Towards a reconciliation of ChOrch in IRS, Configurator and WSMO

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Input

• Considers following work:
  – **IRS**
    • Choreography engine based on ASMs
    • Orchestration engine based on partial OWL-S
  – **Configurator**
    • Partial UML2AD workflow as choreography
    • UML2AD composes these to make orchestrations
  – **Cashew**
    • IO automata as choreographies
    • OWL-S as orchestration (visualised in UML2AD), composes these, engine in Haskell via process algebraic semantics…
  – **WSMO**
    • ASMs are everything (somehow…)
IRS View of ChOrch

Client invokes

presents

Goal

met by

Orchestration of Goals

IRS-III brokers

Deployed Service

conforms to

Client Choreography

Service Choreography
Views on IRS

- Client choreography (currently an ASM) can be viewed as partial workflow
- Composition by orchestration of goals can be compared to workflow composition
- Answers Cashew criticism that
  - OWL-S
    - tackles only ‘operation composition’
      (since it combines operations to make ‘scripts’ over a service that are atomic workflow tasks)
    - ignores challenges of (service) choreography
      (since it encapsulates dependencies between operations)
  - Configurator
    - considers only one (client’s intention) interaction
      **claim:** partial workflows can be viewed as client choreographies
Requirements

• Need to achieve:
  – Reconciliation of viewpoints (IRS reference implementation, Configurator work, WSMO) on paper;
  – Demonstrator that convincingly executes an example illustrating this, i.e.
    • import from Configurator to IRS-III
    • orchestration engine in IRS-III (and interface with choreography engine)
    • export as ASMs
    • orchestration engine in WSMX
Proposal

• Build an ontology fragment:
  – representing workflow patterns;
  – structured as per OWL-S (process model);
  – adapted to capture UML idioms.

• Represent in this language:
  – orchestration of goals (goals as tasks);
  – client choreographies (operations of deployed service as tasks - restricted fragment?).

• Translate via Cashew to (control state) ASMs via process algebra…
Cashew Process Algebra
Syntax and Semantics

\[ \mathcal{E} ::= 0 \mid \Delta \mid \alpha.\mathcal{E} \mid \mathcal{E} + \mathcal{E} \mid \mathcal{E}|\mathcal{E} \mid [\mathcal{E}]\sigma(\mathcal{E}) \mid \mu X.\mathcal{E} \mid X \]

\[ a, \pi, b, \bar{b}, \ldots \in \Lambda \cup \bar{\Lambda} \]
\[ \alpha, \beta, \ldots \in \Lambda \cup \Lambda \cup \{\tau\} \]
\[ \rho, \sigma, \ldots \in \mathcal{T} \]
\[ \gamma, \delta \ldots \in \Lambda \cup \bar{\Lambda} \cup \{\tau\} \cup \mathcal{T} \]

<table>
<thead>
<tr>
<th>Act</th>
<th>[ \alpha.P \xrightarrow{\alpha} P ]</th>
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| Sum1 | \[ P \xrightarrow{\alpha} P' \]
|      | \[ P + Q \xrightarrow{\alpha} P' \] |
| Com1 | \[ P \xrightarrow{\alpha} P' \]
|      | \[ P \mid Q \xrightarrow{\alpha} P' \mid Q \] |
| Com4 | \[ P \xrightarrow{\alpha} P' \]
|      | \[ Q \xrightarrow{\alpha} Q' \]
|      | \[ P | Q \xrightarrow{\alpha} P' | Q' \] |
| Hid1 | \[ P \xrightarrow{\alpha} P' \]
|      | \[ P/\sigma \xrightarrow{\alpha} P'/\sigma \] \[ \gamma \neq \sigma \] |

| TO1  | \[ [P]\sigma(Q) \xrightarrow{\gamma} Q \]
|      | \[ P \xrightarrow{\gamma} P' \] |
| TO2  | \[ [P]\sigma(Q) \xrightarrow{\gamma} P', \gamma \neq \sigma \]
|      | \[ P \xrightarrow{\gamma} P' \] |

| Sum2 | \[ Q \xrightarrow{\alpha} Q' \]
|      | \[ P + Q \xrightarrow{\alpha} Q' \] |
| Com2 | \[ Q \xrightarrow{\alpha} Q' \]
|      | \[ P \mid Q \xrightarrow{\alpha} P \mid Q' \] |
| Com3 | \[ P \xrightarrow{\alpha} P' \]
|      | \[ Q \xrightarrow{\alpha} Q' \]
|      | \[ P \mid Q \xrightarrow{\alpha} P' \mid Q' \] |

| Patient | \[ \alpha.P \xrightarrow{\alpha} P \] |
|         | \[ P \mid Q \xrightarrow{\alpha} P \mid Q \] |
| Hid2    | \[ P \xrightarrow{\gamma} P' \]
|         | \[ P/\sigma \xrightarrow{\gamma} P'/\sigma \] |
| Id1     | \[ 0 \xrightarrow{\gamma} 0 \] |

| Rec"   | \[ E \xrightarrow{\gamma} E' \]
|         | \[ \mu X.E \xrightarrow{\gamma} E'{\mu X.E}/X \] |