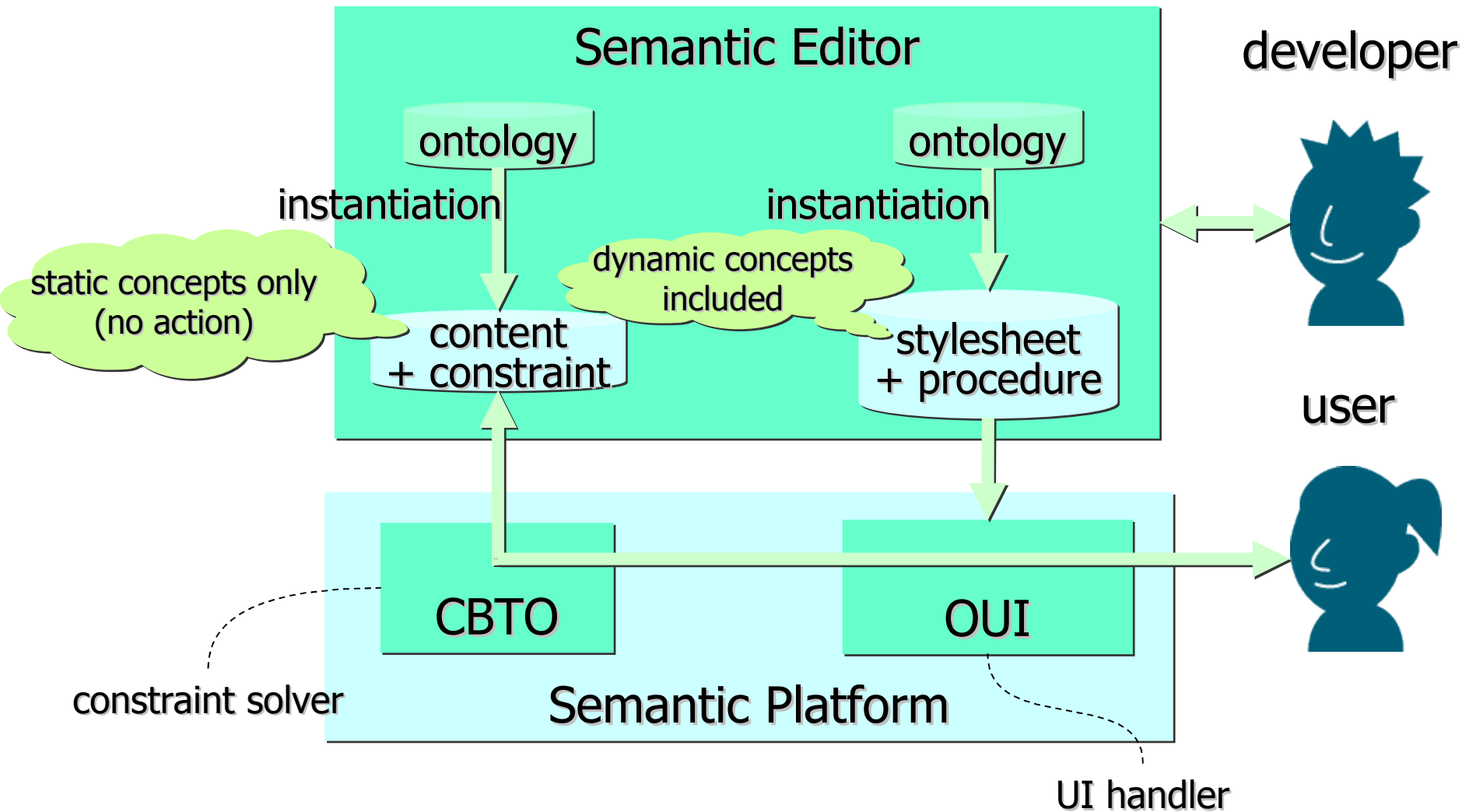# CBTO: Compositional Business-Task Organization

20070605
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Semantic Application Development

developer

Semantic Editor

ontology — instantiation → content + constraint

static concepts only (no action)

dynamic concepts included

ontology — instantiation → stylesheet + procedure

user

Semantic Platform

CBTO

OUI

constraint solver

UI handler

2

CBTO

- Compositional Business Task Organization
    - execution of business task

        = composition of proof tree
    - service = provision of proof-tree parts
- Horn-clause constraint
    - interactive instantiation of clauses
    - subset of WRL, RuleML, etc.

        ... no need for OWL-S, WSMO, etc.

Compositional Organization of Query and Proof

- **service composition & coordination**

participants

budget

destination

travel

accommodation

transportation

sightseeing

reservation service

reservation service

guidance service

Purpose of CBTO

- end-user-semantics-oriented (Web-) service coordination
- interactive, constraint-satisfaction services
  - difficult with OWL-S, WSMO, etc.
- semantic transcoding adapting to user contexts (devices, interests, etc.)
  - due to OUI (Ontological User Interface)
  - CBTO cares about semantics only.

Constraints in CBTO

- ontology
  - constraints on types of nodes and links
  - as simple as RDFS or OWL-Lite
- Horn clause
  - creation & deletion of content
  - including finite-domain constraint
- more general rule

  e.g.: A transportation event is necessary between two events occurring in different places.

  e.g.: resource constraints
  - unexchangeable resources (time, people, etc.)
    - One can participate in at most one event at a time.
  - exchangeable resources (money, etc.)
    - Sum of all expenses is no more than the budget.
- built-in predicate
  - often directed (procedural)

Horn Clause

- possibly directed (procedural) literals

$$p(X,Z) \leftarrow q(X,Y) \ \& \ r(Y,Z).$$

$$p(X,Z) \leftarrow q(X,Y,U) \ \& \ r(Y,U,Z).$$
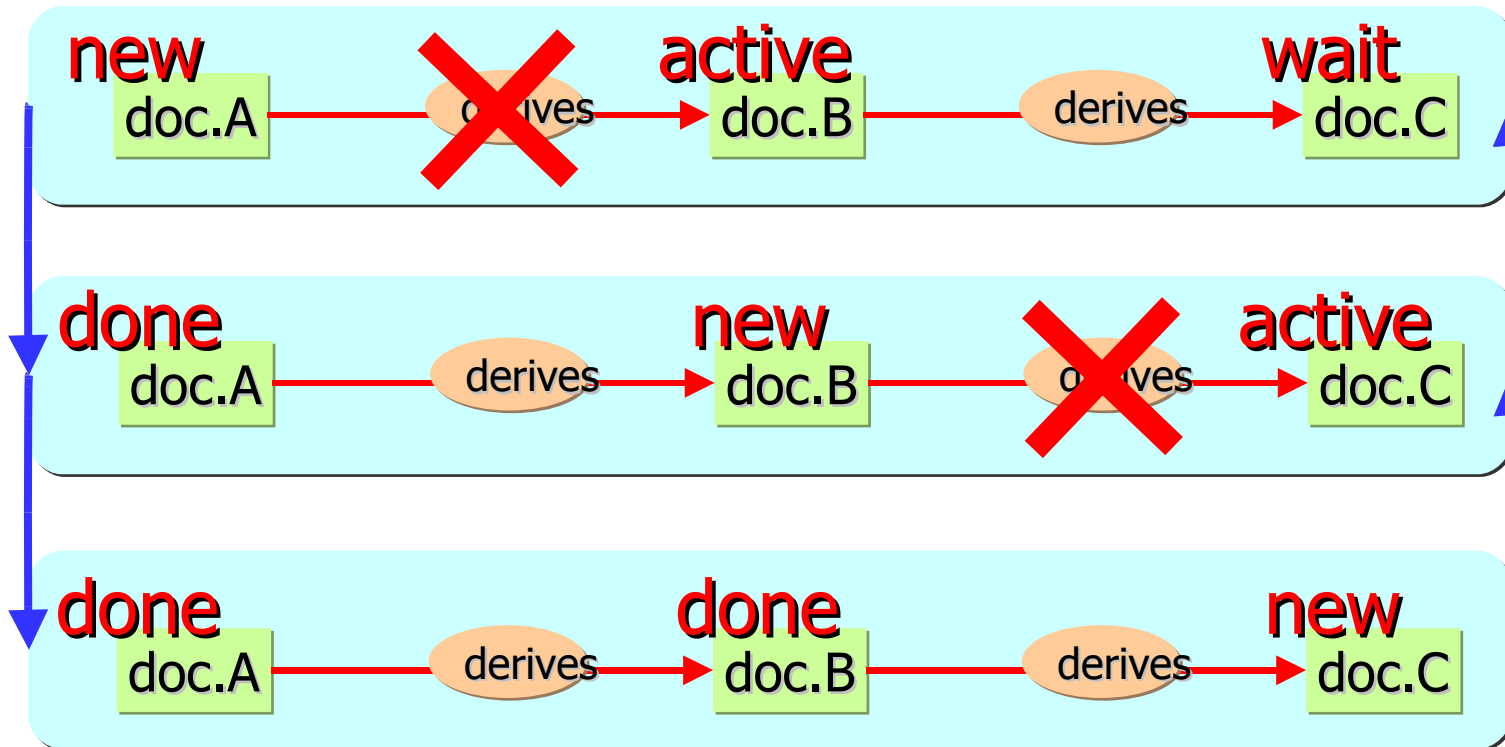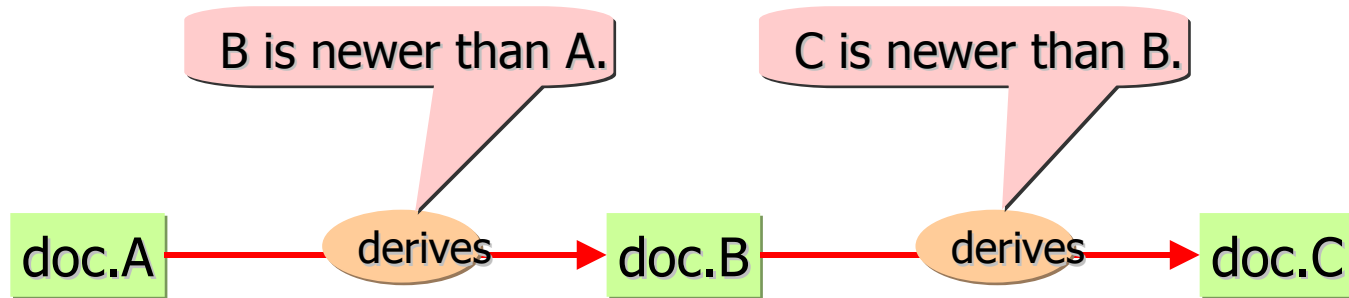
cycle in body = deadlock

Resource-Availability Constraint

- A person can participate in at most one event at one time.
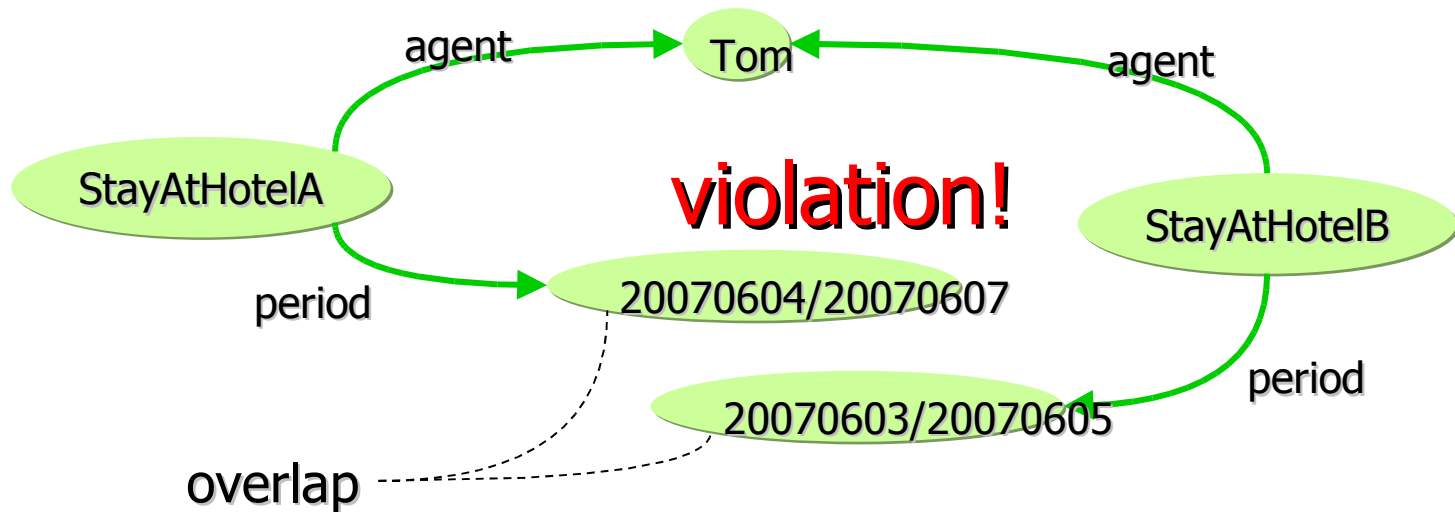
Constraint-Based Workflow

Facts and Hypotheses

- Content (including truth values) may change over interaction with the user and the external world.

- fact
  - part of content fixed by interaction with the external world

- hypothesis
  - indeterminate part of content
  - Temporarily false hypotheses must be preserved.

Accommodation

```
accommodation(Day) <-
    stayHome(Day).
accommodation(Day) <-
    reserve(Day,Hotel) & stay(Day,Hotel).
accommodation(Day) <-
    reserve(Day,Hotel) & cancel(Day,Hotel)
    & accommodation(Day).
```

Use Case: Accommodation Planning

- I've reserved Alexander Hotel. As I've realized that I like Davenport Hotel better, I'd like to stay there instead if possible.

- CBTO tries to reserve Davenport Hotel before canceling Alexander Hotel, in order to hold at least one reservation, because a reservation is an external interaction and hence might fail.

OUI: Ontological User Interface

- GUI according to an ontology-based bidirectional stylesheet
- user's interaction with ontology-based content
- low-cost development of GUI

Summary

- separation
  - semantics (content)
    - constraint (ontology)
    - CBTO: constraint solver
      - workflow, planning, etc.
  - UI (layout & input)
    - bidirectional stylesheet
    - OUI: UI handler