

## Object Identity

- SQL: primary keys
- Object orientation: Java: oids (pointers)  
OODBs: OQL oids  
Object oriented extensions to SQL  
→ Object identity → tables

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## Databases

Relational Calculus-style → Prolog  
foreign keys

```

country('germany', 'D', 835000, 356000,
        'Berlin', 'Berlin')
city('Berlin', 'D', 'Berlin', 3500000, ...)
org('Europarat', 'FR', 'Brussels', 'Paris', 'B', ...)
is_member('D', 'EU', 'full member')
  
```

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Declarative, object-oriented modeling:

Objects  $\hat{=}$  IRIs  $\hat{=}$  logical constant symbols

$const(\text{germany}, 'germany', 'D', 8350000, 356000, \text{berlin})..$   
 $city(\text{berlin}, 3, 500000, \text{germany}, \text{berlin})$   
 $org(en, 'Emp. Union', 'EU', \text{brussels}, \dots)$   
 $isMember(\text{germany}, en, 'member')$

Unique-name assumption:

- different constants mean different objects

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RDF:

Resources  $\hat{=}$  objects

Web: Resource identifiers (URI)

-> different URIs <sup>intentionally</sup> can denote the same thing

-> no unique name assumption

-> equality must be reasoned about

-> denote that two URIs have the same meaning

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not possible with 2 vars

$$\exists x: (\text{name}(x, \text{"john"}) \wedge \text{age}(x, 35))$$

$$\wedge \exists y: (\text{name}(y, \text{"alice"}) \wedge \text{age}(y, 10))$$

$$\wedge \exists y: (\text{name}(y, \text{"bob"}) \wedge \text{age}(y, 8))$$

$$\wedge \exists y: (\text{age}(y, 12) \wedge \text{hasCat}(\text{bob}, x) \wedge \dots)$$

$\Rightarrow$  tree-like structures

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$\mathcal{D}$ :

$$\text{Parent} \equiv \text{Person} \wedge \exists \text{hasChild. Person}$$

$$\text{Parent} \wedge \text{Son} \equiv \dots \exists \text{hasChild. Male}$$

$\Rightarrow$  FOL

$$\forall x: \text{Parent}(x) \leftrightarrow \text{Person}(x)$$

$$\wedge \exists y: \text{hasChild}(x, y)$$

$$\wedge \text{Person}(y)$$

$$\wedge \text{Male}(y)$$

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:capital a rdf:Property ;  
     rdfs:domain :PoliticalThy ;  
     rdfs:range :City .

:Comb a rdfs:Class ;  
     rdfs:subClassOf :PoliticalThy .

:song a Comb.  
     ↑ *would be a class!*

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