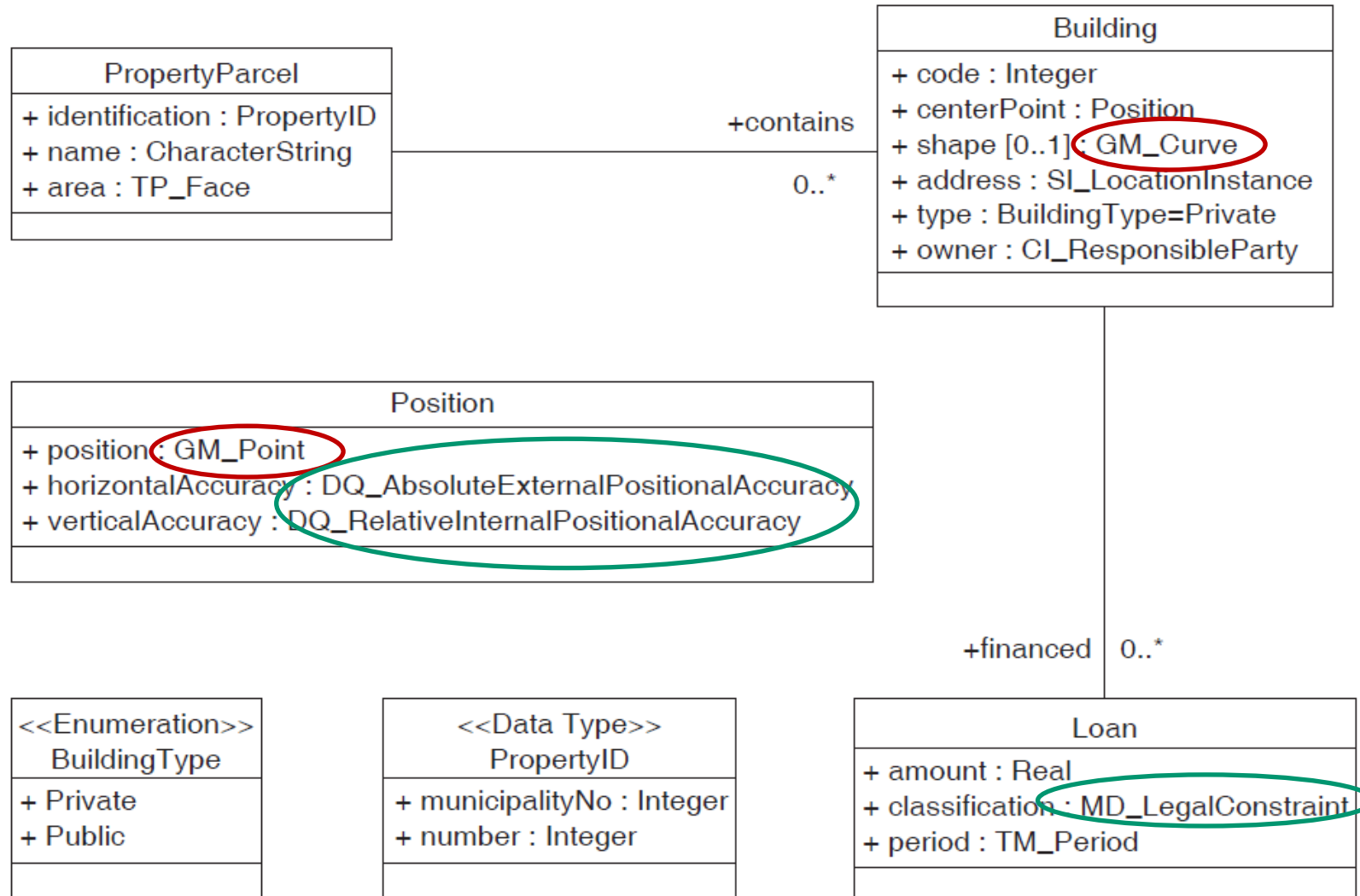
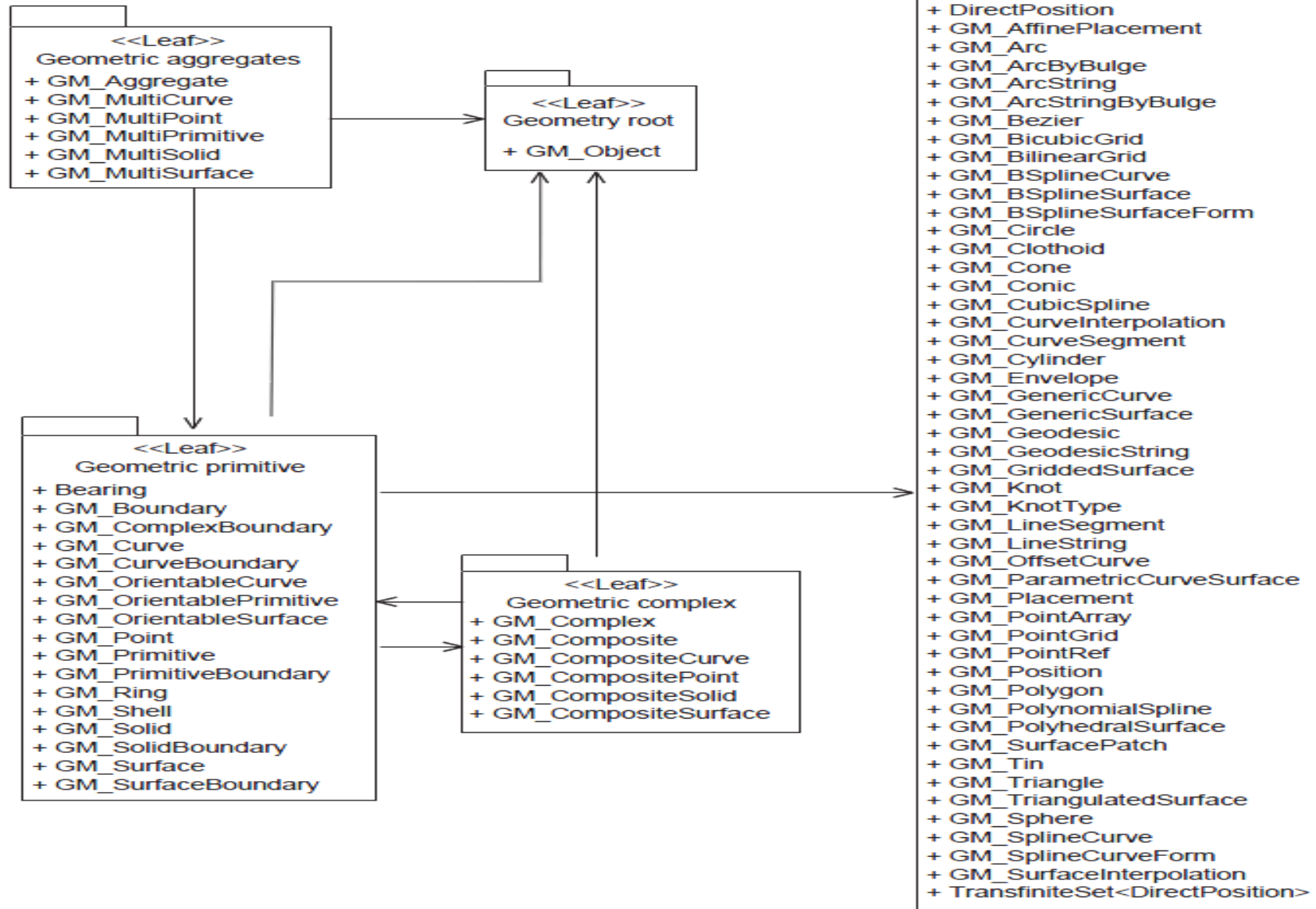


# Example of a spatial information model – in UML class diagram notation

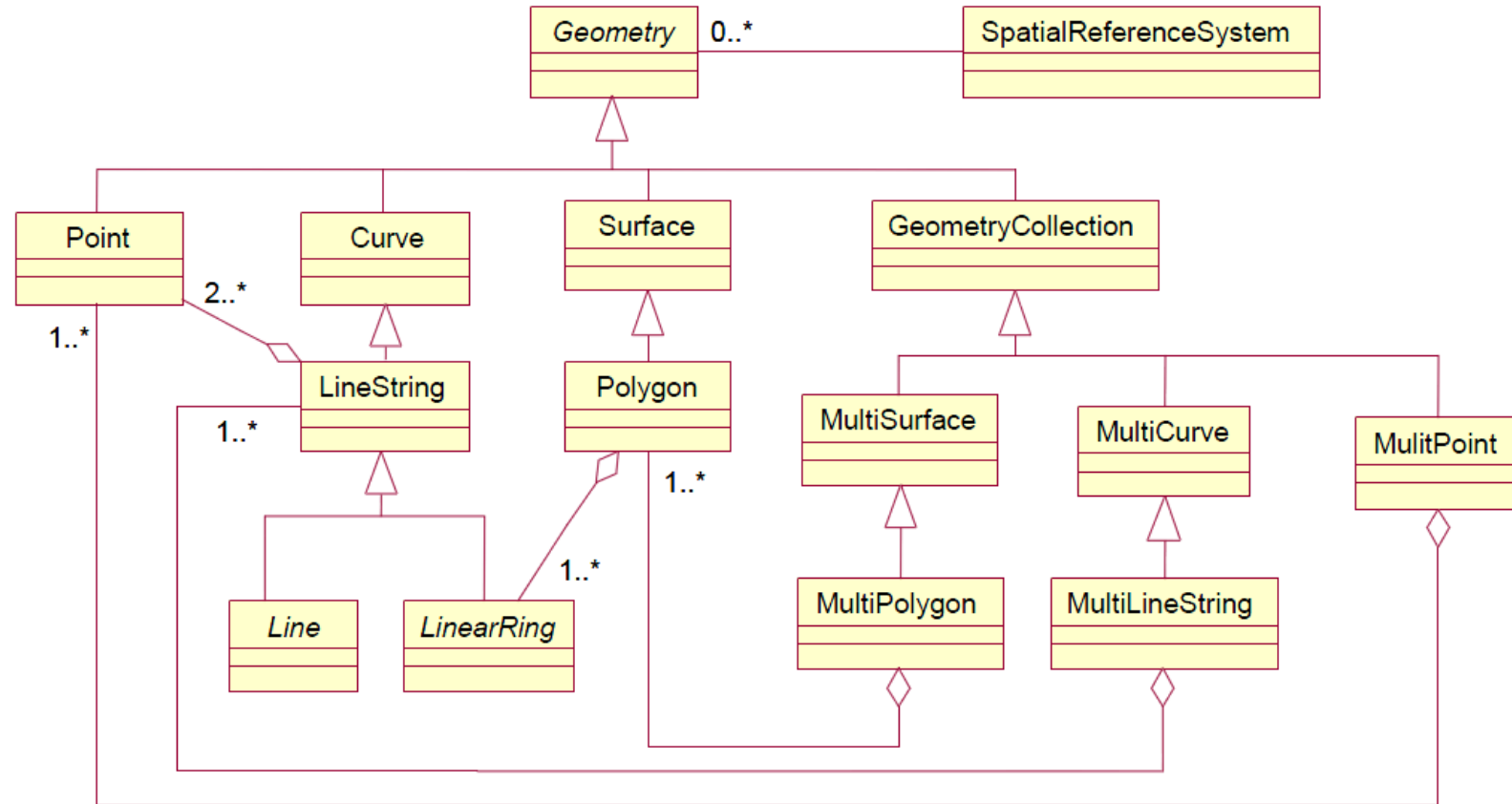




Geometry classes according to ISO 19107

# ISO Geometry definitions (ISO 19125 – Simple Feature)

## END



# ISO Metadata Package Definition (ISO 19115)

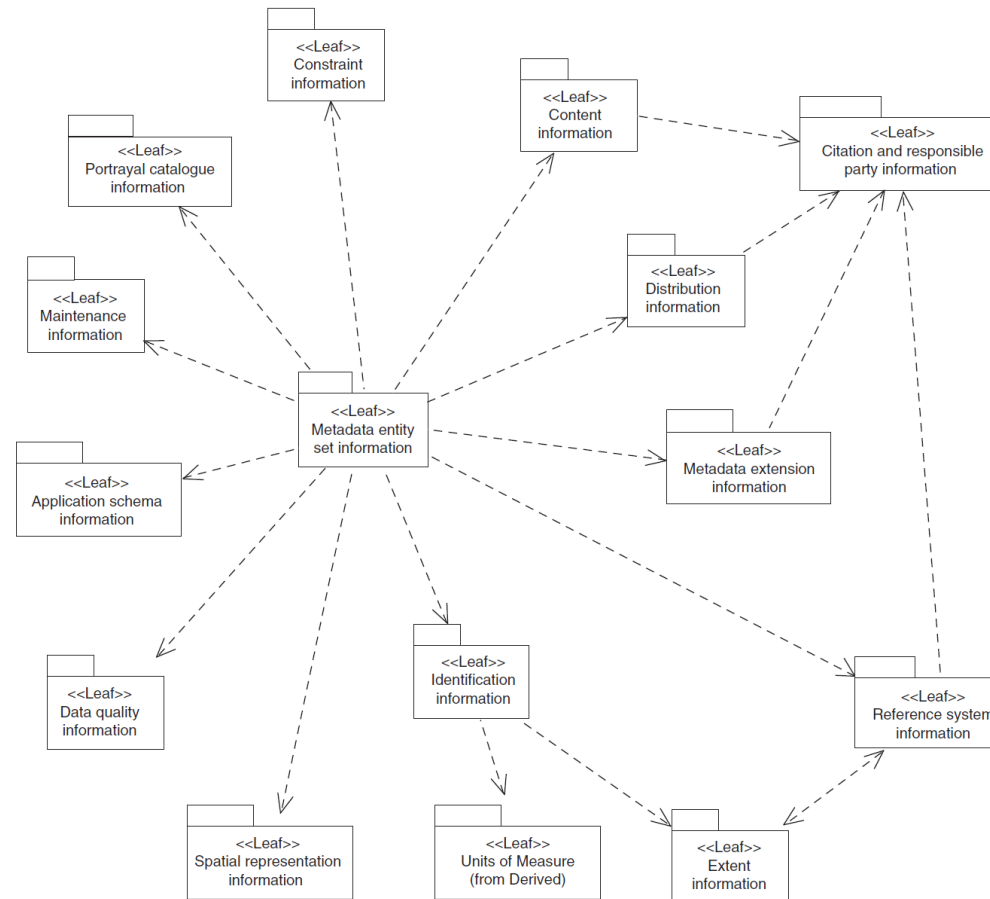


Figure 4 — Metadata packages

# ISO Metadata Definition (ISO 19115)

**Table 2 — Relationship between packages of metadata and metadata entities**

Subclause Number	Package	Entity	UML Diagram	Data Dictionary
6.3.2.1	Metadata entity set information	MD_Metadata	A.2.1	B.2.1
6.3.2.2	Identification information	MD_Identification	A.2.2	B.2.2
6.3.2.3	Constraint information	MD_Constraints	A.2.3	B.2.3
6.3.2.4	Data quality information	DQ_DataQuality	A.2.4.1 A.2.4.2 A.2.4.3	B.2.4.1 B.2.4.2 B.2.4.3
6.3.2.5	Maintenance information	MD_MaintenanceInformation	A.2.5	B.2.5
6.3.2.6	Spatial representation information	MD_SpatialRepresentation	A.2.6	B.2.6
6.3.2.7	Reference system information	MD_ReferenceSystem	A.2.7	B.2.7
6.3.2.8	Content information	MD_ContentInformation	A.2.8	B.2.8
6.3.2.9	Portrayal catalogue information	MD_PortrayalCatalogueReference	A.2.9	B.2.9
6.3.2.10	Distribution information	MD_Distribution	A.2.10	B.2.10
6.3.2.11	Metadata extension information	MD_MetadataExtensionInformation	A.2.11	B.2.11
6.3.2.12	Application schema information	MD_ApplicationSchemaInformation	A.2.12	B.2.12
6.4.1	Extent information	EX_Extent	A.3.1	B.3.1
6.4.2	Citation and responsible party information	CI_Citation CI_ResponsibleParty	A.3.2	B.3.2

# Usage in context of ISO TC211

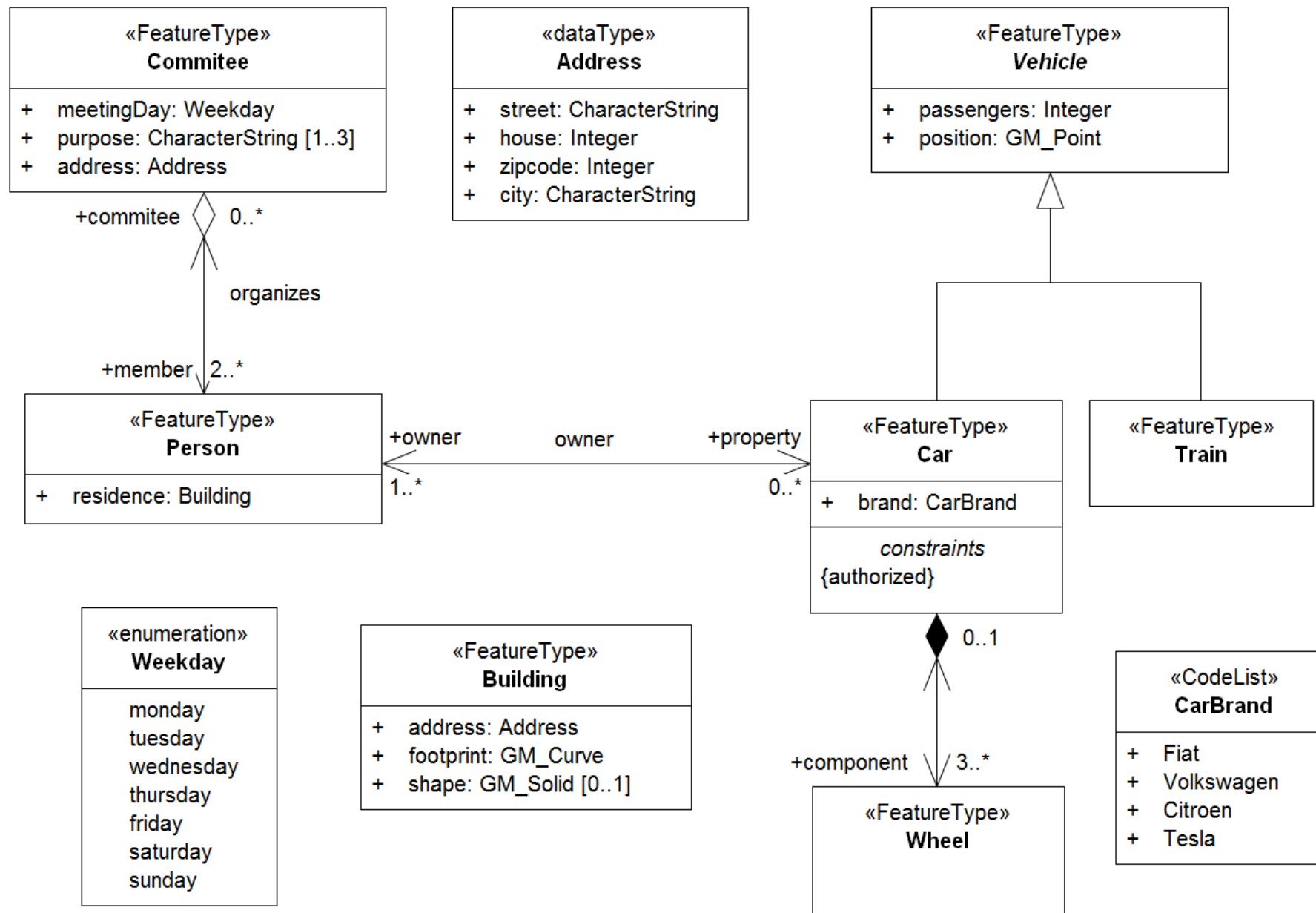
---

- Packages with stereotype **"ApplicationSchema"** contains feature types. This stereotype is important for realization in GML.
- Classes with stereotype **"FeatureType"** represent geographic object types. This stereotype is important for realization in GML.
- Classes with stereotype **"dataType"** are sets of properties without identity. Such classes can not exist as single instances, only as attributes or components in other classes.
- Classes with stereotype **"enumeration"** are fixed lists of possible values. Attributes that use such lists may only take values from the list.
- Classes with stereotype **"CodeList"** are extendable lists of possible values.
- Classes with stereotype **"interface"** are conceptual classes. Such classes can not be used directly in data sets, they must be realized in other classes
- Classes with stereotype **"Union"** contains a list of types where only one may be used in one instance.

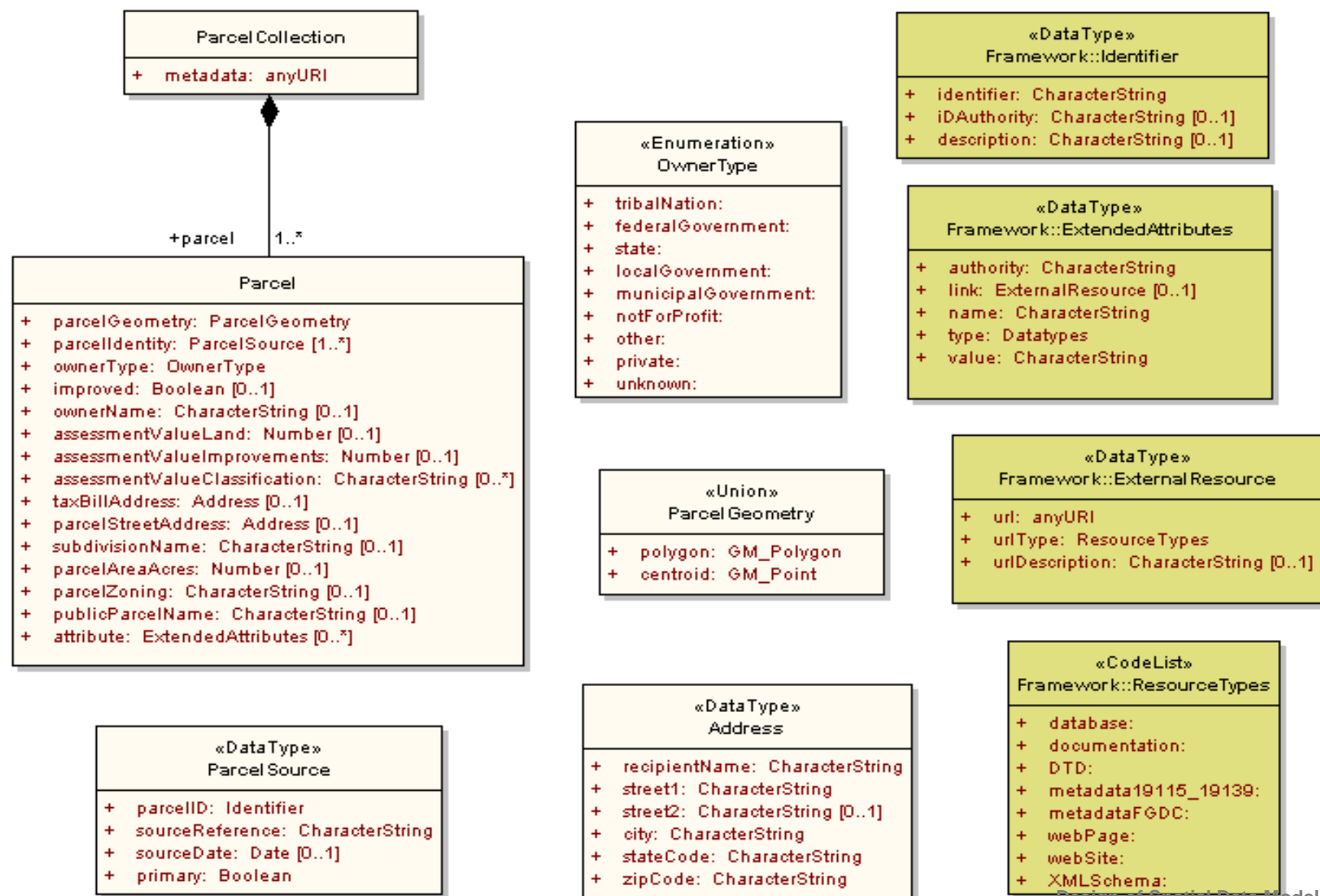
---

## **Some examples of UML class diagrams with spatial data context**

---







# Sources

---

## ➤ UML Information

- <http://www.uml.org/> (OMG: Object Management Group) -> very rich content on resources for UML in general
  - [http://www.uml.org/HTB\\_Articulate\\_Class\\_Models\\_OMG.pdf](http://www.uml.org/HTB_Articulate_Class_Models_OMG.pdf) -> “How to built Class Models” tutorial
  - IBM – UML Basics – the Class diagram (very good introduction)  
<https://developer.ibm.com/articles/the-class-diagram/>
  - Wikipedia  
[http://en.wikipedia.org/wiki/Unified\\_Modeling\\_Language](http://en.wikipedia.org/wiki/Unified_Modeling_Language)  
[https://en.wikipedia.org/wiki/Class\\_diagram](https://en.wikipedia.org/wiki/Class_diagram)
-

# Useful Links –UML in spatial data modeling

---

Description	URL
INSPIRE Consolidated UML Model	<a href="http://inspire.ec.europa.eu/data-model/approved/r4618/html/">http://inspire.ec.europa.eu/data-model/approved/r4618/html/</a>
UML best practices per ISO-TC211 (ISO Technical committee 211 – spatial standards)	<a href="https://github.com/ISO-TC211/UML-Best-Practices/wiki">https://github.com/ISO-TC211/UML-Best-Practices/wiki</a>
UML Profile for GML (Geography Markup Language)	<a href="https://sparxsystems.com/enterprise_architect_user_guide/10/domain_based_models/uml_profile_for_gml.html">https://sparxsystems.com/enterprise_architect_user_guide/10/domain_based_models/uml_profile_for_gml.html</a>

# UML Tools

---

- Modeliosoft
    - <http://www.modeliosoft.com>
  - Visual Paradigm (Community Edition – free in non-commercial use)
    - <https://www.visual-paradigm.com/download/community.jsp>
    - Online Version: <https://online.visual-paradigm.com/de/>
  - Enterprise Architect
    - <http://www.sparxsystems.de/uml/download-trial/>
  - Star UML
    - <http://staruml.io>
  - And many more
-

# Hungry Mind Assignment 2

---

- Design a data model in UML Class diagram notation and choose **one** of the following topics:
  - Data model for a property cadaster in a GIS. You need to deal with parcels, buildings, property owners, taxes, parcel usage, etc. -> you might want to do some research
  - A street network applicable for routing
  - Sensor observation service for meteorological data (covering at least: temperature, wind, precipitation, air-humidity)
  - Your own topic
- Use a UML tool (see slide “UML Tools”) – best as a cloud service

# Hungry Mind Assignment 2 (cont.)

---

## ➤ Principle considerations

- Apply what we've discussed in class with regards to creation of a data model and the UML class diagram notation
- Address the principle requirements that the system must fulfill
- What information needs to be processed (class / entities)?
- How is the relationship between the classes?