Licensing of geospatial data and the authorization prospective

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Overview

- Control of Intellectual Property
- Licensing capabilities of XrML*
- What is the difference between a policy and a license?
- Licensing requirements for Geodata
- Quick summary of GeoXACML
- XrML and GeoXACML working together
- Conclusion

* REL can possibly be used instead of XrML but author has no knowledge about REL

Control of Intellectual Property

Conditions of use

- Who: Subject as the end-user, e.g. Alice
- How: Operation used by the end user, e.g. map, read, write
- What: Data Object accessed by end-user, e.g. features, maps

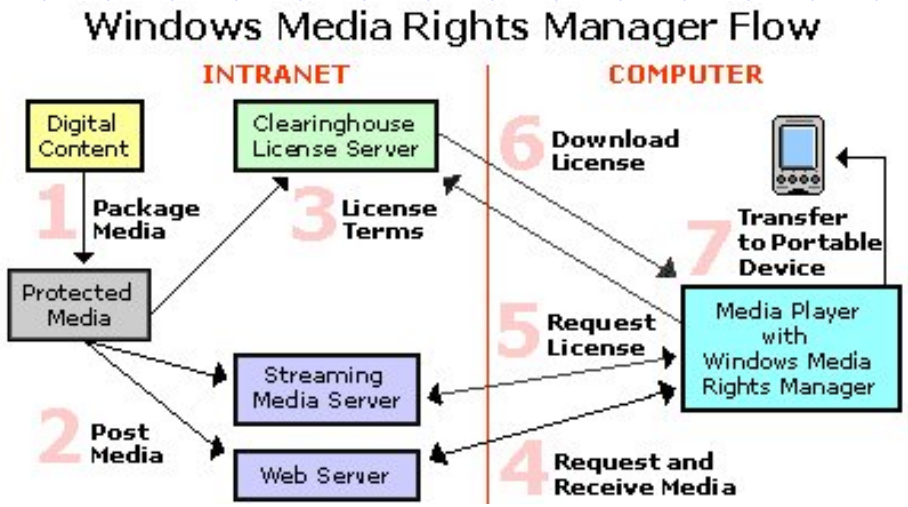
⇒ Useage license

Conditions of distribution

- Who: Distributor as a mediator, e.g. AceMe
- How: Possible modifications for conditions of use, e.g. sub-set of operations
- What: Data Objects, e.g. features, maps accessed by the end-user, e.g. features, maps

⇒ Distribution license

Simple Usage Licensing for a static Product such as a Video



Usage license can be described using a Rights Expression Language, such as XrML

1) Package media (e.g. Video) as a static product, e.g. the video "Signs"
2) License, issued by "Empire Movies", describes the possible use of the Video "Signs"
3) License validation and permit/deny usage of the video

The Distribution License

- AceMe obtains a distribution license from „Empire Movies“ that allows to issue a usage license
  - unlimited playing/no copying of the video „Signs“
  - max. of 2 licenses (two different end-users)
- AceMe issues a usage licenses to Alice and Bob

When Alice or Bob try to play/copy the video, two aspects must be evaluated:

1) Is this license valid? ⇒ Chain of trust

2) Is the requested usage compliant to the licensed usage? ⇒ Authorization

Distribution license can be described using a Rights Expression Language, such as XrML

Attempt to name the difference between a License and a Policy

License

- Explicit statement about the issuer of the license
- Explicit statement about the legitimate owner / user of the license
- Authorization triplet
  - Who
  - How
  - What

Policy

- Implicit knowledge about the issuer of the policy, e.g. the policy resides on the issuer's server
- Explicit statement about the legitimate owner / user of the policy is not necessary
- Authorization triplet
  - Who
  - How
  - What

Some Requirements for simple Licensing of Geodata

- Dynamically created product (depend on service paramter), e.g. a FeatureCollection or a map
- Useage license must obey to spatial nature of data
  - Alice can request maps of layer CityMap if within the administrative boundary of Southampton
  - Bob can request a feature collection contain features of type Building but not „The White House“

GeoXACML provides corpus for spatial authorization

- Is a usage license – been issued under certain conditions – valid? Does a chain of trust exist?

XrML, XML Signature and X.509 certificates provide the means for expressing the license characteristics

Declaration of Required Permissions with XACML*

- Permissions can be encoded in XML
- Rule-based authorization model
- Enforcement of permissions for XML encoded resources (e.g. GML feature collection)
- Supports declaration and enforcement of
  - ☑ **Class permission**: Applies to GML encoded features based on the feature type
  - ☑ **Object permission**: Applies to GML encoded features based on value of non-spatial properties
  - ☒ **Spatial permission**: Not supported ⇨Extension

*e**X**tensible **A**ccess **C**ontrol **M**arkup **L**anguage by OASIS

GeoXACML capabilities based on an object-oriented data model

- Feature-type based (inherited from XACML)
  - All features of a particular type for GML encoded geodata as exchanged with WFS, e.g. BuildingType
  - A layer of a WMS, e.g. Orthophoto, Coastlines
- Feature based (inherited from XACML)
  - Individual features of a particular type encoded in GML and exchanged with WFS, e.g. “The White House”
- Spatial / topology based
  - All features of a particular type, which geometry has a particular topological relation to a given geometry, the permission geometry
    1) Building.location, Within, Box(0,0,10,10)
    2) Building.location, Touching, LineString(0 0,10 10)
    3) Building.location, (¬Overlapping AND ¬Within), Box(0,0,10,10)

GeoXACML*: A Geospatial Extension to XACML

- Developed during dissertation project
- Defines constructs for spatial permissions
  - Geospatial data types based on GML 2.1 simple geometry

    PointAttribute, LineStringAttribute, LinearRingAttribute, BoxAttribute, PolygonAttribute
  - Topological relational functions

    disjoint, touches, crosses, within, overlaps, intersects, equals, contains

*__Geo__spatial e__X__tensible __A__ccess __C__ontrol __M__arkup __L__anguage

Example
Class and Object Permissions

- **Anyone** can **map** features of type **Building**
  - Rule := {*, map, //Building, Condition} → Permit
  - Condition :=
    {string-equal, local-name("//Building"), "Building"}
- **Bob** can not **read** the feature of type **Building** identified by the **address** "350 Fifth Ave Ste. 3201, New York, NY 10118"
  - Rule := {Bob, read, //Building, Condition} → Deny
  - Condition :=
    {string-not-equal, string("//Building/address"), "350 Fifth Ave Ste. 3201, New York, NY 10118"}

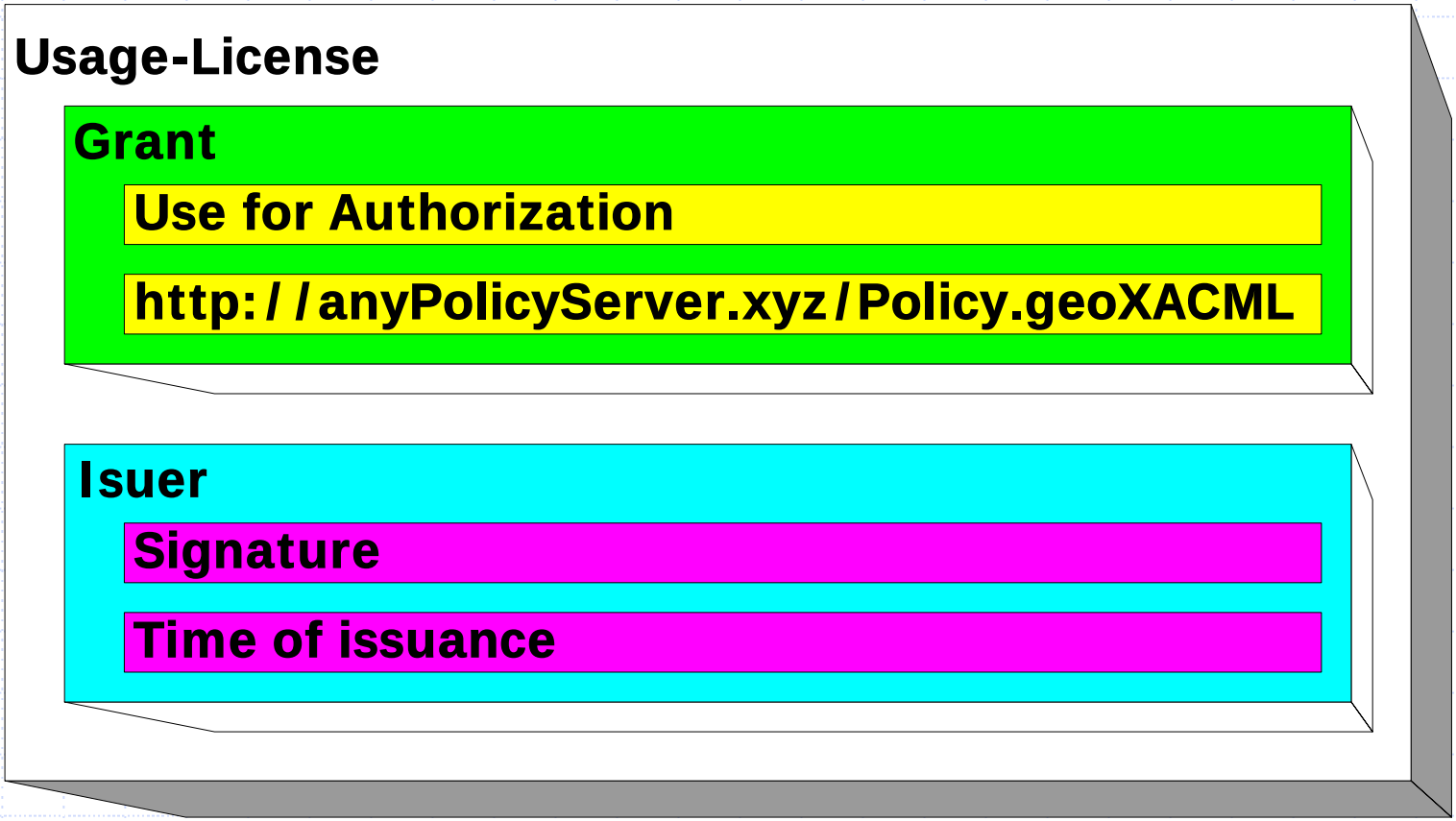
Example Spatial Permissions

- **Bob** can **map** features of type **Building** if the **location** is **within** the area of Manhattan
  - Rule := {Bob, map, //Building, Condition} → Permit
  - Condition := {within, //Building/location, {EPSG:4326, -74,40.6 ... -74,40.6}}
- **Anyone** can **map** features of type **Building** if the **location** is **not within** the area of Manhattan
  - Rule := {*, map, //Building, Condition} → Permit
  - Condition := {¬within, //Building/location, EPSG:4326, -74,40.6 ... -74,40.6}

How XrML and GeoXACML can possibly working together

- XrML supports to declare a distribution license
- GeoXACML supports to declare the authorization part of a usage license
- The static product referenced by the XrML license is a GeoXAML policy file
- How to issue a usage license?
  - A distributor receives a XrML distribution license that includes a usage license including the GeoXACML policy
  - The GeoXACML policy expresses the usage of resources
  - A new XrML license is created from the distributive license, e.g. a new principal is associated to the license
- If the usage license is valid (chain of trust), the authorization policy is used to allow/disallow the usage

A Usage License example using GeoXACML and XrML



Conclusion

- Two different types of licenses exists
  - Distribution-license
  - Usage-license
- Usage-license
  - Must support evaluation of the chain of trust
  - Spatial Authorization
- Chain of trust is supported by XrML
- Spatial authorization is supported by GeoXACML

Can the combined use of XrML (REL) and GeoXACML be the possible solution for licensing of Geodata?

The final slide

Dissertation, covering GeoXACML capabilities is available online

http://tumb1.biblio.tu-muenchen.de/publ/diss/in/2005/matheus.html

Thank you very much for your attention

Questions, please ...