

The Semantic Bases for Adaptation

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5/6/2009

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Autonomy

- Property of Stakeholder
 - Freedom to act
 - Only makes sense in a social setting
- Motivates compliance
 - Other stakeholders have legitimate expectations
 - Penalties and sanctions if noncompliant
- Implies distribution
 - Implies concurrency
- Implies interaction

Autonomic software

- “Self-managing” software
 - Optimizing, healing, protecting, etc.
- Requires monitoring, reflection, and *adaptation*

Autonomic vs. Autonomous

- Autonomic but not autonomous
 - Travel agent that can book a room in an alternative hotel in case of cancellation by the original hotel, but cannot cancel hotel reservation without approval from the hotel
- Autonomous but not autonomic
 - Travel agent that can cancel hotel booking, but does not know how to make alternate reservations if necessary

Semantic Bases

- **Autonomy**
 - **Commitments**
 - Capture business-level expectations
- **Autonomic**
 - **Goals**
 - Capture business-level intentions

Agent

Locus of autonomy

- Has goals (beliefs, intentions, etc.)
- Is party to commitments
- Is goal-directed
 - Expressed by preferences over executions including those that involve commitment violations
 - In some suitable declarative language

Multiagent System

Consists of multiple agents

- Connectors between agents in terms of commitments
- No system-level goals
- Building a multiagent system means focussing on the interconnections
 - Does not matter whether agents expressed in terms of goals and plans, JADE, or BPEL

Adaptation

An *intentional* mechanism

- Agent adapts (in view of its goals),
 - No system-level adaptation
- Agent monitors goals and commitments (and the relevant environmental conditions)
- Agent computes trust
 - Based on its interactions
 - Based on reputation

Bases of Adaptation

Goals, Commitments, Trust

- Goals: when to adapt
- Commitments: which are the *correct* adaptations
- Trust: who to interact with

Few adaptations without interaction

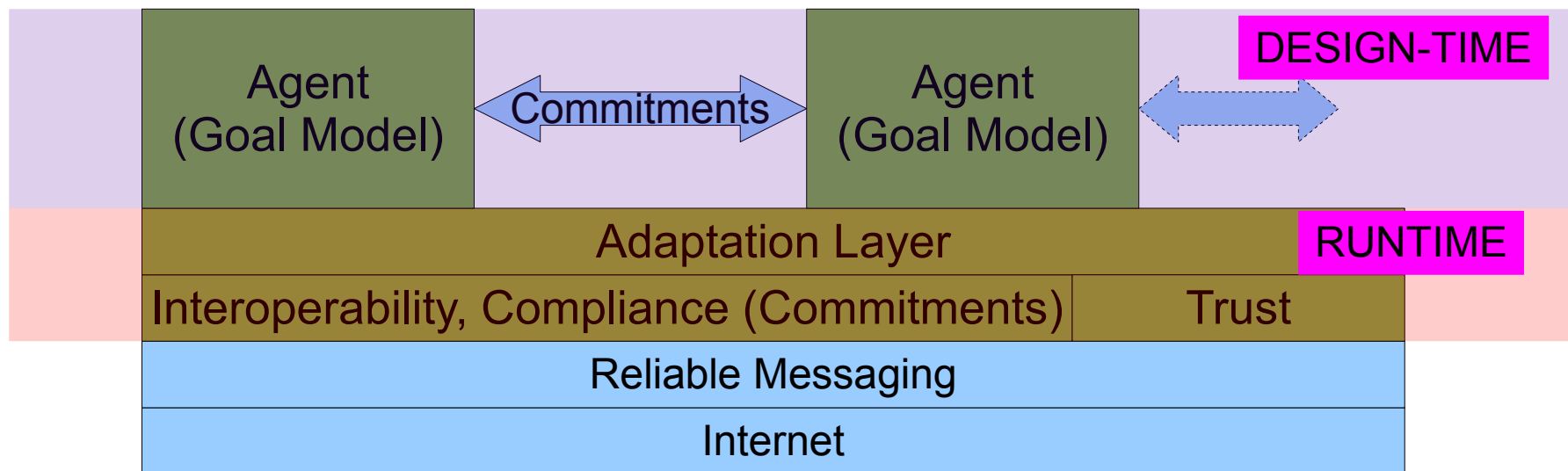
Adaptation Examples

- In response to a hike in interest rates, cardholder transfers his credit card balance to a lower interest credit card
- In response to changed government regulations, card issuing banks have to change their advertising, billing, and interest rate determination procedures
- In view of loss in the stock market, cardholder stops making payment on the card

Adaptation Examples (cont.)

- Amazon goes out of business, so the cardholder starts doing business with Barnes and Noble based on the latter's reputation
- Issuing bank may waive late payment fee rather than risk antagonizing the cardholder and lose his business

Proposal



Automated Verification: Goals-Commitments

Private-public, internal-external, intentional-social

- If an agent incurs a commitment, does it have a strategy (in terms of goals, capabilities, and commitments) for satisfying the commitment?
- If an agent has a goal, does it have a strategy, possibly involving interaction with others, for achieving the goal?

Some Observations

KAOS

- Assigns leaf-level goals to agents, thus not stakeholder-oriented!

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- No treatment of interaction

TROPOS

- Interaction hidden inside plans
- Concept of system-to-be as actor is unclear
 - Who owns it? Who is responsible for it?