Managed Control of Composite Cloud Systems

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THE UNIVERSITY of NEW MEXICO

Outline

Areas of Study

Our group:

- *UNM Informatics*: Information security, theory, and architectures; this work is specific to information security
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Acronyms:

- *UM*: Usage Management
- *PMR*: Personal Medical Record (this is also electronic, in this case)

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  Organizations should control what they pay for
  - Systems
  - Data
  - Records

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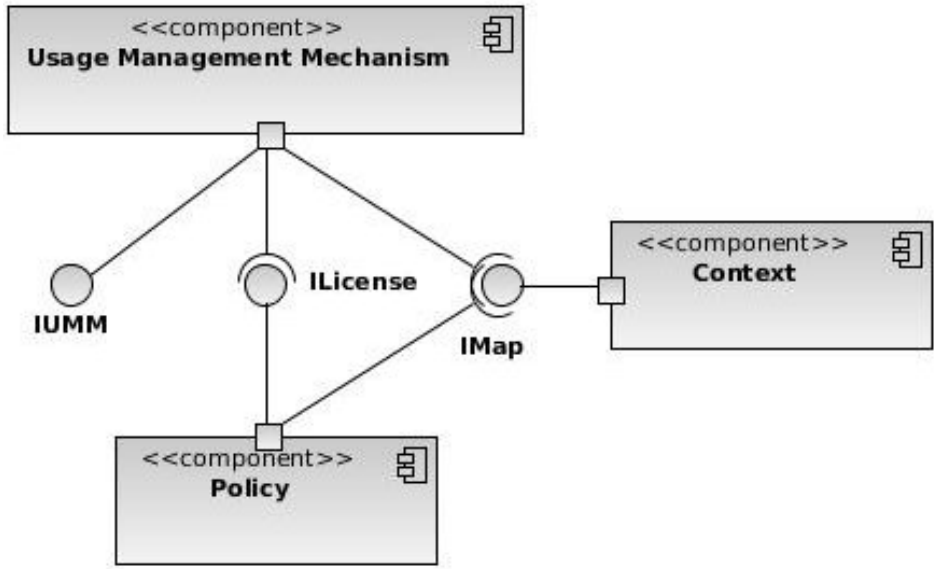
Surprisingly difficult...

- *NP-Complete*
  Simple generalized SLAs are equivalent to *SAT*
- *Multiple Providers*
  Difficult constant factors related to latency, etc.

UM Primer - UM System

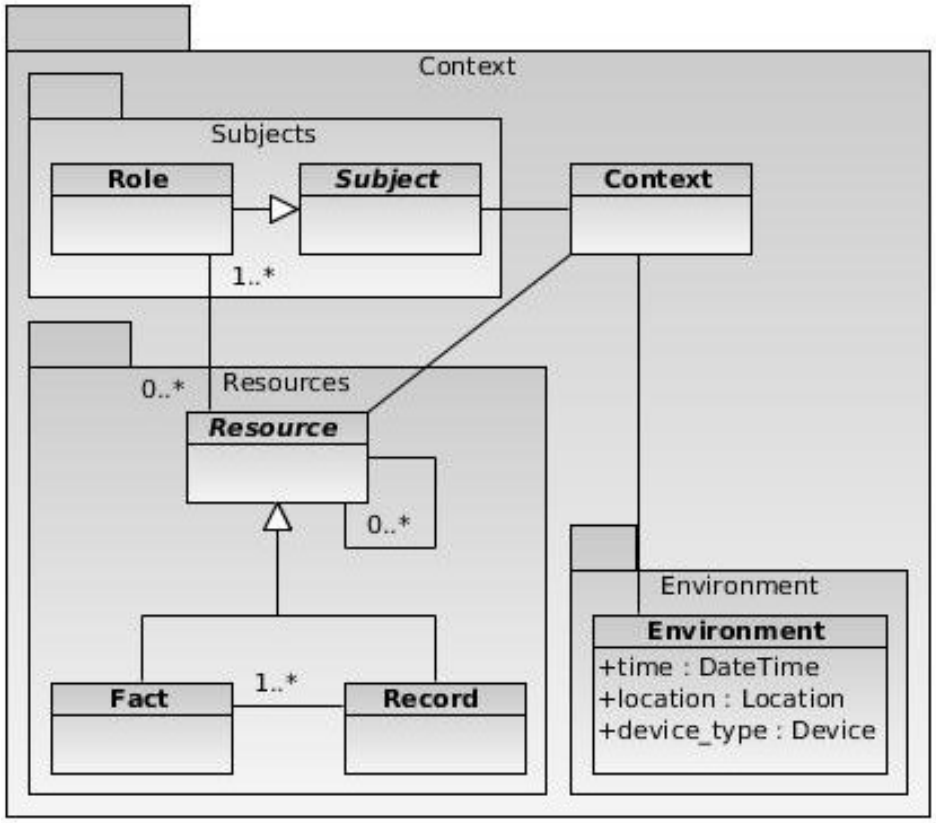
Three basic things:



- *Usage Management Mechanism*
- *Policy*
- *Context*

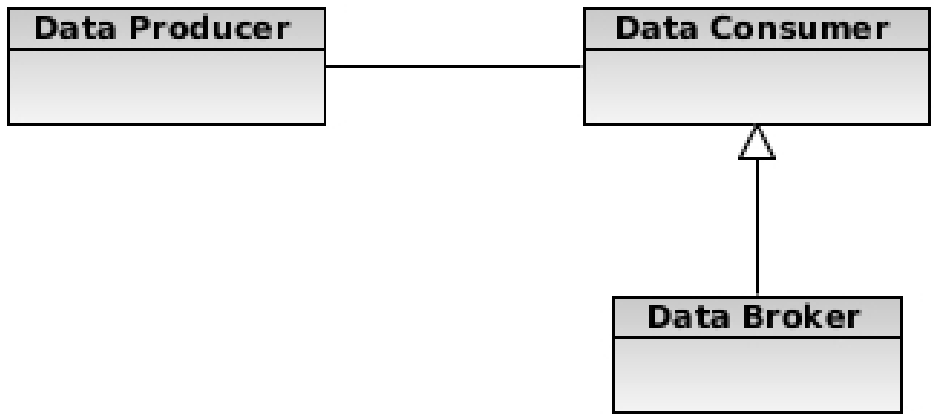
UM Primer - Ontology

Ontology of domain required to pull it all together



Data Marketplace

A data marketplace, in this case, is a virtual environment in which data producers are able to profit by providing their information directly to various kinds of data consumers.



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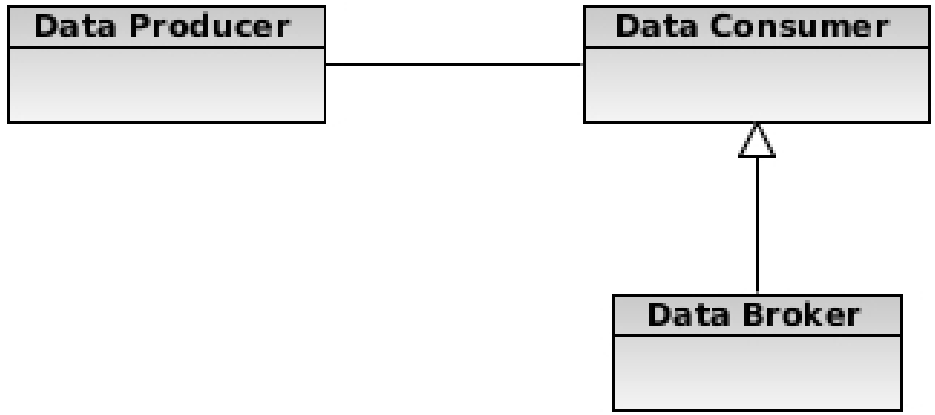

In General:

- *Producers* produce data, *Consumers* directly consume or redistribute data. *Producers* are holders of medical information, generally individual patients. *Consumers* are institutions like research laboratories or pharmaceutical companies.

Data Marketplace - Ontology

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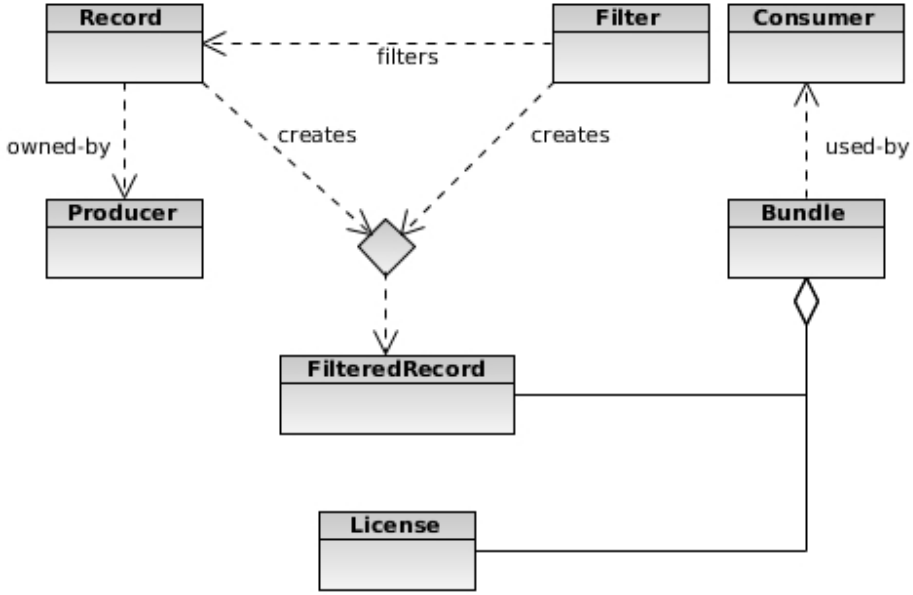

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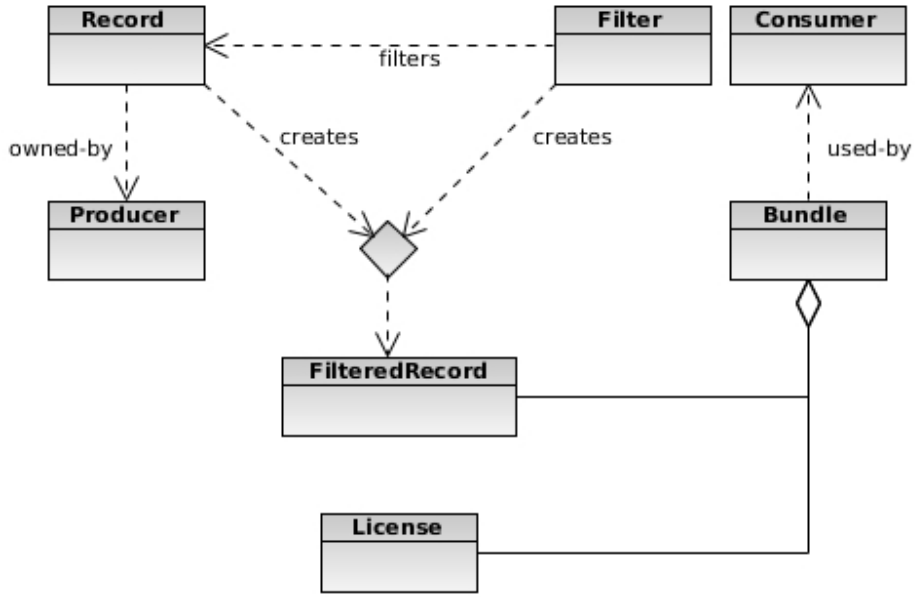

- Use a combination of static and dynamic policy evaluation
  - Static filtering of records pre-distribution is more efficient
  - Dynamic control allows for *transitive attribution*, in which a consumer is appropriately credited for supplying data for products that are separated by more than one state

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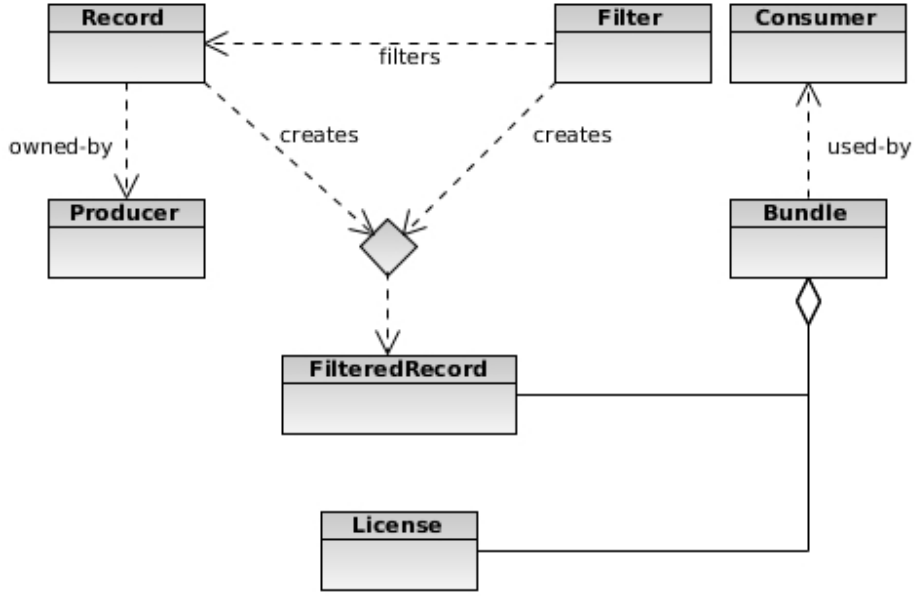

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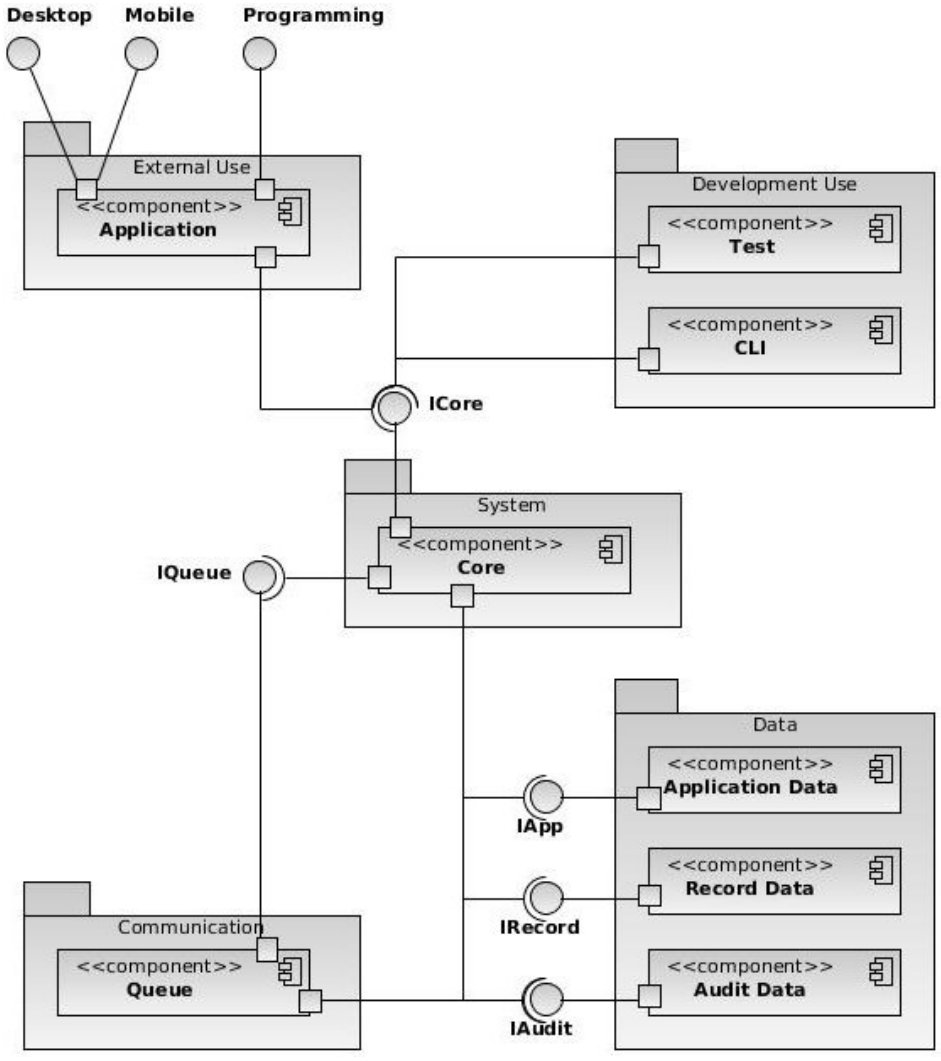
- Note relationships to previous domain ontology
  - Common elements include **Record, Role** entities

Data Marketplace - System Attributes

- *Editability* Certain fields of that record should be editable by the owner. Other fields must only be editable by specific medical providers.
- *Roles* Verifiable roles related to ownership of specific areas of a given record.
- *Auditability* Keeps a clear record of who edited what, what those specific changes were, how they were made, and when.
- *Security* Use of modern security systems as much as possible to provide additional control over assets.
- *Accessibility* Wide accessibility geographically, access to medical information from devices with a variety of form factors.
- *Performance* Core functionality must be high performance.
- *Flexibility* This system and the data it manages can be used in a wide variety of contexts.
- *Extensibility* It must provide programmatic interfaces.

Data Marketplace - Logical View



Conclusions

New Approach

- Protecting *facts* rather than *records*

New Models

- More fine-grained control creates new opportunities around data management and use

Better Service

- New models provide new services, at the cost of new risks