

# Things, References, Connectors, Types, Variables, Relations and Attributes



Duarte Gouveia  
EEWC 2016 Madeira  
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# Modeling Ontology

- **Things** Problem of Identity
- **References** Notion of Pointer and Sign
- **Connectors** Linking mutable and immutable
- **Types** Dynamic expression of constraints
- **Variables** Hold values using temporal logic
- **Relations** First class citizen with Relational Algebra
- **Attributes** Variables within closure of a Thing

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# Things

A Thing is something that has an identity.

- Identifiable attributes/values
- Relations with other identifiable things

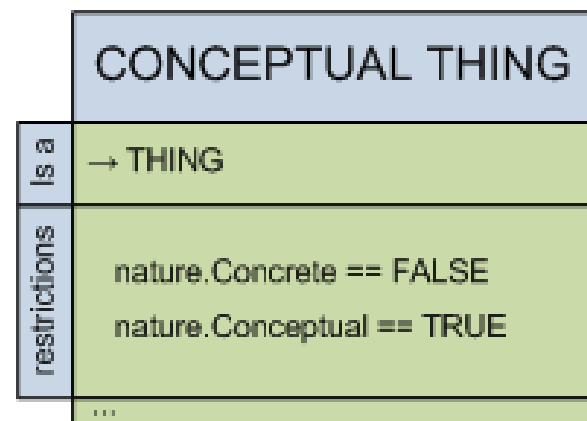
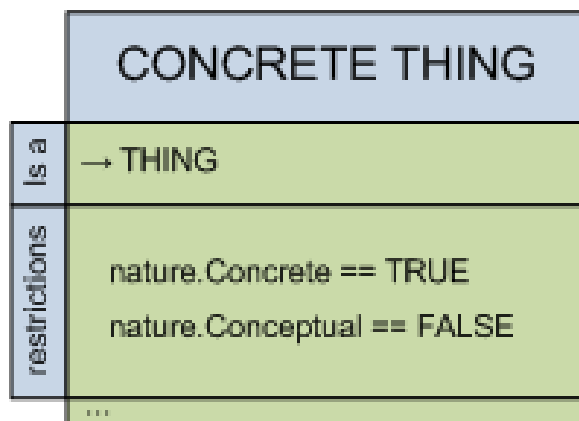
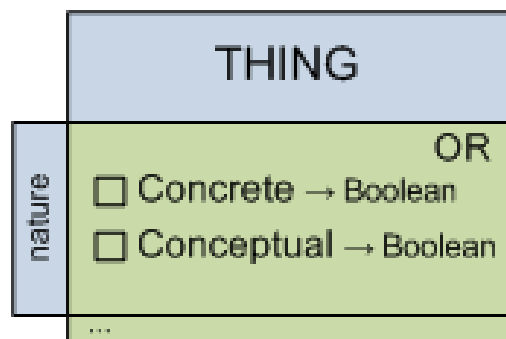
The identity should be a hidden attribute that works as an identifier.

# Things

Examples:

- The red apple in the fruit basket
- The next element in a sequence
- That specific grain of sand in my thumb
- The glass with water that was here
- The ship that belonged to Theseus

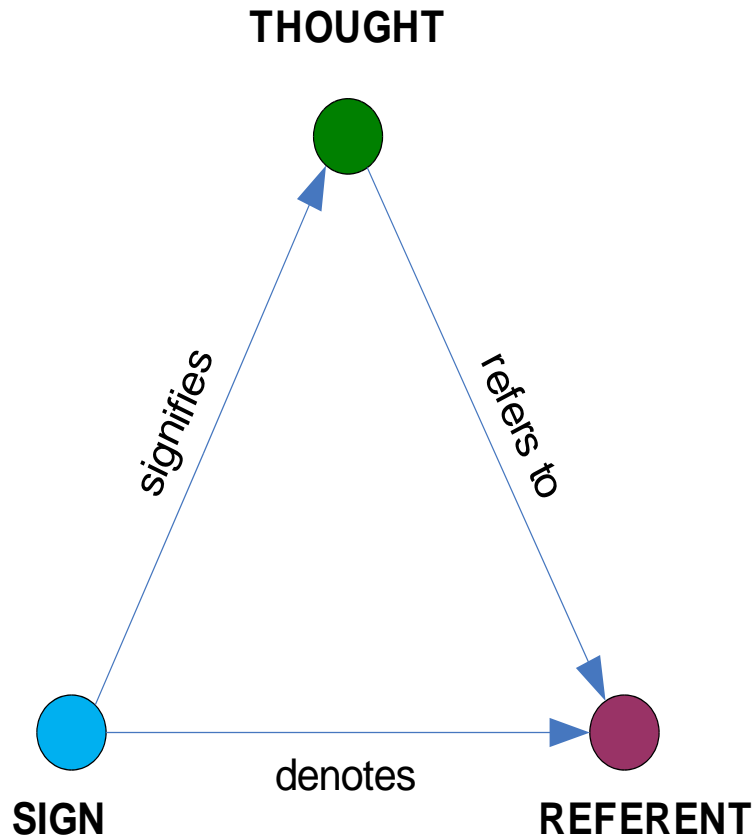
# Things



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# References



Sign – Concrete Reference

Pointer – Conceptual Reference

Thing names  
and Attribute names  
are **References**.



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# Types

Types as dynamic boolean expression of constraints.

Each constraint can express restrictions on:

- **Names**  
have an attribute called X
- **Values**  
only accept values X, Y or Z
- **Relationships**  
have an attribute X that refers to a Thing with the constraint Y
- **Representation Form**  
a number represented with Roman numerals

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# Variables

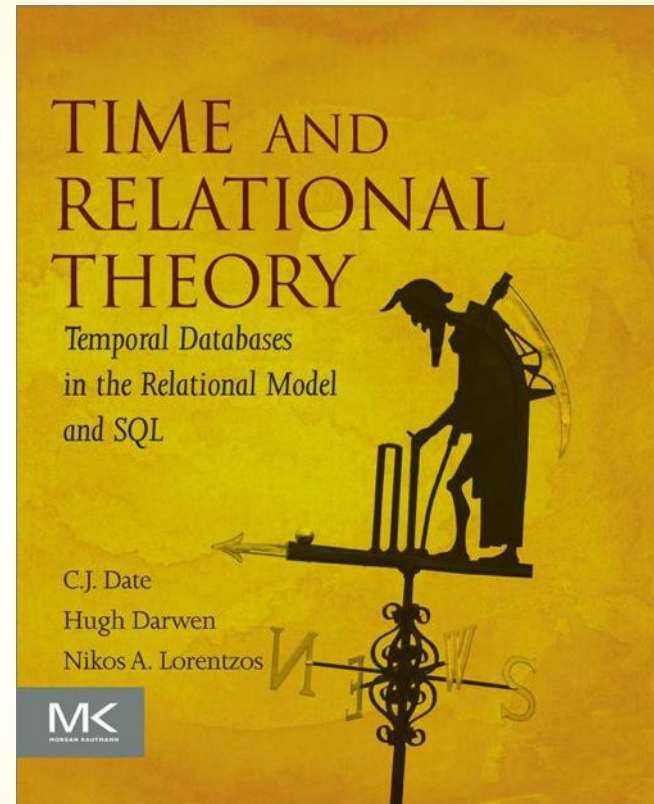
## Types of Time:

- Transaction Time
- Valid Time

## Temporal Logic

Value since T

Value during T1 to T2



Date, C. J., Darwen, H., & Lorentzos, N. (2014). *Time and relational theory: Temporal databases in the relational model and sql*. Morgan Kaufmann.

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# Relations

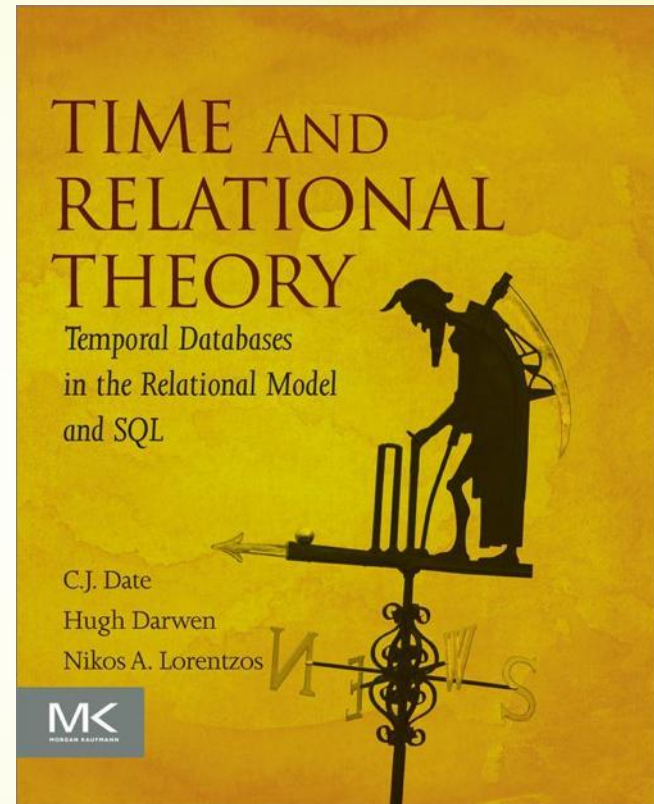
Head:

Set of Attributes

Body:

Set of Tuples

Relations as First Class Citizens  
(can be values in assignments)



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