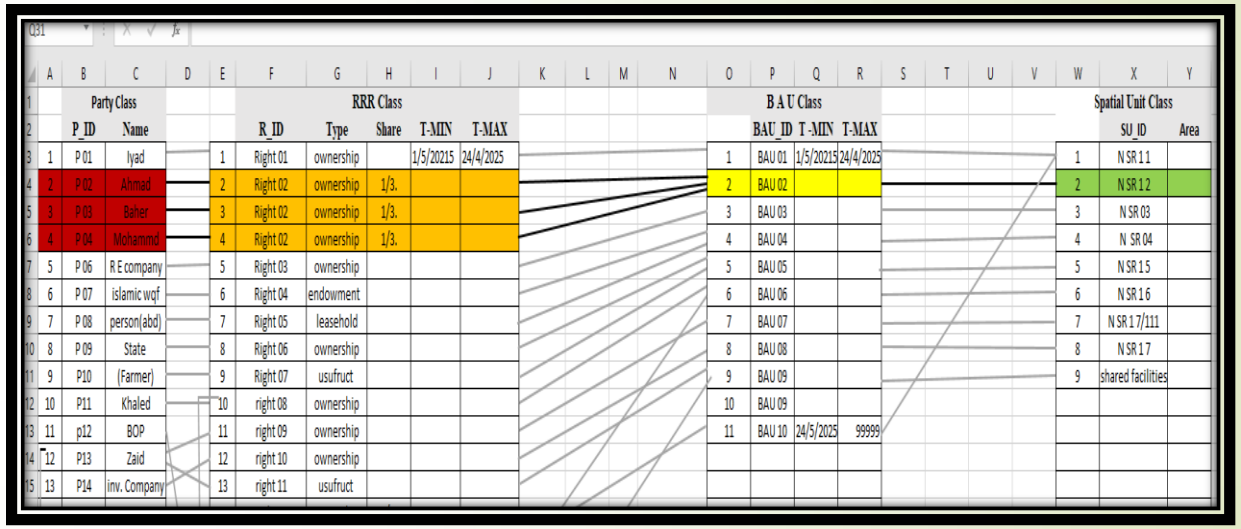
*Database tables and its attributes*

**2. Joint ownership (co-ownership):** more than one owner of the same specific area of land without a formal division



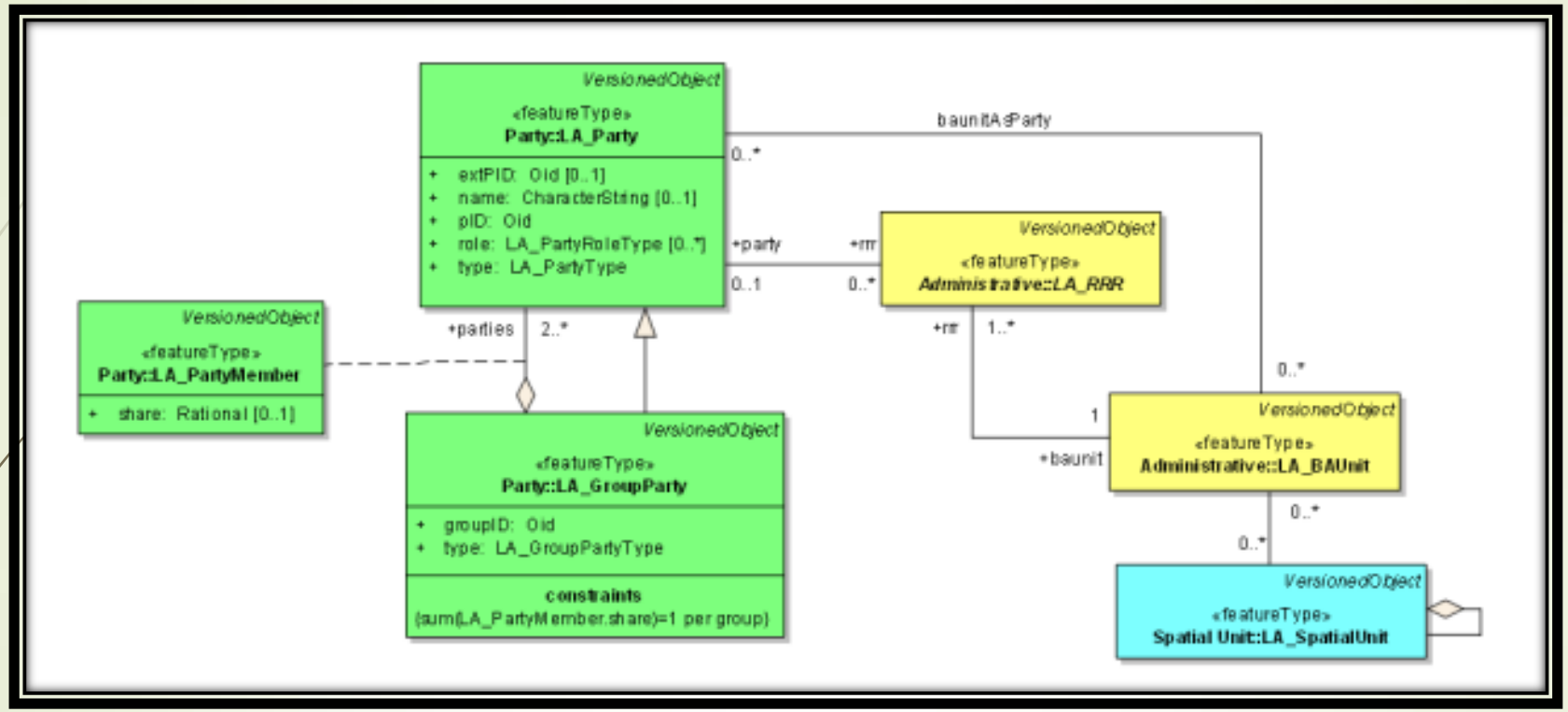



*Instance level (LADM-Based)*

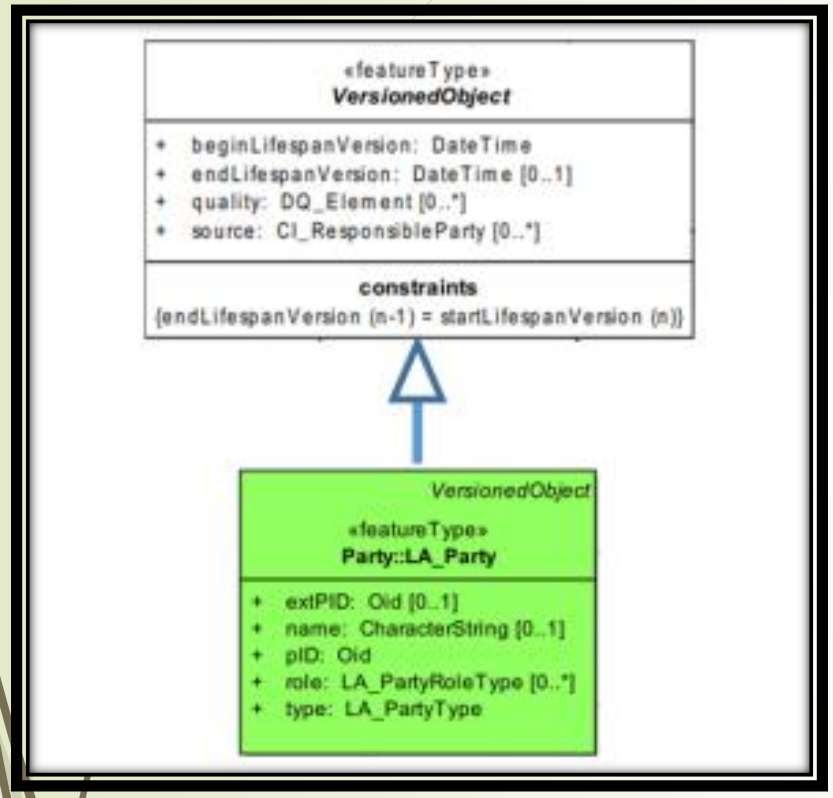


| | Party Class | | | RRR Class | | | | | B A U Class | | | | Spatial Unit Class | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P_ID | Name | | R_ID | Type | Share | T-MIN | T-MAX | BAU_ID | T-MIN | T-MAX | | SU_ID | Area | |
| 1 | P 01 | Iyad | 1 | Right 01 | ownership | | 1/5/20215 | 24/4/2025 | 1 | BAU 01 | 1/5/2025 | 24/4/2025 | 1 | N SR 1 1 | |
| 2 | P 02 | Ahmad | 2 | Right 02 | ownership | 1/3. | | | 2 | BAU 02 | | | 2 | N SR 1 2 | |
| 3 | P 03 | Baher | 3 | Right 02 | ownership | 1/3. | | | 3 | BAU 03 | | | 3 | N SR 03 | |
| 4 | P 04 | Mohammd | 4 | Right 02 | ownership | 1/3. | | | 4 | BAU 04 | | | 4 | N SR 04 | |
| 5 | P 06 | R E company | 5 | Right 03 | ownership | | | | 5 | BAU 05 | | | 5 | N SR 1 5 | |
| 6 | P 07 | islamic wqf | 6 | Right 04 | endowment | | | | 6 | BAU 06 | | | 6 | N SR 1 6 | |
| 7 | P 08 | person(abd) | 7 | Right 05 | leasehold | | | | 7 | BAU 07 | | | 7 | N SR 1 7/111 | |
| 8 | P 09 | State | 8 | Right 06 | ownership | | | | 8 | BAU 08 | | | 8 | N SR 1 7 | |
| 9 | P10 | (Farmer) | 9 | Right 07 | usufruct | | | | 9 | BAU 09 | | | 9 | shared facilities | |
| 10 | P11 | Khaled | 10 | right 08 | ownership | | | | 10 | BAU 09 | | | | | |
| 11 | p12 | BOP | 11 | right 09 | ownership | | | | 11 | BAU 10 | 24/5/2025 | 99999 | | | |
| 12 | P13 | Zaid | 12 | right 10 | ownership | | | | | | | | | | |
| 13 | P14 | inv. Company | 13 | right 11 | usufruct | | | | | | | | | | |

*Database tables and its attributes*



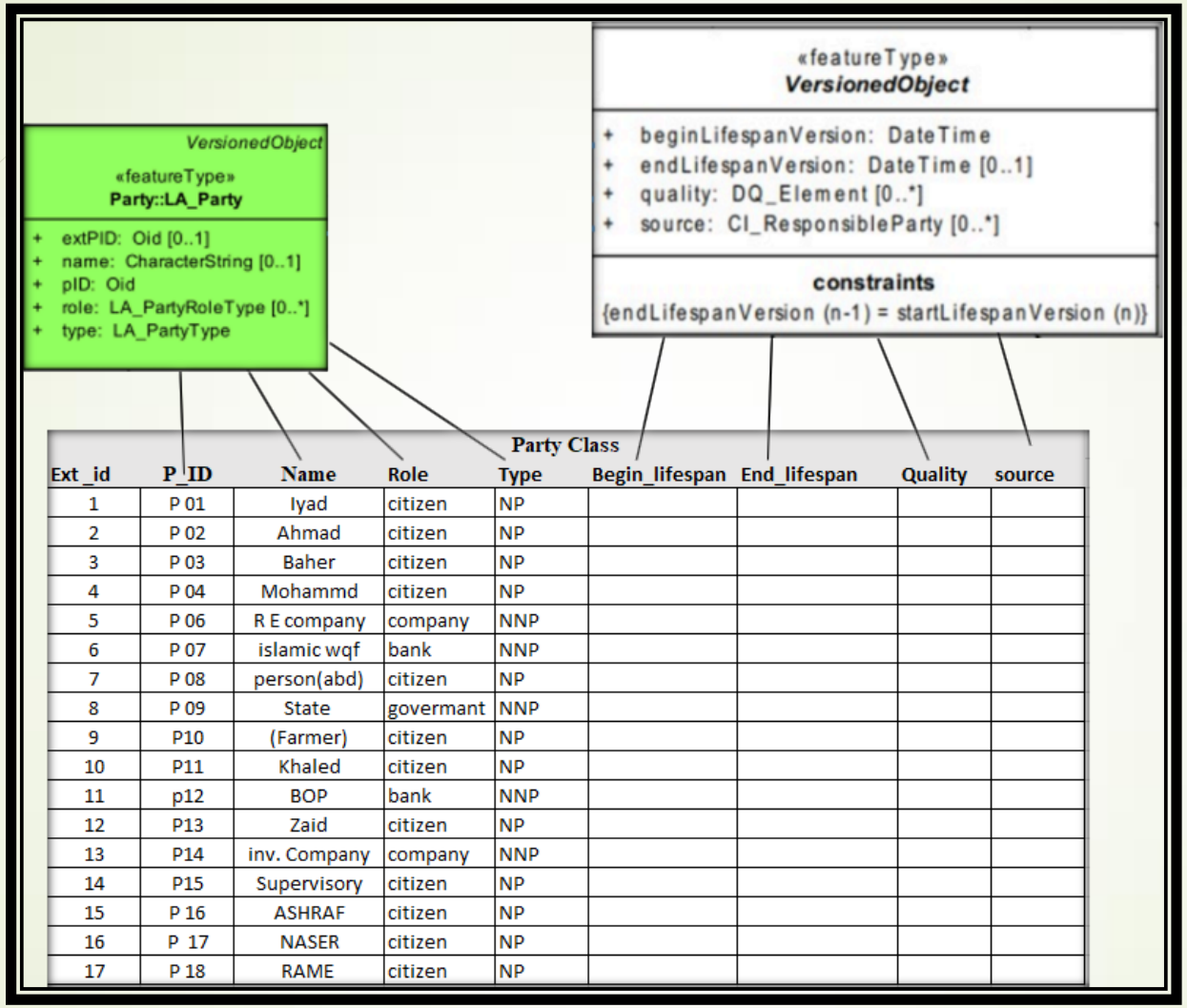

The party package




Class LA_Party is a specialisation of class VersionedObject

| | Party Class | |
|---|---|---|
| | P_ID | Name |
| 1 | P 01 | Iyad |
| 2 | P 02 | Ahmad |
| 3 | P 03 | Baher |
| 4 | P 04 | Mohammd |
| 5 | P 06 | R E company |
| 6 | P 07 | islamic wqf |
| 7 | P 08 | person(abd) |
| 8 | P 09 | State |
| 9 | P10 | (Farmer) |
| 10 | P11 | Khaled |
| 11 | p12 | BOP |
| 12 | P13 | Zaid |
| 13 | P14 | inv. Compan |
| 14 | P15 | Supervisory |
| 15 | P 16 | ASHRAF |
| 16 | P 17 | NASER |
| 17 | P 18 | RAME |

share” the fraction of the whole

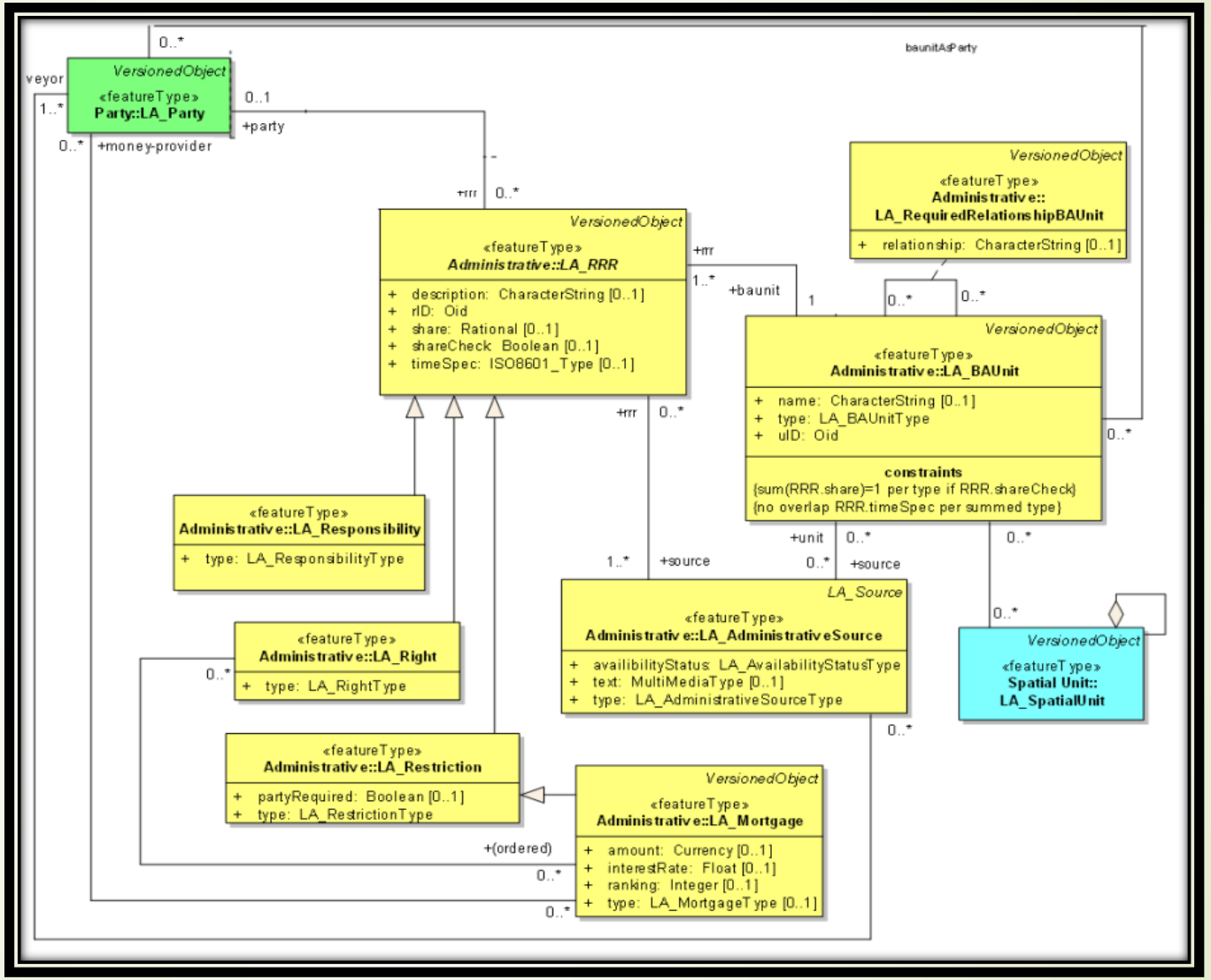



**Party Class**

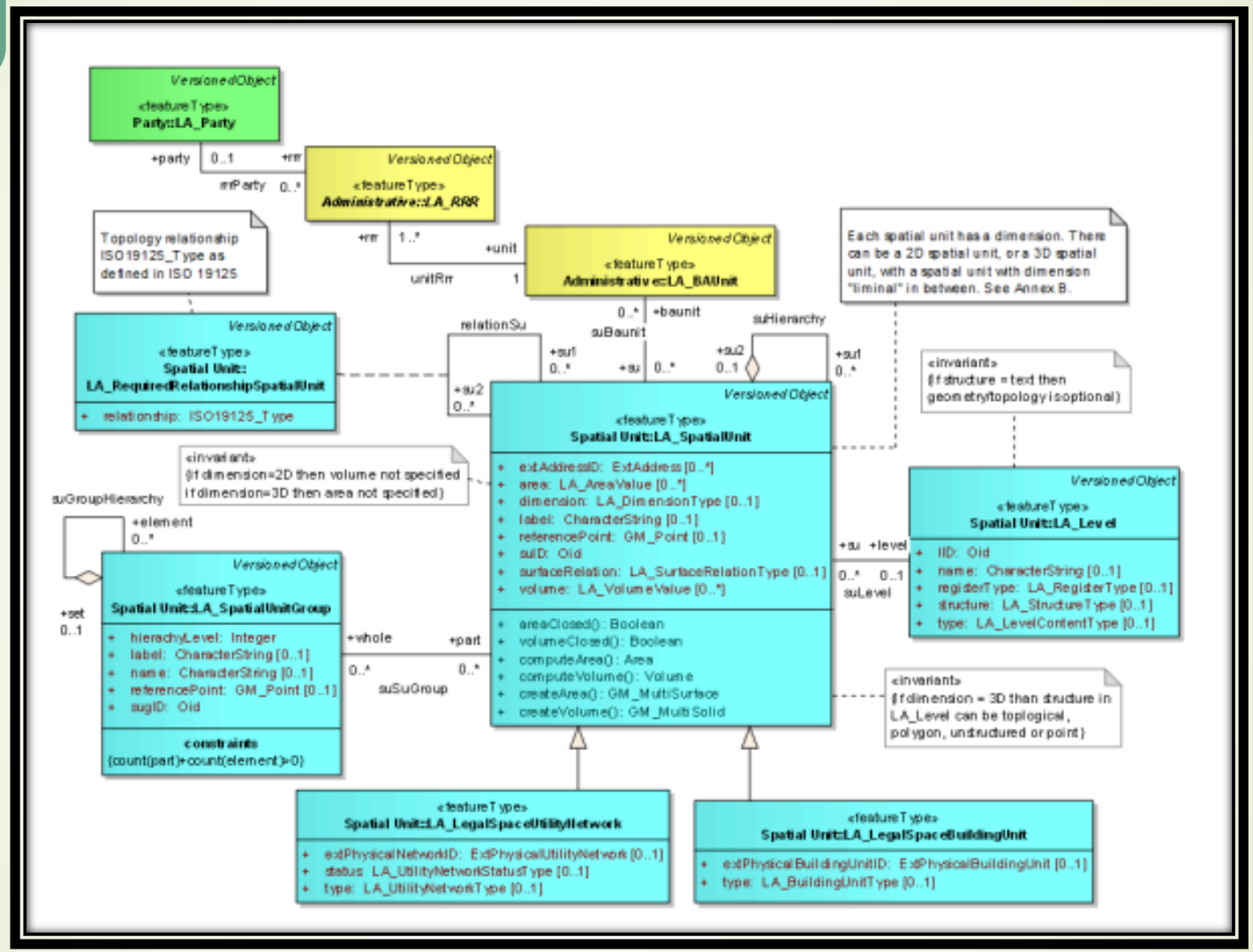
| Ext_id | P_ID | Name | Role | Type | Begin_lifespan | End_lifespan | Quality | source |
|---|---|---|---|---|---|---|---|---|
| 1 | P 01 | Iyad | citizen | NP | | | | |
| 2 | P 02 | Ahmad | citizen | NP | | | | |
| 3 | P 03 | Baher | citizen | NP | | | | |
| 4 | P 04 | Mohammd | citizen | NP | | | | |
| 5 | P 06 | R E company | company | NNP | | | | |
| 6 | P 07 | islamic wqf | bank | NNP | | | | |
| 7 | P 08 | person(abd) | citizen | NP | | | | |
| 8 | P 09 | State | govermant | NNP | | | | |
| 9 | P10 | (Farmer) | citizen | NP | | | | |
| 10 | P11 | Khaled | citizen | NP | | | | |
| 11 | p12 | BOP | bank | NNP | | | | |
| 12 | P13 | Zaid | citizen | NP | | | | |
| 13 | P14 | inv. Company | company | NNP | | | | |
| 14 | P15 | Supervisory | citizen | NP | | | | |
| 15 | P 16 | ASHRAF | citizen | NP | | | | |
| 16 | P 17 | NASER | citizen | NP | | | | |
| 17 | P 18 | RAME | citizen | NP | | | | |

Table in the database was modified as shown in the previous image.

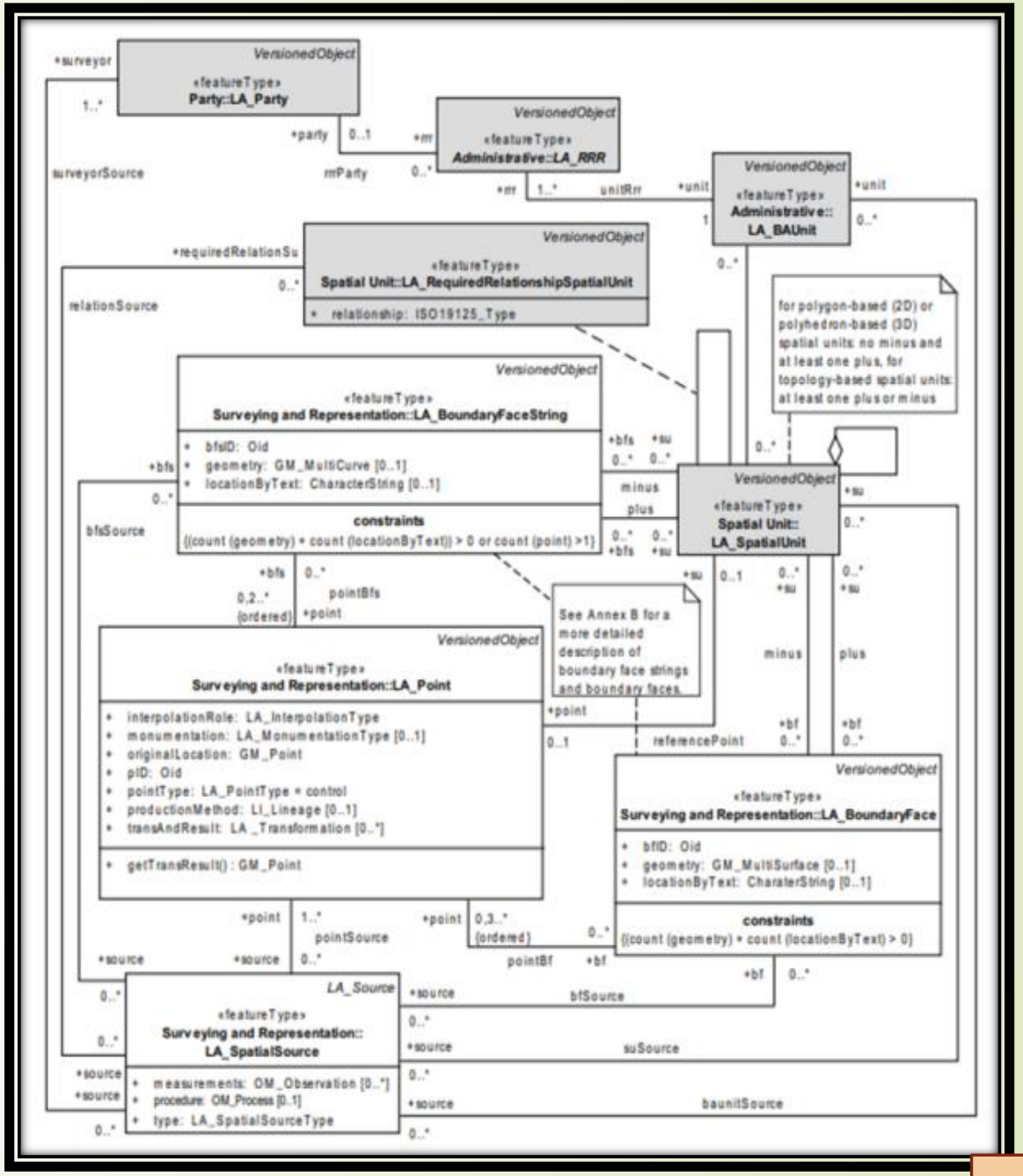
# Administrative Package



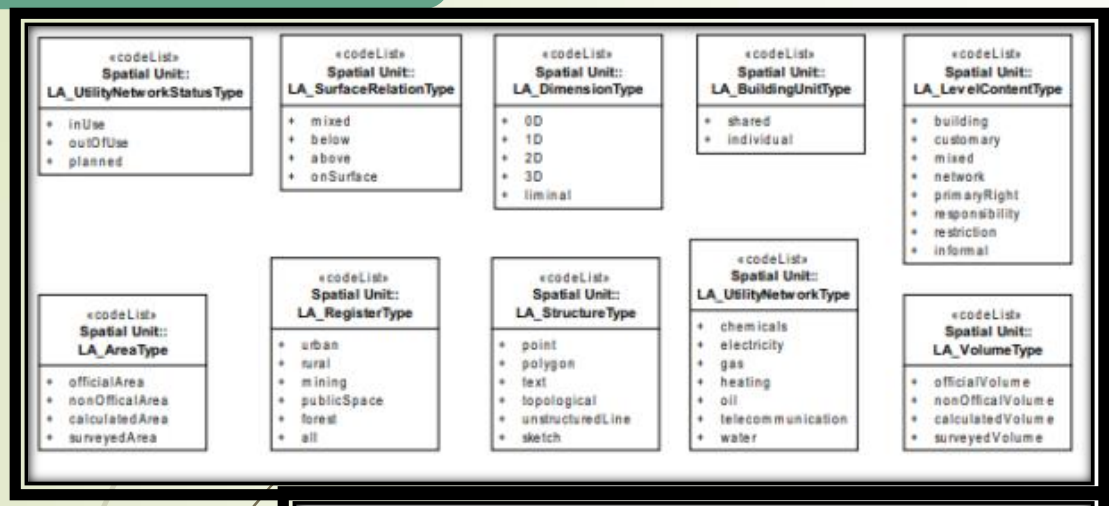
# Spatial Unit Package



# *Surveying and Representation Subpackage*



# Code lists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Spatial Unit::
LA_UtilityNetworkStatusType
+ inUse
+ outOfUse
+ planned
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Spatial Unit::
LA_SurfaceRelationType
+ mixed
+ below
+ above
+ onSurface
«codeList»
Spatial Unit::
LA_DimensionType
+ 0D
+ 1D
+ 2D
+ 3D
+ liminal
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Spatial Unit::
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+ shared
+ individual
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Spatial Unit::
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+ building
+ customary
+ mixed
+ network
+ primaryRight
+ responsibility
+ restriction
+ informal
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+ officialArea
+ nonOfficialArea
+ calculatedArea
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+ rural
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+ forest
+ all
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+ polygon
+ text
+ topological
+ unstructuredLine
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+ gas
+ heating
+ oil
+ telecommunication
+ water
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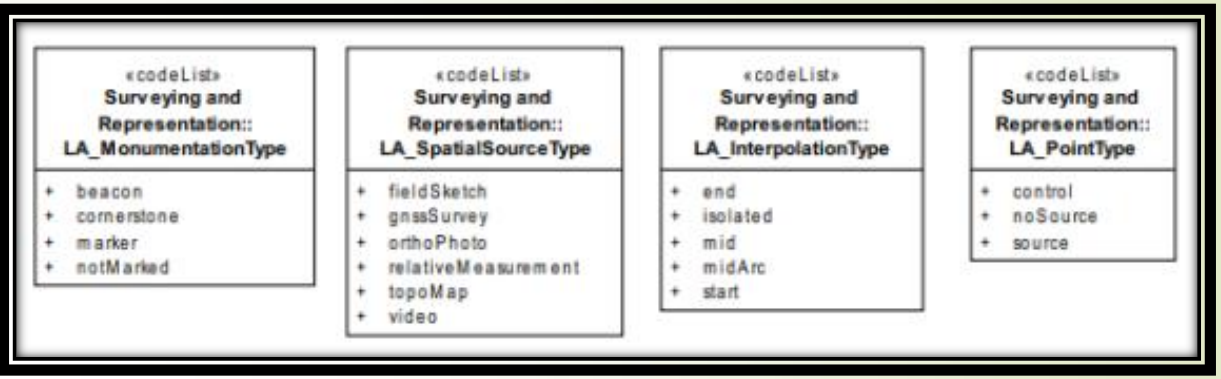
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+ orthoPhoto
+ relativeMeasurement
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+ midArc
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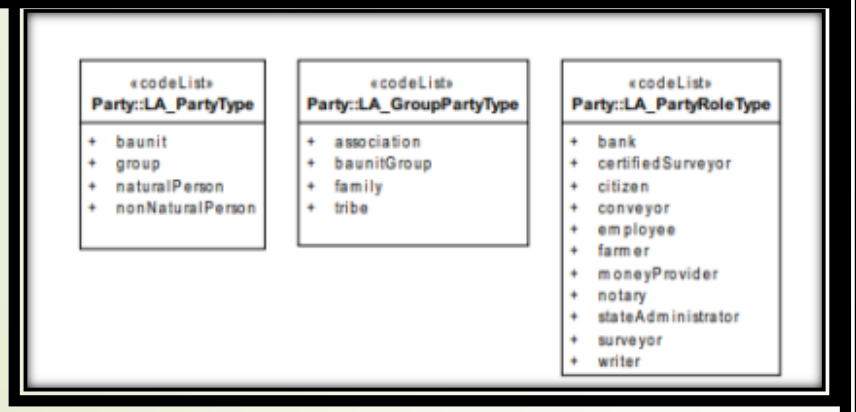
+ source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+ employee
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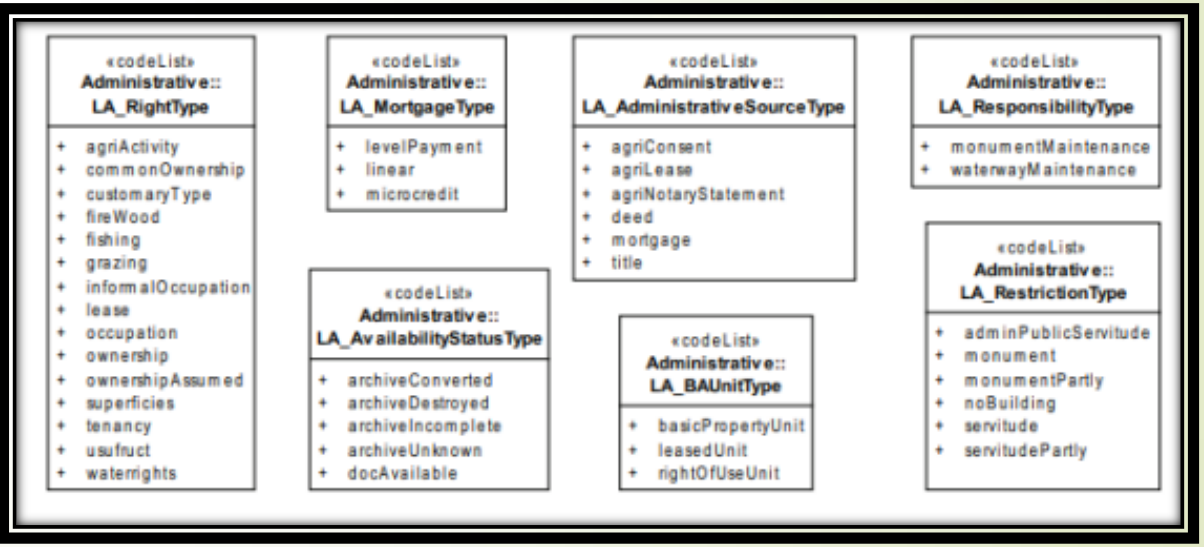
+ moneyProvider
+ notary
+ stateAdministrator
+ surveyor
+ writer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+ customaryType
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+ grazing
+ informalOccupation
+ lease
+ occupation
+ ownership
+ ownershipAssumed
+ superficies
+ tenancy
+ usufruct
+ waterrights
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+ agriLease
+ agriNotaryStatement
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+ rightOfUseUnit
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+ monumentMaintenance
+ waterwayMaintenance
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LA_RestrictionType
+ adminPublicServitude
+ monument
+ monumentPartly
+ noBuilding
+ servitude
+ servitudePartly

# A Country Profile of the Czech Republic Based on an LADM for the Development of a 3D Cadastre

## ❖ Background

The article discusses the development of the Czech State Profile in relation to the international conceptual model LADM (ISO 19152), as a prelude to the creation of a 3D cadastre for the cadastral register.

## ❖ The need for a 3D cadastre

There is a legal and planning necessity to record these parts in 3D to accurately secure rights.
(Vertical urban expansion problem).

# A Country Profile of the Czech Republic Based on an LADM for the Development of a 3D Cadastre

## ❖ Legal basis

A “building right” may be registered as a temporary right under which a facility may be built on another person’s land (for a maximum period of 99 years).

## ❖ GeoInfoStrategy

Government plan to develop spatial data infrastructure

Supports the creation of the National Set of Spatial Objects, a nation-wide reference and standardized 3D database

# A Country Profile of the Czech Republic Based on an LADM for the Development of a 3D Cadastre

## ❖ LADM merged into the Czech national file

The existing model was reverse engineered and converted into a LADM-compatible conceptual model.

Representation includes:

1. Legal Parties (CZ_Party)
2. Rights, Restrictions, and responsibilities (CZ_RRR)
3. Administrative Units (CZ_BAUnit)
4. Spatial Units (CZ_SpatialUnit)

## Compared to the mechanism in place in Palestine

| Comparison | Czech Republic | Palestine |
|---|---|---|
| **Approved form** | LADM (ISO 19152) | There is no official adoption of LADM yet. |
| **Representation of the cadaster** | Currently 2D, with plans to expand to 3D. | Only two-dimensional (2D) representation, based on surface plot boundaries |
| **3D representation** | A partial legal 3D model (for residential units, tunnels) was developed. | There is no legal three-dimensional representation. Scenarios such as floors or tunnels are not formally represented. |
| **Legal basis** | A civil law that recognizes three-dimensional space as part of property. | Real estate laws are still based on traditional concepts of land as a 2D space. |
| **Infrastructure register** | There is a trend to register utility networks as a legal space in the cadastre. | Underground utility networks or rights-of-way are not explicitly recorded within the cadastre. |
| **The role of technology** | Use CityGML, BIM, LiDAR, Point Clouds | Relatively limited – Main use for paper or digital 2D maps and CAD |
| **Vertical multiple ownership** | Authenticated via CZ_LegalSpaceBuildingUnit class | They are often processed within separate regulatory files and not explicitly in the land registry. |

# Recommendations for Palestine

1. **Modernizing the legal framework**

**2. Adopting LADM as a standard model**

**3. Start creating a LADM-based Palestinian state file**

**4. Use of CityGML, BIM and LiDAR systems**

**5. Infrastructure inclusion**

# Methodology for the development of LADM country profiles

## ❖ Study objective

To design a standard methodology for developing country files based on LADM, which can be adopted in the standard, drawing on previous international experiences and expertise.

## ❖ Methodology 3 stages

1. **Scope Definition:**

- Will the document describe the current situation or a vision for the future?
- Identify the relevant stakeholders: the responsible authority, universities, engineering firms, municipalities.
- Analyze existing laws and data to develop an initial conceptual map.

## 2. Profile creation

- Analyze the current real state data model and convert it to UML
- Match existing system elements with LADM elements such as (LA party….)
- Add new national elements needed such as facilities, archaeological sites
- Adopt appropriate language
- Use tools such as Enterprise Architect, INTERLIS, or UML-based tools

## 3. Profile Testing

- Convert the conceptual model into a real database (database schema).
- Perform LADM (Annex A of ISO 19152) conformance testing.
- Test models through pilot projects.
- Implement data transformation and integration tools (XML, GML, SQL, etc.).
- Involve stakeholders during testing to improve the model.

## ❖ Best practices learned

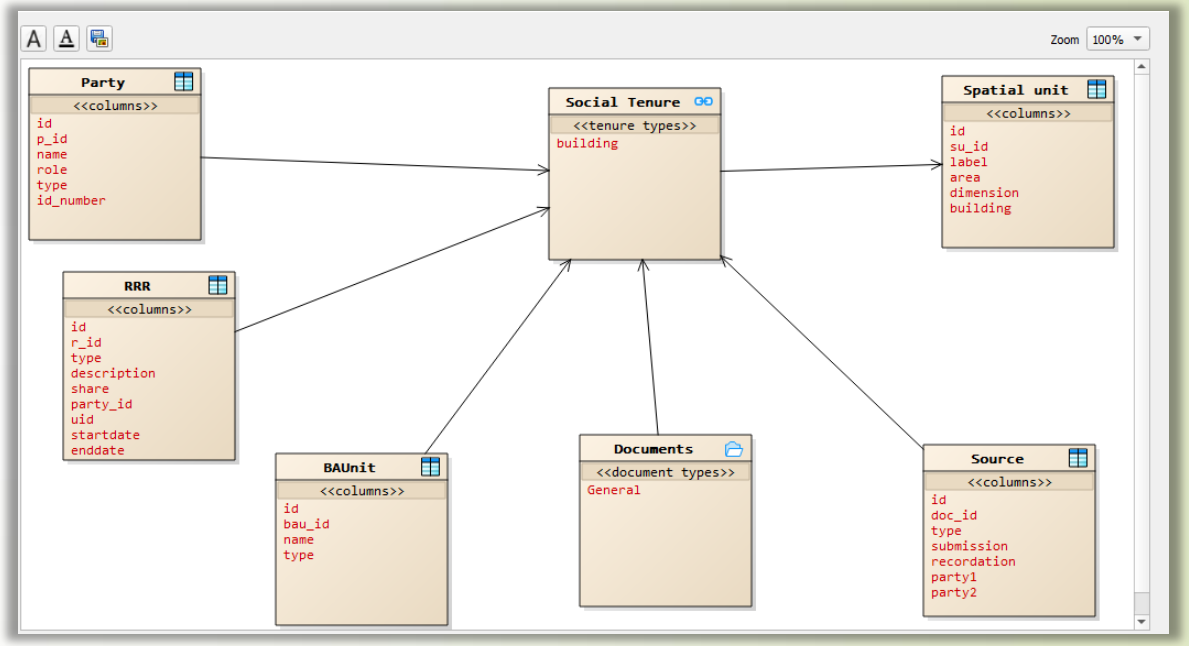
- Stakeholder engagement from the outset (government, academics, regulatory bodies)
- Develop the conceptual model first, then validate its compatibility with LADM.
- The document must be tested using real-world data.
- Provide training to participants on LADM and UML.
- Publish and formally adopt the document (e.g., the Czech Republic will publish it as national technical standard)

## Comparison with Palestine

| Factor | The paper | Palestine |
|---|---|---|
| **Profile range** | Current or future (preferably gradual) | There is no official country file yet. |
| **Participation of parties** | It is necessary to involve government + academics + users | Participation is often partial and limited. |
| **Land management system** | The conceptual model is extracted from it and then improved. | The systems are 2D and do not use UML models. |
| **3D representation** | Integrated in some countries such as Poland, Israel, Türkiye | No official legal or engineering 3D representation. |
| **Modeling tools** | | |
| **UML ،INTERLIS ، Shape Change ، SQL ،GML** | | |
| | The tools are not officially used in state institutions. | |
| **Test file** | Through pilot projects and conversion to a database | No actual LADM project has been implemented yet. |

# Implementation:Simplified Palestine LADM profile for STDM

| Table name | LADM Class | Role in model |
|---|---|---|
| party.csv | Party | Represents individual and institutions with rights (owners, buyers, banks( |
| spatialunit.csv | spatialUnit | Represents the land parcel or unit |
| baunit.csv | BAUnit | The administrative-legal unit (usually a parcel case or property( |
| rrr.csv | RRR | Represents the rights, restrictions and responsibility (e.g. Ownership, mortgage( |
| document.csv | source | Legal document supporting the RRR (e.g. deeds. Mortgage contract( |




UML Diagram

## Challenges

- legal and institutional fragmentation
- Incomplete and informal nature of land registration
- Political restrictions and jurisdictional limitations
- Paper Based System ,capacity limitations
- Customary and social tenure systems

# Recommendations

- Digitize and harmonize legacy land records across institutions
- Capacity Building and Technical Training
- Legal and Regulatory Reform
- Pilot Projects and Phased Implementation
- Development of a Palestinian LADM Profile
- Public Awareness and Community Engagement
- Institutional Coordination and Strategy

use modern technology

## Conclusion

- The application of LADM in Sarra demonstrates the potential of standardized land information systems in Palestine.
- Despite legal, political, and technical barriers, LADM provides a flexible structure capable of integrating formal and informal data.
- A phased implementation starting with pilot villages can modernize land governance, improve transparency, and support development. National adoption of LADM can enhance data interoperability, secure tenure rights, and contribute to sustainable development goals.

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Thank
You!


ANY
QUESTIONS?