

Primary-Context Model and Ontology: A Combined Approach for Pervasive Transportation Services

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Outline

- Pervasive transportation services
- A combined approach to context modelling:
 - Primary-context model and ontology
- Park & shop service

Pervasive Transportation Services

- Extend the vision of pervasive computing to large geographical areas
- **Intelligent Transportation Systems (ITS)** produce an abundance of context information
- **Pervasive transportation services**
 - use context information from several distributed, heterogeneous ITS
 - dynamically correlate this information

Modelling Context Information

- **Context model**
 - **Decouples** applications and sensors
 - Standard way to **store, manage, and share distributed** information in a **scalable** manner
- **Context ontology**
 - Thorough **representation** of domain knowledge
 - Provides **semantics/meaning**
 - Higher-level **information-reasoning**

Combined Approach

- **Primary-Context Model and Ontology**
 - **PCM:** Primary-Context Model
 - **PCOnt:** Primary-Context Ontology
- Common abstractions.....to model data
- Spatial interface.....to access data
- Primary context.....to correlate data
- Ontology.....to reason about data

Primary-Context

1. Identity

- *Type : Id : Name : Description*

2. Location

- *Geometry : Symbolic*

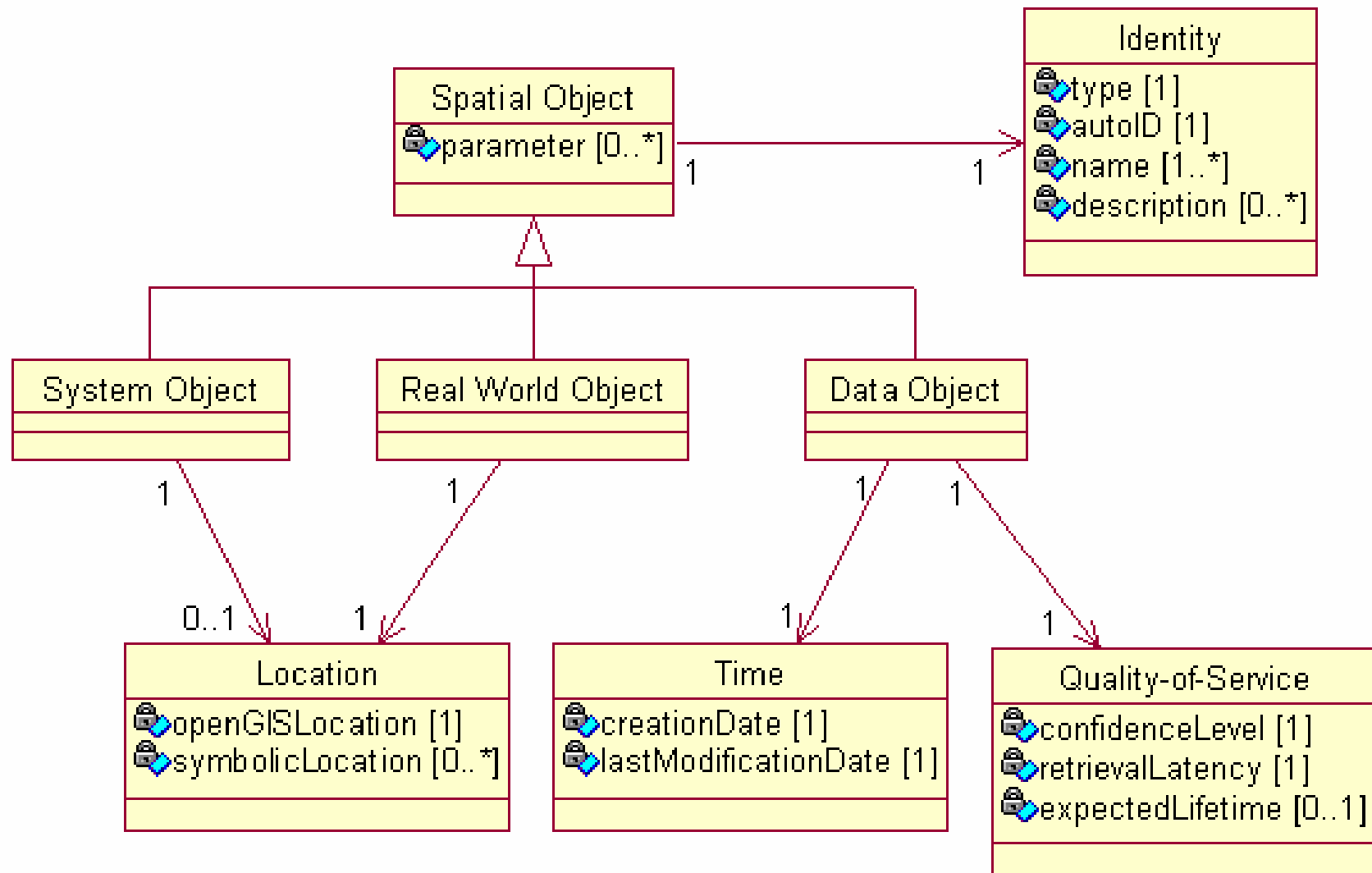
3. Time

- *Creation date : Last modification date*

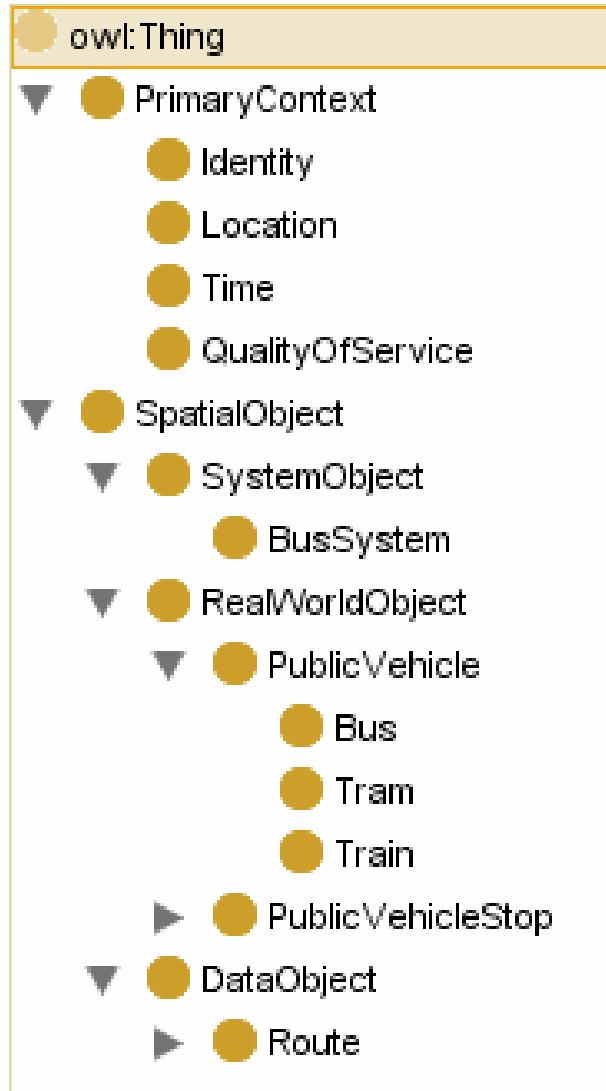
4. Quality of Service

- *Confidence level : Retrieval latency :
Expected lifetime*

Primary-Context Model

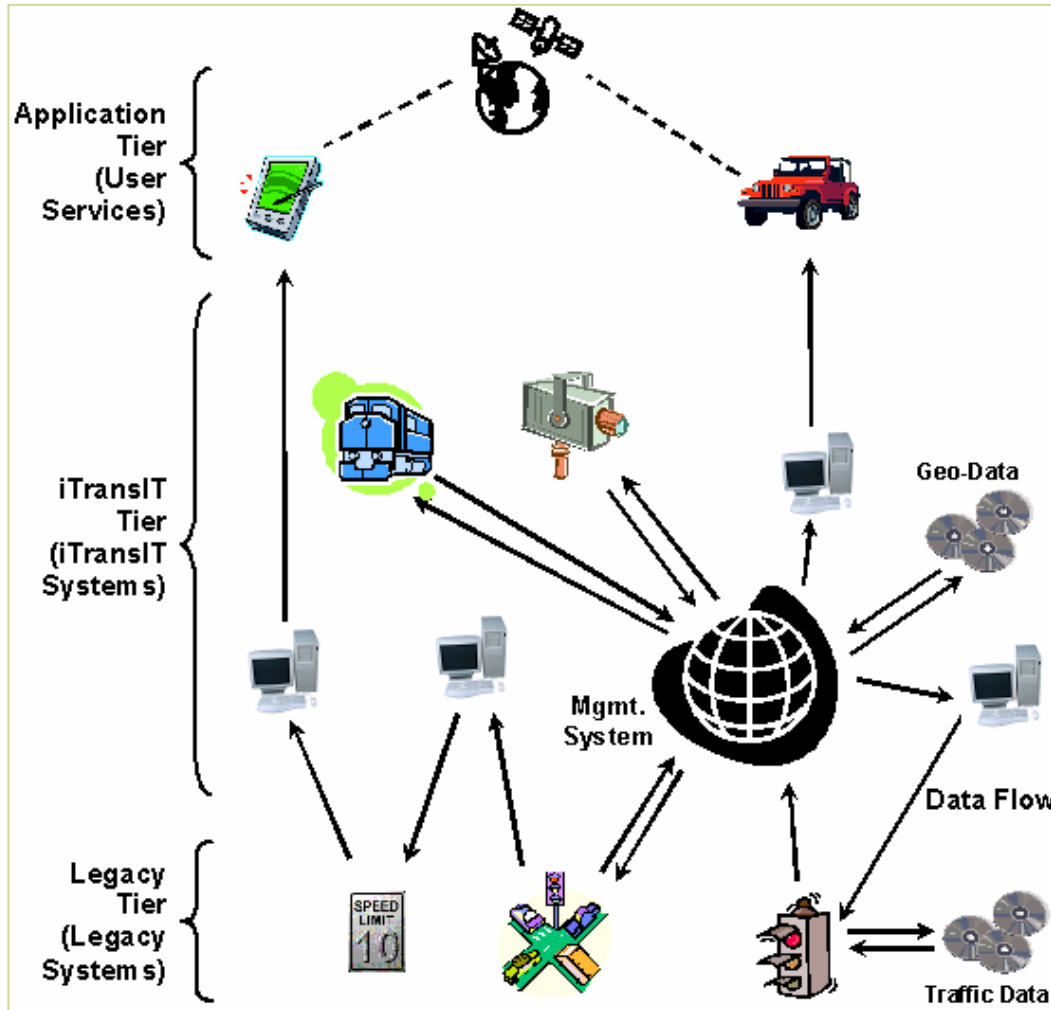


Primary-Context Ontology



- Defines all **concepts** in our domain
- Enables **consistency checking** of context information
- Adds **semantic meaning** to spatial object types
- Allows **deduction** of high-level, implicit context information from low-level, explicit context information

iTransIT Framework



- iTransIT systems and services:
 - modelled with **PCM**
 - use concepts from **PCOnt** as type values
- Context information can be easily accessed with **Spatial Interface**

Example PerTrans Service

Park & shop service

- Combines information from a **car park system** and a **shopping assist system**
- Both systems modelled using PCM
- All spatial object types are valid PCOnt concepts
- PCOnt enables information inference
- Primary context used to correlate information

XML PCM extract

```
<realWorldObject>
  <identityContext>
    <type> CarPark</type>
    <autoID> 8902D</autoID>
    <name> Empire Parking Lot</name>
    <description> Parking lot of Empire State Building
  </description>
  </identityContext>
  <locationContext>
    <openGISLocation> 0 008 741</openGISLocation>
    <symbolicLocation> Midtown Manhattan
  </symbolicLocation>
  </locationContext>
</realWorldObject>
```

Conclusions

- The Primary-Context Model and Ontology adopt a **combined approach** to modelling context information
- The PCM and PCOnt facilitate:
 - Interoperation across independent ITS
 - Information correlation
 - Information reasoning