Specification of Web Services

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Transparency of business processes is critical for cooperation

Needs

- semantic constraints
- temporal aspects
- access control policies
- consider non-web processes

Current Approaches

- can't model relations b/w inputs and outputs
- differentiate b/w outputs and effects
- mostly miss / no semantics of ACPs
- don't support

Our Approach

Combination of Pi-Calculus and DLs
- formal semantics for temporal aspects
- variables to model relations
  - b/w inputs and outputs
  - access control policies as pre-conditions

Features

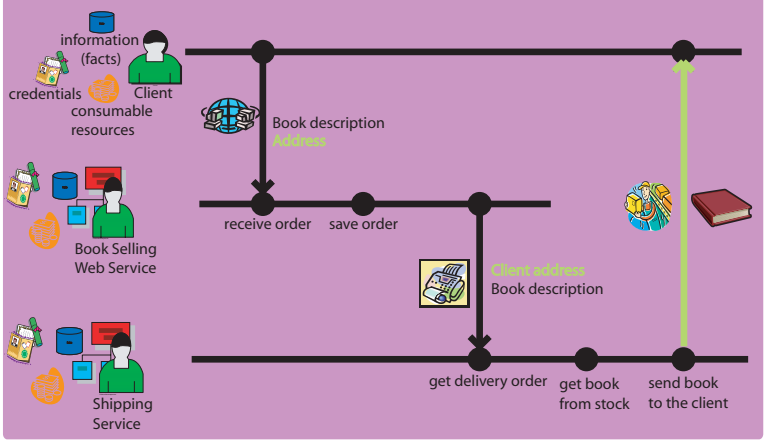
Unified specification of outputs and effects
Channel = (protocol, address, message type)
- can model non-web processes as well
- captures correct semantics of comm.

Interoperable credential based access control

Syntax

$A := 0 \mid$	null
$l(v_1,\ldots,v_j) \mid$	input activity
$\bar{l}o_1,\ldots,o_k \mid$	output activity
$[c]P,Q$	if-then-else
$W := A_1 \parallel \ldots \parallel A_n$	composition

Example



Automatic Matchmaking of Web Services

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does invoking the web service lead to desired outputs?

want some reading material via surface mail

$Book \subseteq ReadingMaterial$

do inputs and outputs relate as desired?

reading material should be sent to the address provided as input

does the web service accept desired inputs?

want to pay with Visa

$VisaCard \subseteq CreditCard$

do the involved agents have desired credentials?

book shipping service should be gov. rec.

city admn. rec.

$CityAdmn.Rec. \subseteq GovRec$

do certain actitivities happen in desired order?

is the Visa card charged after the reading material has been delivered?

do certain activities have desired ACPs?

charging service should be accessible to only Visa business partners

expressive request specification formalism

Matchmaking Algorithm

Given a request R and a web service description W
calculate V(R), the set of variables in R
calculate V(W), the set of variables in W
from V(R) and V(W) calculate the substitution functions $\sigma_1,\ldots,\sigma_n$
For each i in {1,...,n}
  generate W_i from W and σ_i by α-conversion
  eliminate condition expressions from W_i -> $W_{i,1},\ldots,W_{i,2^{k+1}}$ $C_{i,1},\ldots,C_{i,2^{k+1}}$
  For each j in {1,...,2^{k+1}}
    If the structures of R and $W_{i,j}$ are same and
    every input type of R is sub concept of corr. input type of $W_{i,j}$ and
    every output rule of R subsumes corr. output rule of $W_{i,j}$ and
    every condition in R is subsumed by the corr. condition of $W_{i,j}$
    then W is a match for R with conditions $C_{i,j}$