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GEOGRAPHIC MARKUP LANGUAGE (GML) 개요

목차

- GML의 소개
 - 배경
 - GML 개요
- GML 세부사항들
 - 개념적 스키마
 - 스키마 기술언어
 - GML 스키마
 - 응용 스키마
- 요약

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배경

데이터 모델링과 저장



지리정보

어떻게 데이터를 저장?



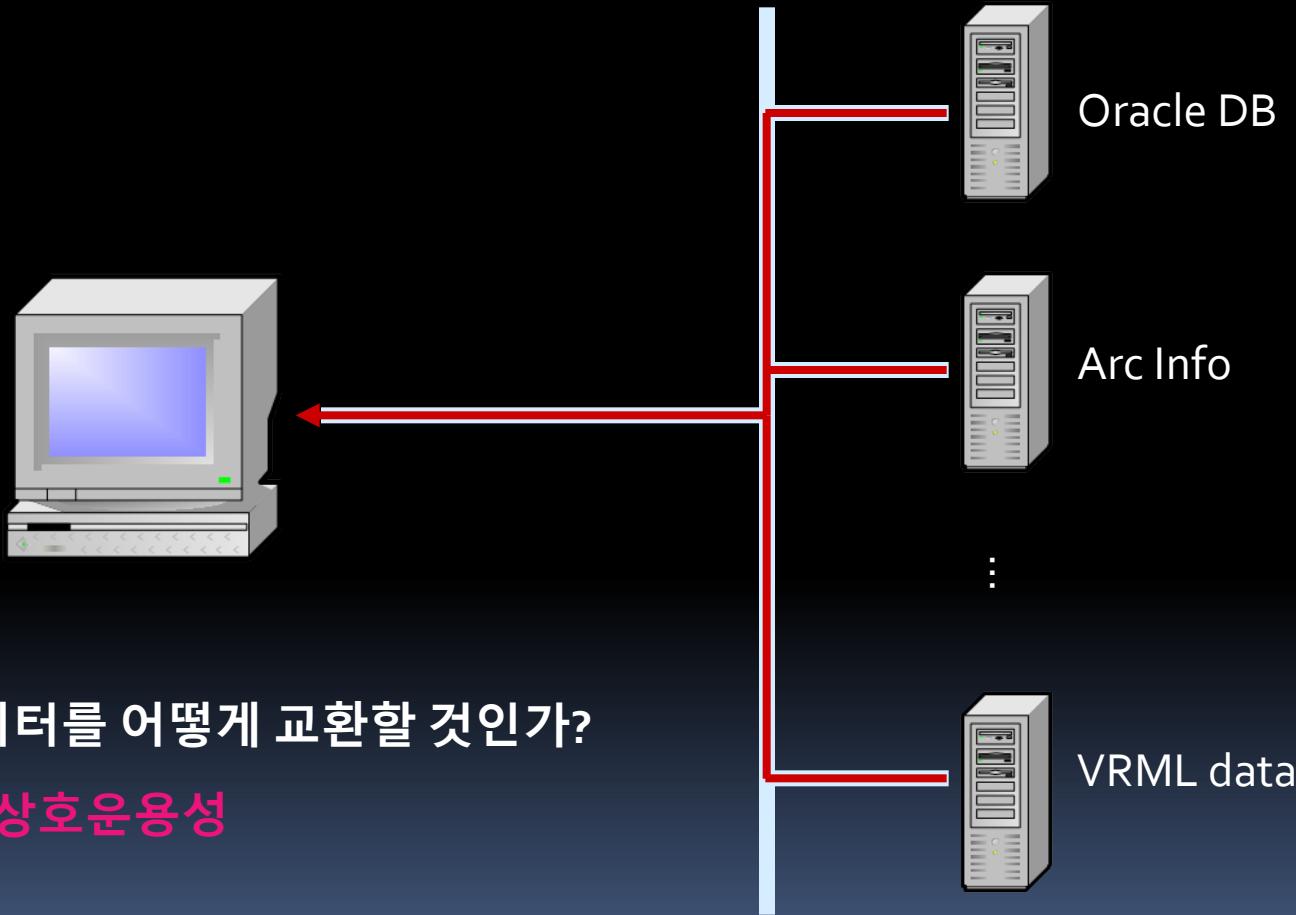
디지털 표현

데이터를 어떻게 기술할 것인가?

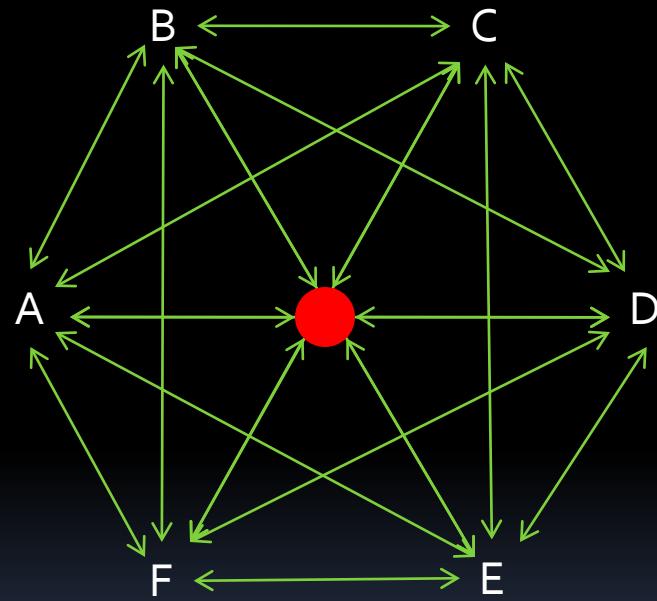
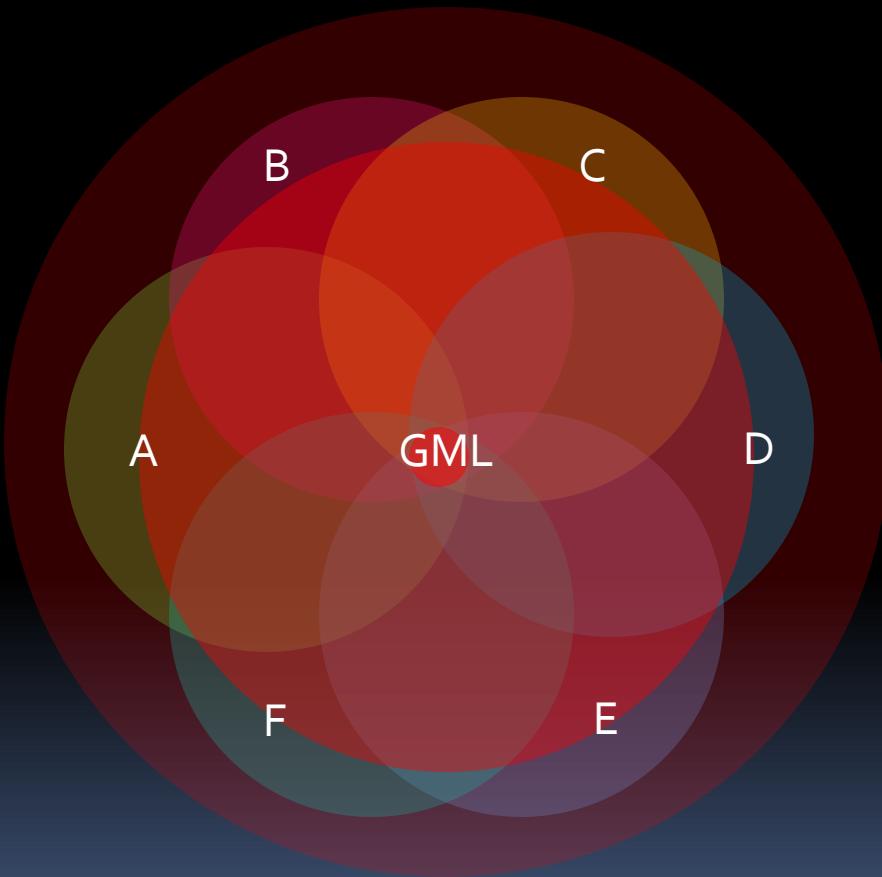
→ 개념적 모델링

→ 기술 규칙: 스키마

데이터 전송



배경 HLL





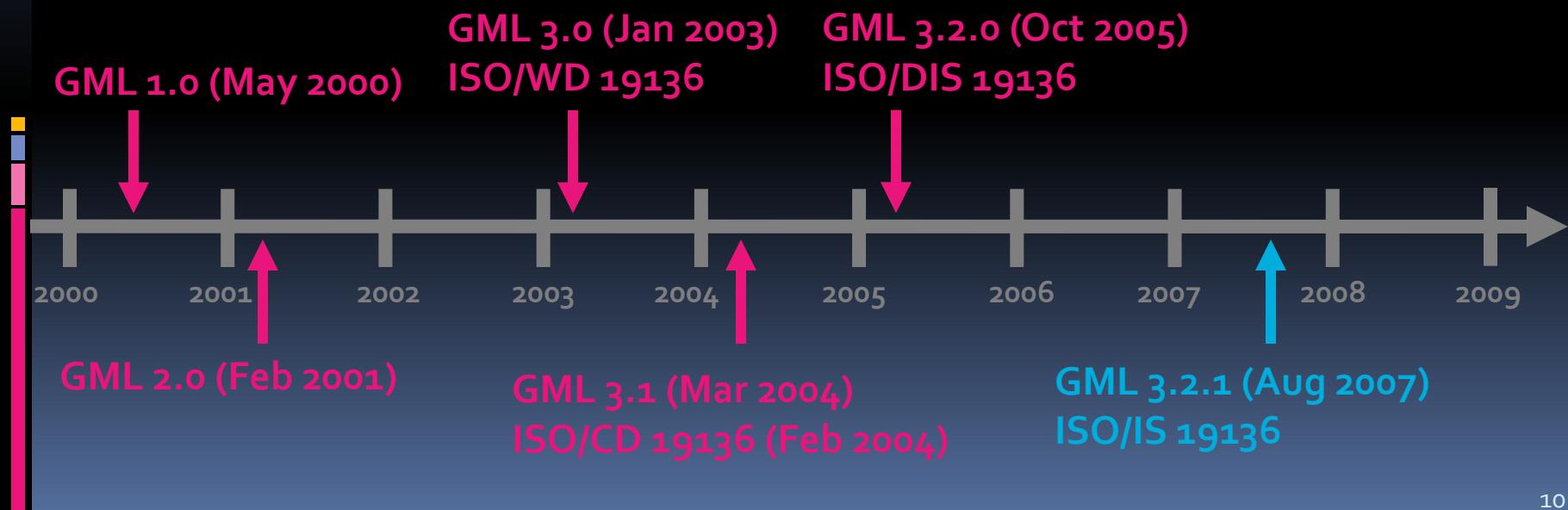
GML 개요

GML이란? - 정의

- 데이터 포맷
 - 데이터 모델 + 기술 언어 + 기술 규칙
- Geography Markup Language
 - (ISO 19103 + ISO 19107 + ISO 19108 + ISO 19109 + ISO 19111 + ISO 19123 + ...) + XML Schema + Encoding Rule
 - 지리정보의 모델링, 전송 및 저장을 위한 XML 스키마로 작성된 XML 문법
 - 지형지물의 공간, 비공간 속성을 포함
 - 웹과 웹 기반 서비스를 고려한 설계

GML이란? - 상태

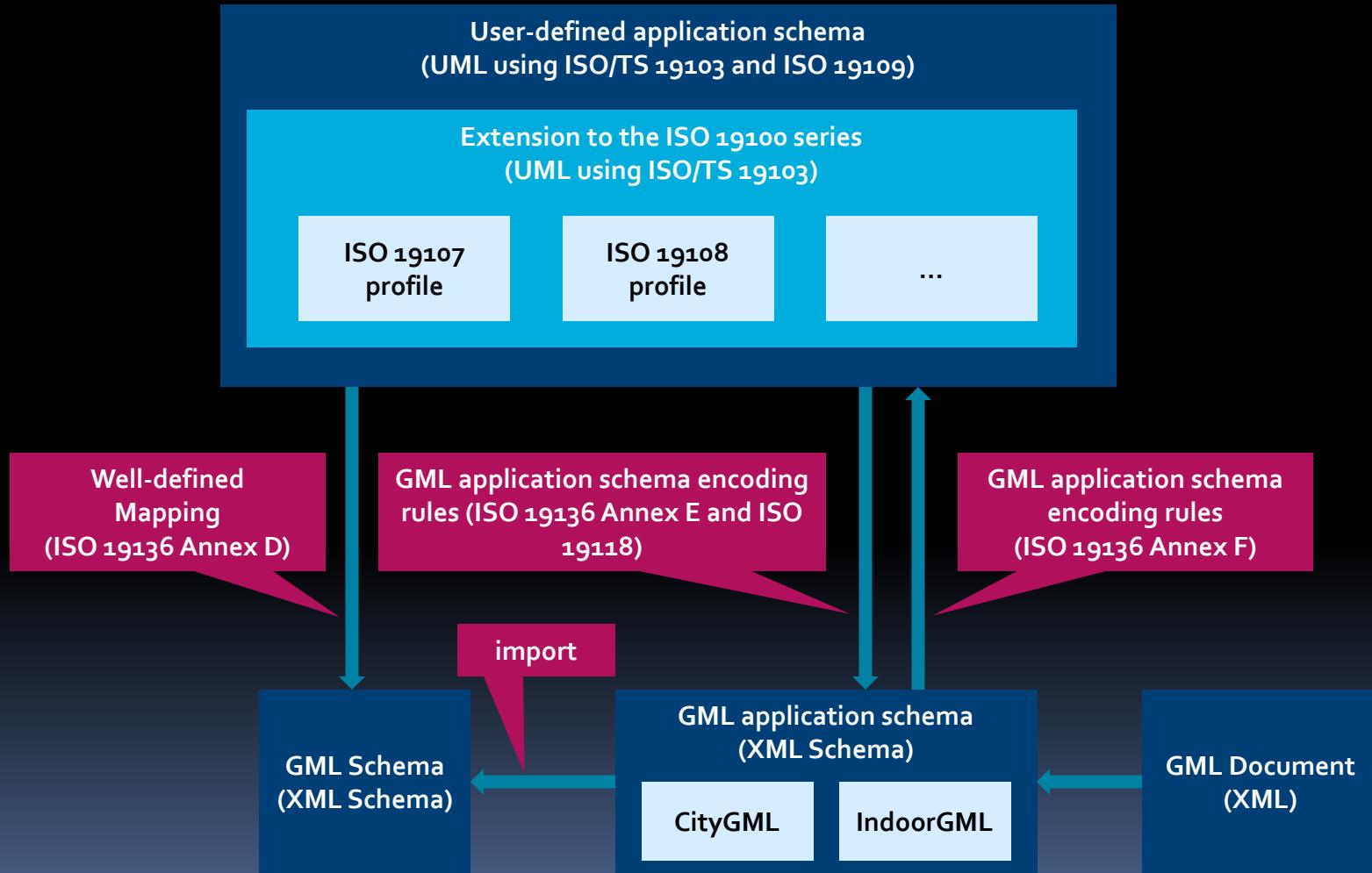
- 표준화
 - OGC (Open Geospatial Consortium)
 - OpenGIS® Geography Markup Language Encoding Specification (Implementation Spec.)
 - ISO/TC211 (International Organization for Standardization)
 - ISO 19136 Geographic information – Geography Markup Language
 - International Standard – 3.2.1



GML이란? - 명세서

- 명세서에서 XML 스키마 문법, 메커니즘, 규약을 정의
 - 지리 응용 스키마와 객체의 정의를 위한 개방적이고 중립적인 프레임워크를 제공
 - GML 프레임워크의 적절한 부분집합을 제공하는 프로파일 허용
 - 특화된 도메인과 정보 커뮤니티를 위한 지리 응용 스키마를 제공
 - 응용 스키마와 데이터 집합의 저장과 전송을 지원
 - 지리 응용 스키마와 기술하는 정보를 공유하는 조직력의 증가

ISO 19100 시리즈와의 관계



ISO 19100 시리즈와의 관계

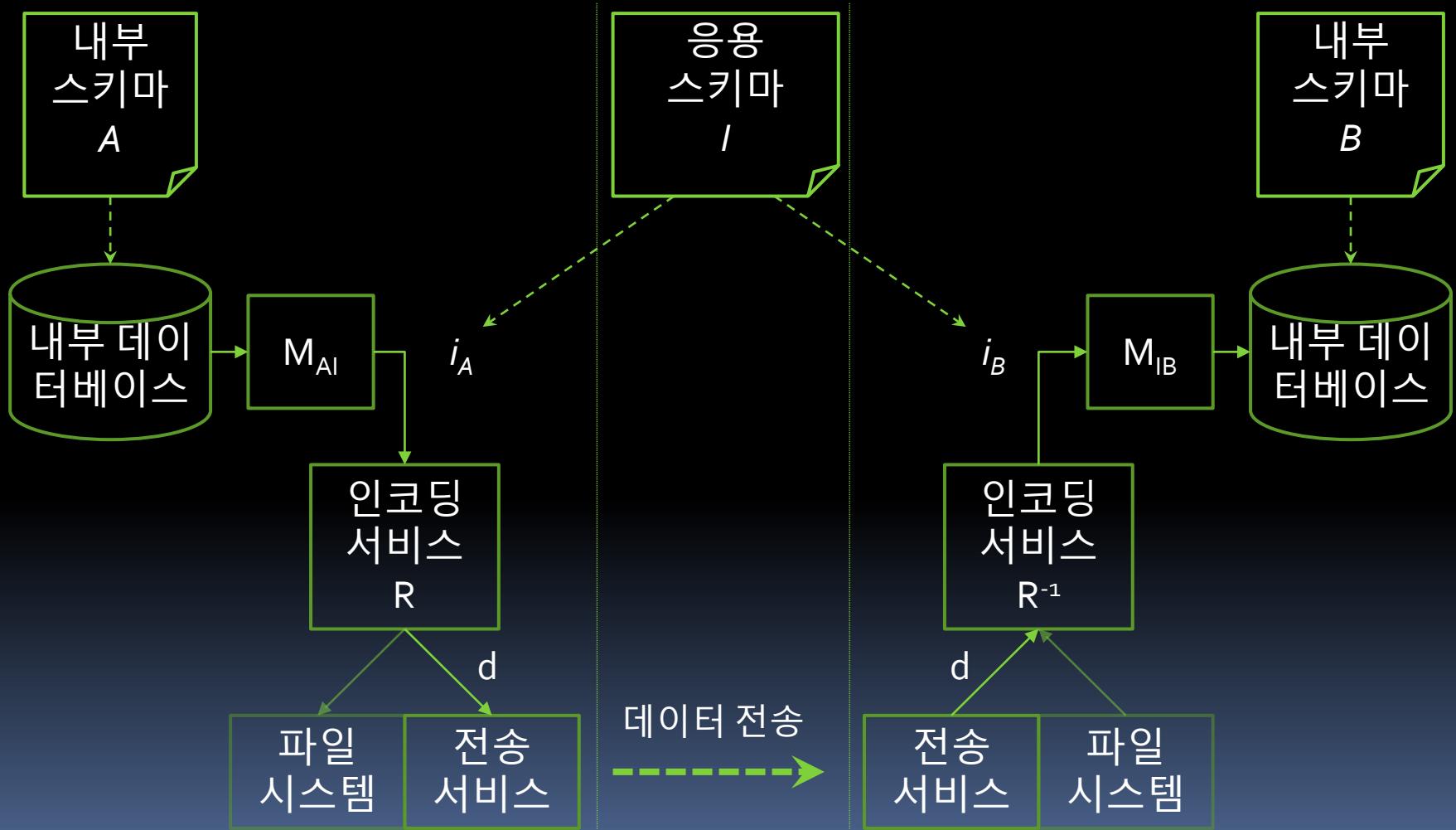
6709 - Standard representation of latitude, longitude and altitude for geographic point locations	19120 - Functional standards
19101 - Reference model	19121 - Imagery and gridded data
19103 - Conceptual schema language	19122 - Qualifications and Certification of personnel
19104 - Terminology Introduction	19123 - Schema for coverage geometry and functions
19105 - Conformance and testing	19124 - Imagery and gridded data components
19106 - Profiles	19125 - Simple feature access - Part 1 – 3
19107 - Spatial schema	19126 - Profile - FACC Data Dictionary
19108 - Temporal schema	19127 - Geodetic codes and parameters
19109 - Rules for application schema	19128 - Web Map server interface
19110 - Methodology for feature cataloguing	19129 - Imagery, gridded and coverage data framework
19111 - Spatial referencing by coordinates	19130 - Sensor and data models for imagery and gridded data
19112 - Spatial referencing by geographic identifiers	19131 - Data product specifications
19113 - Quality principles	19132 - Location based services - Reference model
19114 - Quality evaluation procedures	19133 - Location based services - Tracking and navigation
19115 - Metadata	19134 - Multimodal location based services for routing and navigation
19116 - Positioning services	19135 - Procedures for registration of geographical information items
19117 - Portrayal	19136 - Geography Markup Language
19118 - Encoding	19139 - Metadata - Implementation specification
19119 - Services	

GML 명세서의 목차 (Ver. 3.2.1)

(한글판 : 2014년)

1. Scope	17. Directions
2. Conformance	18. Observations
3. Normative references	19. Coverages
4. Terms and symbols	20. Profiles
5. Conventions	21. Rules for GML application schemas
6. Overview of the GML schema	Annex A. Abstract test suites
7. General rules and base schema components	Annex B. Abstract test suite for software implementations
8. Xlinks and basic types	Annex C. GML schema
9. Features	Annex D. Implemented Profile of the ISO 19100 series
10. Geometric primitives	Annex E. UML-to-GML application schema encoding rules
11. Geometric complex, composites and aggregates	Annex F. GML-to-UML application schema encoding rules
12. Coordinate reference systems schemas	Annex G. Guidelines for subsetting the GML schema
13. Topology	Annex H. Default styling
14. Temporal information and dynamic features	Annex I. Backwards compatibility with earlier versions of GML
15. Definitions and dictionaries	Annex J. Modularization and dependencies
16. Units, measures and values	

응용 스키마를 통한 데이터의 교환



목차

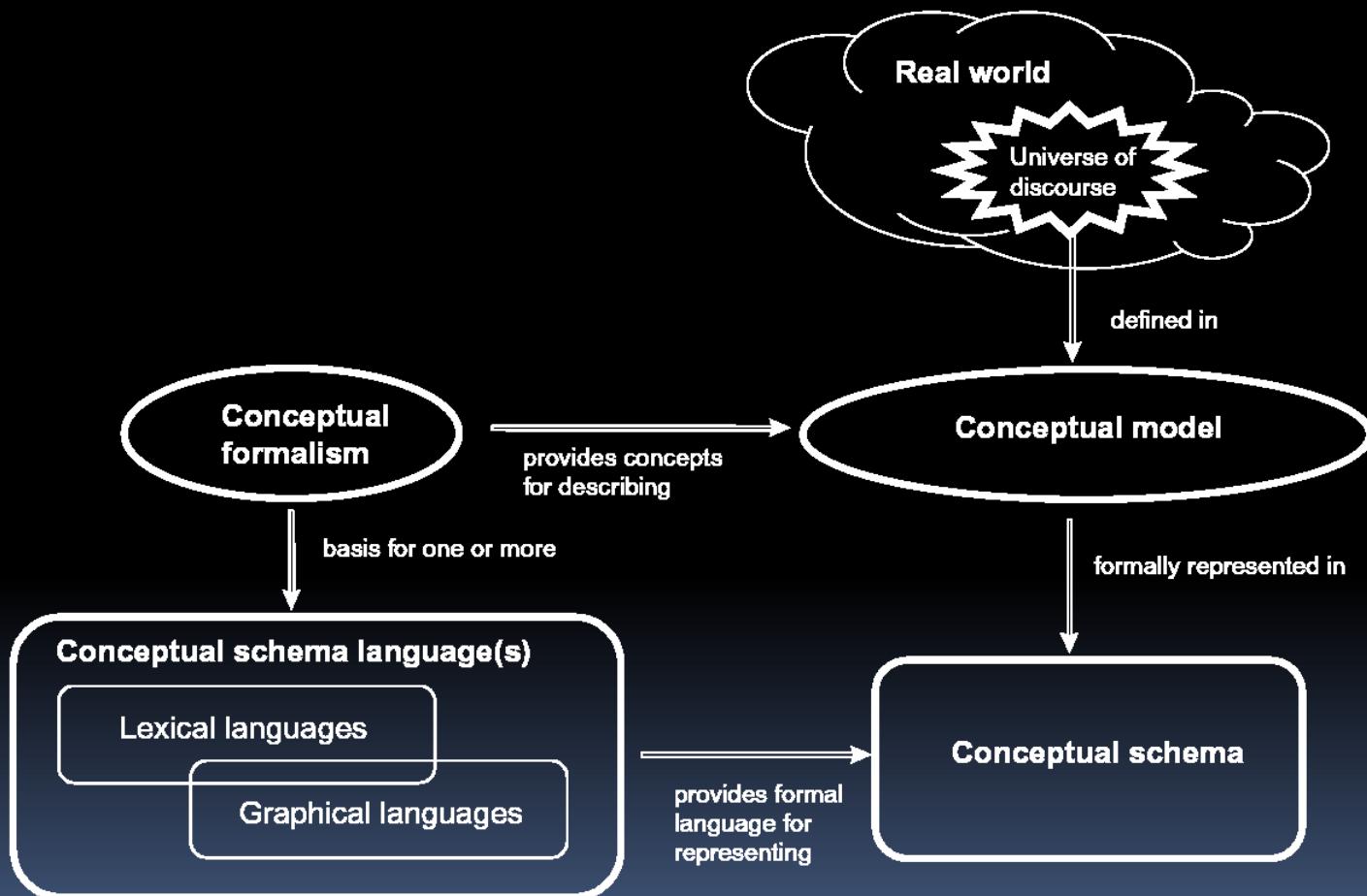
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세부 내용

- GML 세부사항
 - ▣ 개념적 스키마 (ISO 19100 시리즈의 프로파일)
 - UML, feature, spatial schema, CRS, temporal schema, coverage
 - ▣ 기술 언어
 - XML, XML Namespace, XLink, XML Schema
 - ▣ GML 스키마
 - General rules, base schema, basic types, geometry, CRS, temporal information and dynamic feature, coverage, dictionary, units, measures, values, directions, observations
 - ▣ 응용 스키마
 - 프로파일
 - 응용 스키마를 위한 규칙

개념적 스키마

개념적 스키마 언어

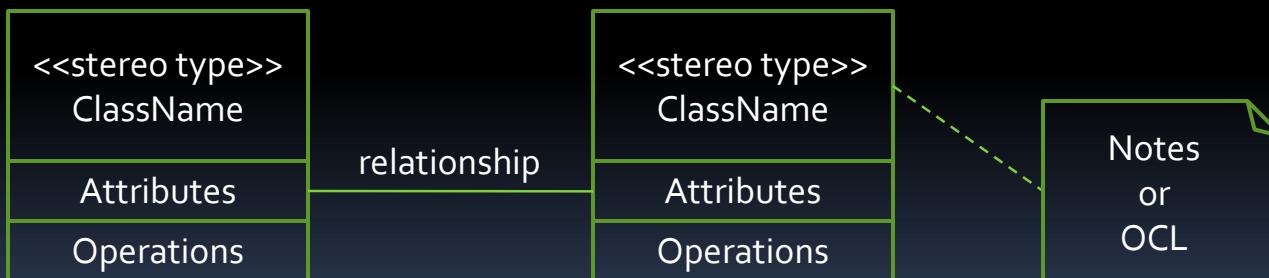


현실에서 개념적 스키마로의 표현 (ISO 19103)

UML - 클래스 다이어그램

■ 클래스

- 공통적인 속성, 연산, 관계 및 의미를 공유하는 객체들의 집합의 기술



UML - 클래스 다이어그램

■ 속성 기술

```
<property> ::= [<visibility>] ['/' <name> [':<prop-type>] ['<multiplicity>'] [= <default>] ['{' <prop-modifier> [, <prop-modifier>]* '}' ]
```

- Ex) +coordinates : Number[1..*] {sequence}
- Ex) #origin : Point [0..1]
- Ex) -characterSet : MD_CharacterSetCode = “utf8”

■ 연산자 기술

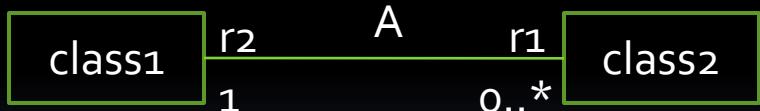
```
[<visibility> <name> '(' [<parameter-list>] ')' [':<return-type>] ['{' <oper-property> [, <oper-property>]* '}' ]]
```

- Ex) +dimension(point : DirectPosition = NULL) : Integer
- Ex) +GM_Surface(patch[1..*] : GM_SurfacePatch) : GM_Surface
- Ex) + buffer(radius : Distance) : GM_Object

UML - 클래스 다이어그램

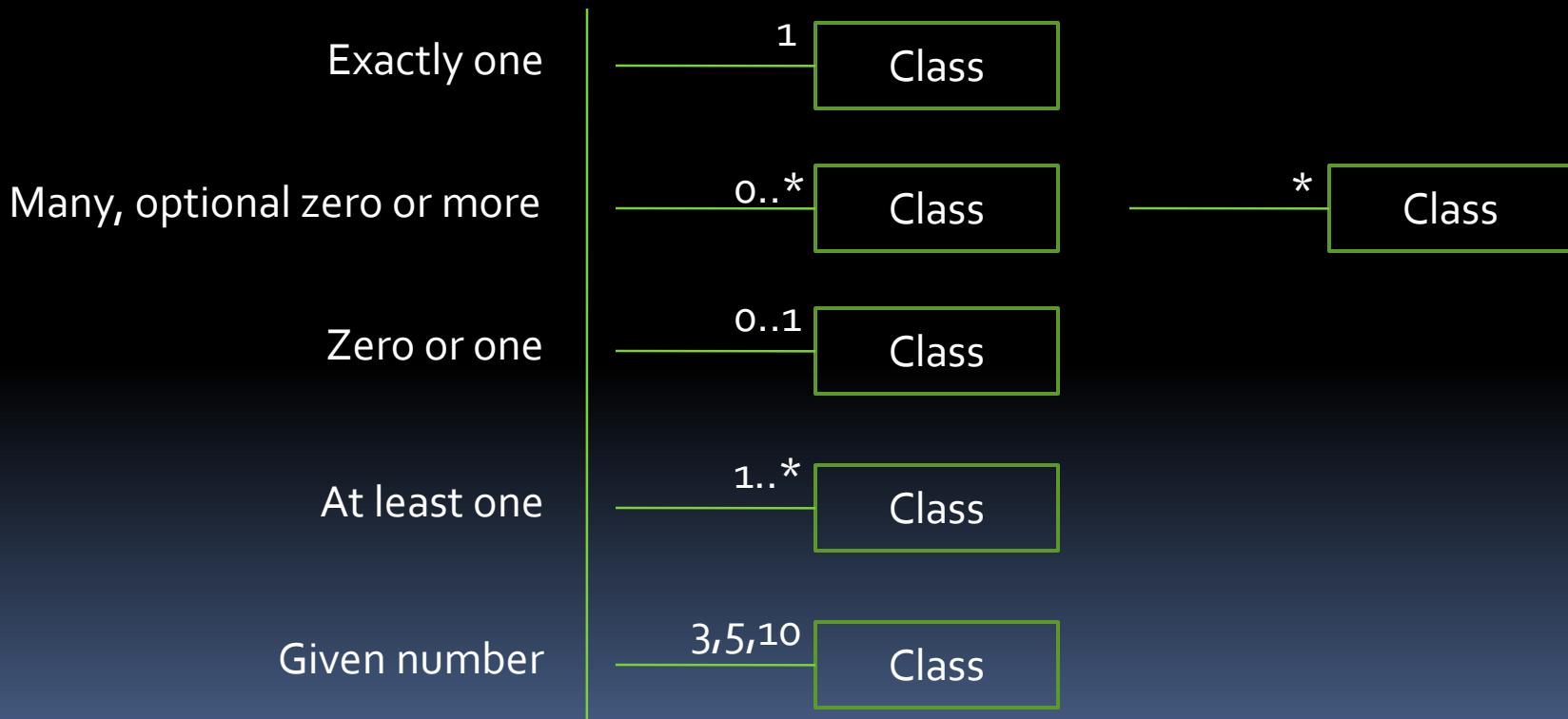
■ Relationship

▫ 모델의 요소들 간의 구체화된 의미적 연결



UML - 클래스 다이어그램

■ Relationship



기술 언어

XML Schema

XML

시작

- XML (eXtensible Markup Language)
 - XML 문서라고 불리는 데이터 객체들의 클래스를 기술



XML 네임스페이스

- 동기

- XML에서 요소의 이름과 속성 이름의 인식 및 충돌의 문제를 회피

- XML Namespace

- IRI(Internationalized Resource Identifiers)을 네임스페이스의 이름으로 사용
 - 예약된 속성을 사용하여 선언
 - *xmlns:*

```
<x xmlns:edi='http://ecommerce.example.org/schema'>
  <!-- the "edi" prefix is bound to http://ecommerce.example.org/schema
      for the "x" element and contents -->
  <edi:abc />
</x>
```

XLink

XML Linking Language

■ XLink

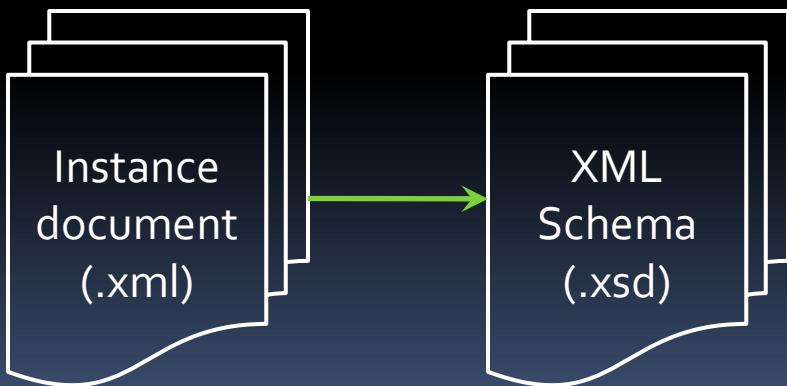
- ▣ 리소스 간의 연결을 생성하고 기술하기 위해 요소가 XML 문서 내에 삽입되도록 함

```
<my:crossReference  
    xmlns:my="http://example.com/"  
    xmlns:xlink="http://www.w3.org/1999/xlink"  
    xlink:type="simple"  
    xlink:href="students.xml"  
    xlink:role="http://www.example.com/linkprops/studentlist"  
    xlink:title="Student List"  
    xlink:show="new"  
    xlink:actuate="onRequest">  
    Current List of Students  
</my:crossReference>
```

XML Schema

XML 스키마

- 스키마의 목적
 - XML 문서 정의
- 인스턴스 문서
 - 특정 스키마의 형식을 따르는 XML 문서



```
<?xml version="1.0"?>
<purchaseOrder orderDate="1999-10-20">
  <shipTo country="US">
    <name>Alice Smith</name>
    <street>123 Maple Street</street>
    <city>Mill Valley</city>
    <state>CA</state>
    <zip>90952</zip>
  </shipTo>
  <billTo country="US">
    <name>Robert Smith</name>
    <street>8 Oak Avenue</street>
    <city>Old Town</city>
    <state>PA</state>
    <zip>95819</zip>
  </billTo>
  <comment>Hurry, my lawn is going wild!</comment>
  <items>
    <item partNum="872-AA">
      <productName>Lawnmower</productName>
      <quantity>1</quantity>
      <USPrice>148.95</USPrice>
      <comment>Confirm this is electric</comment>
    </item>
    <item partNum="926-AA">
      <productName>Baby Monitor</productName>
      <quantity>1</quantity>
      <USPrice>39.98</USPrice>
      <shipDate>1999-05-21</shipDate>
    </item>
  </items>
</purchaseOrder>
```

Purchase Order, po.xml

XML Schema

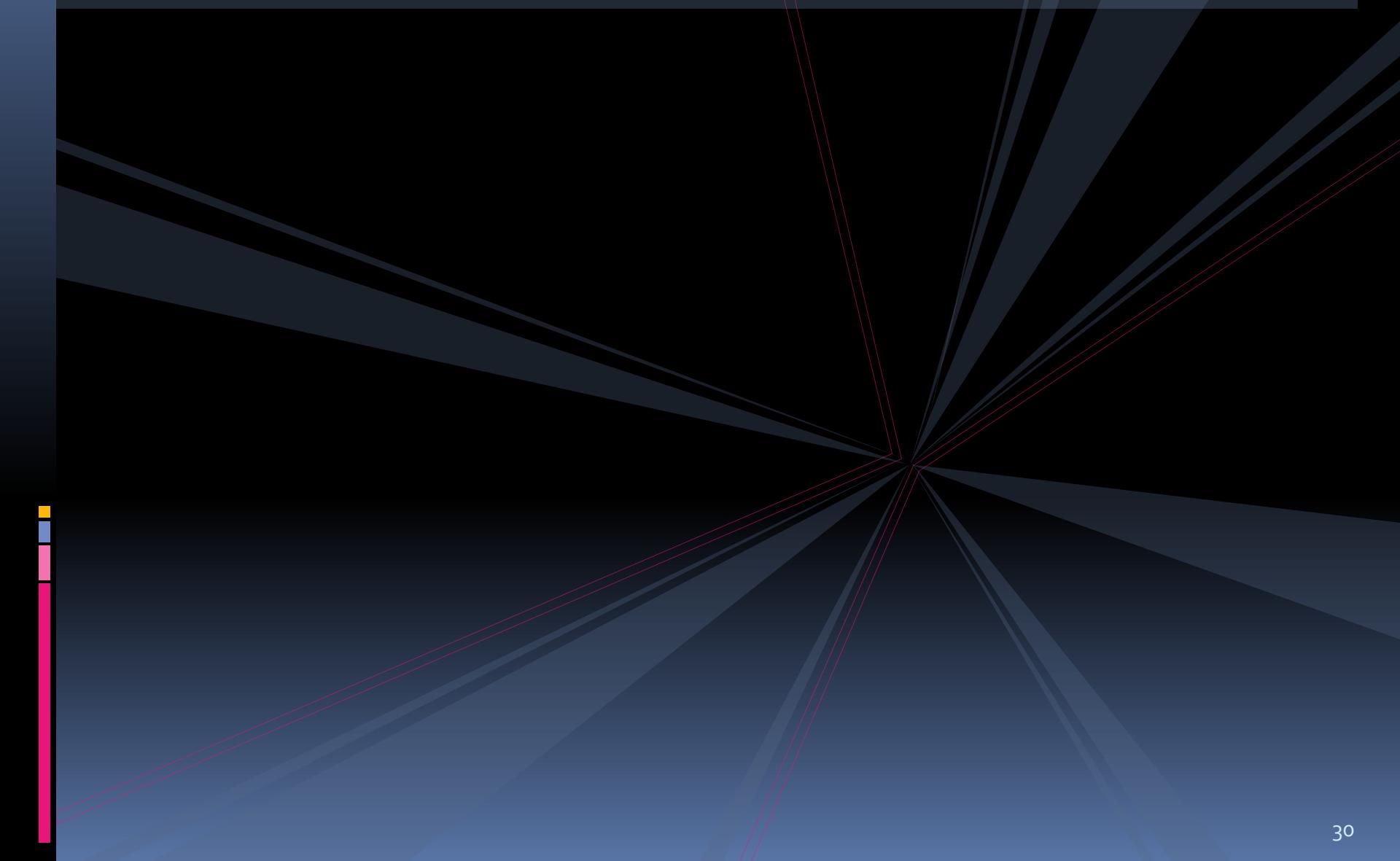
VIE SCHULE

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<xsd:annotation>
  <xsd:documentation xml:lang="en">
    Purchase order schema for Example.com.
    Copyright 2000 Example.com. All rights reserved.
  </xsd:documentation>
</xsd:annotation>
<xsd:element name="purchaseOrder" type="PurchaseOrderType"/>
<xsd:element name="comment" type="xsd:string"/>
<xsd:complexType name="PurchaseOrderType">
  <xsd:sequence>
    <xsd:element name="shipTo" type="USAddress"/>
    <xsd:element name="billTo" type="USAddress"/>
    <xsd:element ref="comment" minOccurs="0"/>
    <xsd:element name="items" type="Items"/>
  </xsd:sequence>
  <xsd:attribute name="orderDate" type="xsd:date"/>
</xsd:complexType>
<xsd:complexType name="USAddress">
  <xsd:sequence>
    <xsd:element name="name" type="xsd:string"/>
    <xsd:element name="street" type="xsd:string"/>
    <xsd:element name="city" type="xsd:string"/>
    <xsd:element name="state" type="xsd:string"/>
    <xsd:element name="zip" type="xsd:decimal"/>
  </xsd:sequence>
  <xsd:attribute name="country" type="xsd:NMTOKEN" fixed="US"/>
</xsd:complexType>
```

```
<xsd:complexType name="Items">
  <xsd:sequence>
    <xsd:element name="item" minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="productName" type="xsd:string"/>
          <xsd:element name="quantity">
            <xsd:simpleType>
              <xsd:restriction base="xsd:positiveInteger">
                <xsd:maxExclusive value="100"/>
              </xsd:restriction>
            </xsd:simpleType>
          </xsd:element>
          <xsd:element name="USPrice" type="xsd:decimal"/>
          <xsd:element ref="comment" minOccurs="0"/>
          <xsd:element name="shipDate" type="xsd:date" minOccurs="0"/>
        </xsd:sequence>
        <xsd:attribute name="partNum" type="SKU" use="required"/>
      </xsd:complexType>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
<!-- Stock Keeping Unit, a code for identifying products --&gt;
&lt;xsd:simpleType name="SKU"&gt;
  &lt;xsd:restriction base="xsd:string"&gt;
    &lt;xsd:pattern value="\d{3}-[A-Z]{2}"/&gt;
  &lt;/xsd:restriction&gt;
&lt;/xsd:simpleType&gt;
&lt;/xsd:schema&gt;</pre>
```



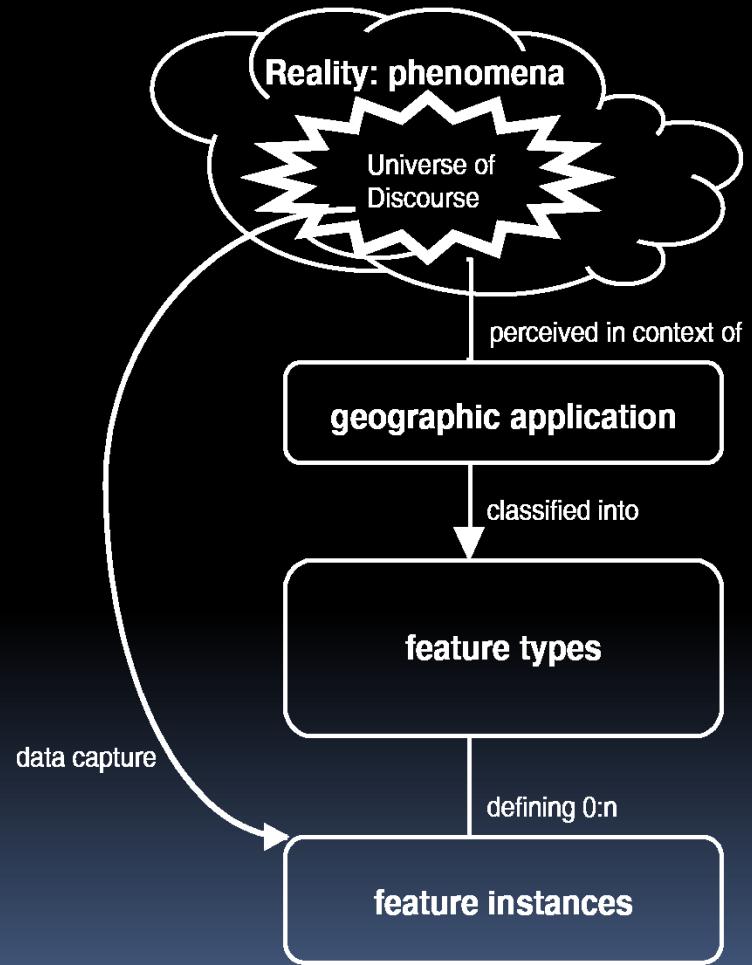
Feature



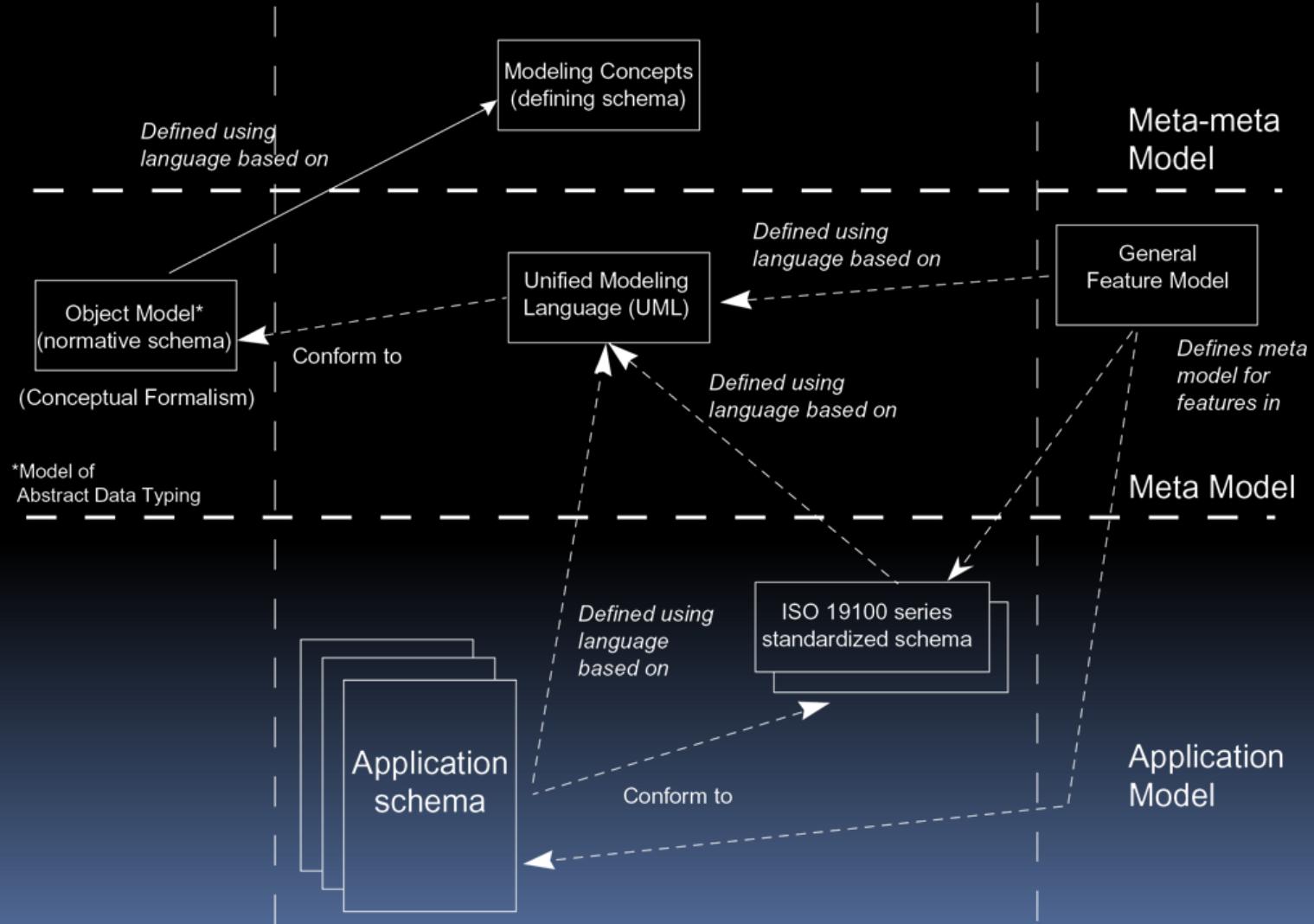
A dark blue background featuring a central point from which numerous thin, light-colored lines radiate outwards. In the bottom left corner, there is a vertical color bar consisting of four distinct horizontal bands: yellow, light blue, pink, and magenta.

Feature의 개념

- Feature
 - 지리정보의 기본적인 단위
 - 실 세계의 현상의 추상화
- Feature 타입
 - 개념으로 분류되는 실 세계 현상의 집합의 추상화
 - 예) 강, 다리
- Feature 인스턴스
 - 특정 실 세계 현상에 대한 추상화
 - 예) 한강, 한남대교

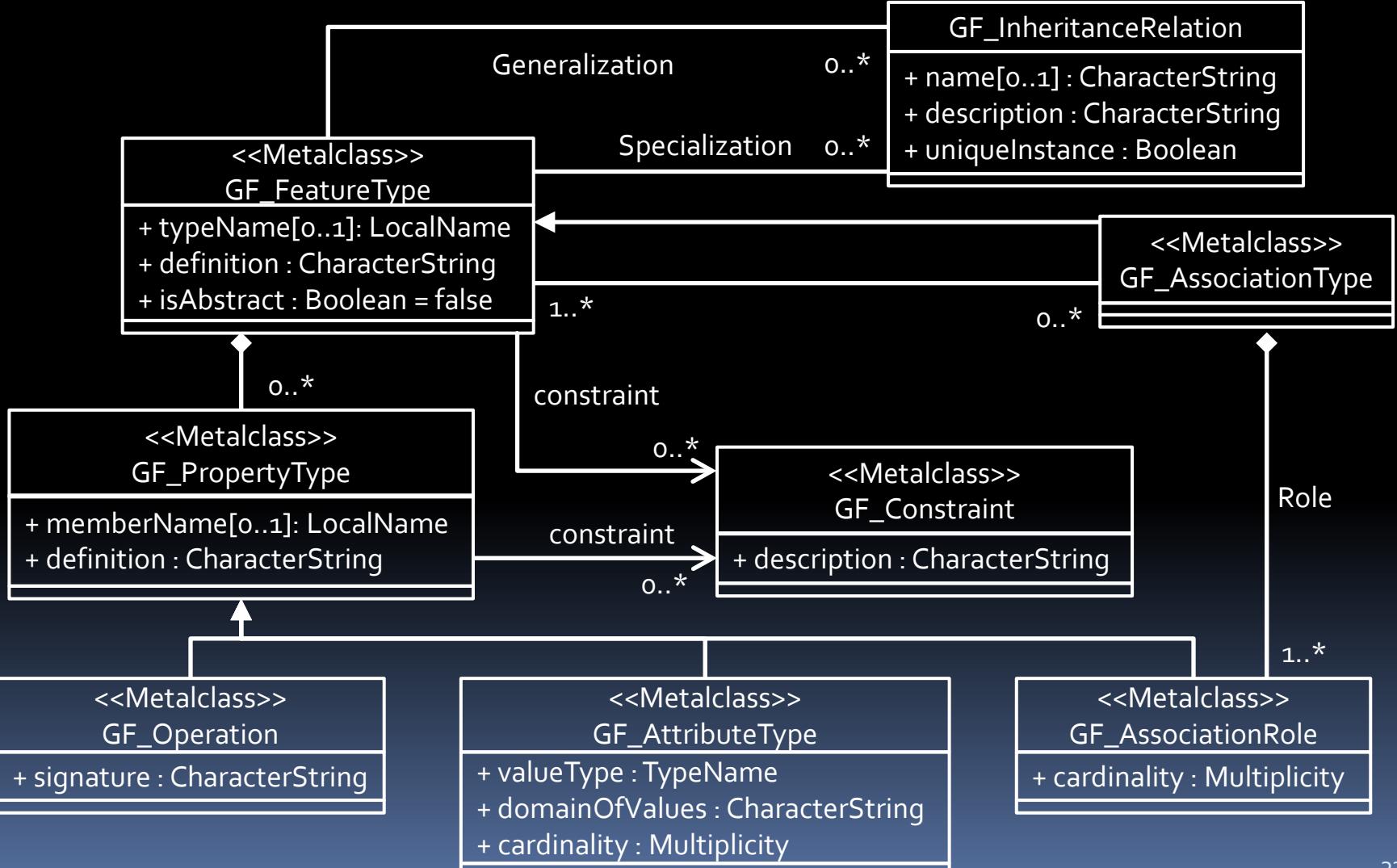


ISO 스키마의 구조

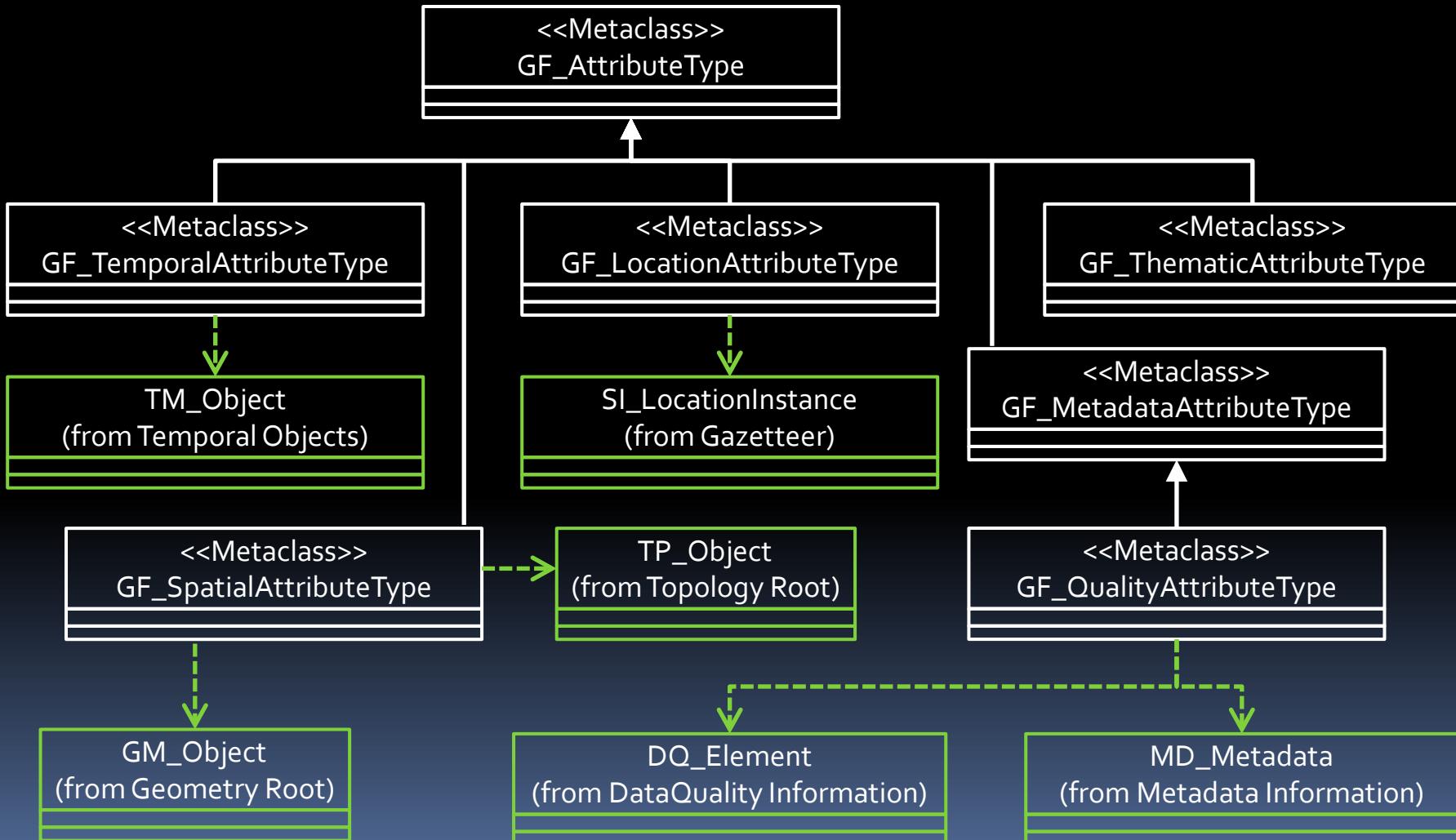


General Feature Model

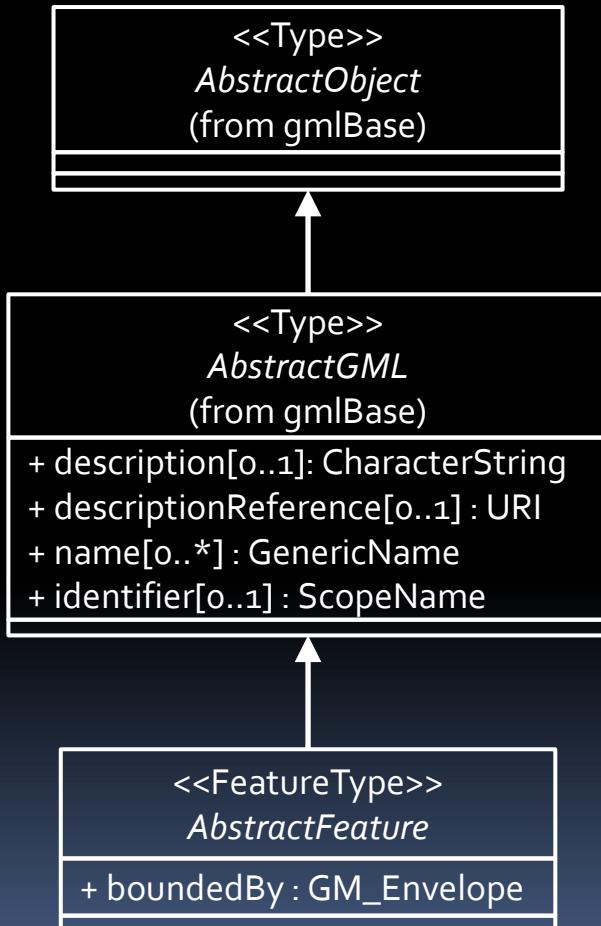
GENERAL LEGAL MODEL



Feature 탑의 속성들



Feature LÉGATURE

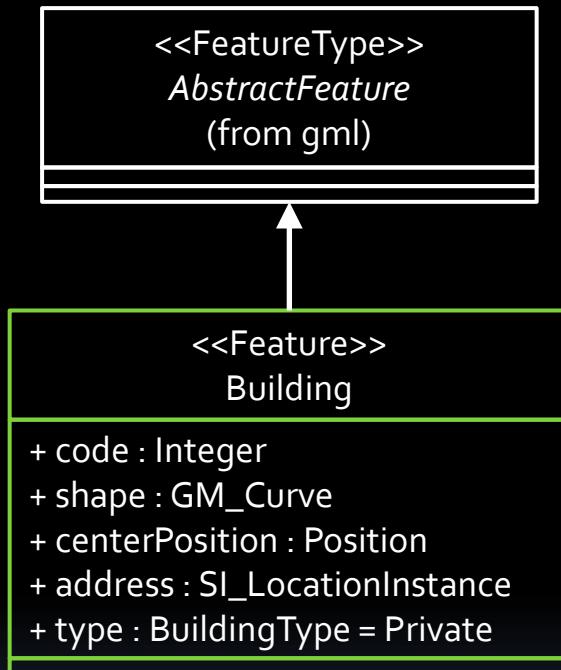


```
<complexType name="AbstractFeatureType" abstract="true">
<complexContent>
<extension base="gml:AbstractGMLType">
<sequence>
<element ref="gml:boundedBy" minOccurs="0"/>
<element ref="gml:location" minOccurs="0"/>
</sequence>
</extension>
</complexContent>
</complexType>

<element name="AbstractFeature"
type="gml:AbstractFeatureType"
abstract="true" substitutionGroup="gml:AbstractGML"/>
```

Feature의 예제

LG9016-1



```
<complexType name="BuildingType">
<complexContent>
<extension base="gml:AbstractFeatureType">
<sequence>
<element name="code" type="xs:integer"/>
<element name="shape" type="gml:CurvePropertType"/>
...
</sequence>
</extension>
</complexContent>
</complexType>

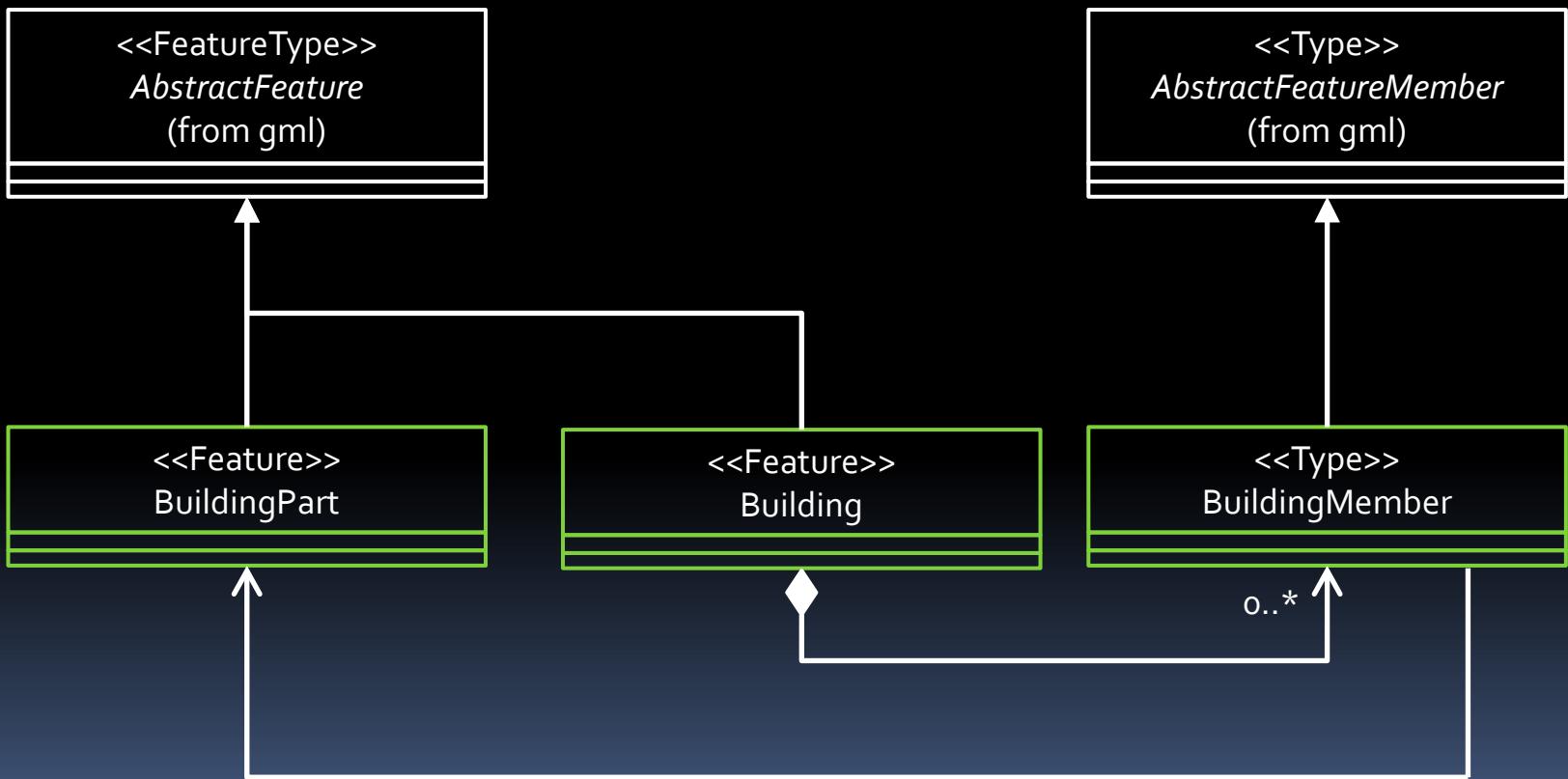
<element name="Building" type="my:BuildingType"
substitutionGroup="gml:AbstractFeature"/>
```

XML schema definition for the `BuildingType` complex type. It extends the `AbstractFeatureType` and defines a sequence of elements: `code` (type `xs:integer`) and `shape` (type `gml:CurvePropertType`). A substitution group is defined for the `Building` element.



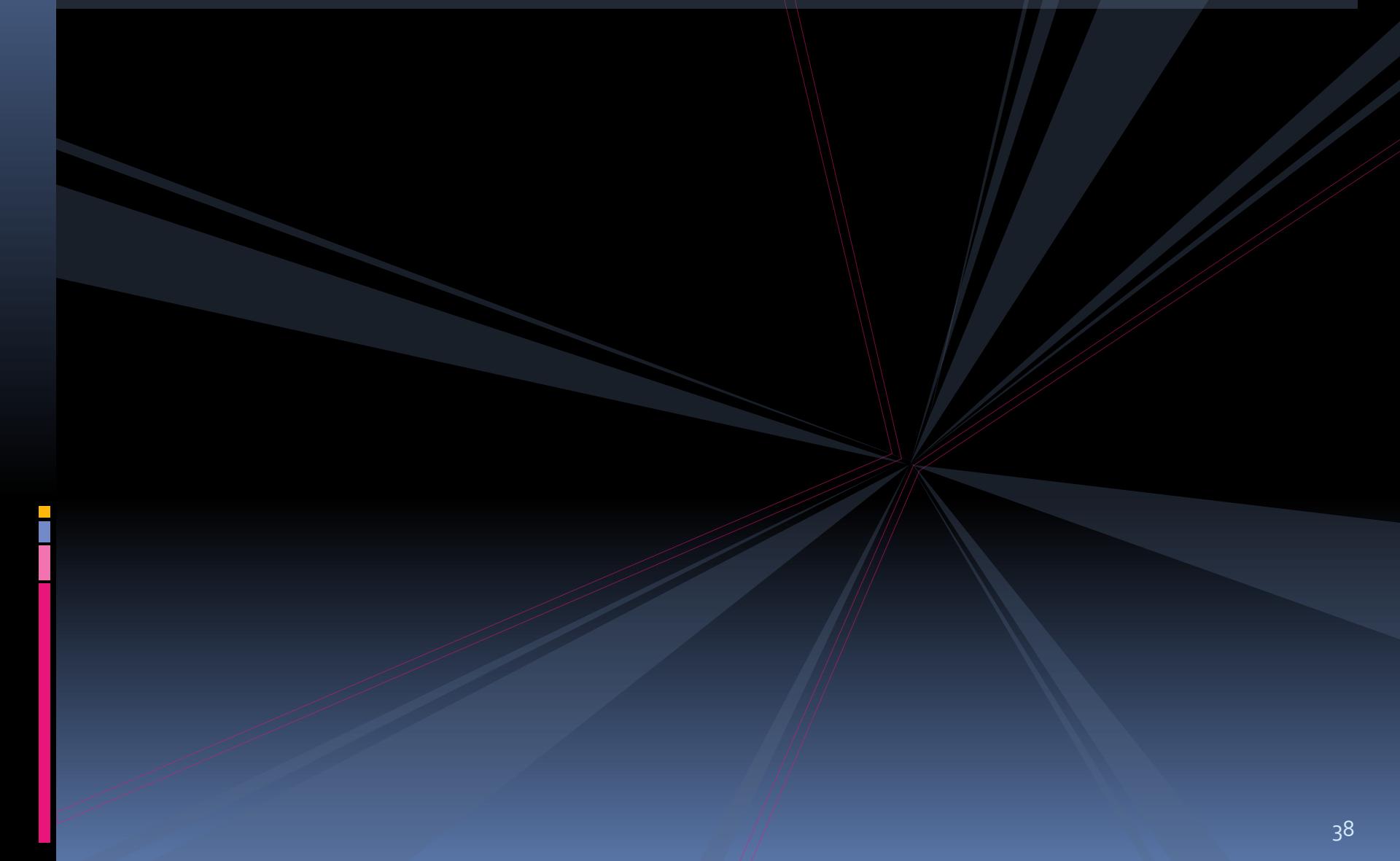
Feature Collection

LEGALIS COLLECTION





Spatial Schema



A decorative graphic on the left side features a vertical bar composed of several thin, light-colored horizontal stripes. To its right is a vertical color bar with four distinct segments: yellow at the top, followed by blue, pink, and red at the bottom. The main background is black, with a series of thin, light-colored lines radiating from a central point towards the edges, creating a starburst effect.

기본 개념

기하 객체

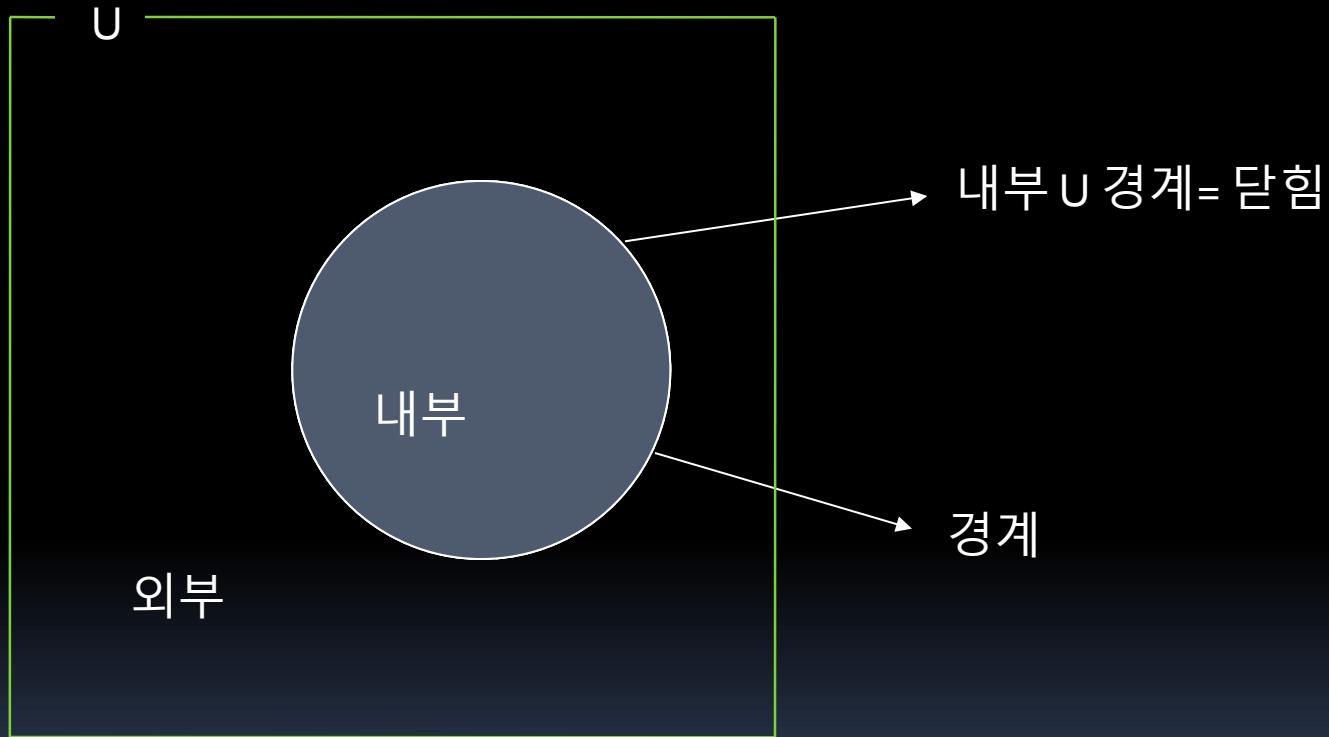
{
점
직선
사각형
...



→ 무한 점 집합

→ 점집합 이론

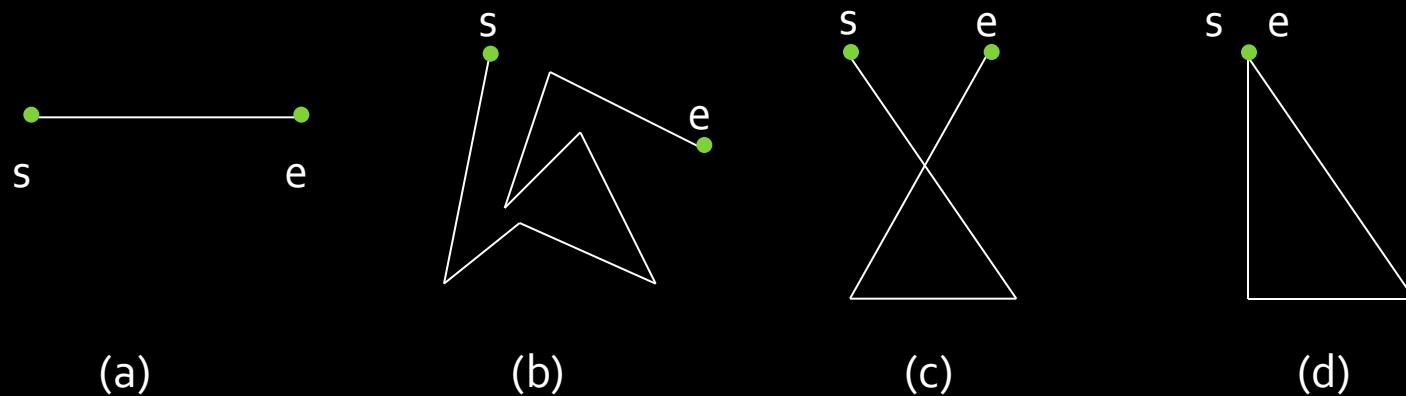
내부, 외부, 경계의 개념



경계와 차원 (B-Rep) (B-Rep)

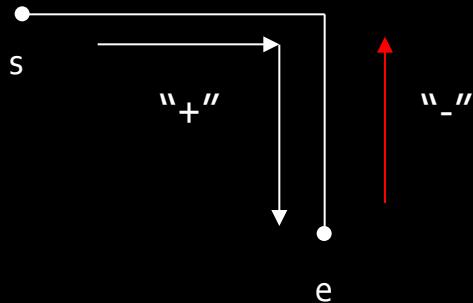
	Dim.	Boundary	Example
Point	0	Empty	.
Curve	1	Point	—●—●—
Surface	2	Curve	■
Solid	3	Surface	■■■■

Simple, Cycle의 개념

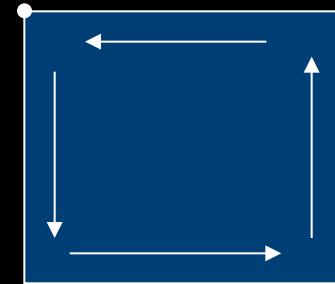


simple	cycle
(a), (b), (d)	(c)

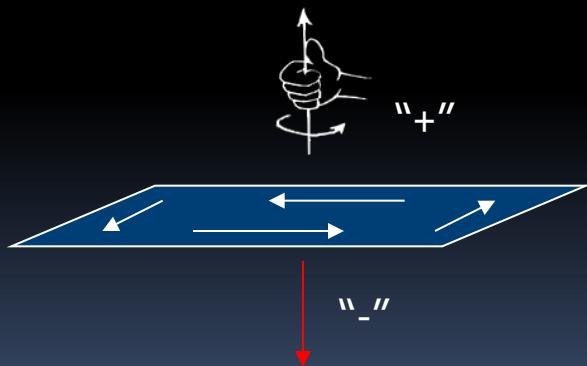
방향성의 개념



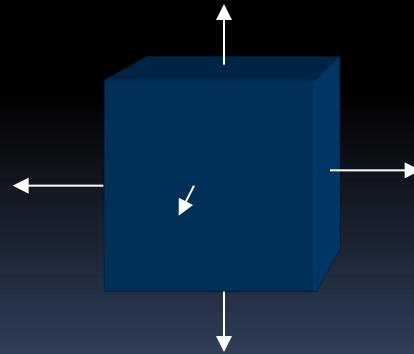
모든 커브에 대해서 커브의 진행 방향



경계로 사용될 때, 커브의 왼쪽 방향

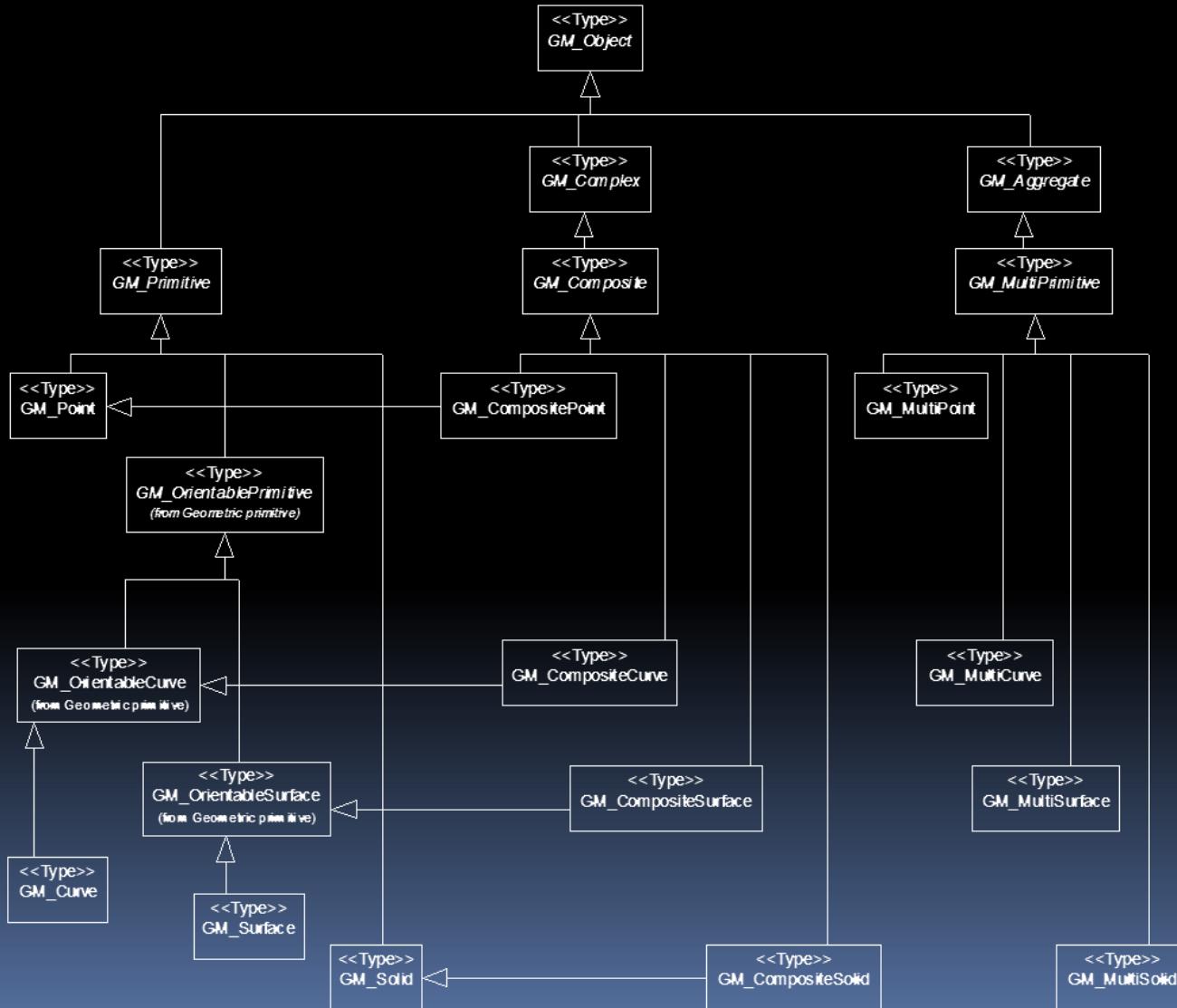


모든 면에 대해서 오른손 법칙에 의해 Z축

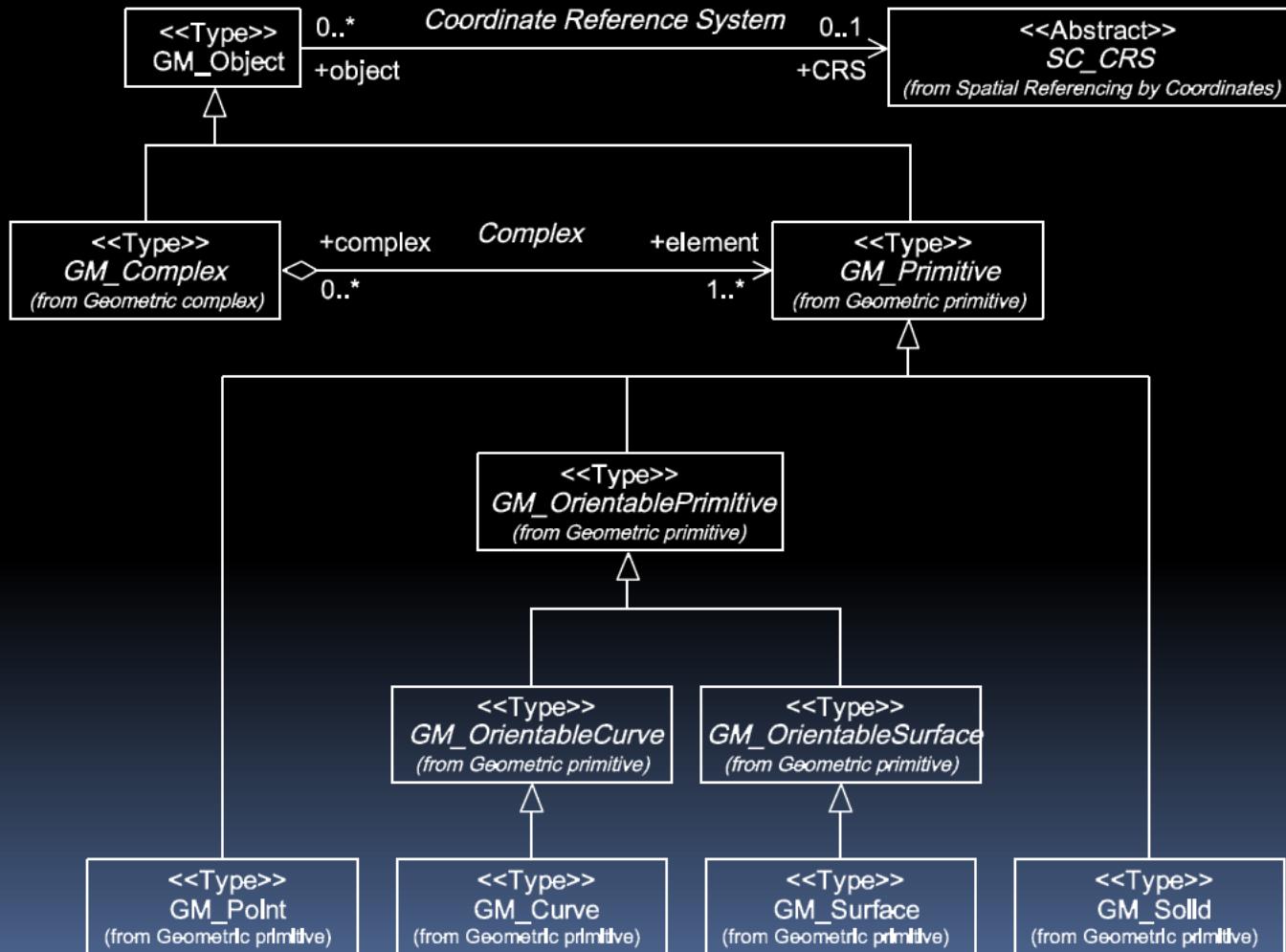


경계로 사용될 때, 면의 아래 방향

최상위 기하 다이어그램



Primitive STRUCTURE



Coordinates

COORDINATES?

```
<complexType name="DirectPositionType">
<simpleContent>
<extension base="gml:doubleList">
<attributeGroup ref="gml:SRSReferenceGroup"/>
</extension>
</simpleContent>
</complexType>
<element name="pos" type="gml:DirectPositionType"/>
```

```
<complexType name="DirectPositionListType">
<simpleContent>
<extension base="gml:doubleList">
<attributeGroup ref="gml:SRSReferenceGroup"/>
<attribute name="count" type="positiveInteger" />
</extension>
</simpleContent>
</complexType>
<element name="posList" type="gml:DirectPositionListType" />
```

```
<pos srsDimension="3">
10 5 3
</pos>
<pos srsDimension ="3">
11 5 4
</pos>
<pos srsDimension ="3">
20 10 8
</pos>
```

```
<posList
srsDimension ="3"
count="3">
10 5 3
11 5 4
20 10 8
</posList>
```

Point

Geometry

```
<<Type>>  
GM_Point  
+ position : DirectPosition
```

By value

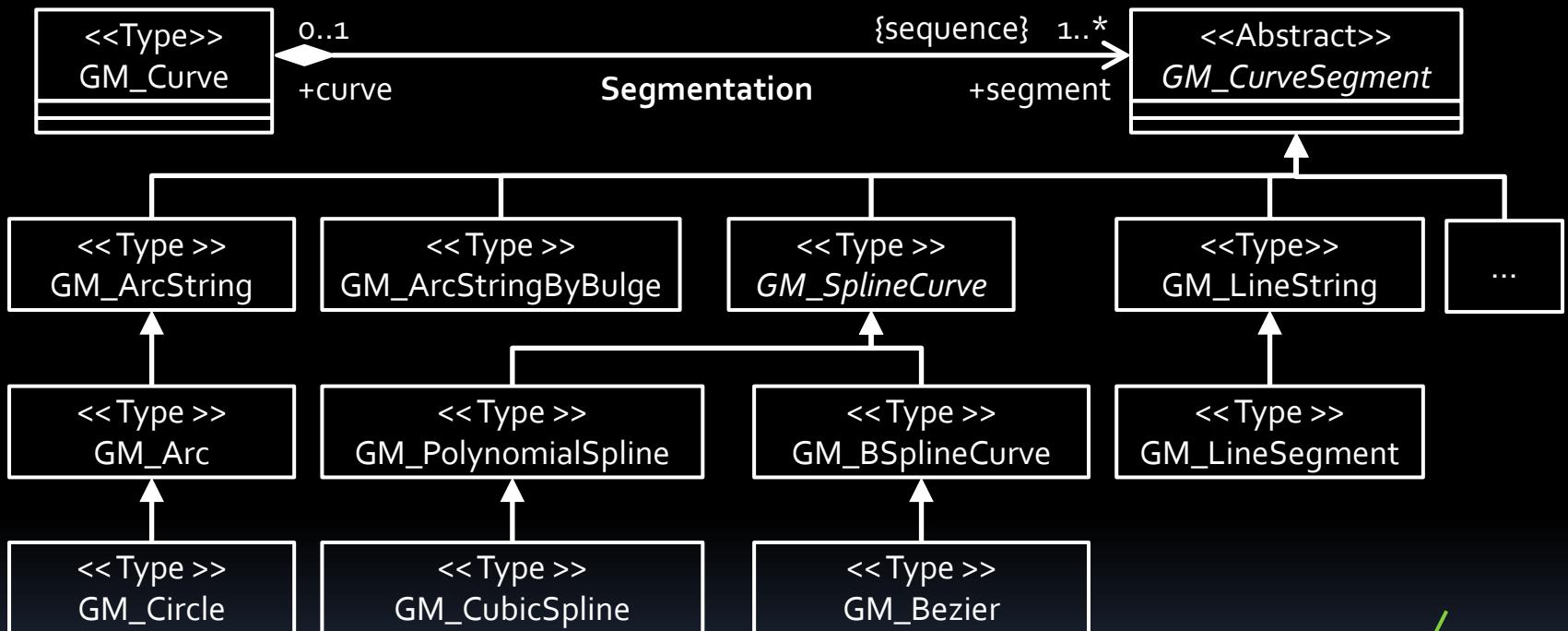
```
<my:centerPosition>  
<gml:Point id="p1" srsName="epsg:4326">  
<gml:pos srsDimension="2">  
5.5623 33.2323  
</gml:pos>  
</gml:Point>  
</my:centerPosition>
```

By reference

```
<my:centerPosition xlink:xhref="#p1"/>
```

Curve

CALAG



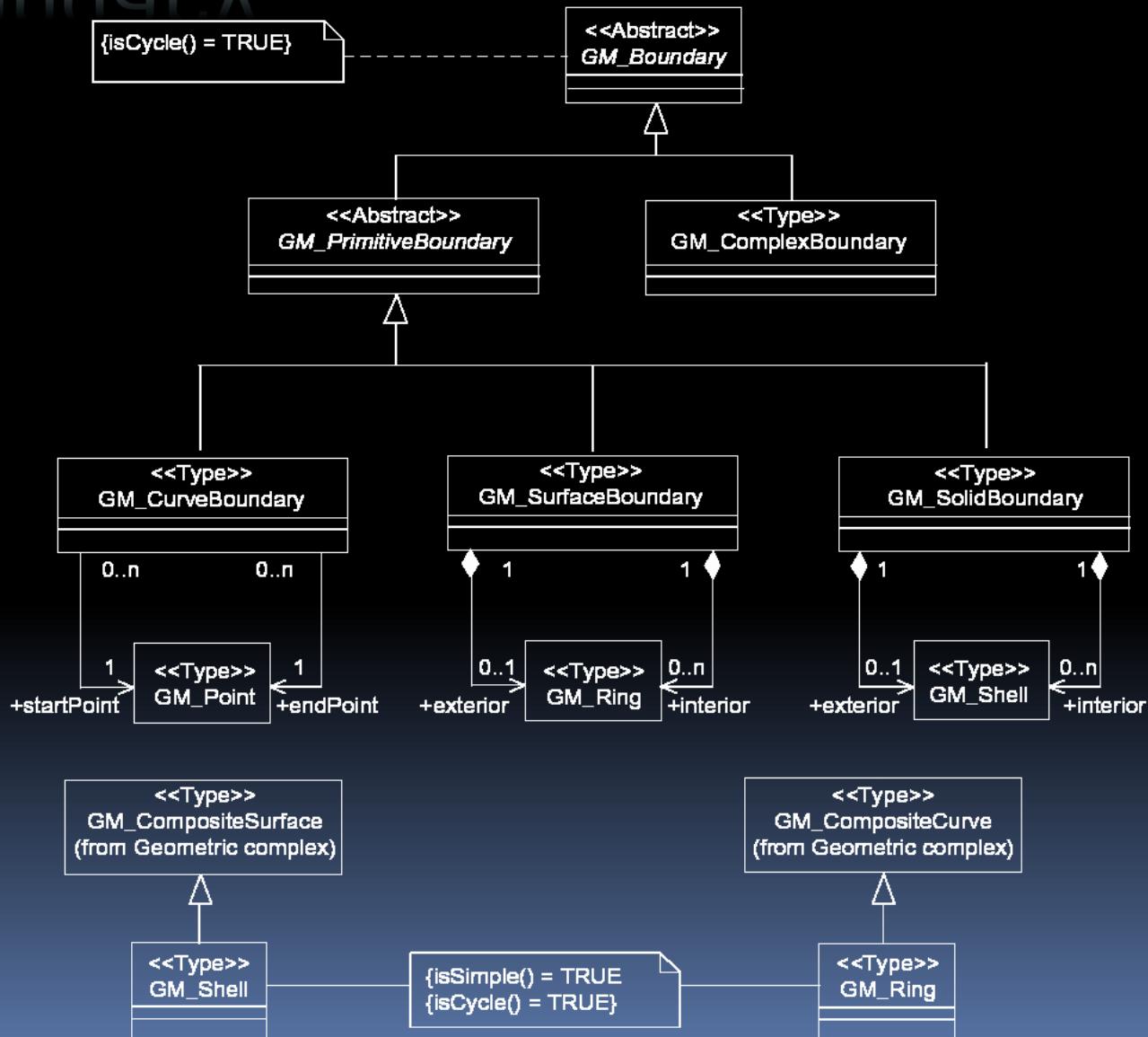
LineString

```
<complexType name="LineStringType">
<complexContent>
<extension base="gml:AbstractCurveType">
<sequence>
<choice>
<choice minOccurs="2" maxOccurs="unbounded">
<element ref="gml:pos"/>
<element ref="gml:pointProperty"/>
<element ref="gml:pointRep"/>
</choice>
<element ref="gml:posList"/>
<element ref="gml:coordinates"/>
</choice>
</sequence>
</extension>
</complexContent>
</complexType>
```

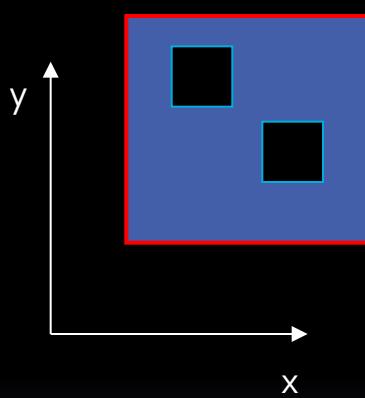
```
<gml:LineString>
<gml:posList srsDimension ="3"
count="3">
5618686.0 2573988.4 158.200000
5618692.5 2574008.8 158.000000
5618705.5 2574049.8 158.100000
</gml:posList>
</gml:LineString>
```

Boundary

BOUNDARY

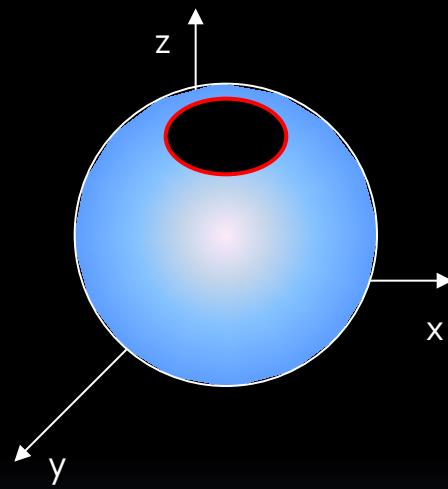


면의 외부 경계에 개수



2-Dimension plane

→ 1 exterior boundary

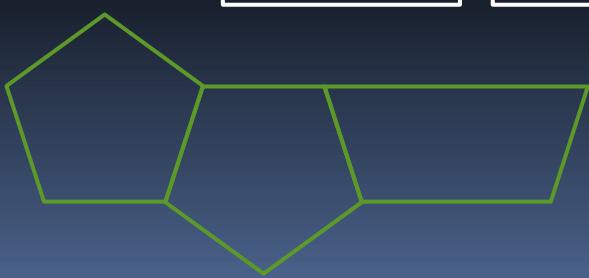
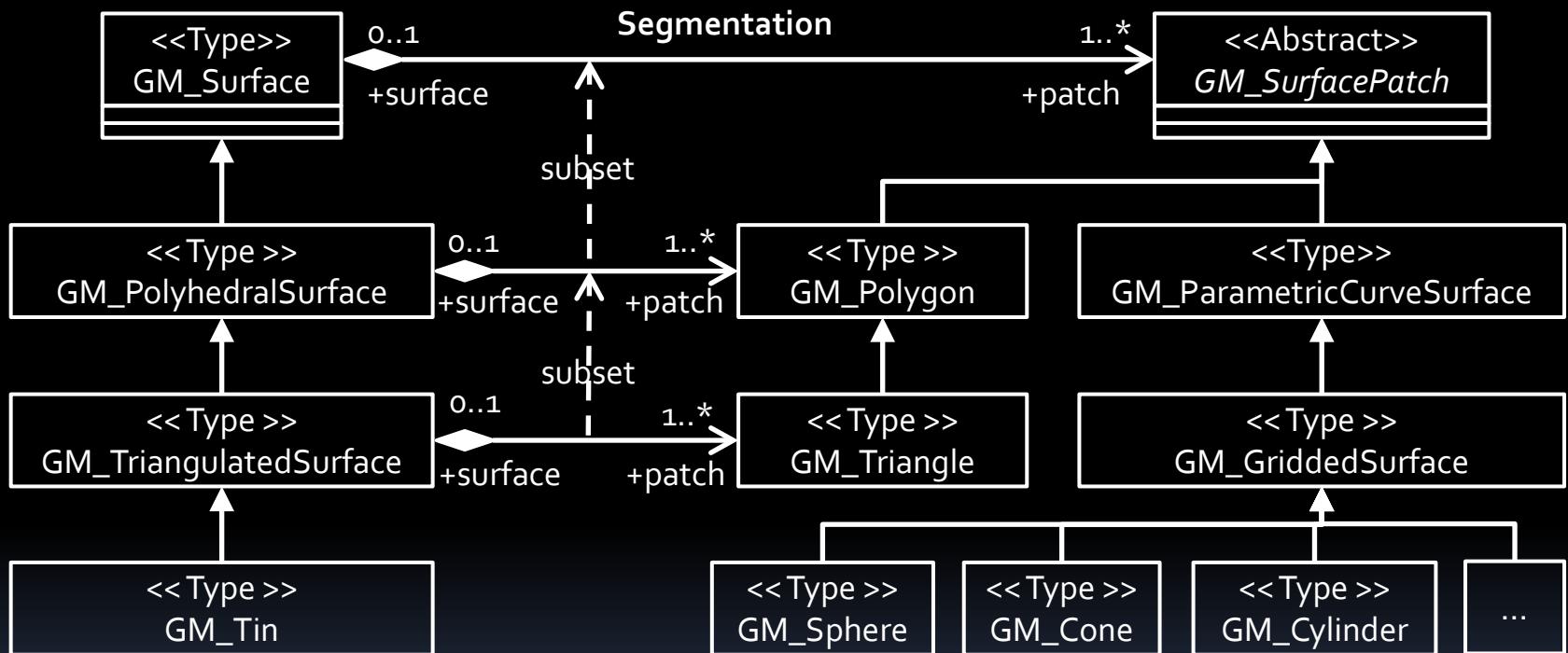


3-Dimension surface

→ 0 exterior boundary

Surface

Segmentation



Polygon and LinearRing

```
<complexType name="PolygonType">
<complexContent>
<extension base="gml:AbstractSurfaceType">
<sequence>
<element ref="gml:exterior" minOccurs="0" />
<element ref="gml:interior" minOccurs="0"
maxOccurs="unbounded" />
</sequence>
</extension>
</complexContent>
</complexType>
```

```
<gml:Polygon>
<gml:exterior>
<gml:LineRing>
<gml:posList dimension="3">
  1 1 1
  1 5 1
  5 5 1
  5 1 1
  1 1 1
</gml:posList>
</gml:LineRing>
<gml:exterior>
</gml:Polygon>
```

Solid

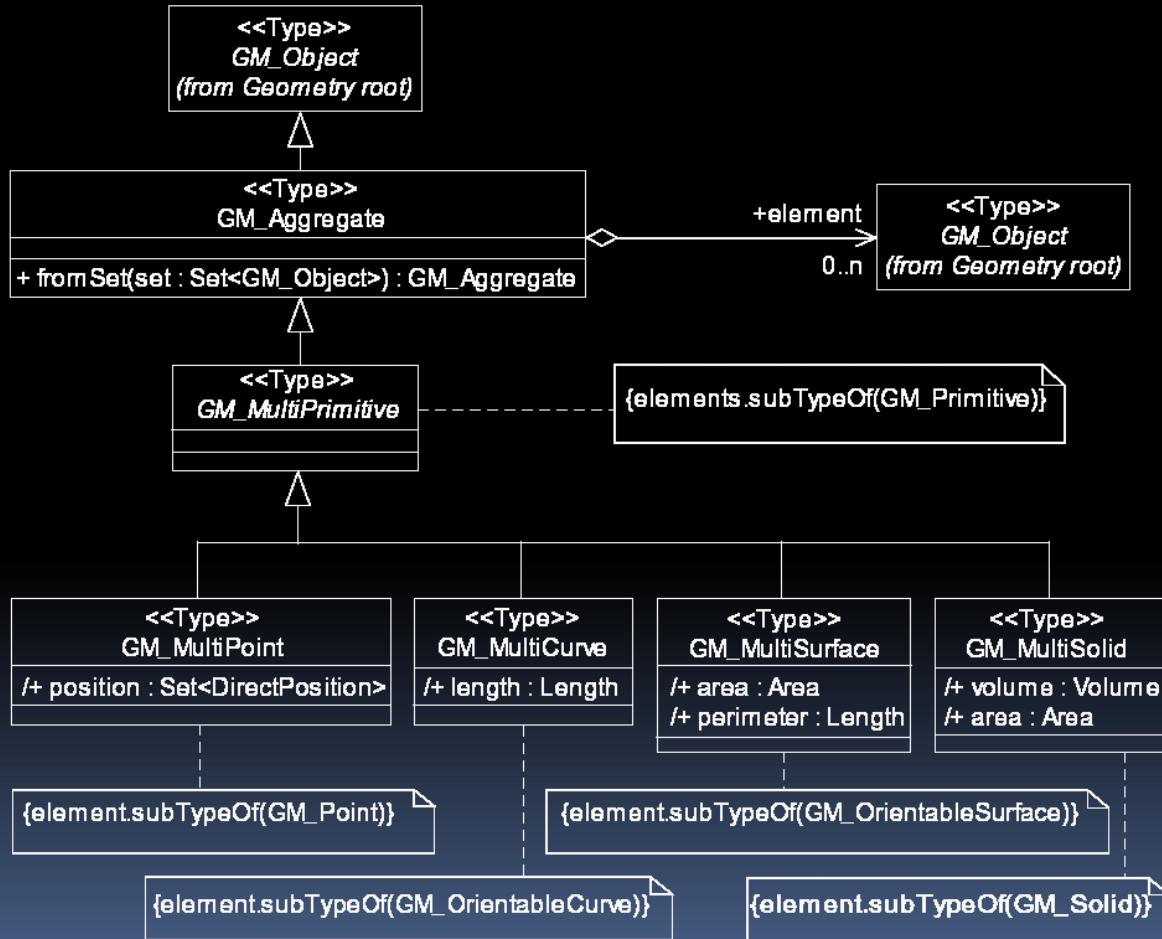
2010

```
<complexType name="SolidType">
<complexContent>
<extension base="gml:AbstractSolidType">
<sequence>
<element name="exterior"
type="gml:ShellPropertyType" minOccurs="0"/>
<element name="interior"
type="gml:ShellPropertyType" minOccurs="0"
maxOccurs="unbounded"/>
</sequence>
</extension>
</complexContent>
</complexType>
```

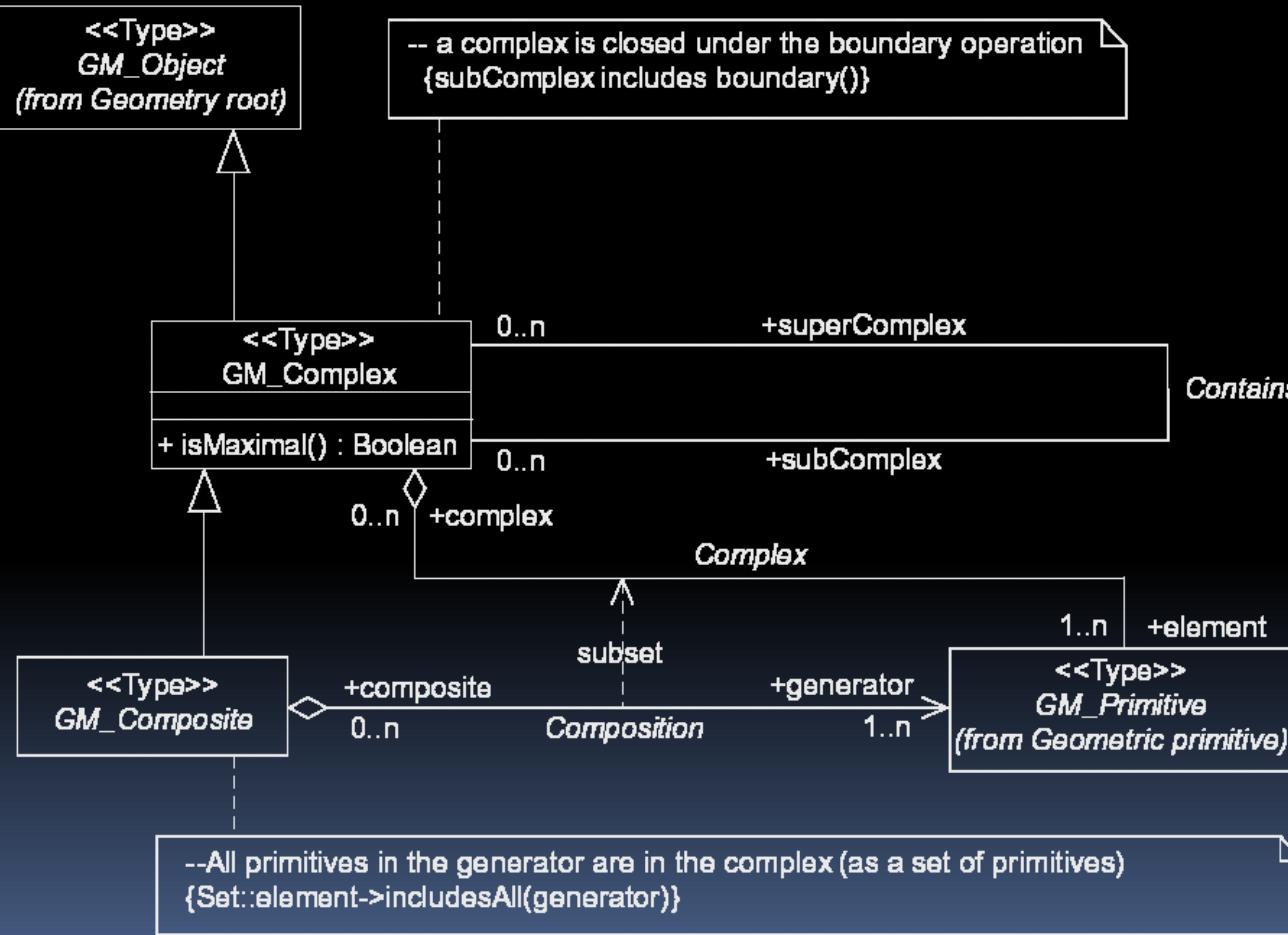
```
<gml:Solid>
<gml:exterior>
<gml:Shell>
<gml:surfaceMember>
<gml:Polygon>
<gml:exterior>
<gml:LineRing>
<gml:posList dimension="3">
  1 1 1
  1 5 1
  5 5 1
  5 1 1
  1 1 1
  ...
</gml:posList>
</gml:LineRing>
</gml:exterior>
</gml:Shell>
</gml:exterior>
</gml:Solid>
```

Aggregate

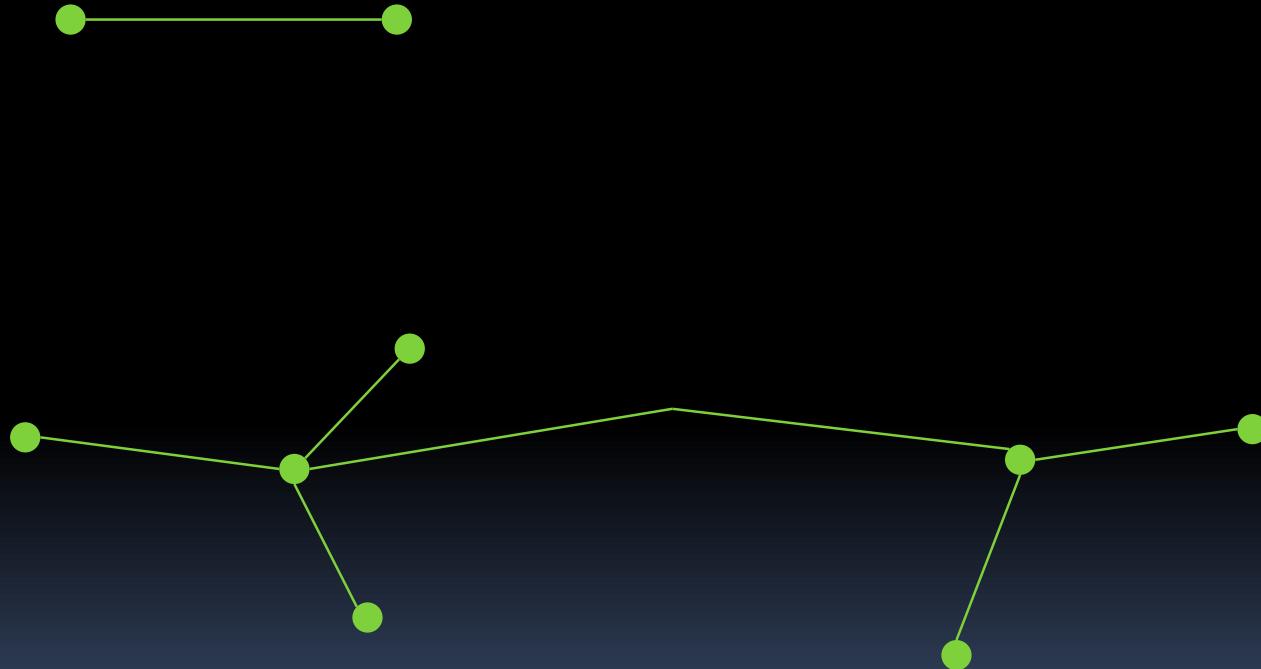
Aggregate



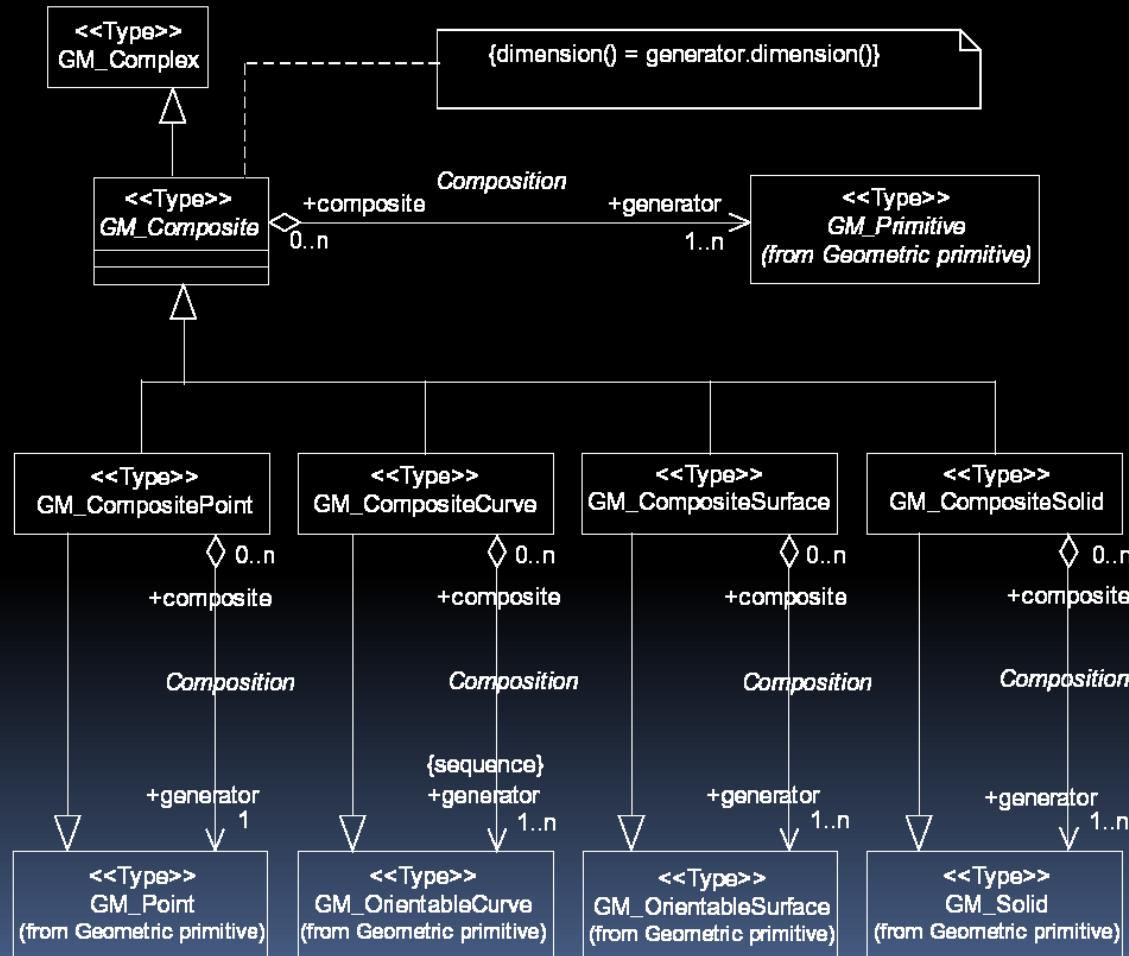
Complex



Complex coupling



Composite COMPOSITE

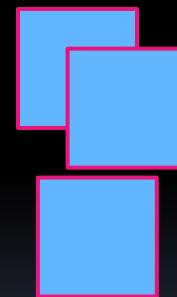


집합 기하 객체의 비교

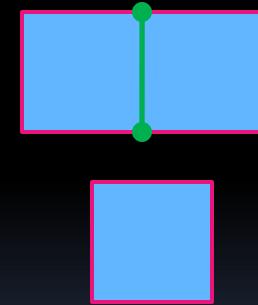
- Aggregate, MultiPrimitive, Complex, Composite의 차이점



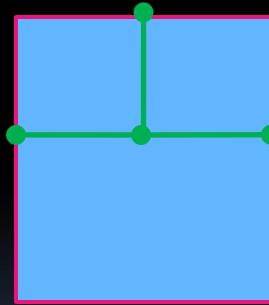
Aggregate



Multi Surface



Complex

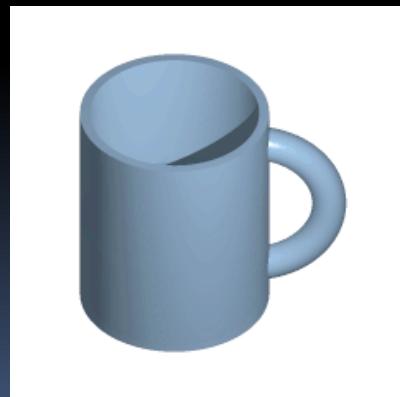


Composite Surface

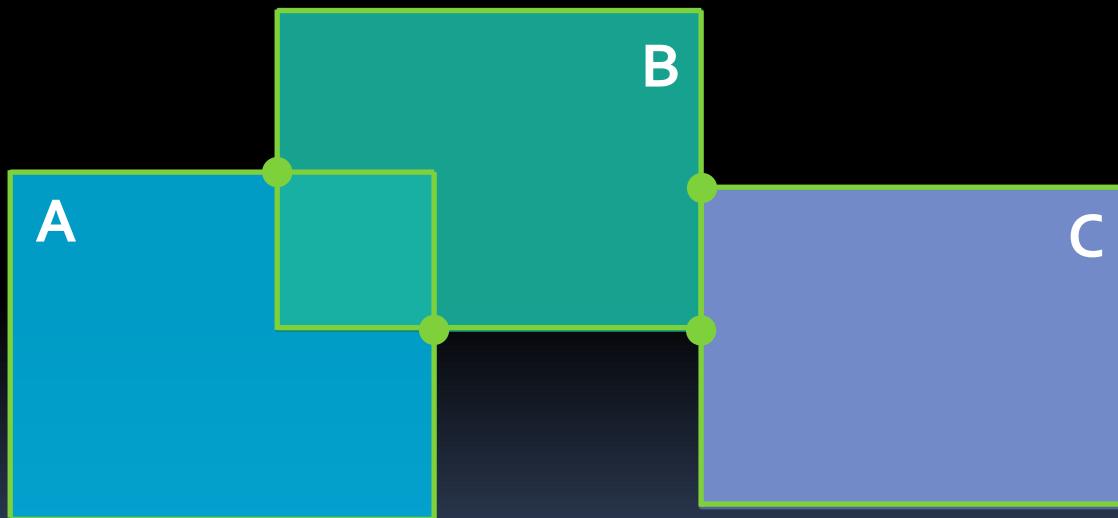
위상의 개념

■ Topology

- 기하 공간이 유연하고 연속적으로 변형되더라도 기하적인 특성이 변하지 않는 특성
- 예) 그래프의 연결성

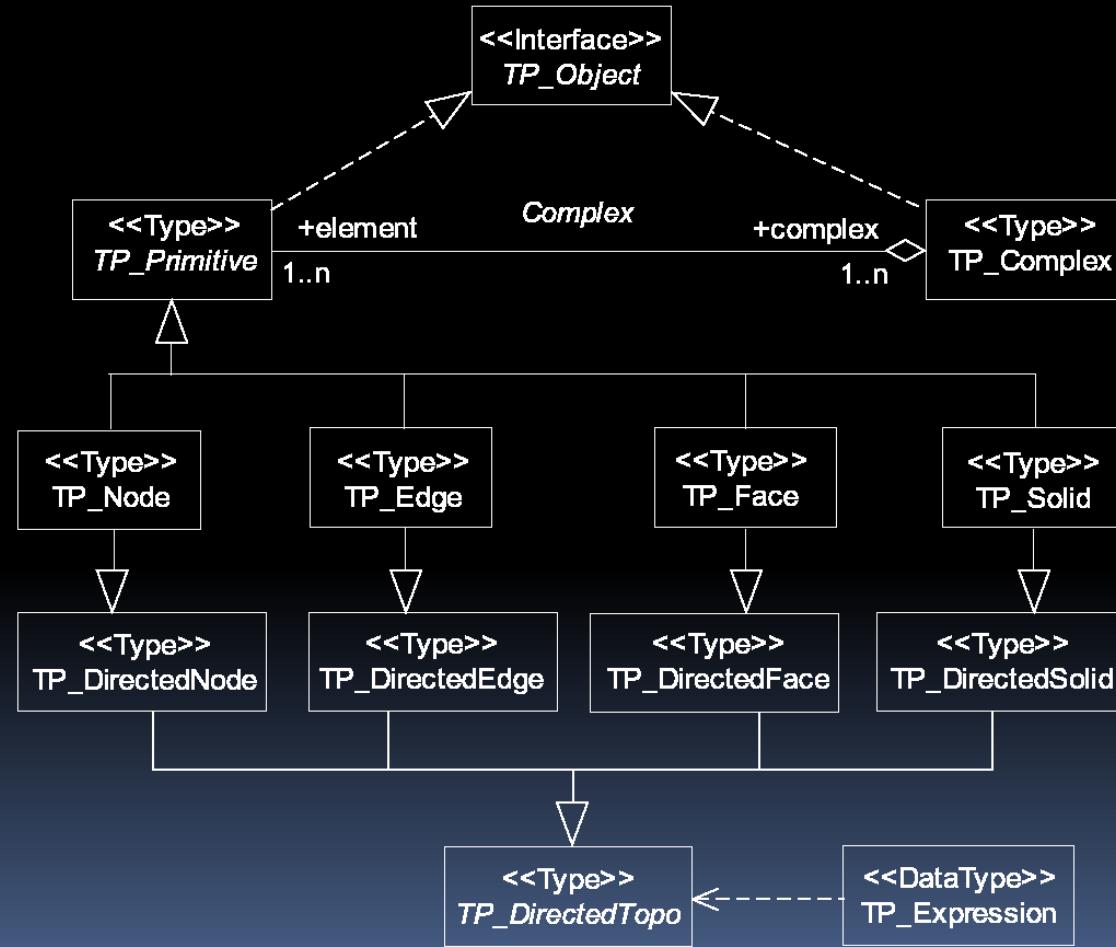


위상의 활용

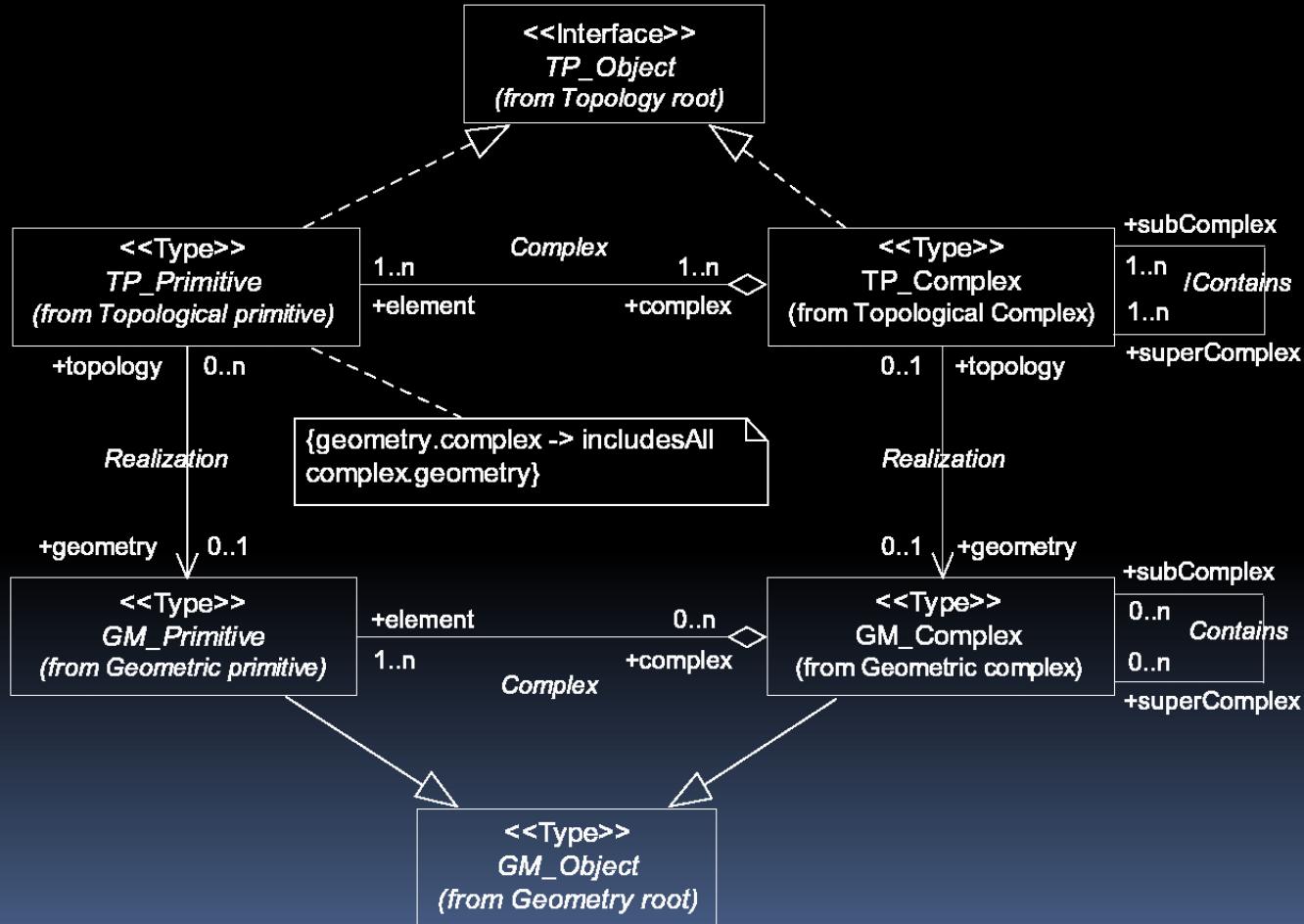


Topology

Robotics

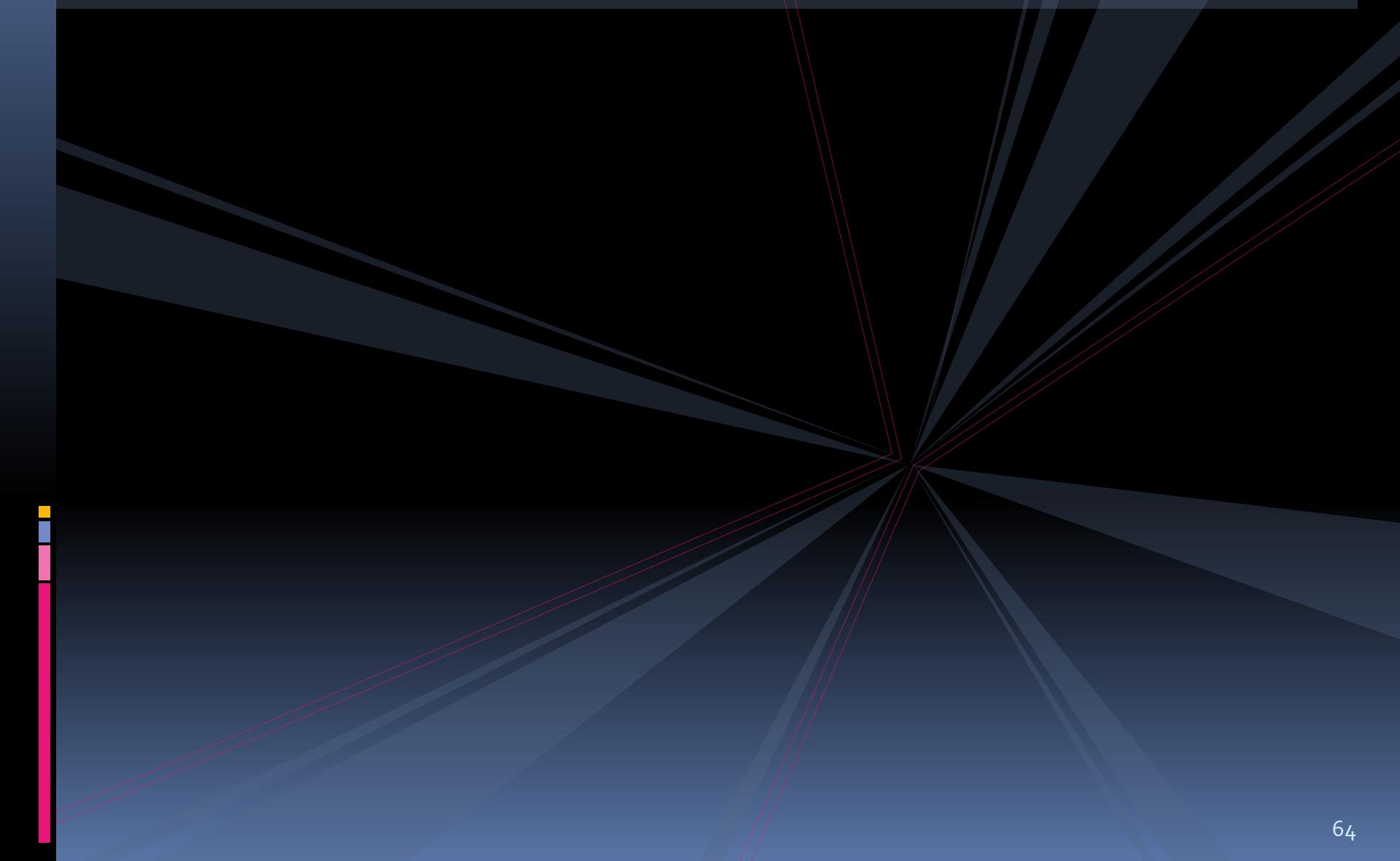


기하와 위상의 관계

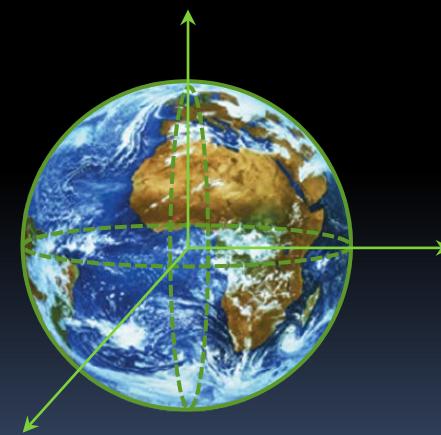
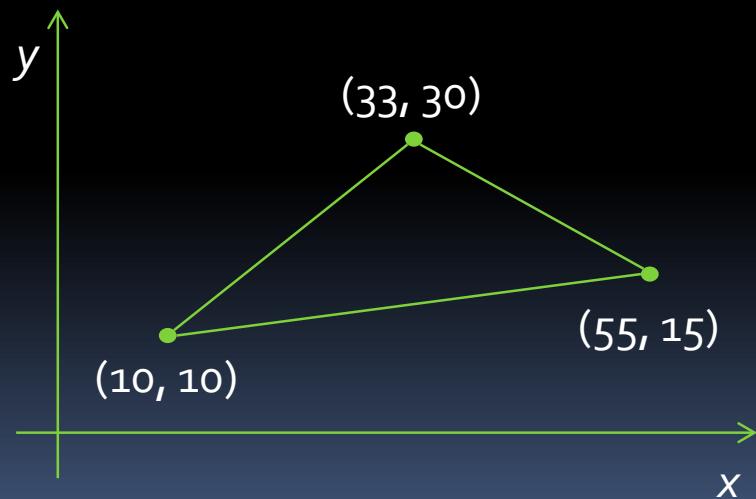




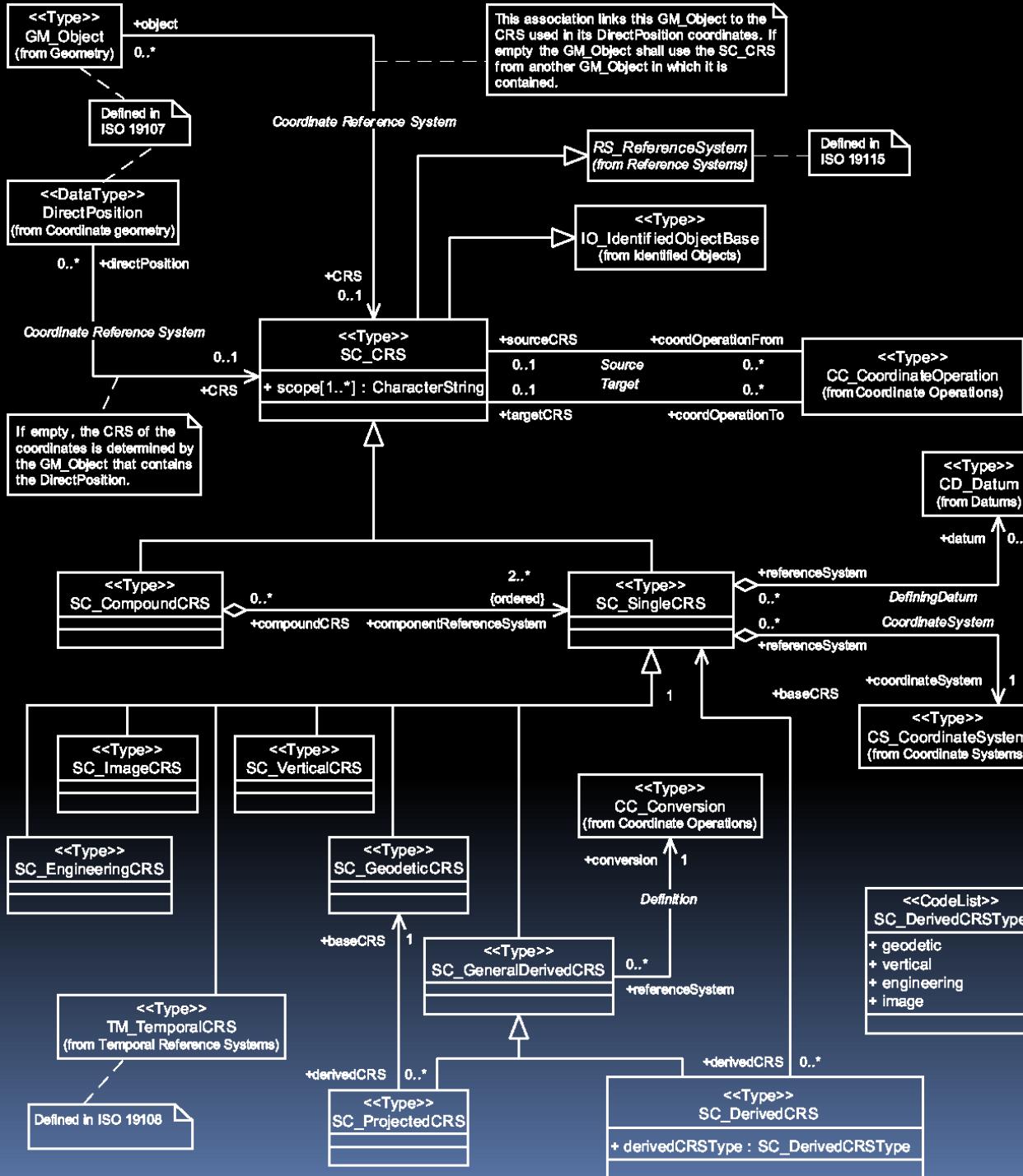
CRS Schema



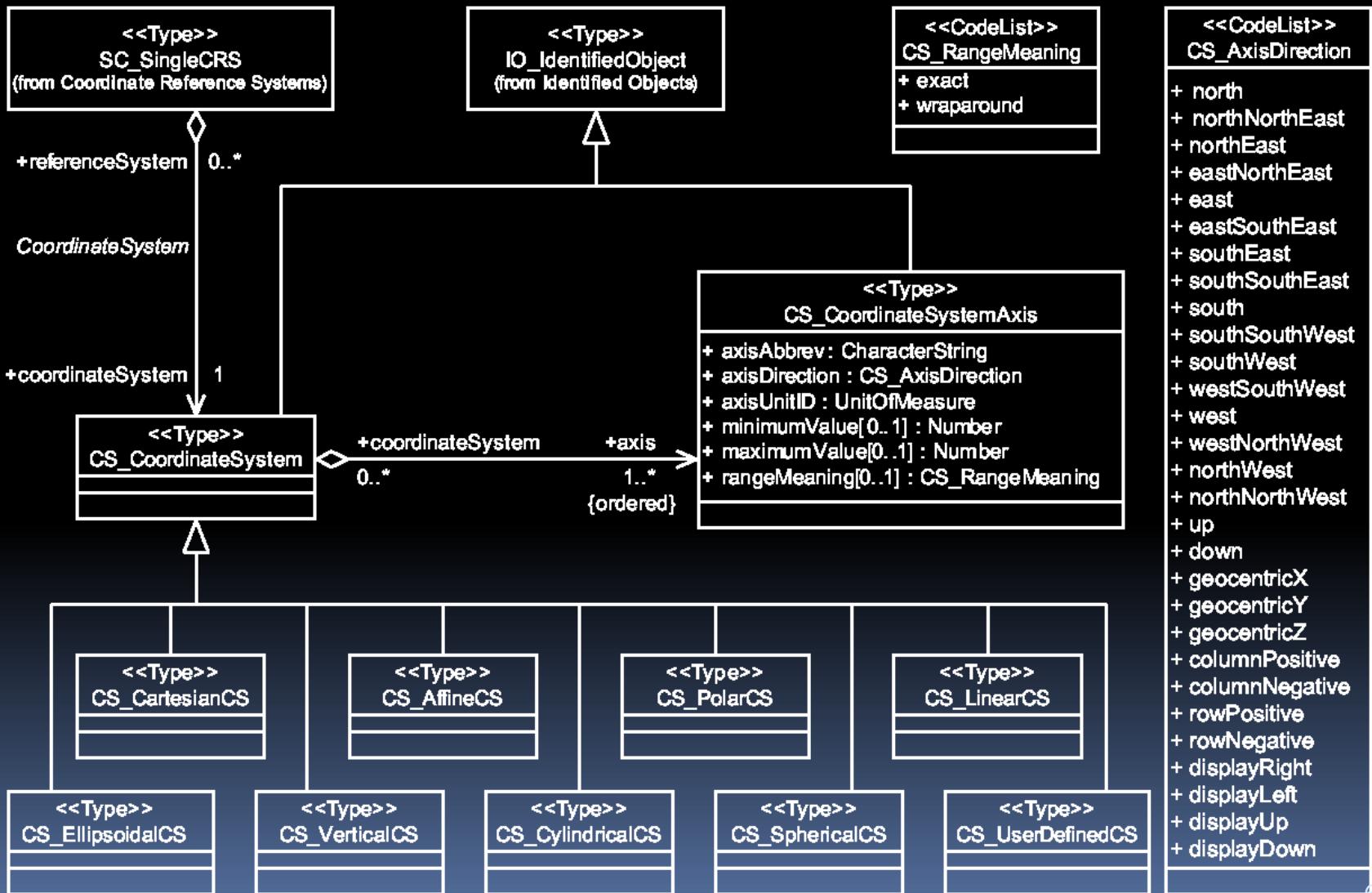
Coordinate Reference Systems



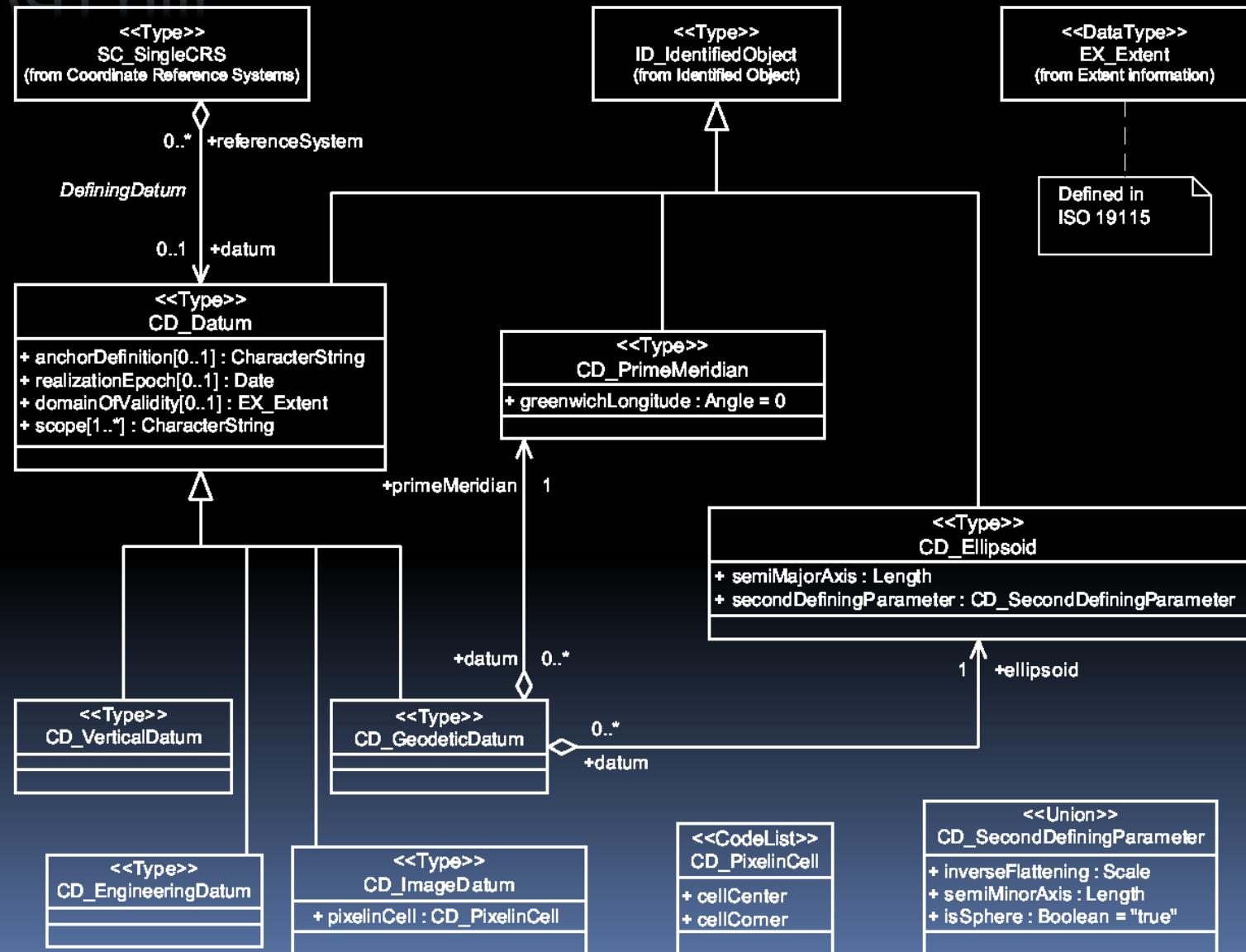
CRS Top-Level Diagram



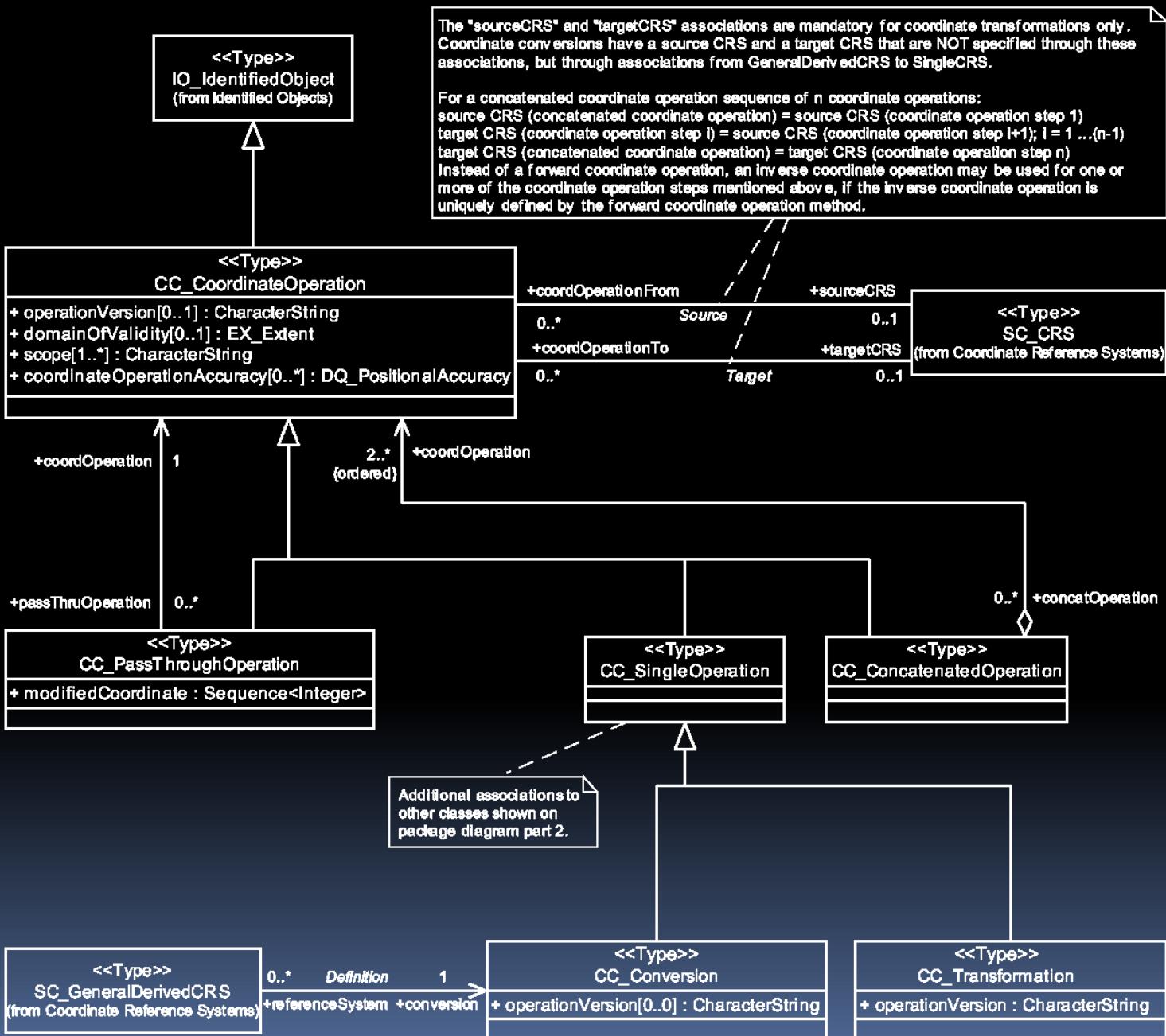
Coordinate System

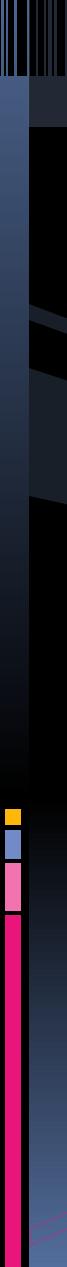


Datum

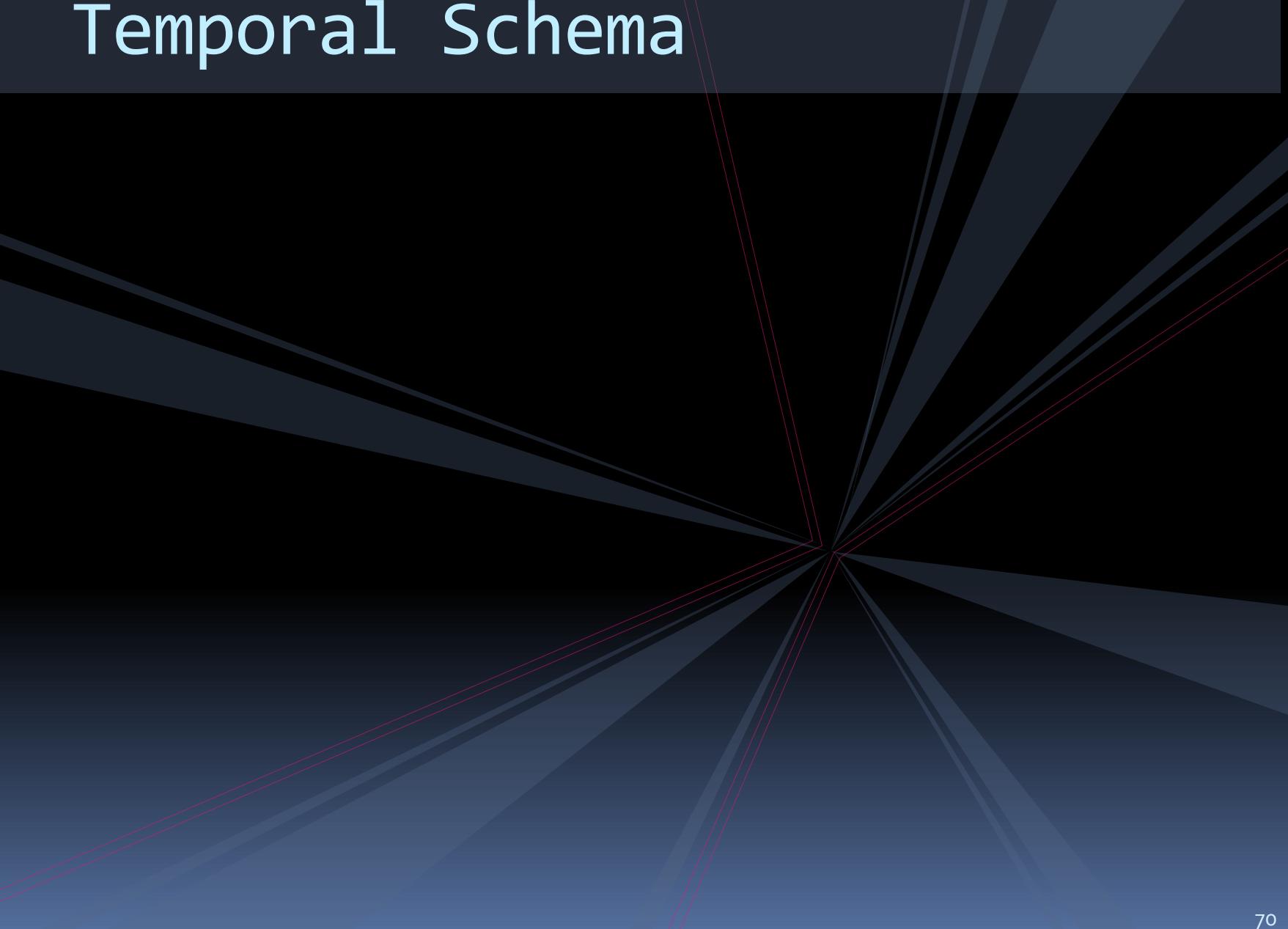


Coordinate Operation



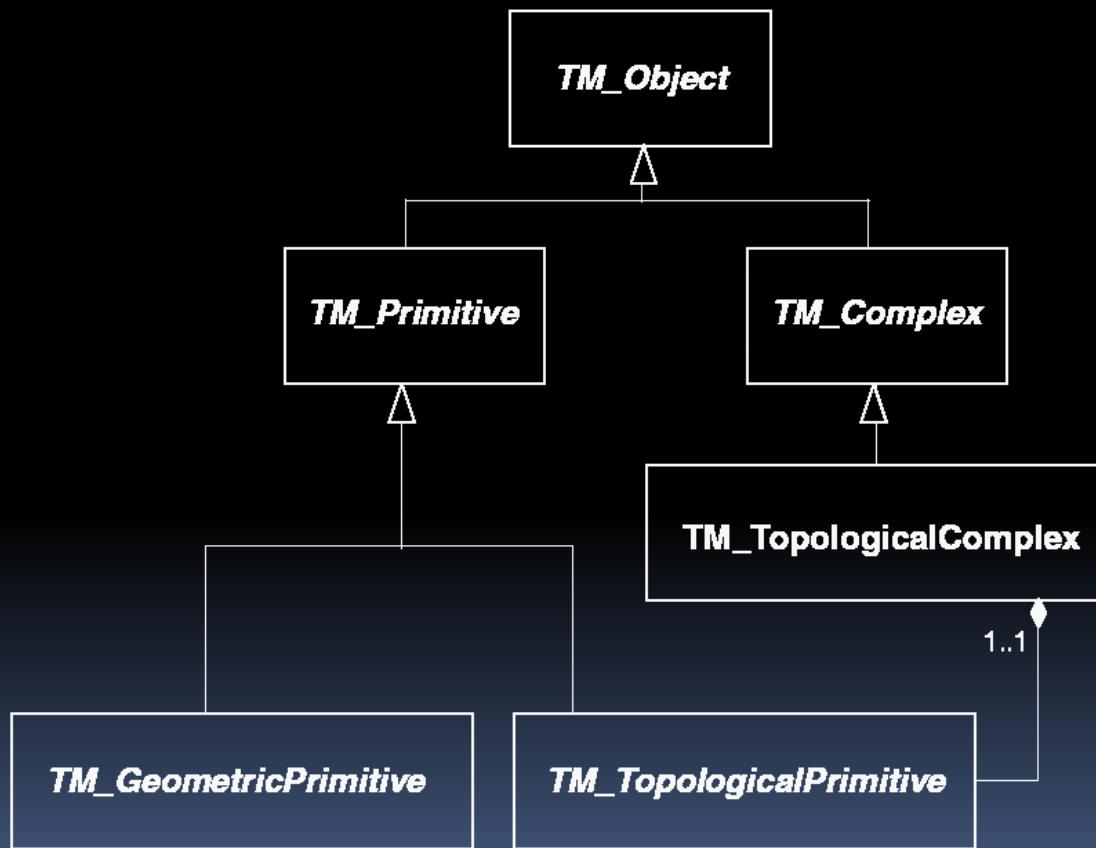


Temporal Schema



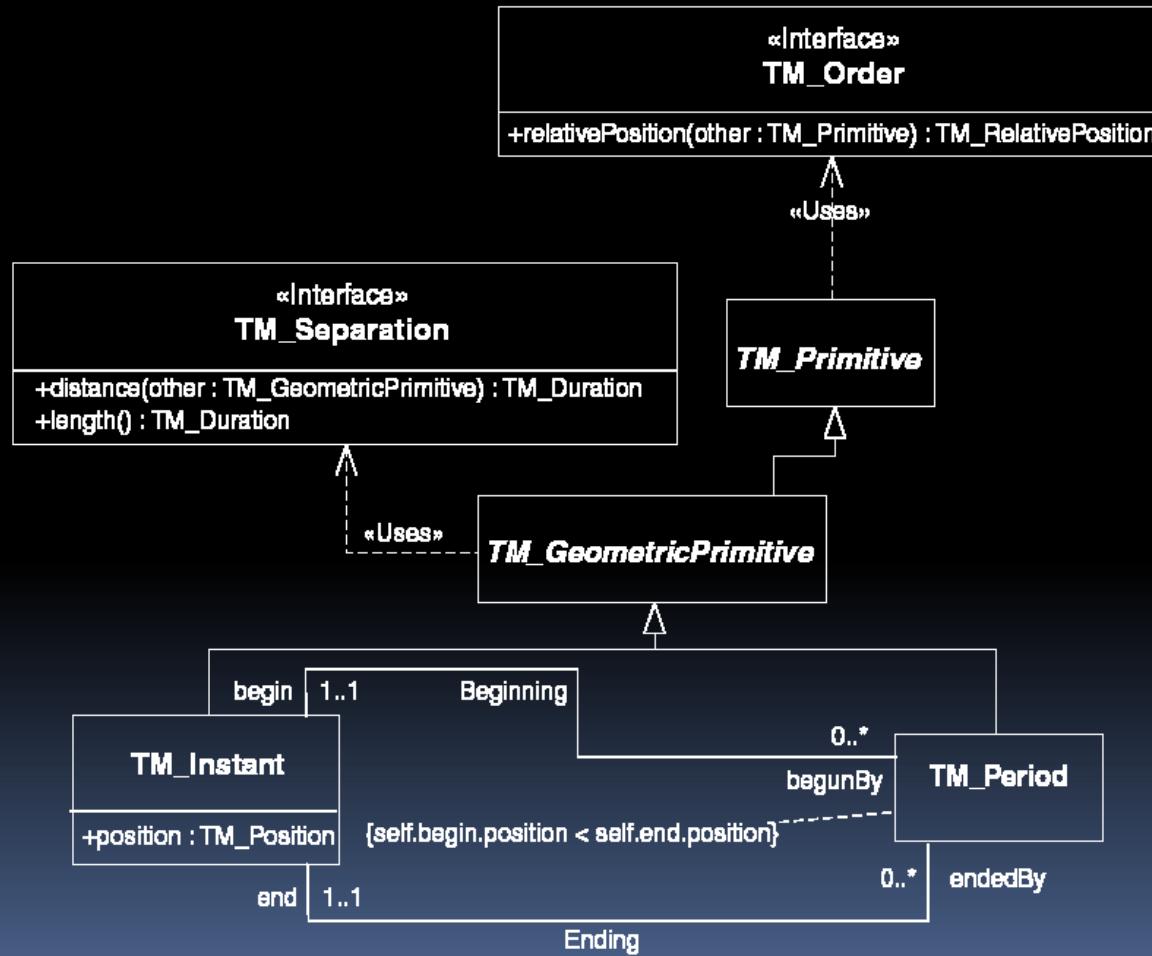
Temporal Object Diagram

Temporal Object Model

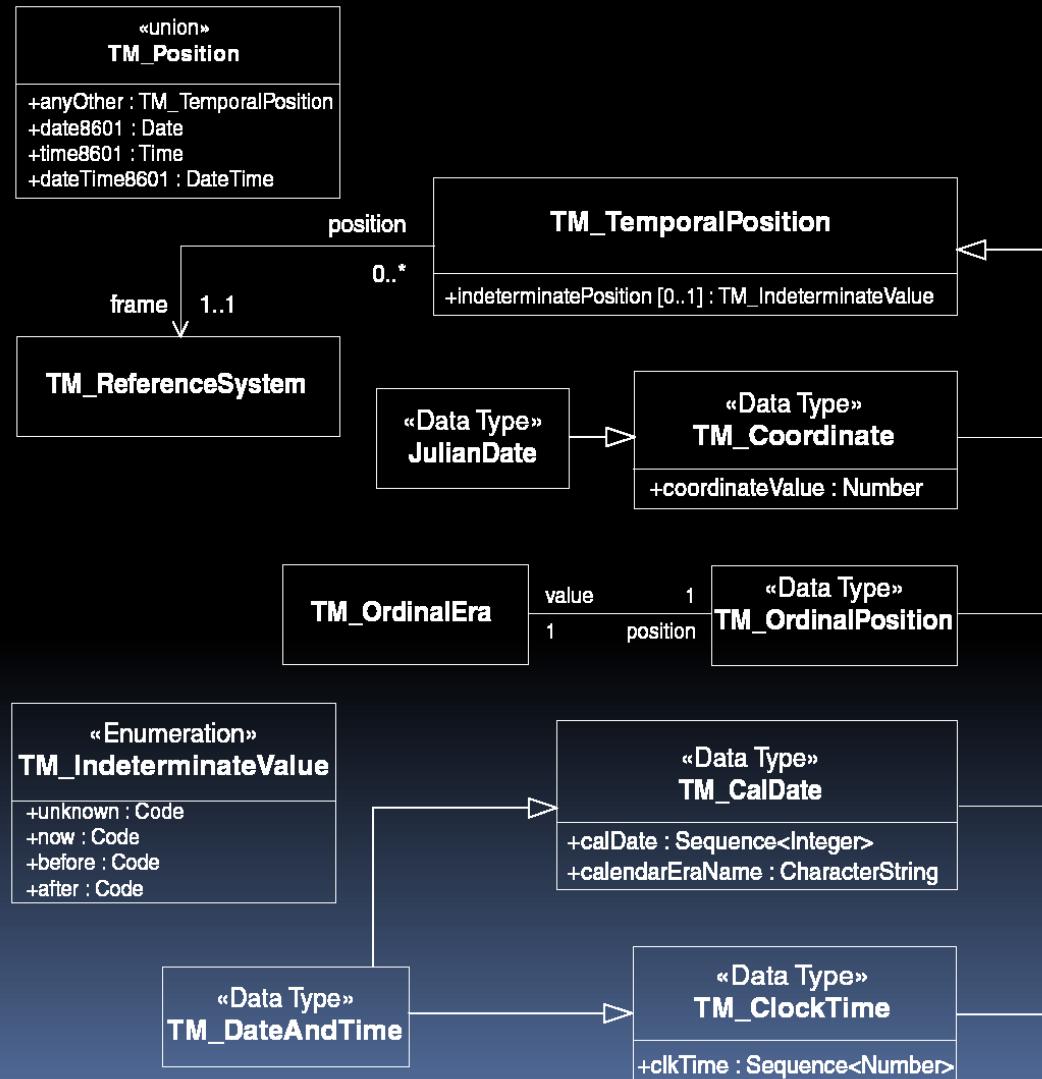


Temporal Geometric Objects

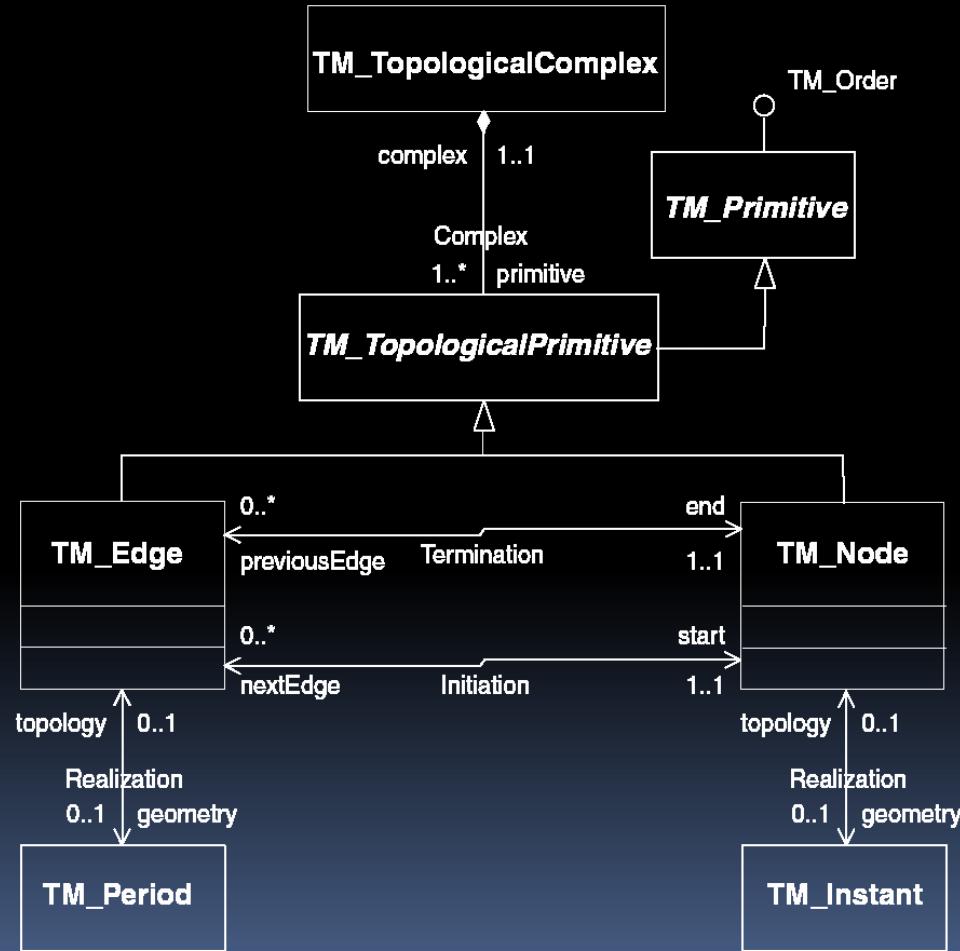
TEMPORAL GEOMETRIC OBJECTS

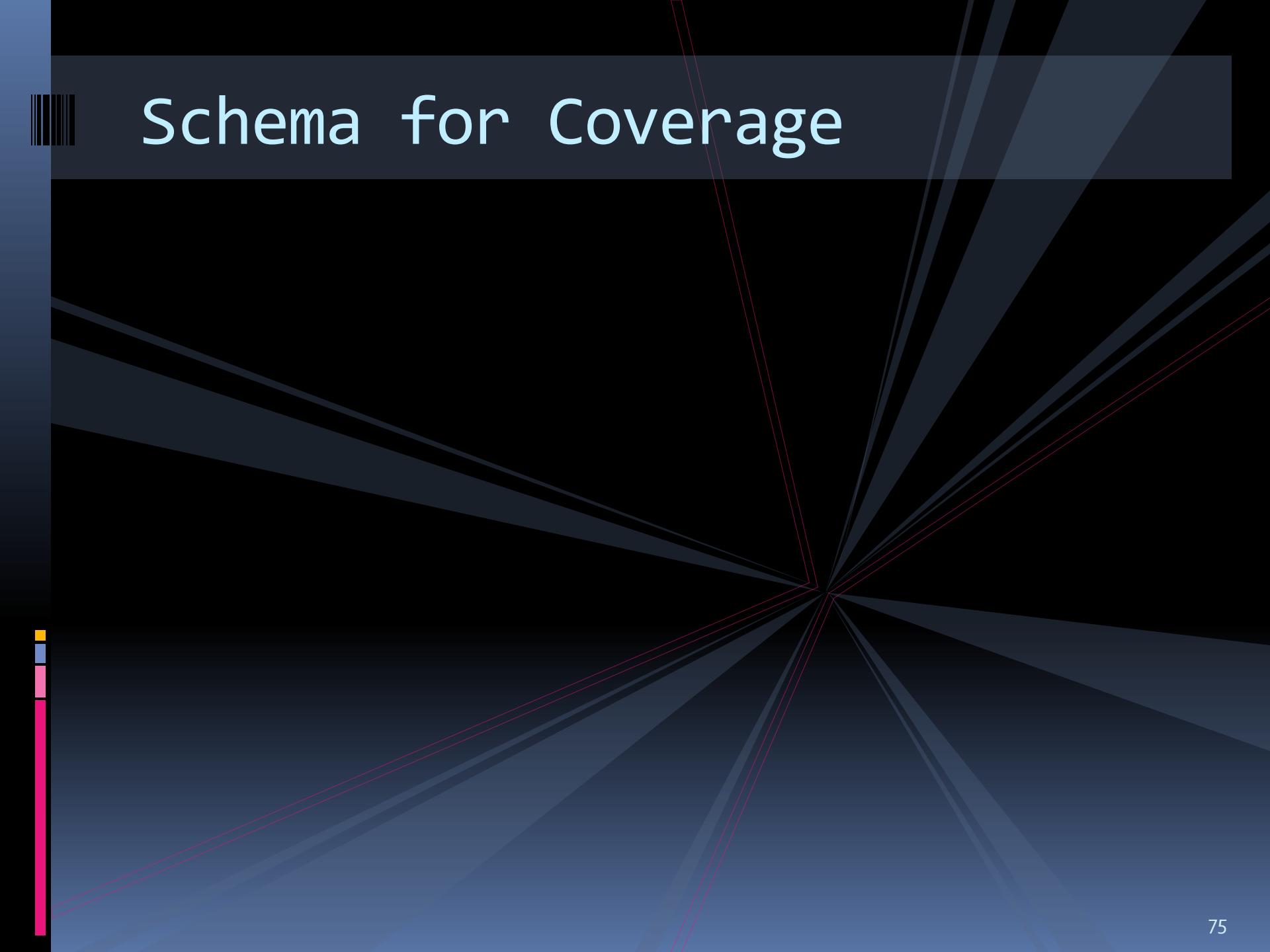


Temporal Position



Temporal Topology



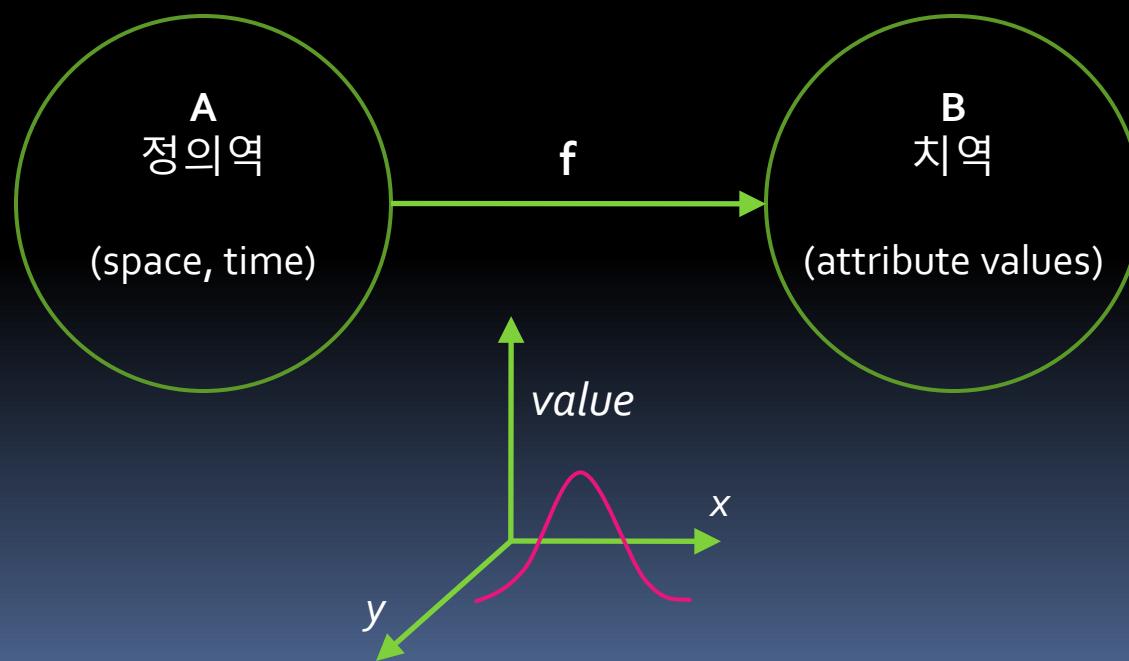


Schema for Coverage

커버리지 모델의 개념

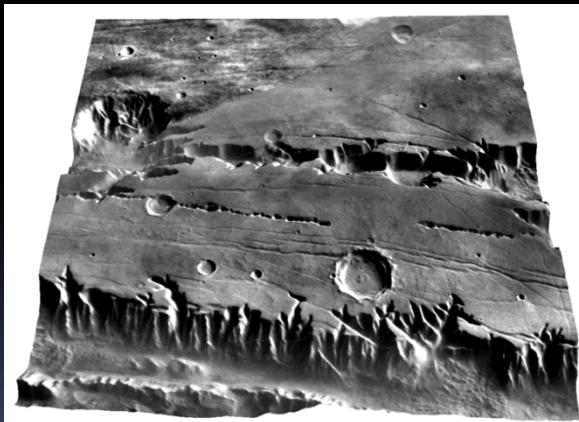
■ Coverage

- 시공간 정의역 내에서 특정 위치에 대해 특정 값을 반환하는 함수처럼 동작하는 feature



커버리지의 예

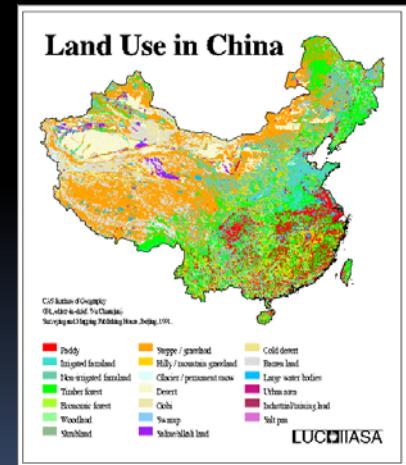
- Digital Elevation/Terrain Model (DEM/DTM)
 - 래스터 모델
 - 지형을 표현하기에 적합



화성 표면의 DEM
Grid Coverage

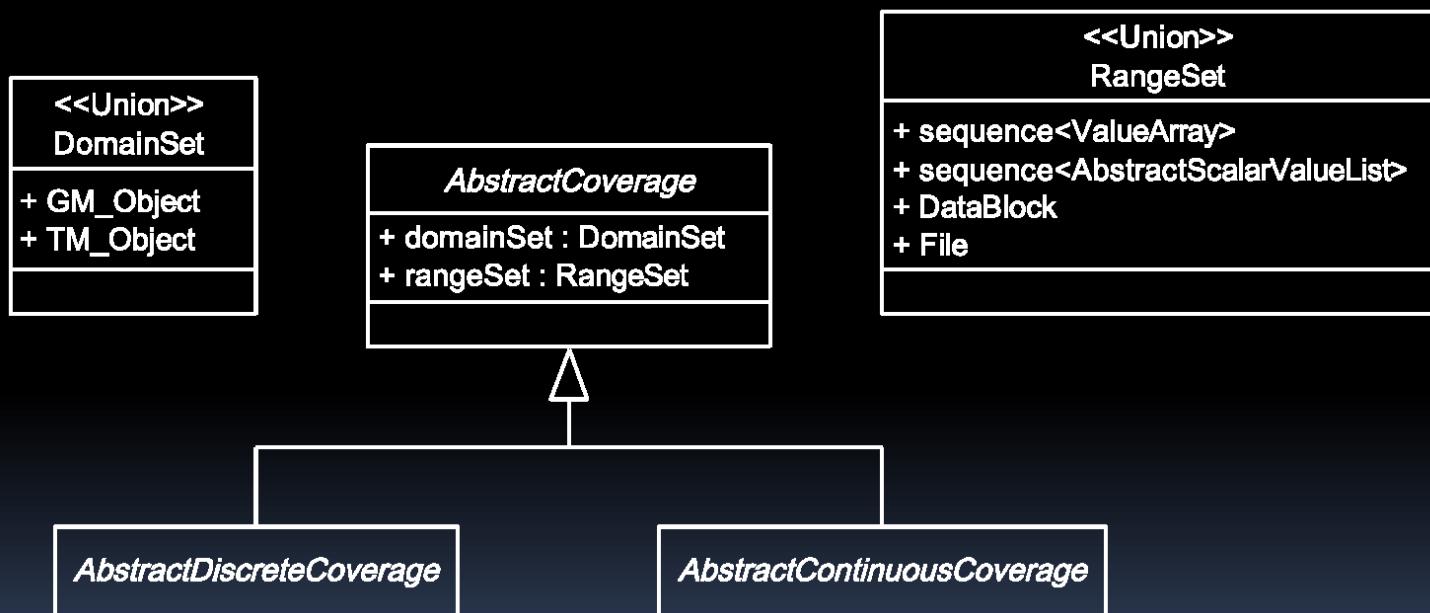


통계 정보
MultiSurface Coverage

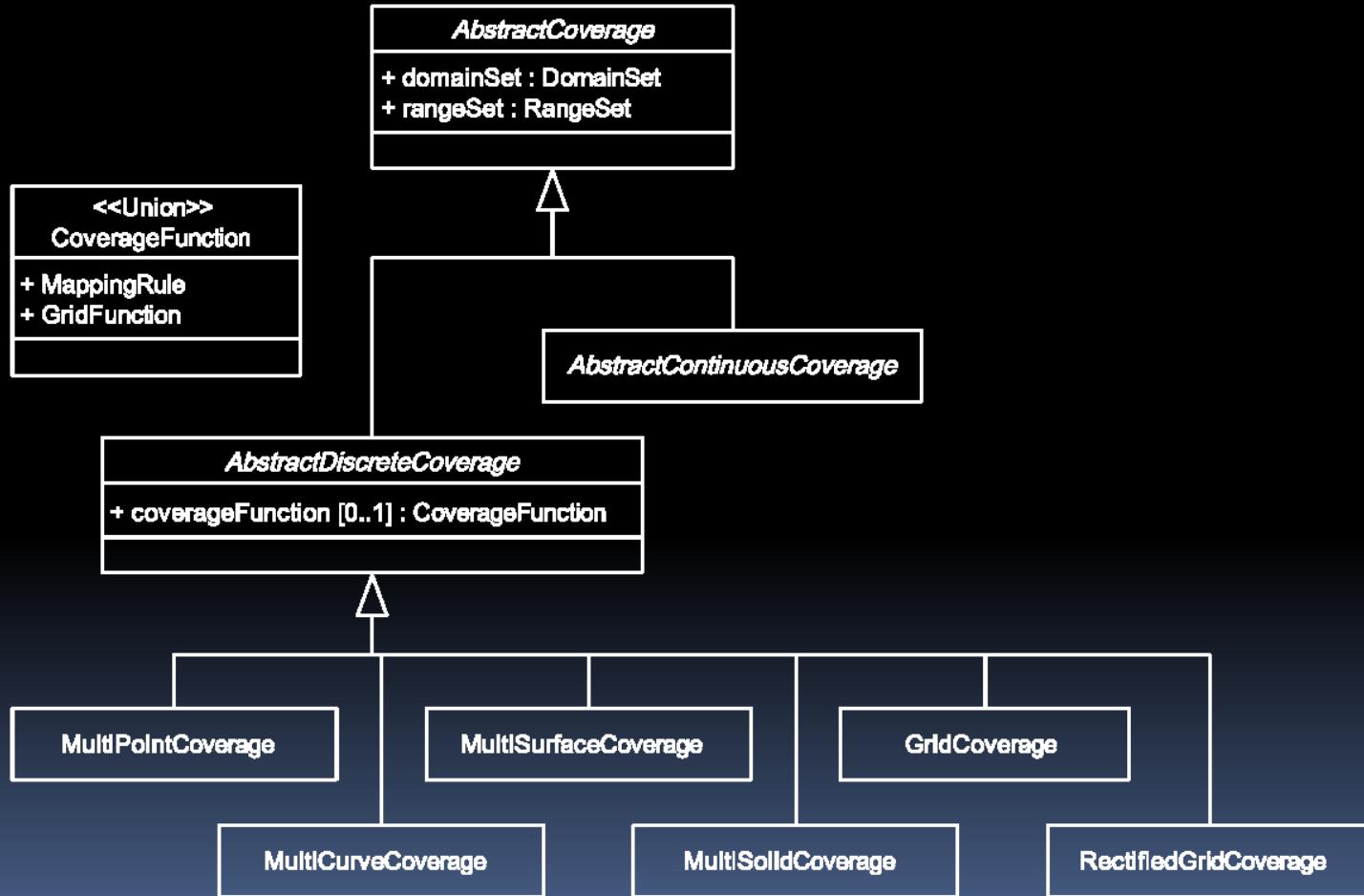


Land Use
MultiPoint Coverage

Coverage Model



Discrete Coverage

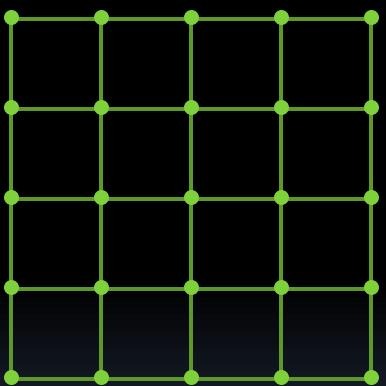


MultiPoint Coverage

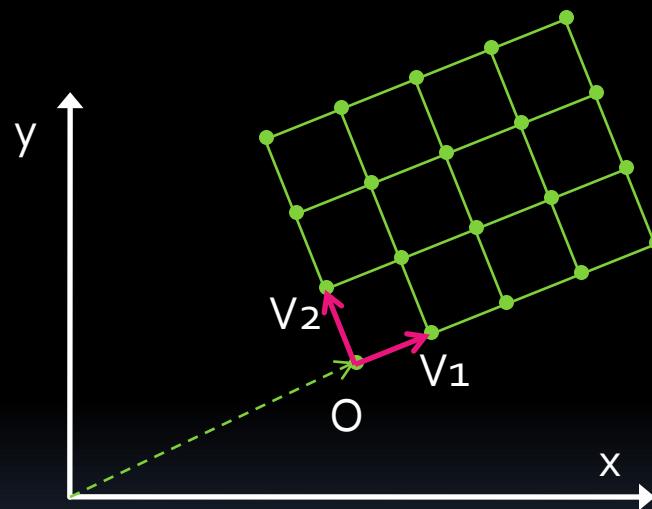
WATCTHOTUS COAEL.966

<pre><AverageTempPressure> <gml:boundedBy> <gml:Envelope> <gml:lowerCorner>1 1</gml:lowerCorner> <gml:upperCorner>3 3</gml:upperCorner> </gml:Envelope> </gml:boundedBy> <gml:domainSet> <gml:MultiPoint> <gml:pointMember> <gml:Point> <gml:pos>1 1</gml:pos> </gml:Point> </gml:pointMember> <gml:pointMember> <gml:Point> <gml:pos>2 2</gml:pos> </gml:Point> </gml:pointMember> </gml:MultiPoint> </gml:domainSet> <gml:rangeSet> <gml:ValueArray> <gml:valueComponents> <Temperature>3</Temperature> <Temperature>5</Temperature> <Temperature>7</Temperature> </gml:valueComponents> </gml:ValueArray> </gml:rangeSet> </AverageTempPressure></pre>	<pre></gml:pointMember> <gml:pointMember> <gml:Point> <gml:pos>3 3</gml:pos> </gml:Point> </gml:pointMember> </gml:MultiPoint> </gml:domainSet> <gml:rangeSet> <gml:ValueArray> <gml:valueComponents> <Temperature>3</Temperature> <Temperature>5</Temperature> <Temperature>7</Temperature> </gml:valueComponents> </gml:ValueArray> </gml:rangeSet> </AverageTempPressure></pre>
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Grid and Rectified Grid

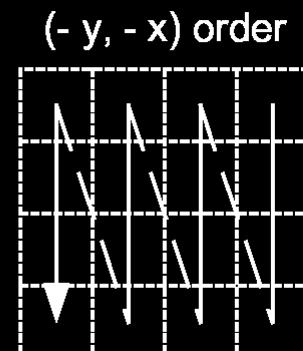
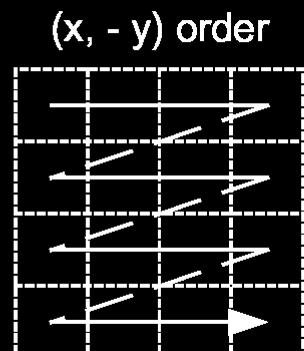
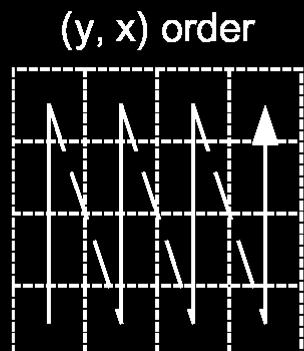
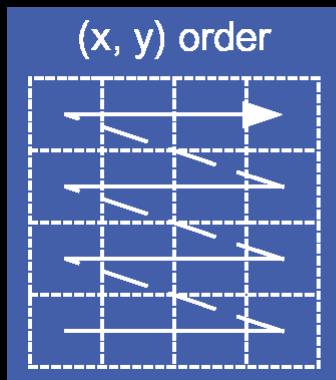


Grid

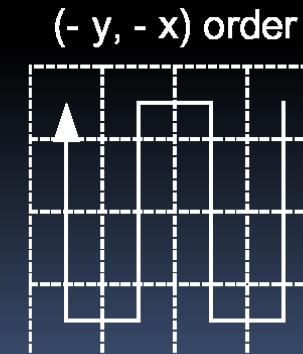
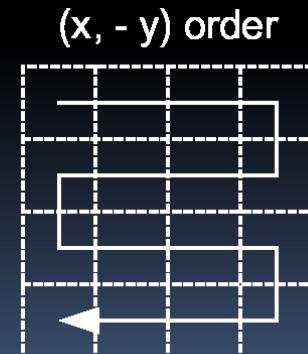
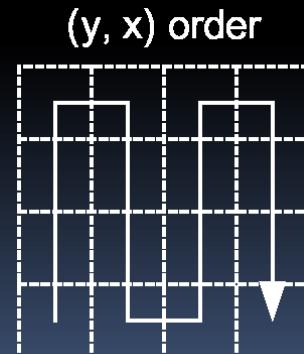
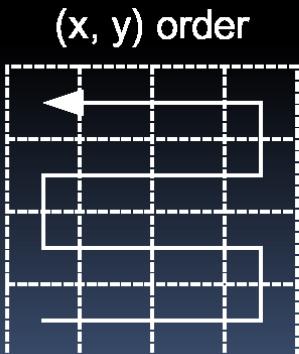


Rectified Grid

Sequential Enumeration (1/3)



linear scanning

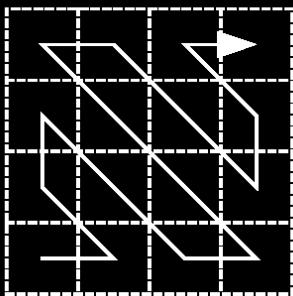


boustrophedonic scanning

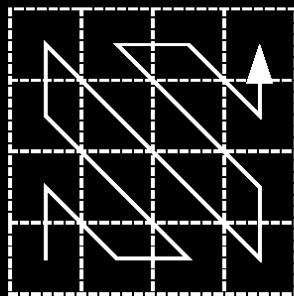
Sequential Enumeration (2/3)

2600AGUJSTPT 2110WGLPCTOU ↴ ↴ ↴ ↴

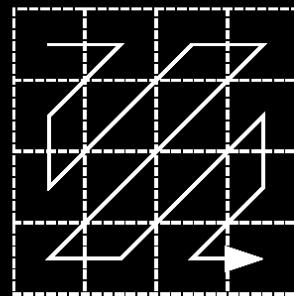
(x, y) order



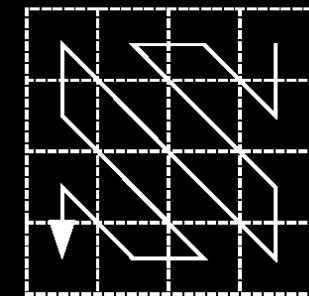
(y, x) order



$(x, -y)$ order

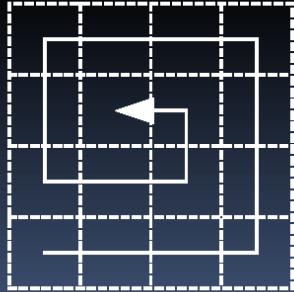


$(-y, -x)$ order

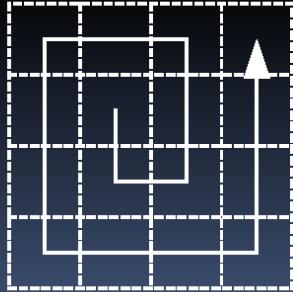


Cantor-diagonal scanning

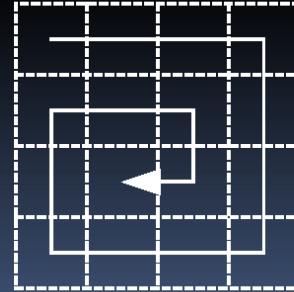
Inward
 (x, y) order



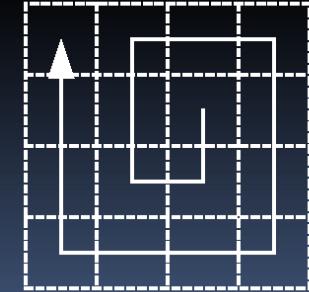
Outward
 (y, x) order



Inward
 $(x, -y)$ order



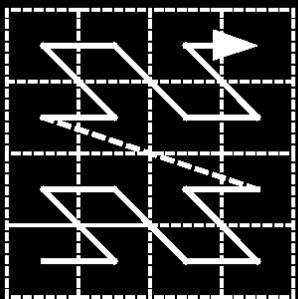
Outward
 $(-y, -x)$ order



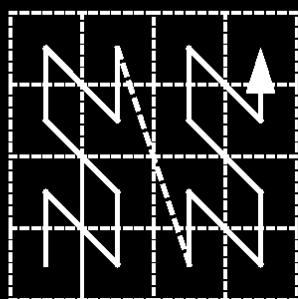
spiral scanning

Sequential Enumeration (3/3)

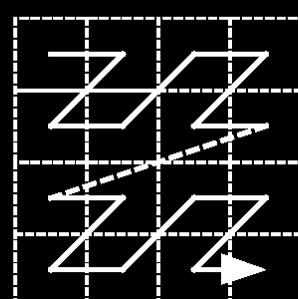
(x, y) order



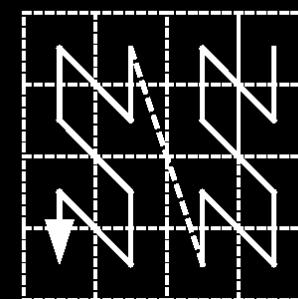
(y, x) order



$(x, -y)$ order



$(-y, -x)$ order



Morton ordering

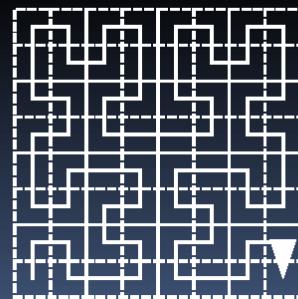
(x, y) order



$(x, -y)$ order



(y, x) order



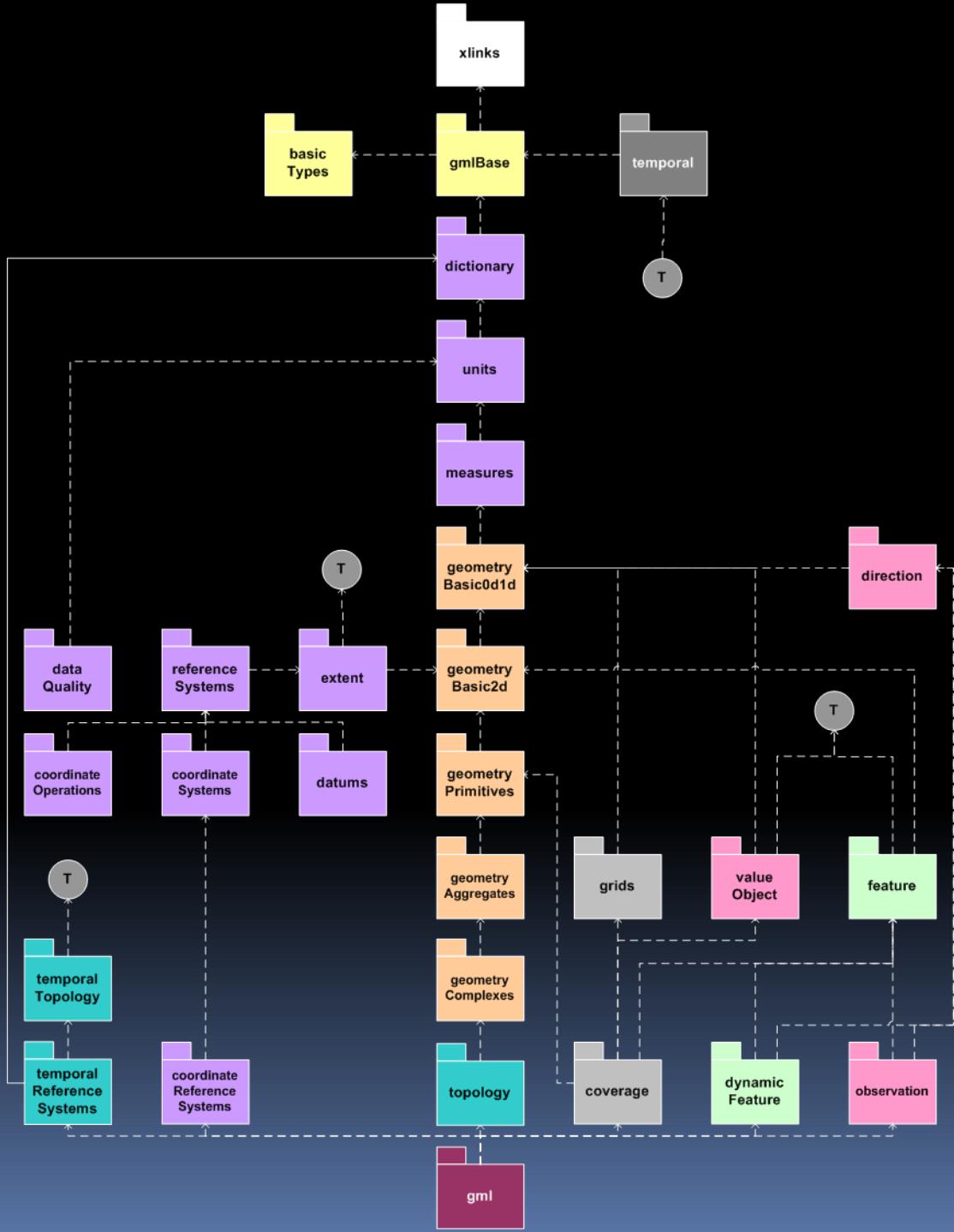
$(y, -x)$ order



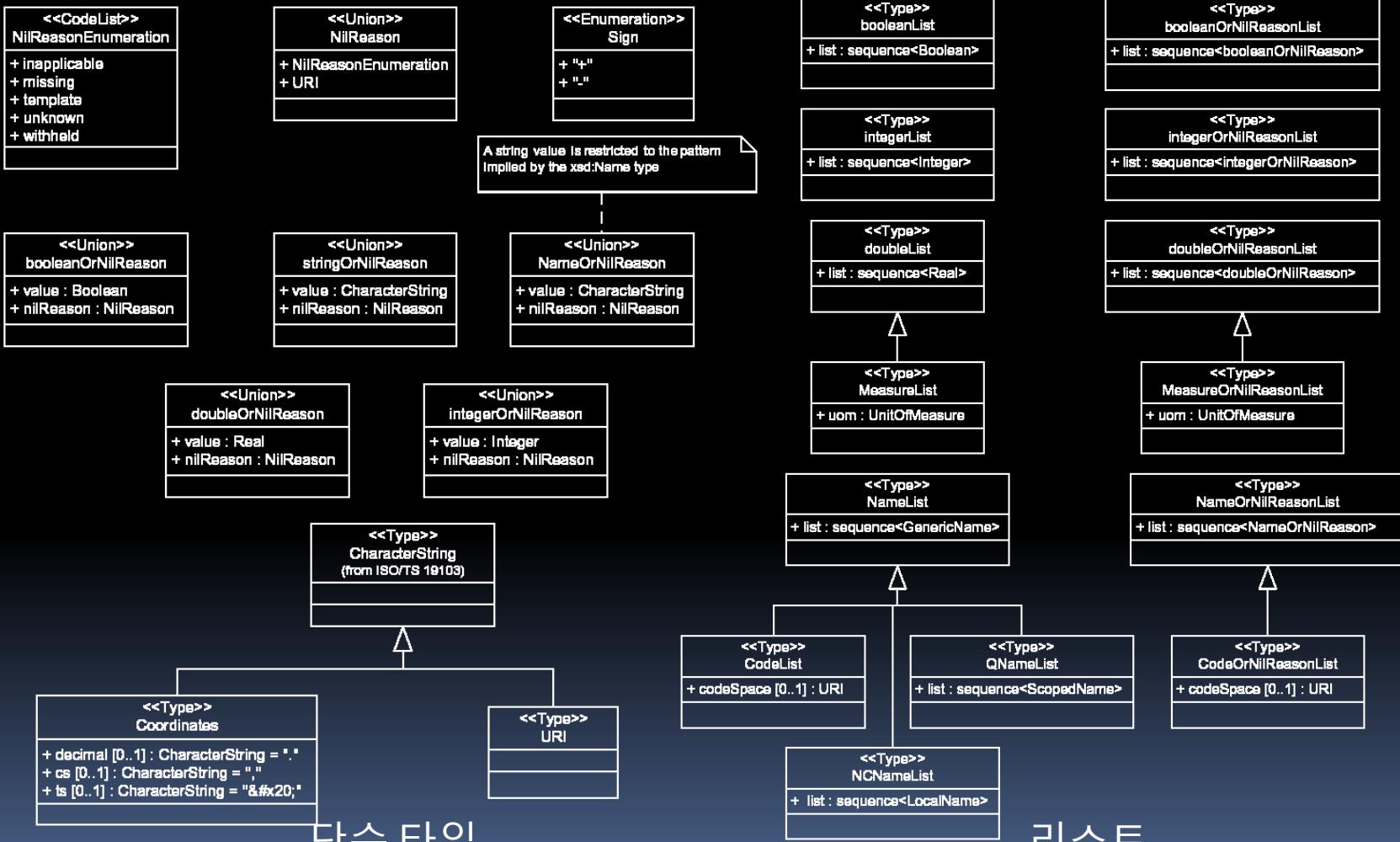
Hilbert ordering

GML Schema

GML 3.2.1 Diagram



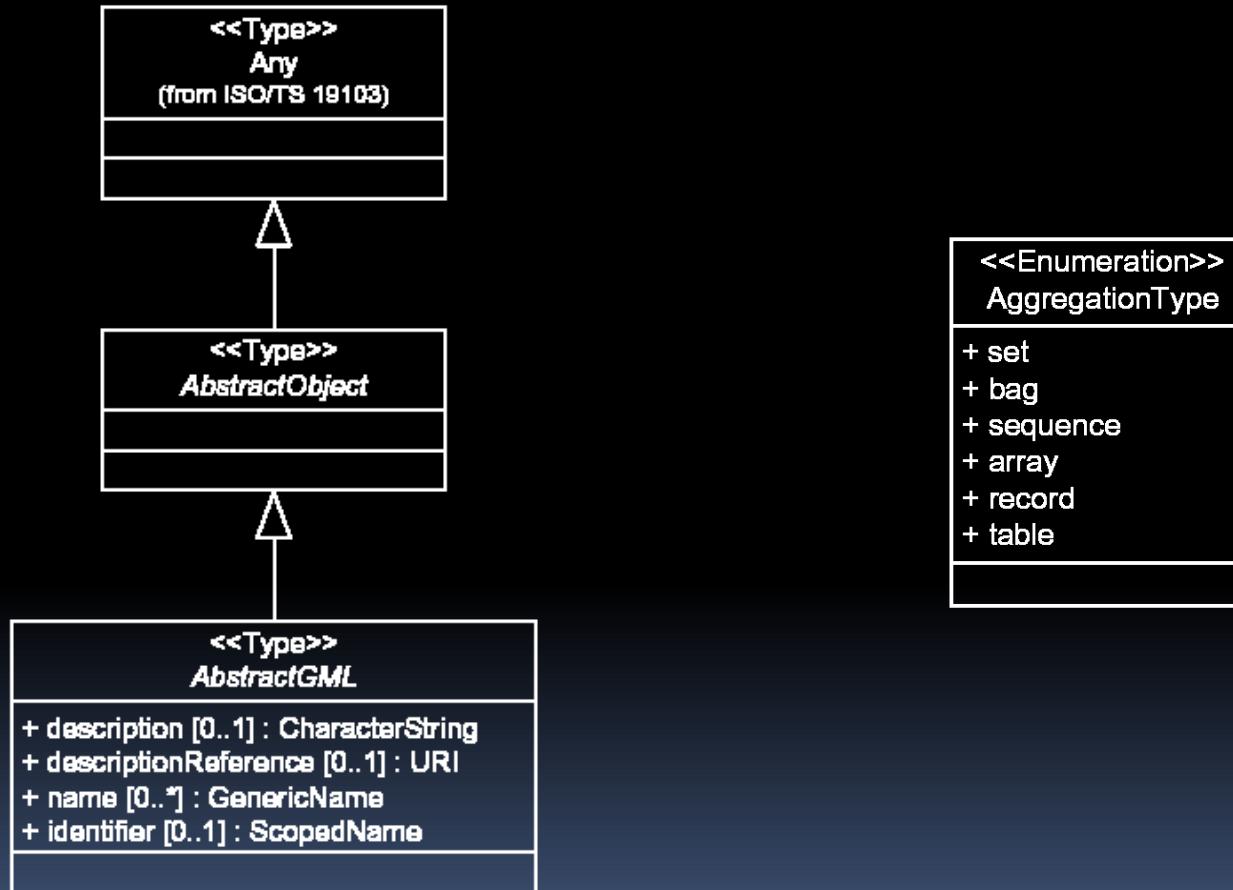
“basicTypes” 패키지



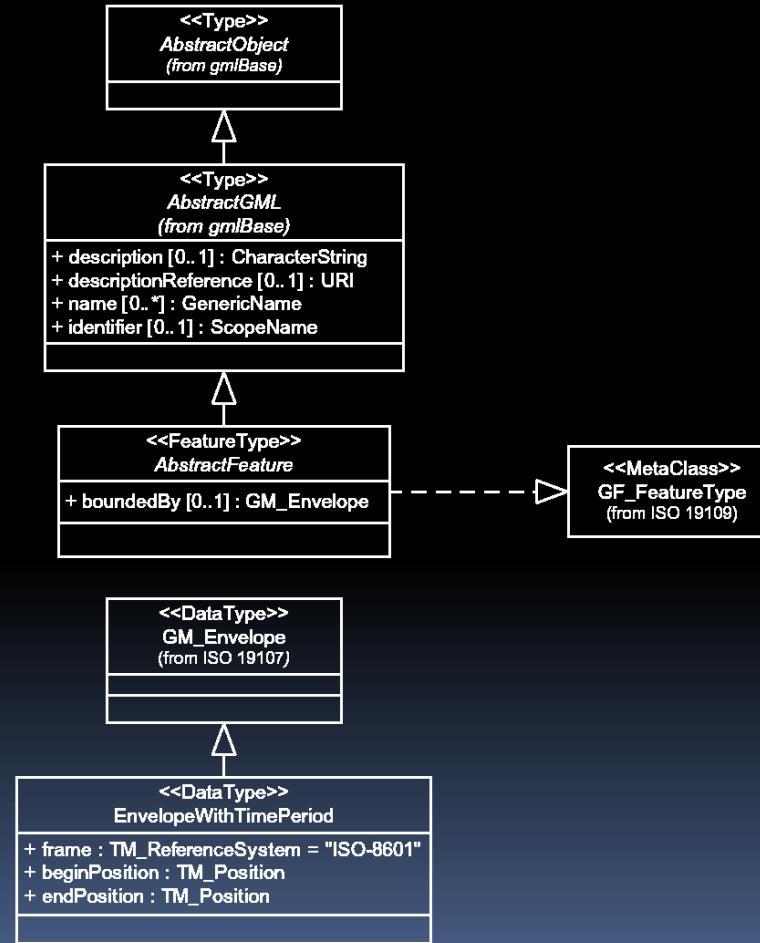
단순 타입

리스트

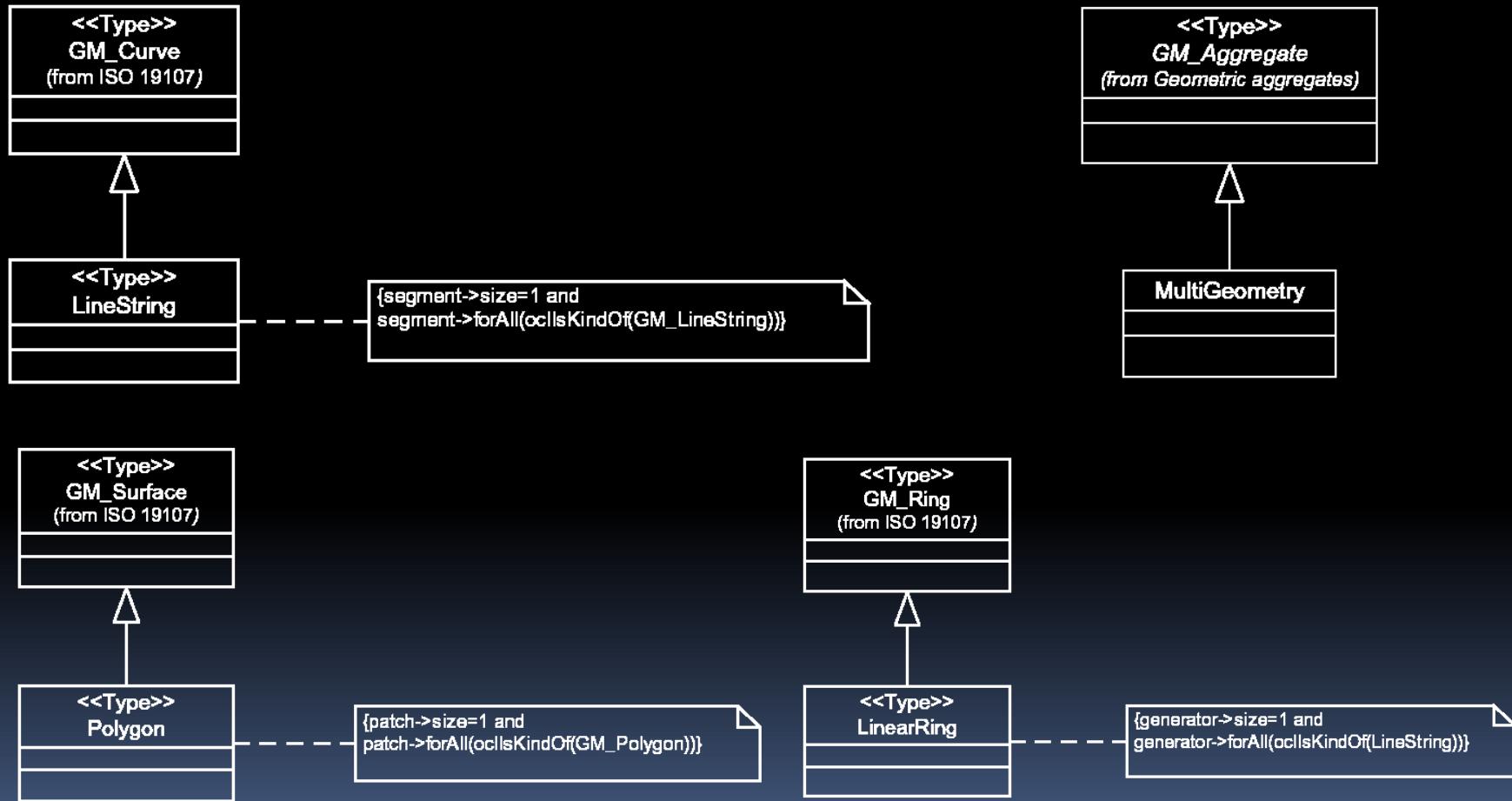
“gmlBase” 패키지



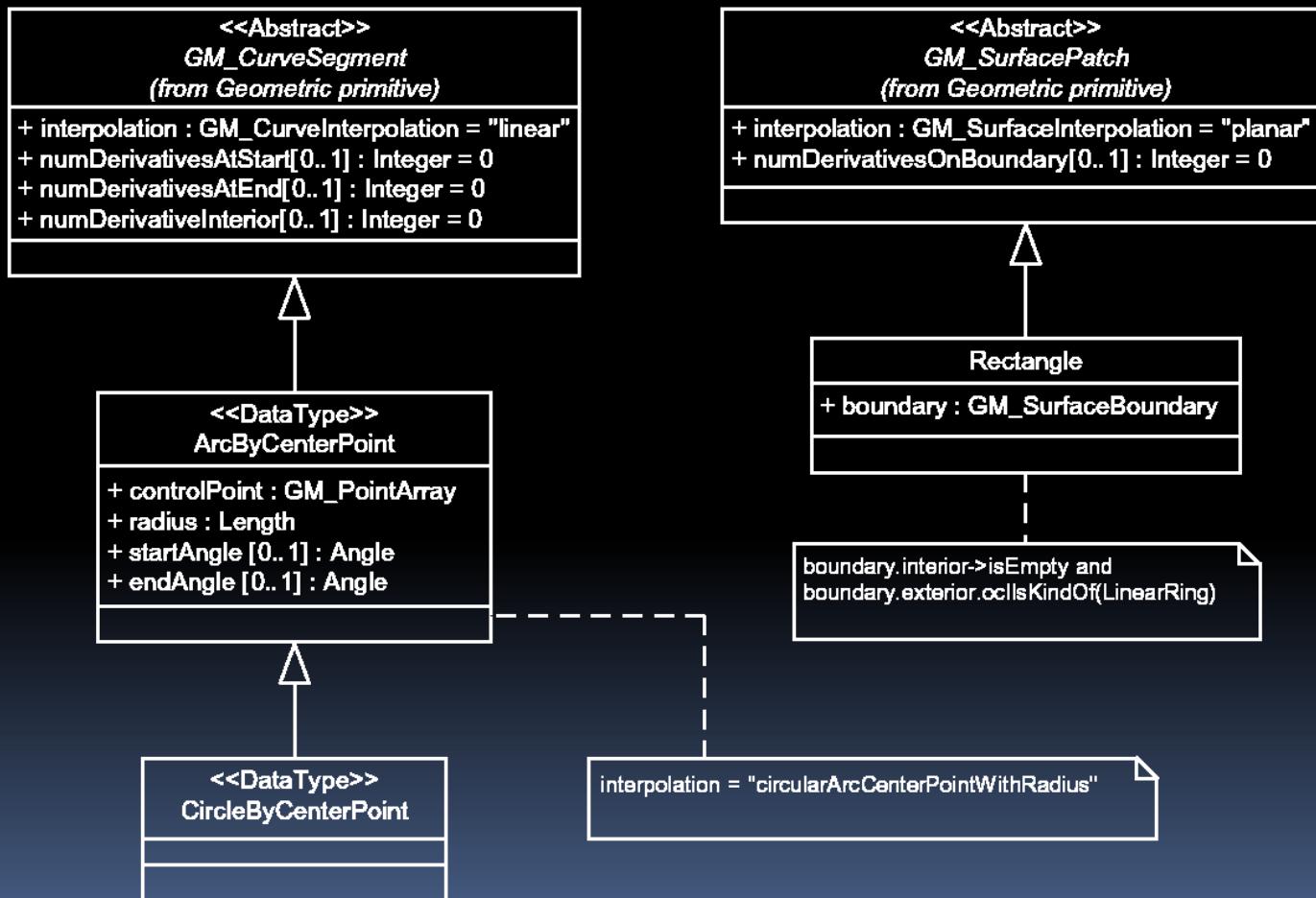
“feature” 패키지



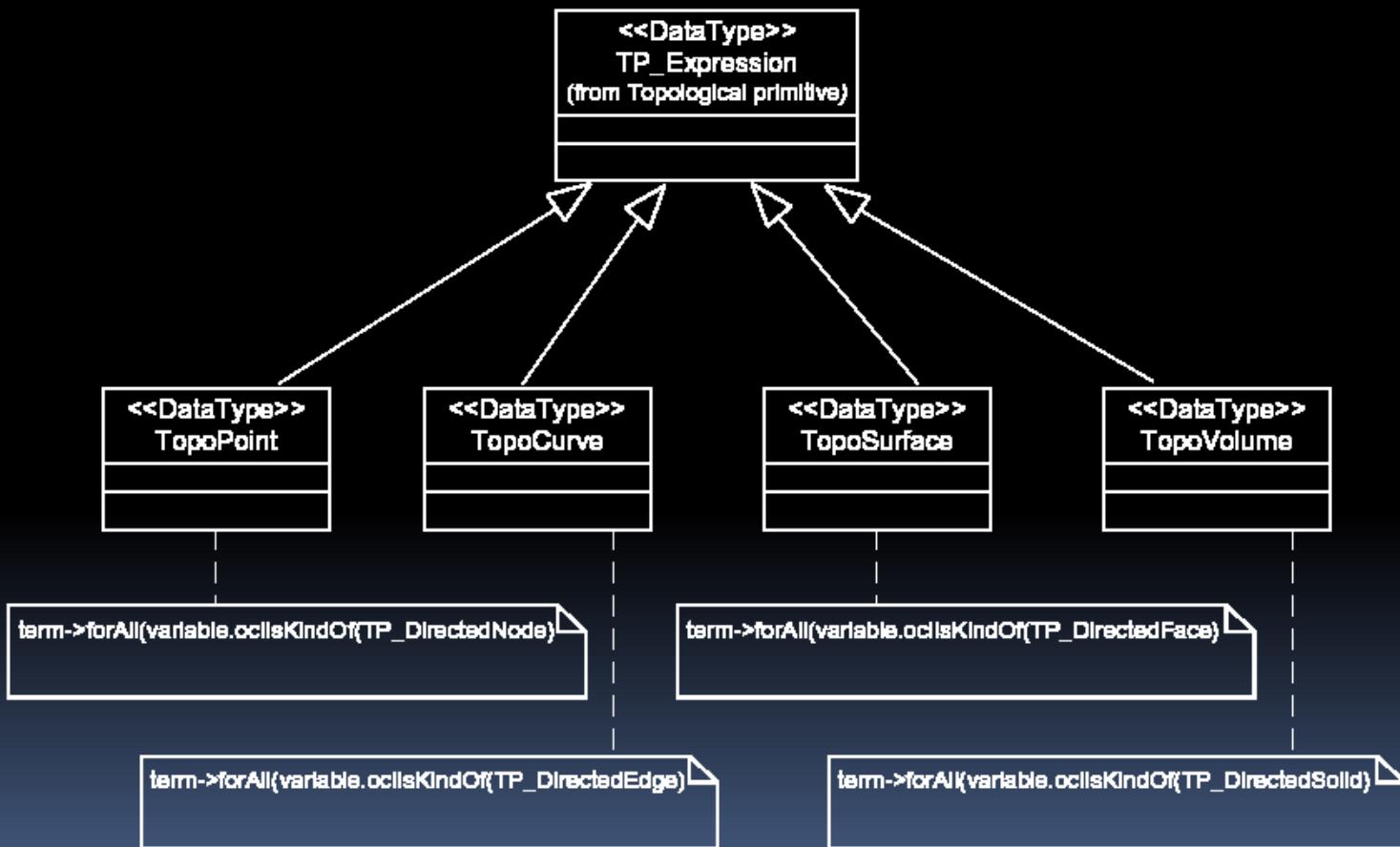
Geometries 패키지



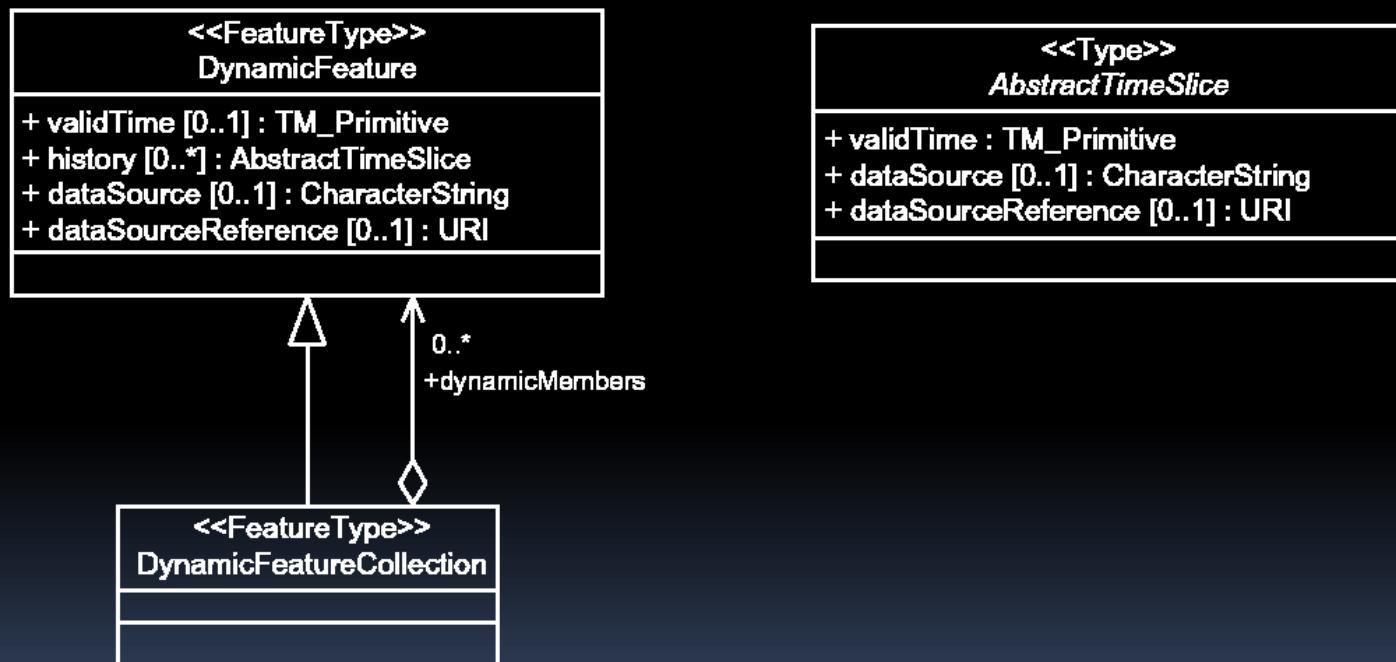
Geometries 패키지



“topology” 패키지

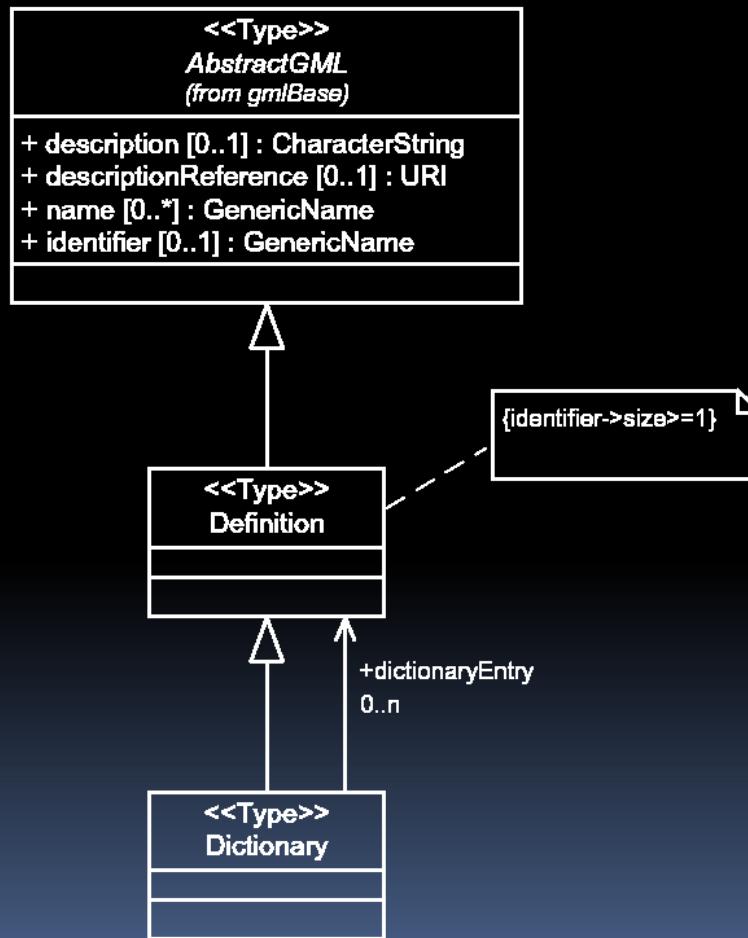


“dynamicFeature” 패키지

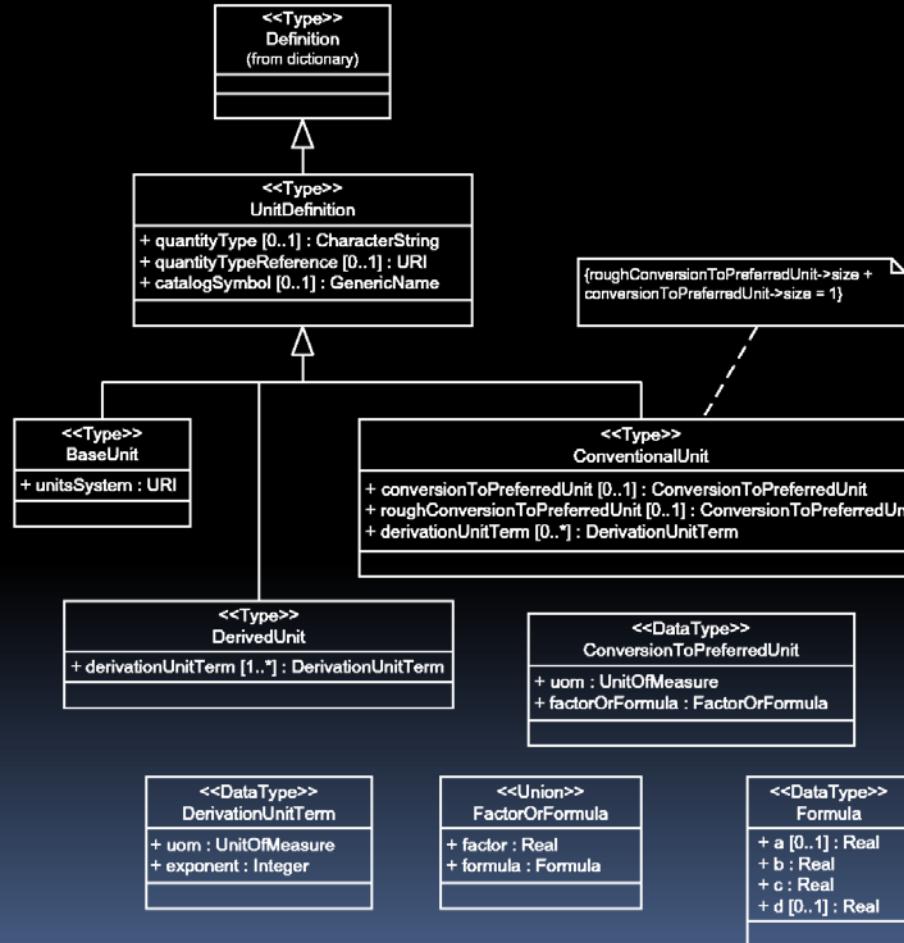


“dictionary” 패키지

ATCCTOURLA API

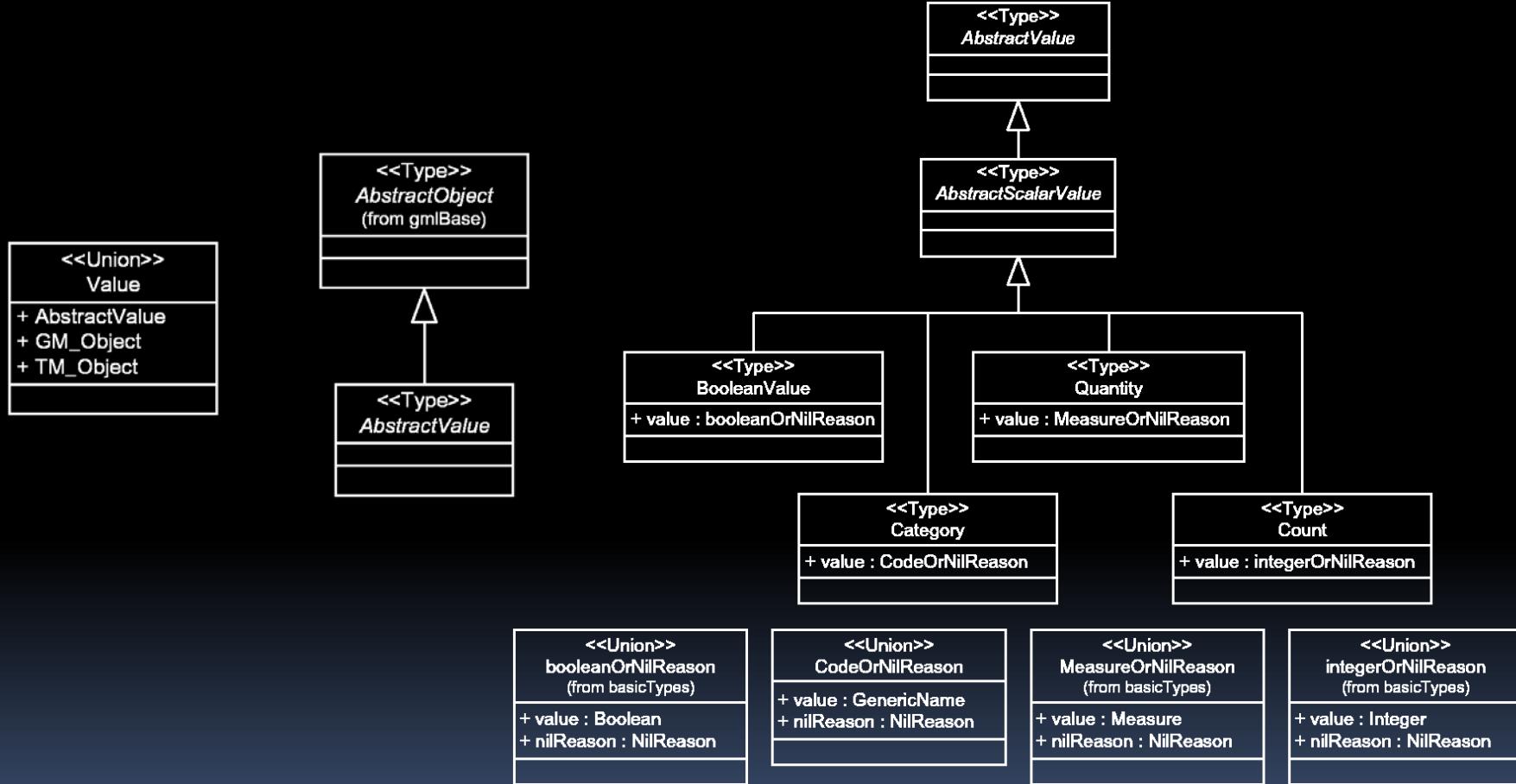


“units” 패키지



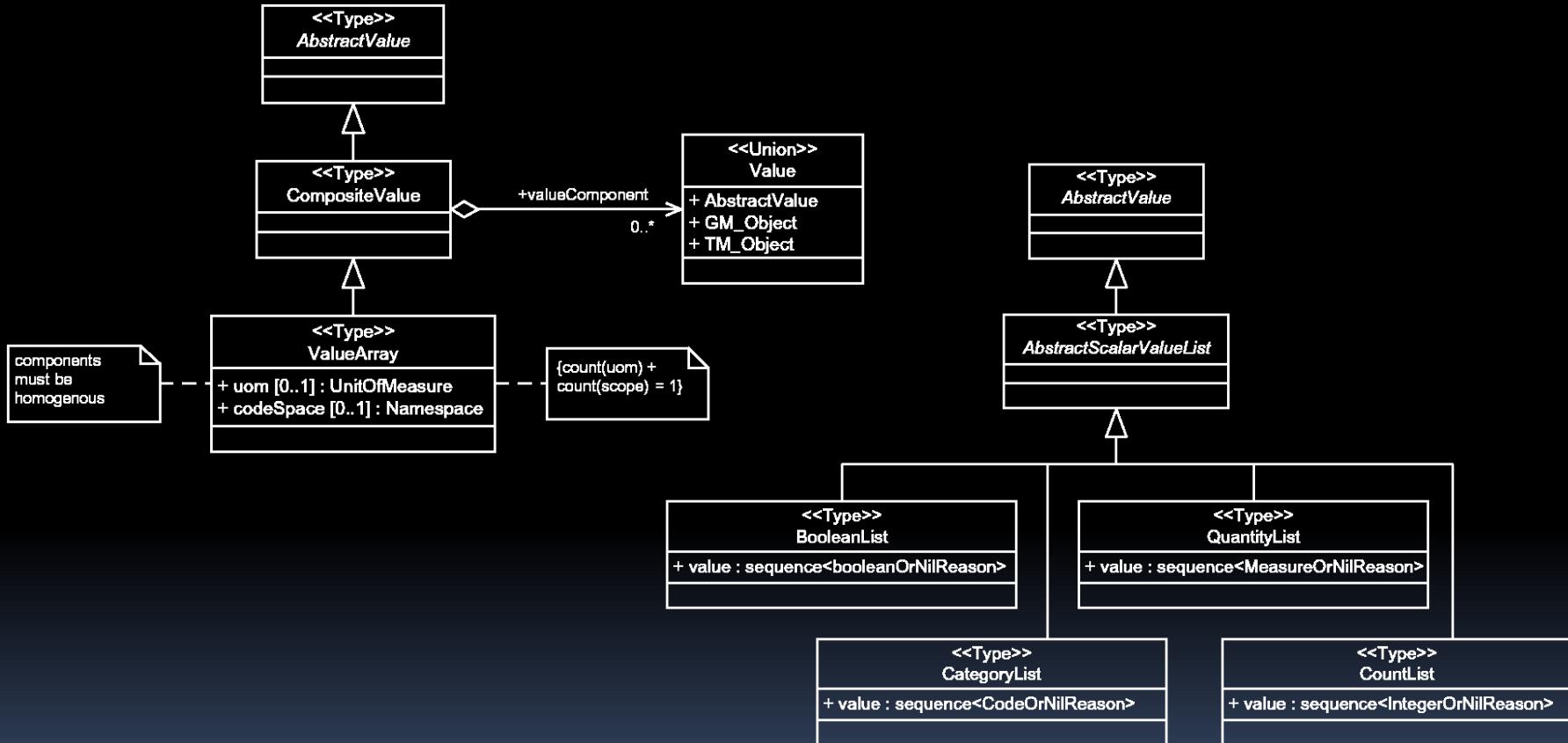
“valueObjects” 패키지

APT060016002



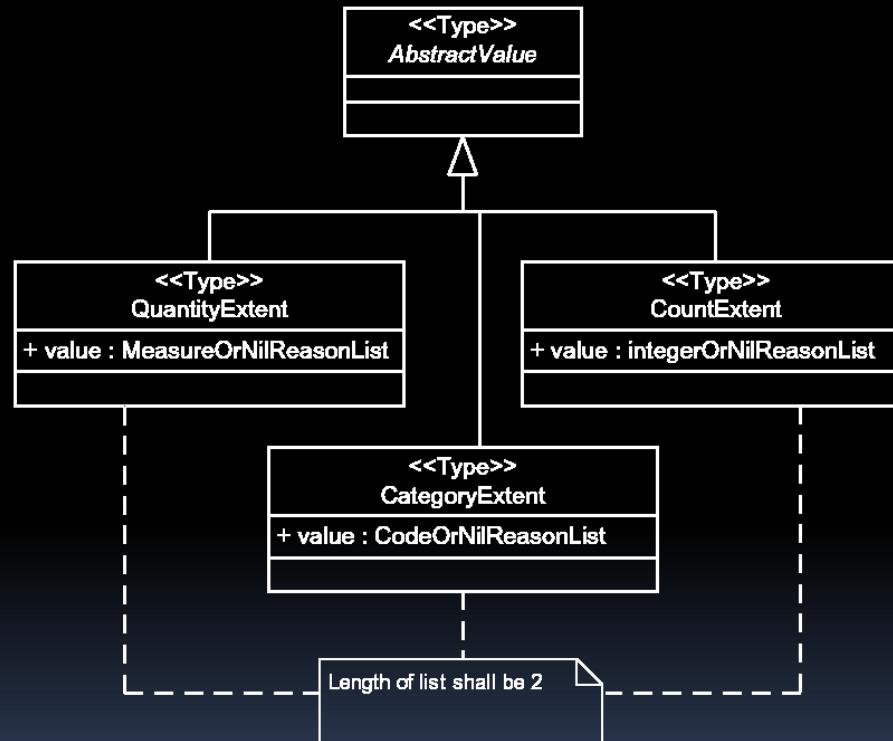
“valueObjects” 패키지

APT060016C02



“valueObjects” 패키지

APT060016002 편집기



“direction” 패키지

ATL.GCCTOU

기상학

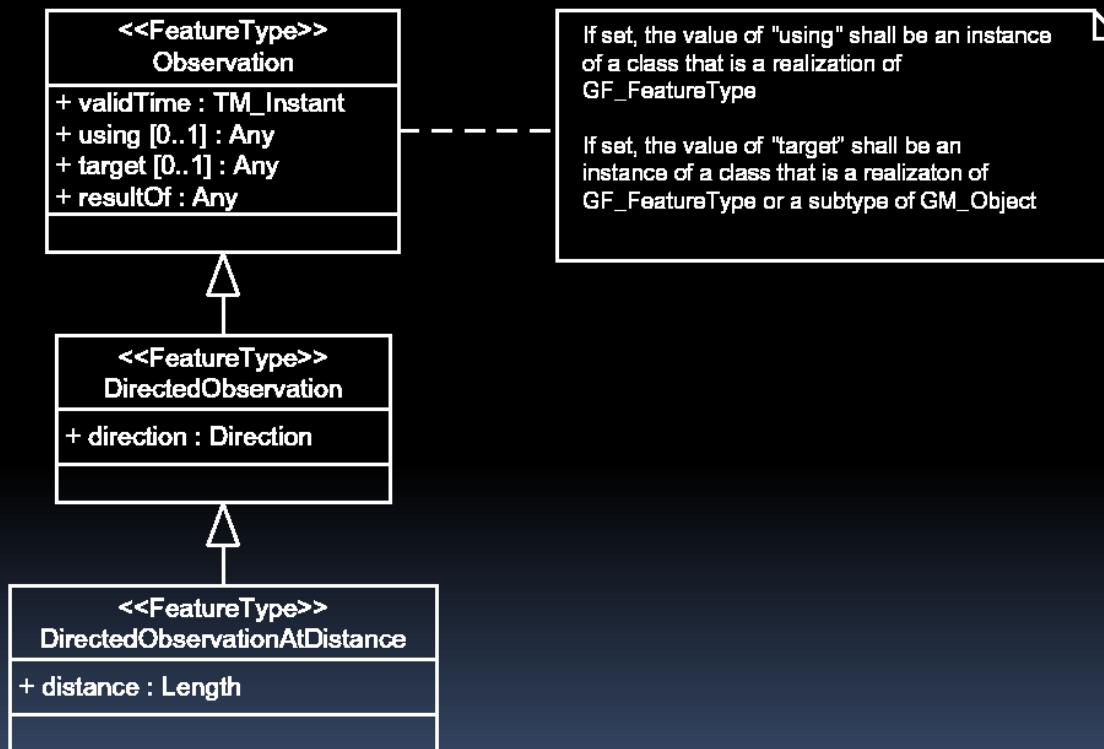
<<Union>>	
Direction	
+ vector : Vector	
+ compassPoint : CompassPoint	
+ keyword : GenericName	
+ description : CharacterString	
+ reference : URI	

<<Enumeration>>	
CompassPoint	
+ N	
+ NNE	
+ NE	
+ ENE	
+ E	
+ ESE	
+ SE	
+ SSE	
+ S	
+ SSW	
+ SW	
+ WSW	
+ W	
+ WNW	
+ NW	
+ NNW	

“observation” 패키지

ODS61.A9CTOU

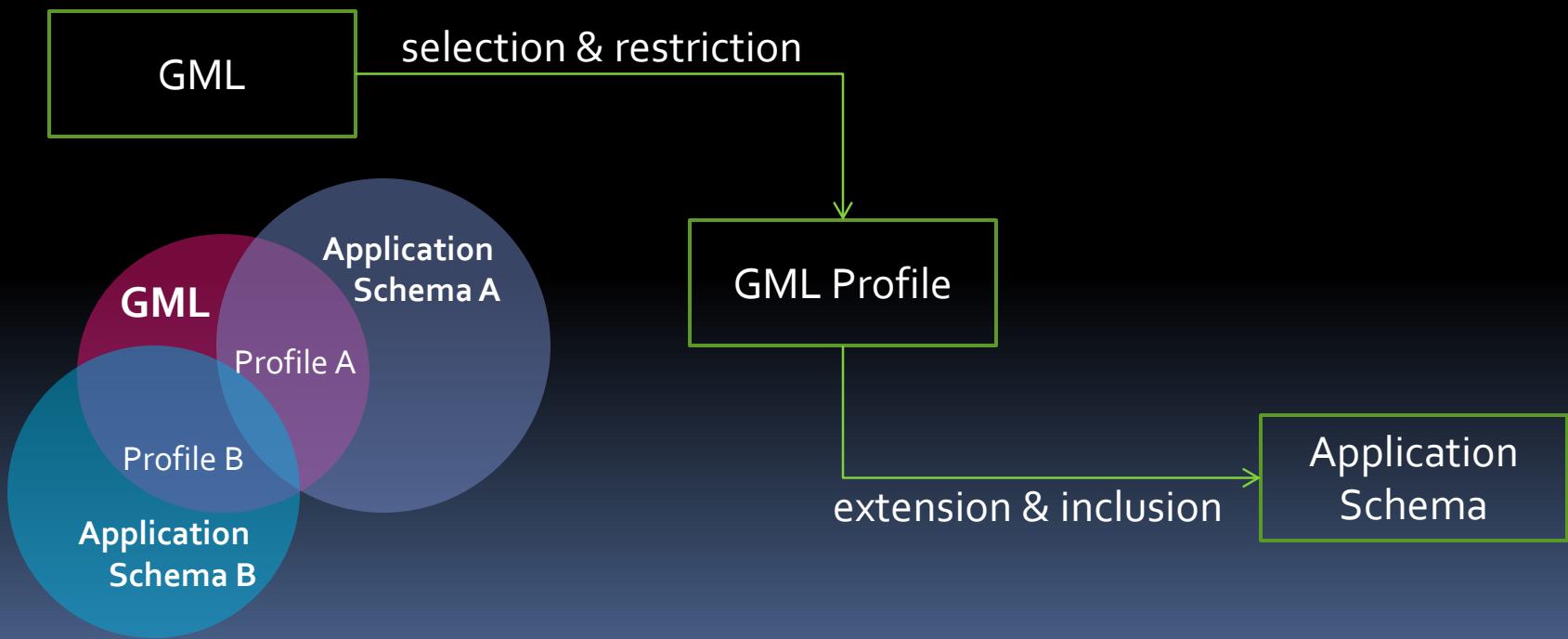
판권 © 2011



응용 스키마

응용 스키마

- 응용 스키마의 생성
 - ▣ 두 단계

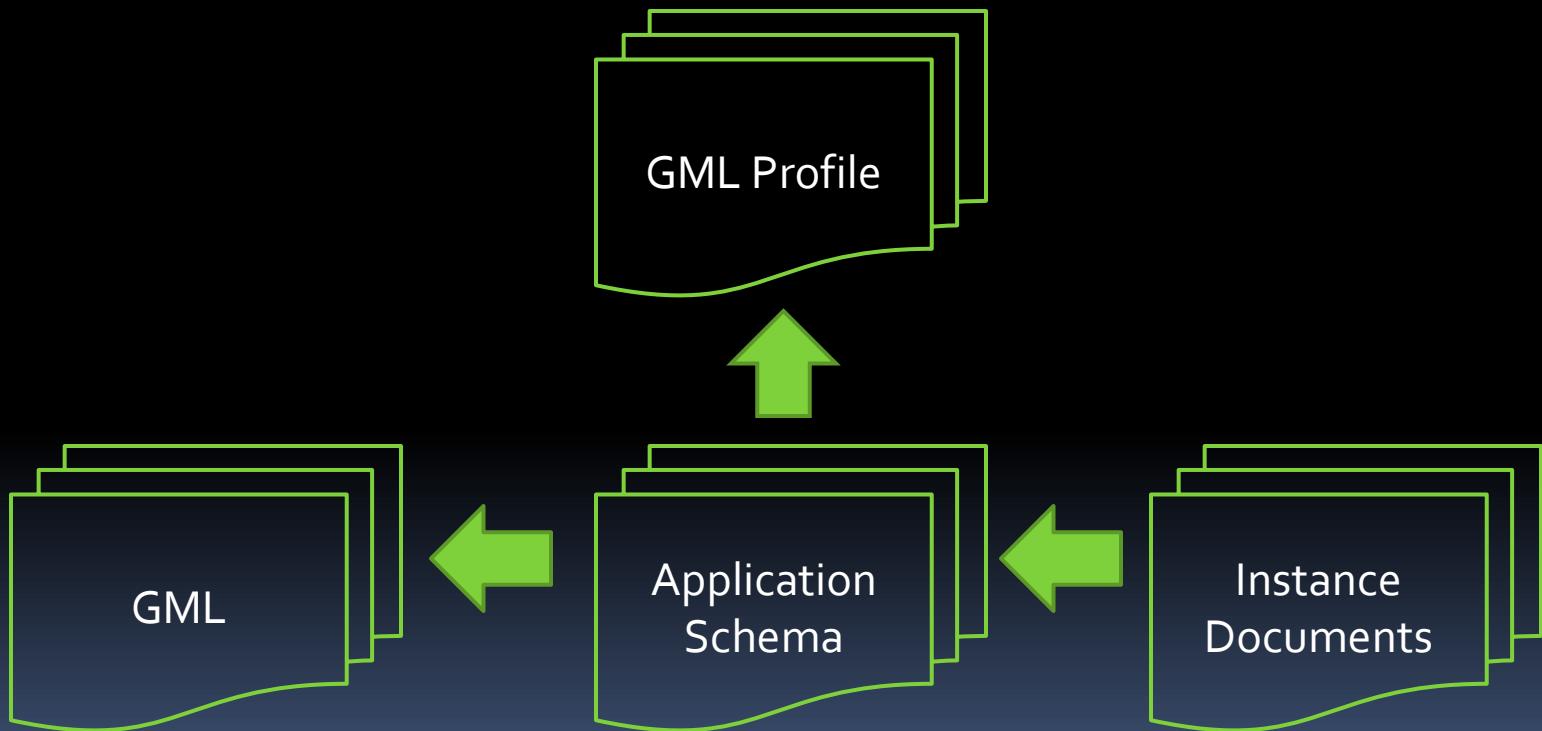


GML 프로파일의 규칙

■ 프로파일의 규칙

- GML 프로파일은 GML 부분집합의 논리적인 제한
- 프로파일은 필수적인 GML 요소나 속성의 이름, 정의 데이터 타입을 변경하지 말아야 함
- 프로파일을 정의하는 스키마는 'gml' 네임스페이스로 "<http://www.opengis.net/gml/3.2>" 을 사용해야 함
- 프로파일에서 확장된 타입을 사용할 때, 응용 스키마는 별도의 네임스페이스를 사용해야 하고, "<http://www.opengis.net/gml/3.2>"를 네임스페이스로 사용해서는 안됨

규칙의 기능적인 테스트



Outline

CONTENTS

- GML의 소개
 - 배경
 - GML 개요
- GML 세부사항들
 - 개념적 스키마
 - 스키마 기술언어
 - GML 스키마
 - 응용 스키마
- 요약

요약

■ GML

- 지리정보를 위한 모델링, 전송 및 저장을 위한 XML 스키마
 - 응용 스키마와 데이터 집합의 저장 및 전송을 지원
- 지리 응용 스키마와 객체의 정의를 위한 개방형, 중립적인 프레임워크
- 데이터 모델
 - Basic types, geometry, CRS, temporal information and dynamic feature, coverage, dictionary, units, measures, values, directions, observations