

Relations



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Active Structure

What Is A Relation

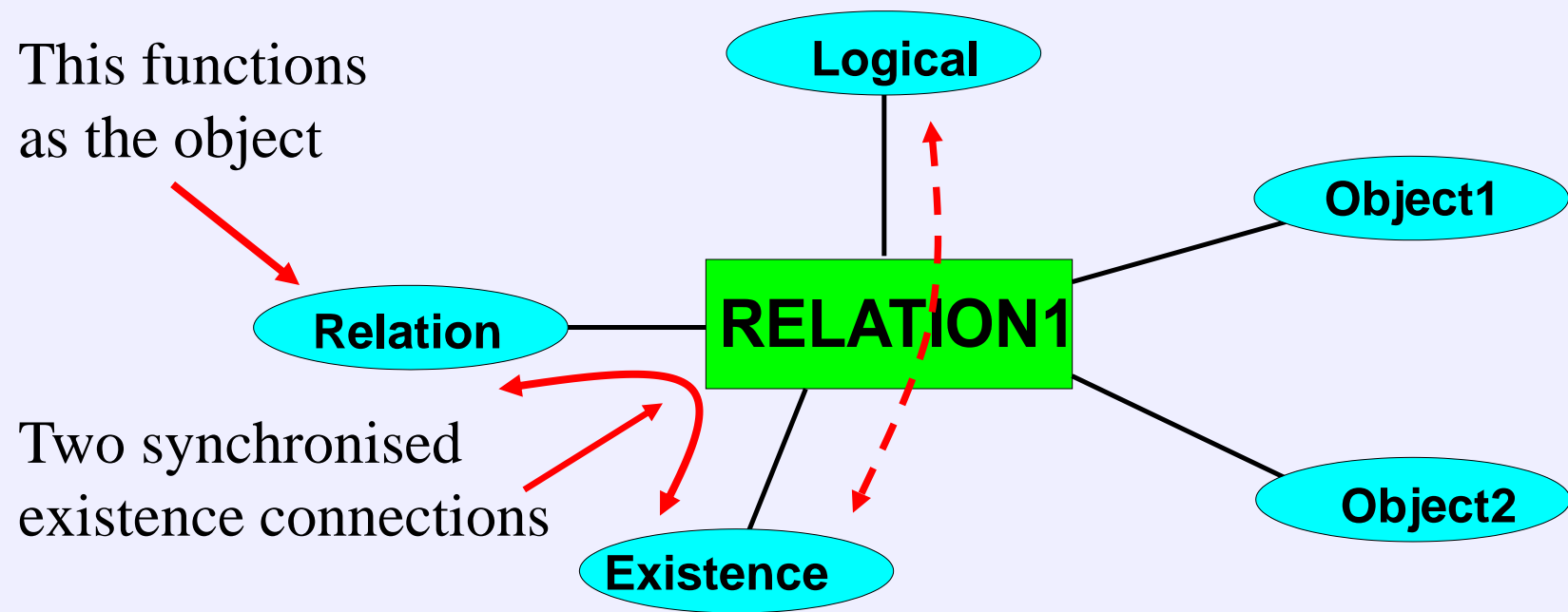
A relation can be an abstract family relation - He is my cousin
- the relation seems to be separate from the thing, but it can just as easily seem to be the thing.

A car isn't a heap of spare parts - one of its necessary components is an assembly relation over all the other components, with each of those having an assembly relation over their components, to make them what they are

This way, relations become indistinguishable from objects - they are the objects



Relation Connections

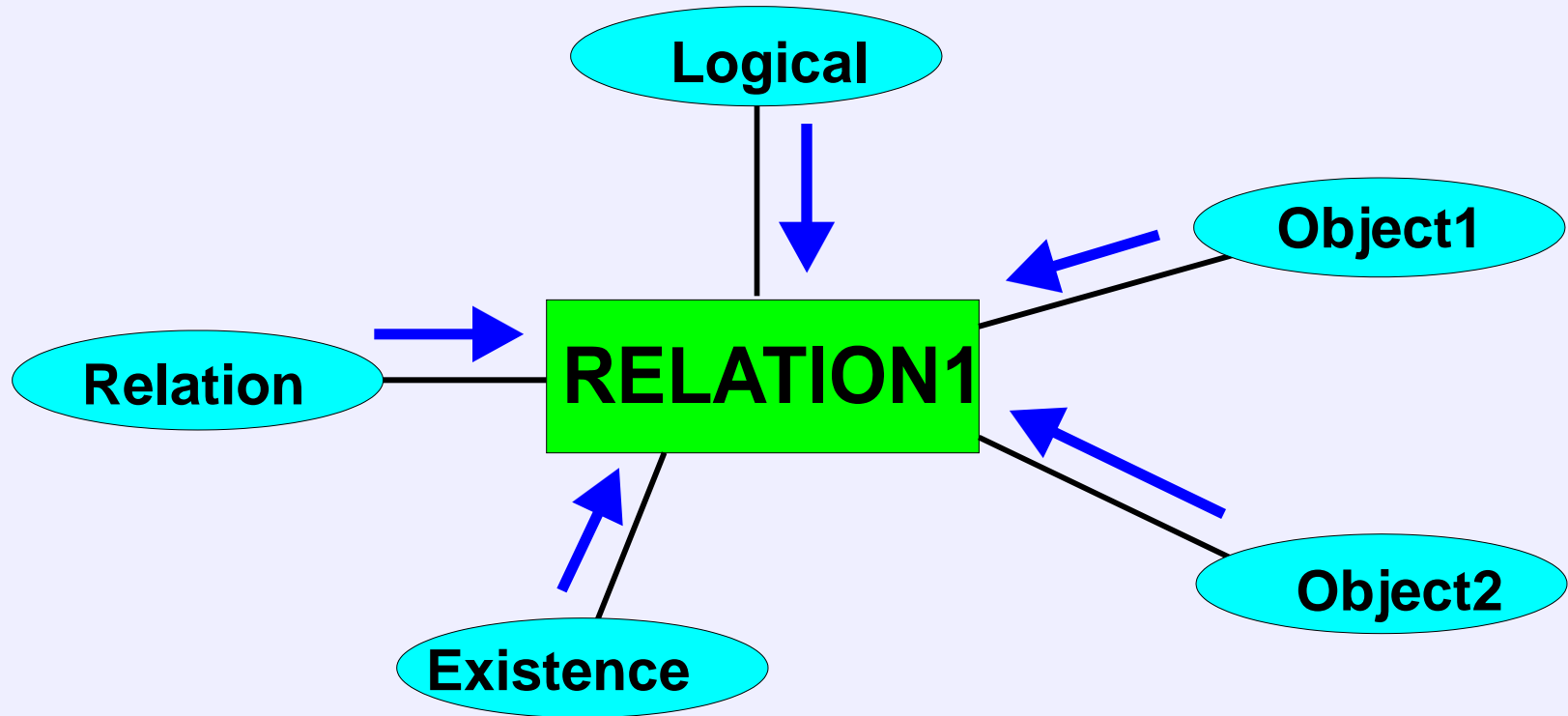


A Relation has a minimum of four connections that can be either input or output

Predicate, Boolean, Existence and Time logic are used simultaneously to represent the interaction of relations - Existence and Logical values are partially dependent on each other



Assertion



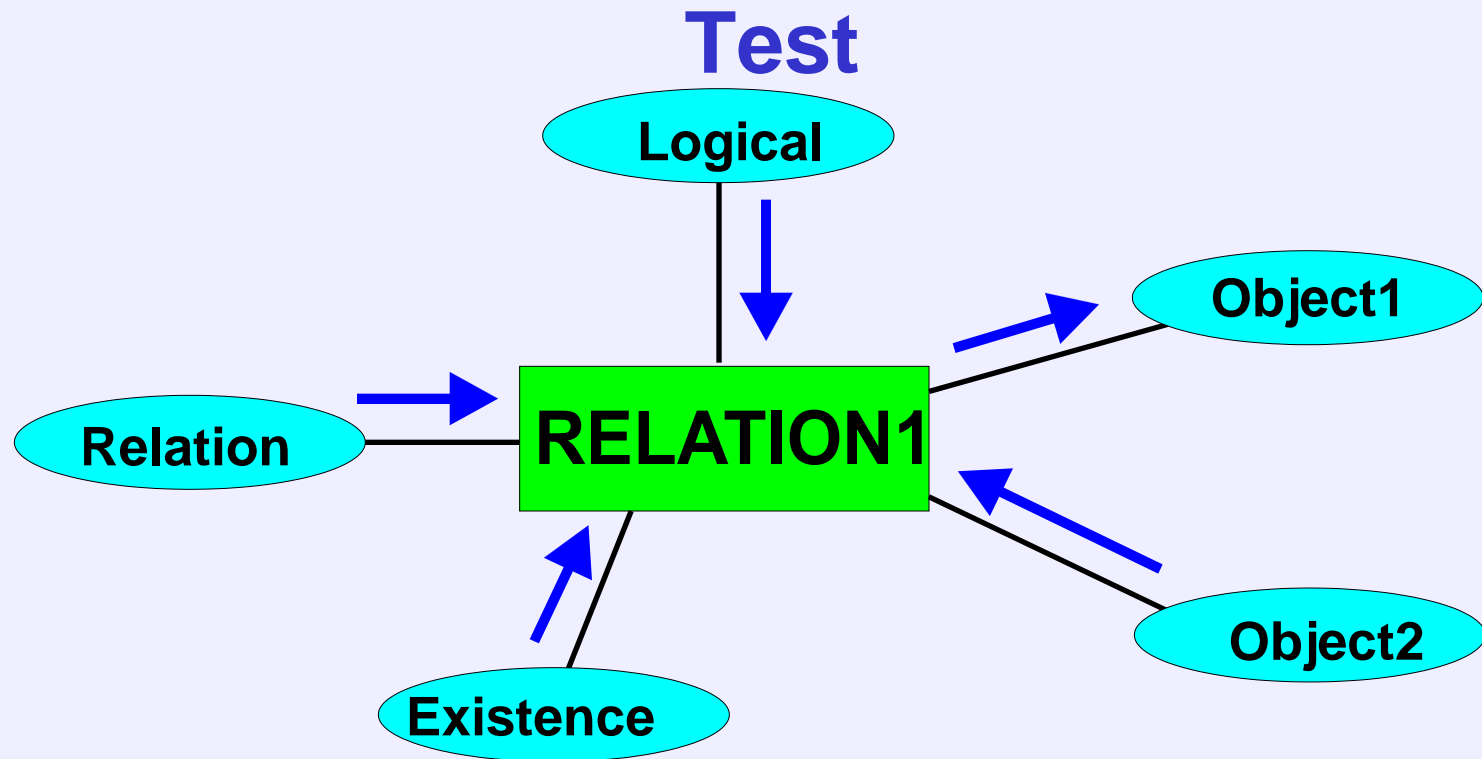
Setting all inputs to True/Exists asserts the Relation exists and is true

Sometimes a relation is false - “not to exceed”



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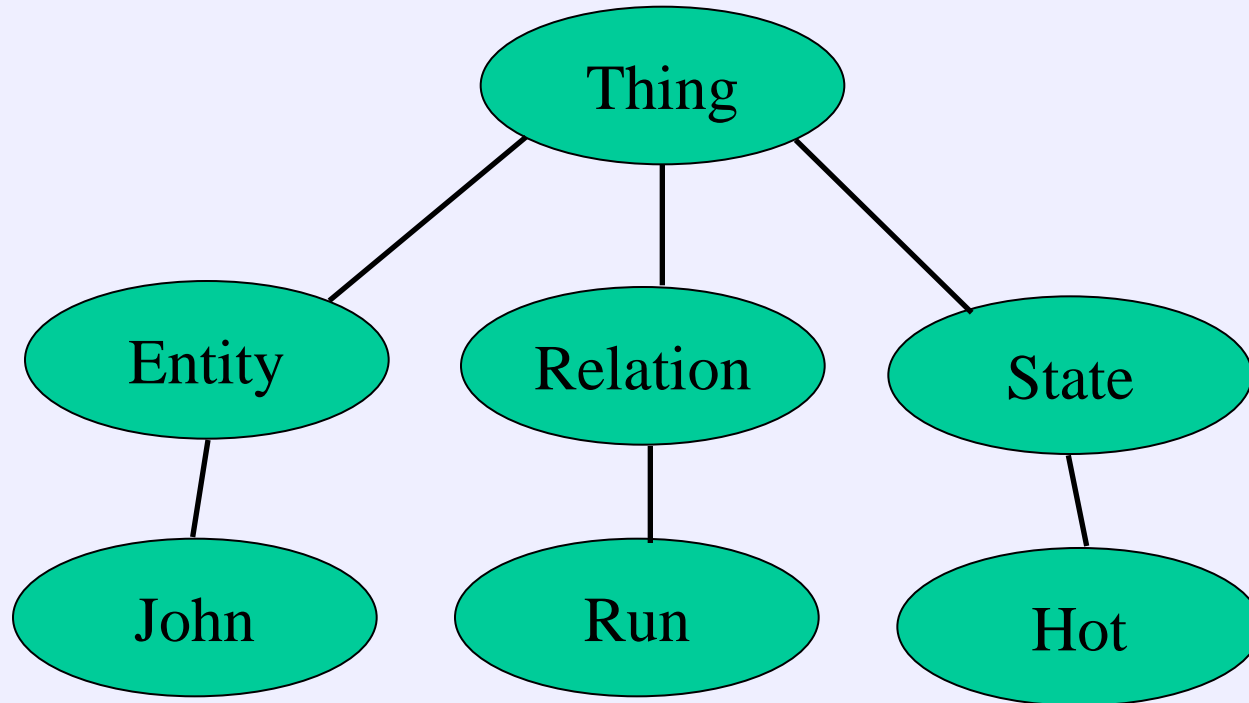


Setting one or more inputs to MayExist allows querying of the Relation:

- Who owns this car
- Does John own this car
- How long has John owned a green car
- What Relation exists between John and this car



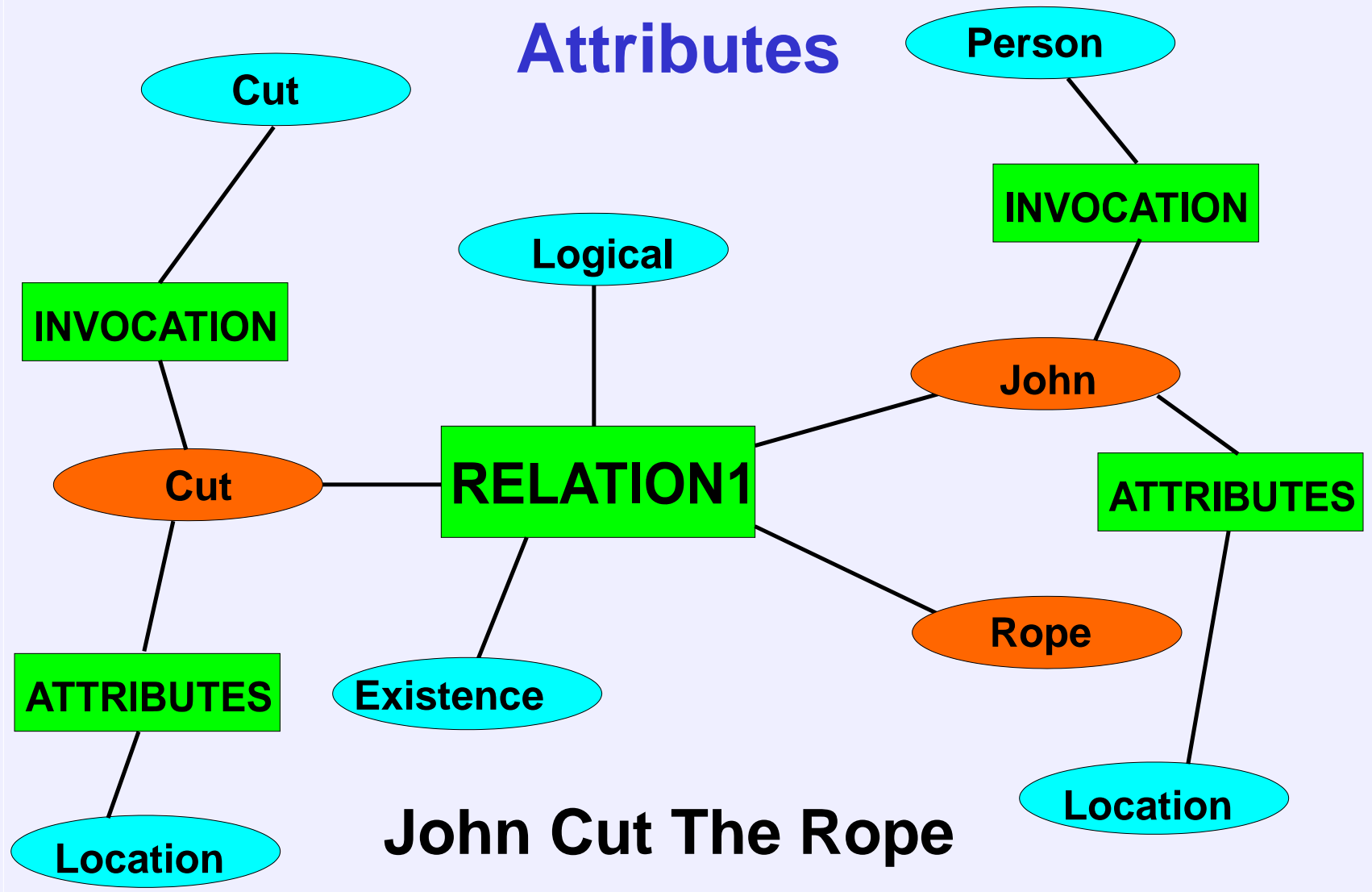
Relations and Things



A Relation is not an Entity, but it is useful to talk about it as if it were



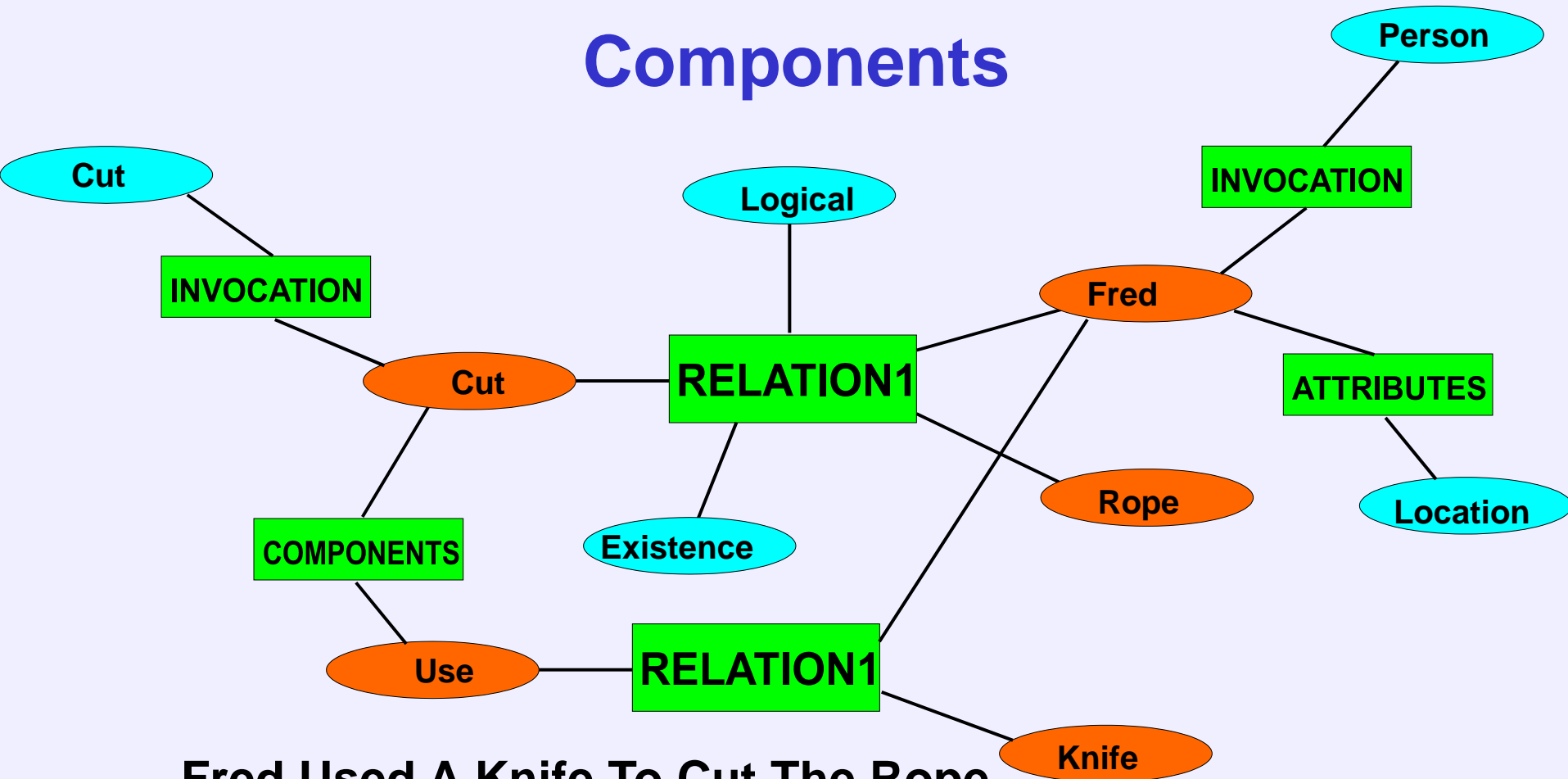
Attributes



We can allow Relations to have attributes like Location in the same way as Entities



Components



Fred Used A Knife To Cut The Rope

A Relation can have components - other Relations -
in the same way an Entity has components



Relations and Objects

We can say

Fred bought a Ford or a Chevrolet

and know that Fred bought a car. We can also say

Fred is Joe's brother or cousin

and know (and make use of the fact) that there is a family relation between Fred and Joe.

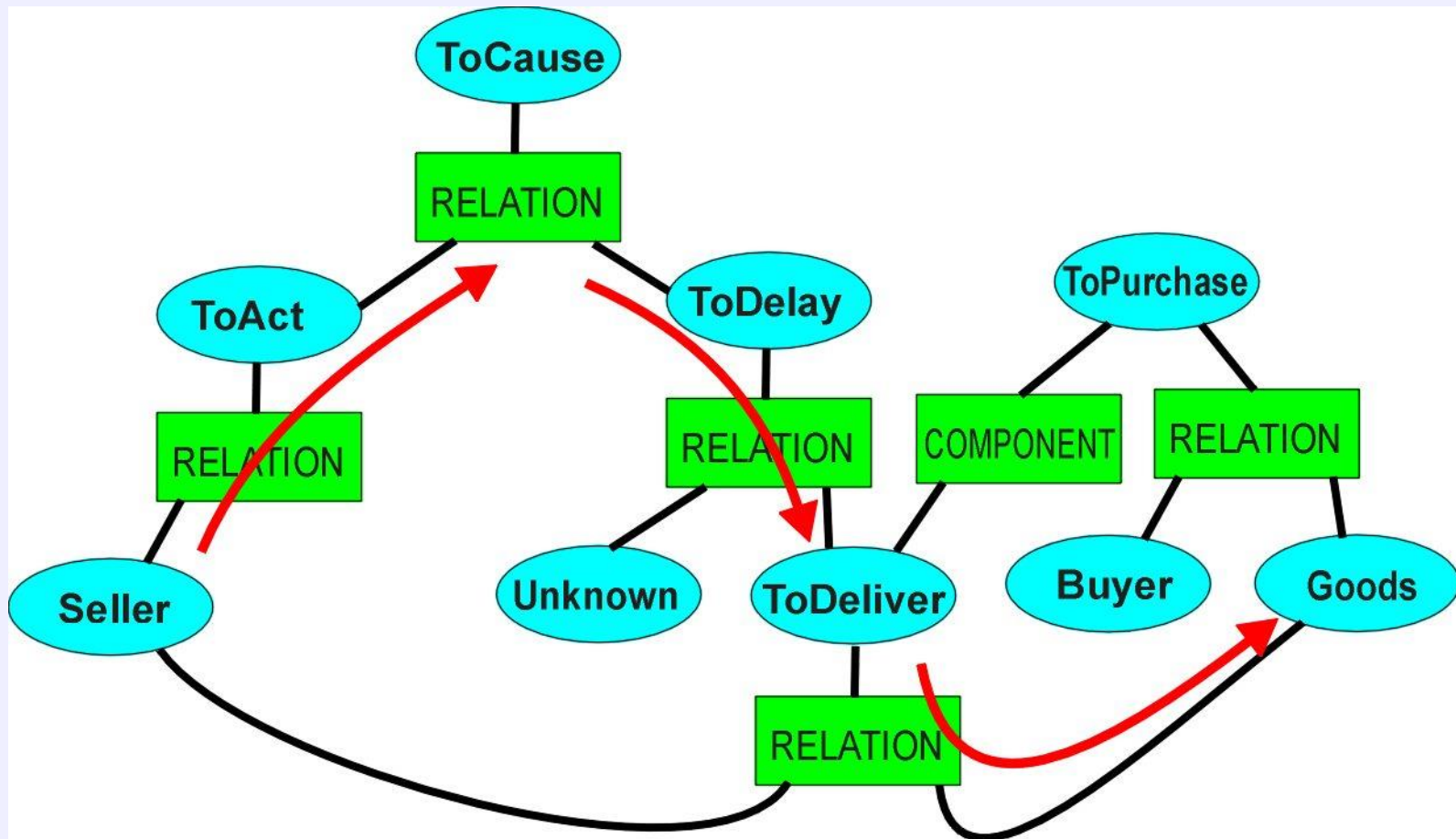
Making relations look like any other object allows us to approach the flexibility of natural language



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Relations On Relations

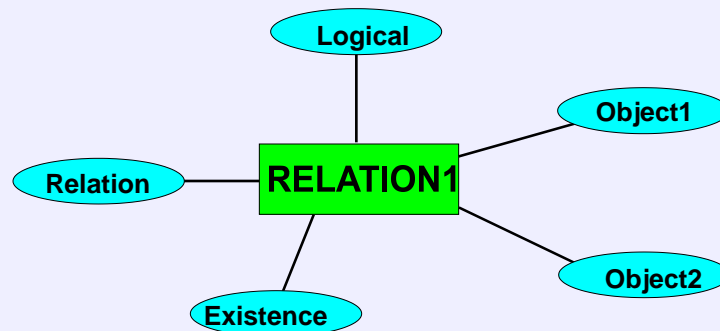


Relations connect other relations just as well as they connect objects



Symbolizing Relations

If we allow Relations to have the same sorts of properties as Entities - Attributes, Components, Members - then we can build complex Relations out of simple ones by adding properties the text provides, in a way that could not be handled by fixed parameters



Relations & Primitives

Verbs do not always map directly into relation primitives

She gave John a headache

This does not fit the primitive of Give - the transference of possession, because “She” does not have the headache

Instead, we need to transform it into

She caused John to have a headache

The more common verbs have many senses, which can be differentiated by the types of object they connect



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Relation Matching

When matching verbs to relations, we have to match the type of subject, object or multiple objects if ditransitive, to ensure the correct meaning is found.

Some verbs, like “Give Up” are collocational, and can have part of the collocation remotely, as “Give It Up”

Passive verbs have subjects connected through prepositions, as “He was shot by Fred”, so a whole specialised matching structure using maps for particular meanings is built around prepositions

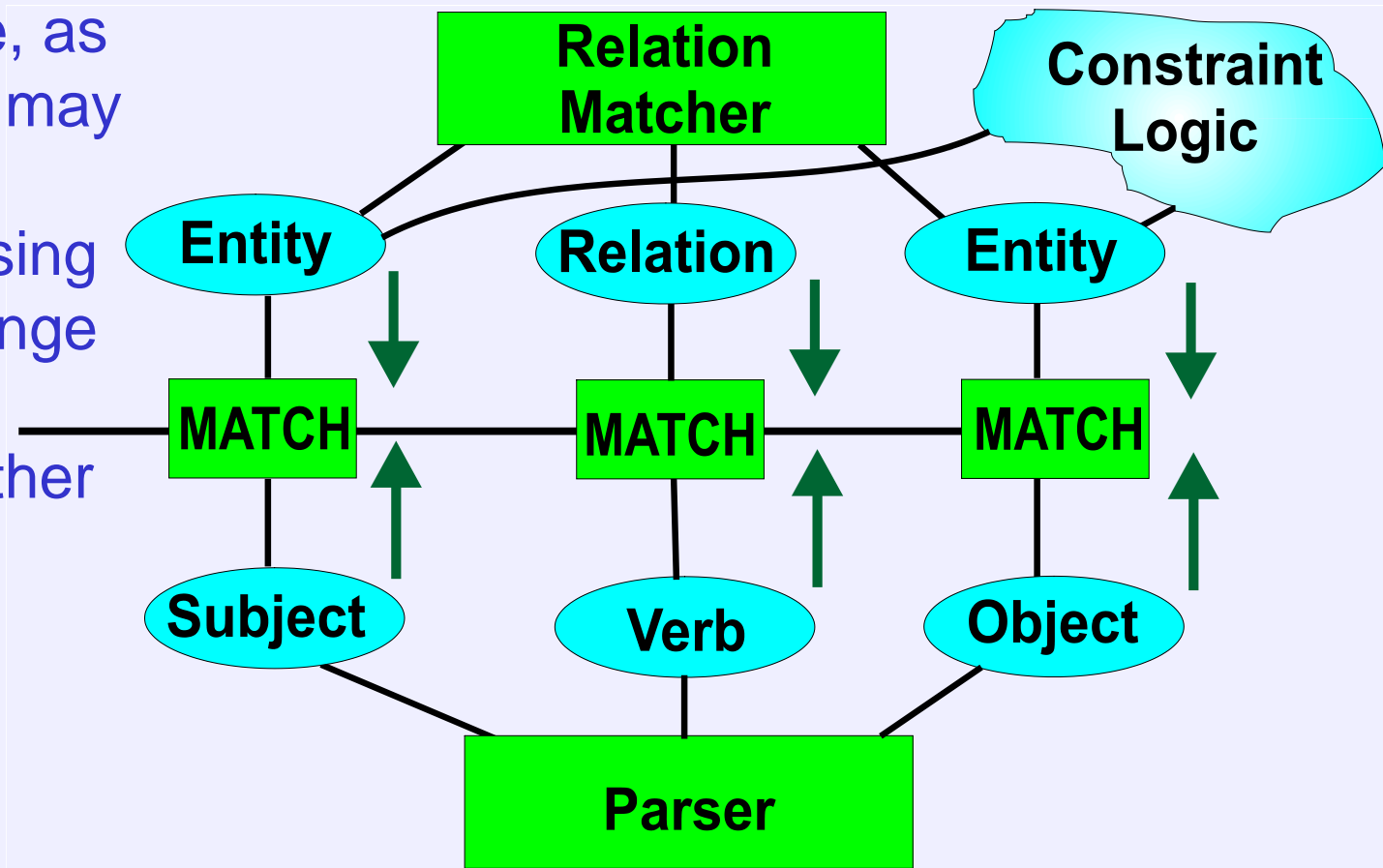


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Relation Matching

The matching process is active, as partial matching may occur on any connection, causing a reduction in range of permissible objects on the other connections. The matching backtracks as it connects and searches.

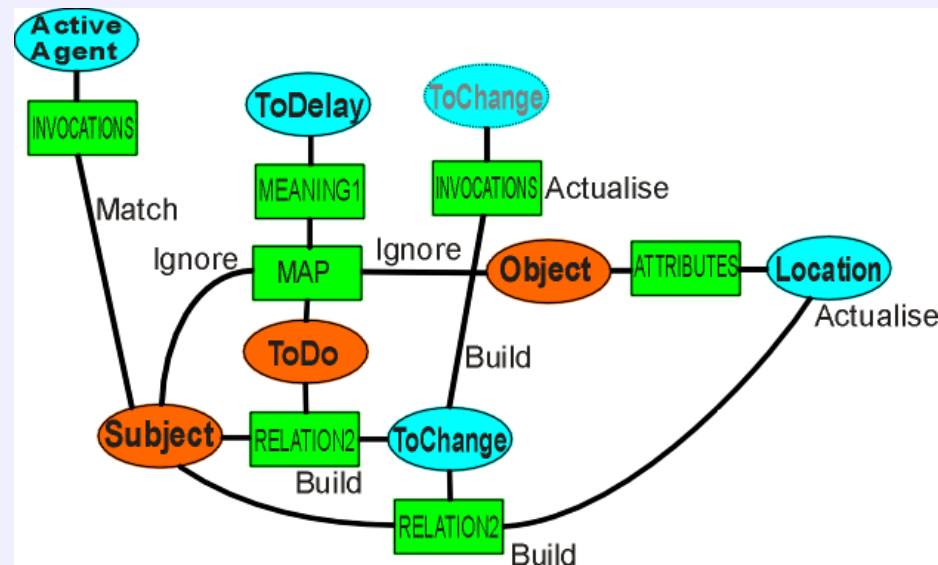


Matching and Augmenting

Matching may result in tentative new structure being built as the meaning shifts

“Give” becomes “Cause To Have”

where the word “give” turns into a structure that is “cause to have” through a map for the particular meaning, matched against the parameters.



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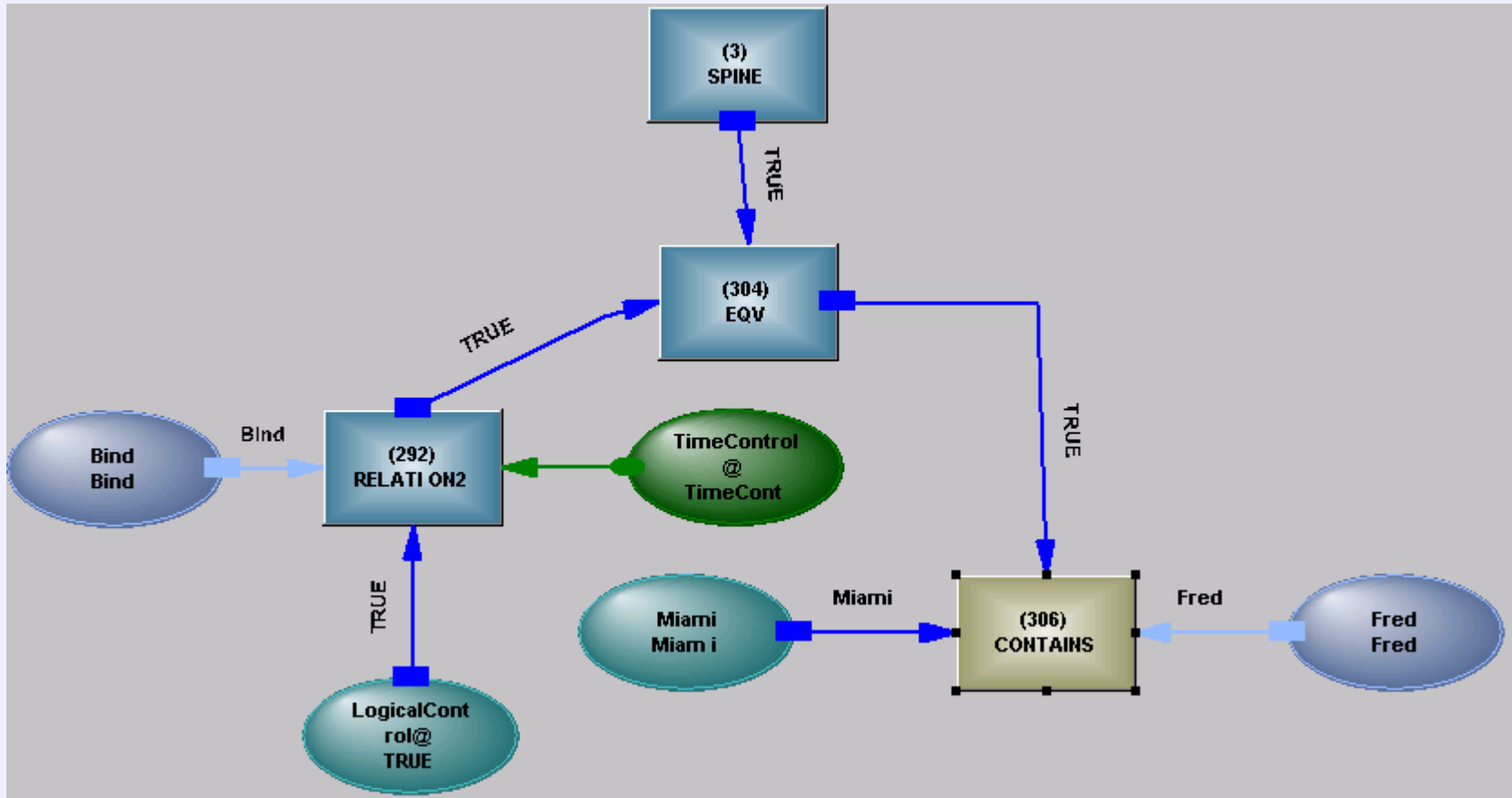
An Example

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Fred in Miami



Miami Contains Fred



The RELATION operator is controlled logically and existentially through Time, and it in turn controls a CONTAINS operator, asserting Fred's location



Fine Control

With this level of control, we can say

- Fred is in Miami
- Fred is not in Miami
- Fred could be in Miami
- Fred may have been in Miami some time in the last six months
- Fred or Joe will be in Miami or Boca Raton soon



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All Together Now

The combination of logical, existential and time control over relations, together with alternatives on any connection, allows relations built from active structure to represent a wide range of statements



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