

Integrating Web Service Discovery and Composition

Astro Seminar, March 9 2006

Piergiorgio Bertoli

`bertoli@irst.itc.it`

ITC-IRST, Via Sommarive 18, 38055 Povo, Trento, Italy

Outline of talk

- Motivation
- Key Assumptions and Ideas
- Proposed Architecture
- Next Steps

Motivation

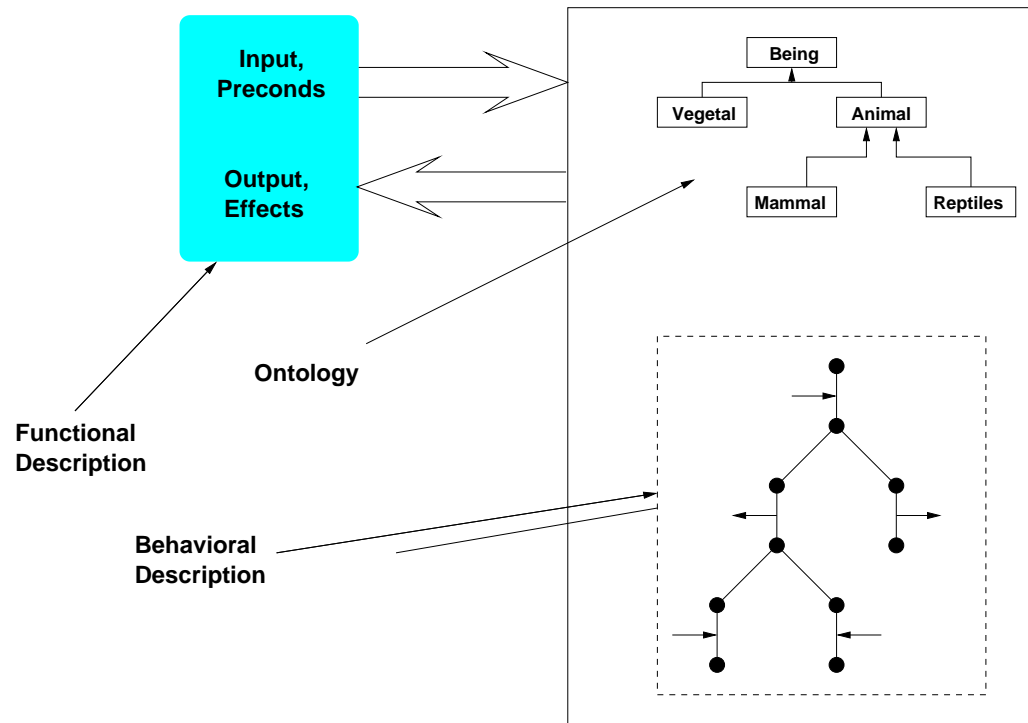
- Web Services are thought as being a vast, distributed set of entities, published into (e.g. UDDI) directories
- Need for satisfying a requirements → “Google-like” discovery of satisfactory services:
 - Not trivial: reputation, ranking,
 - Active research area
- No stand-alone WS is satisfactory? Answer: composition.
 - Not trivial: complex protocols, nondeterminism,
 - Active area as well, several techniques

A Knowledge Web Project Deliverable

Some key assumptions and ideas

Assumptions:

- Services are published as functional + behavioral descriptions
- Requirements can be split into a functional and a “behavioral” part
- The semantics of data are given as ontologies (in reqs. and WSs)



Some key assumptions and ideas

Ideas:

1. Perform a “functional level” composition FLC first, where
 - interaction with discovery is needed
 - behaviors are disregarded
 - results are taken as “guide” for final composition
2. Perform “process level” composition on (small) outcome of FLC
3. Use ontology info to extract “type relation” information needed to describe domains for (functional and behavioral) composition

Top-level architecture

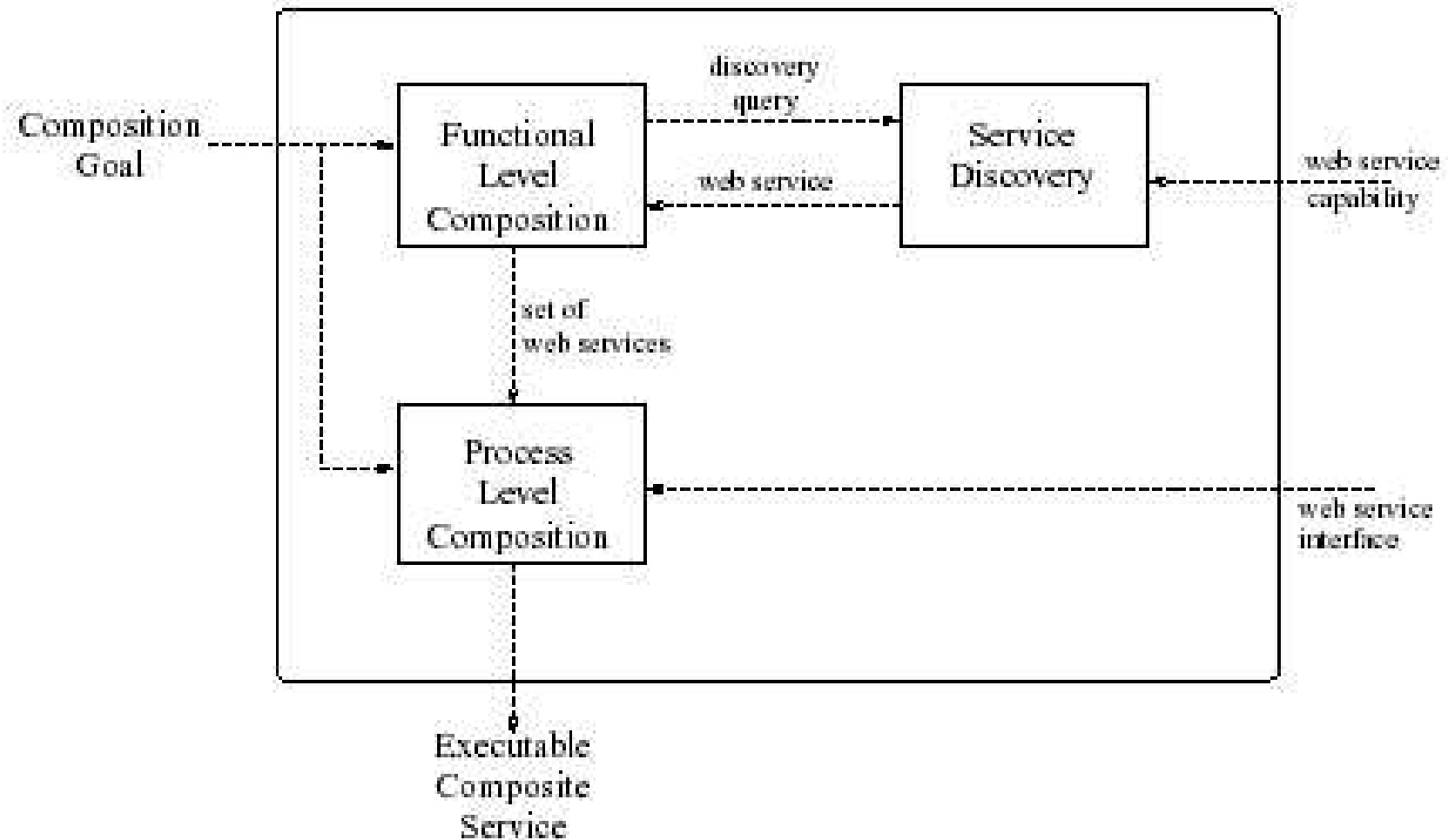
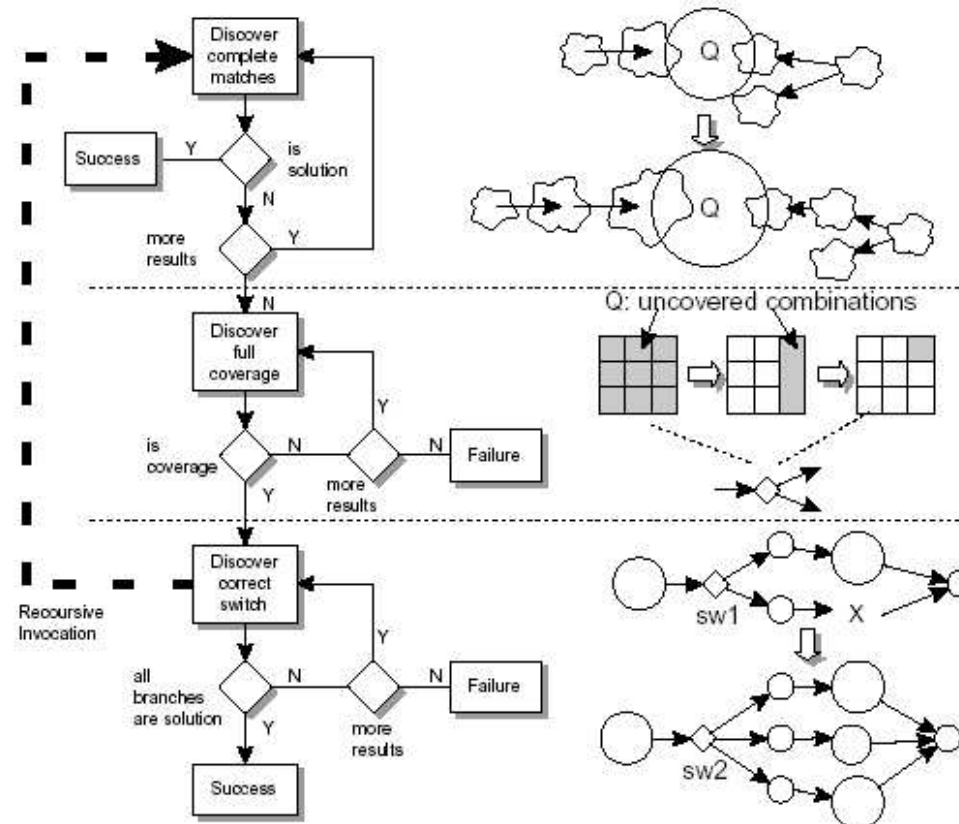


Figure 5.1: Schema Integration Discovery and Composition.

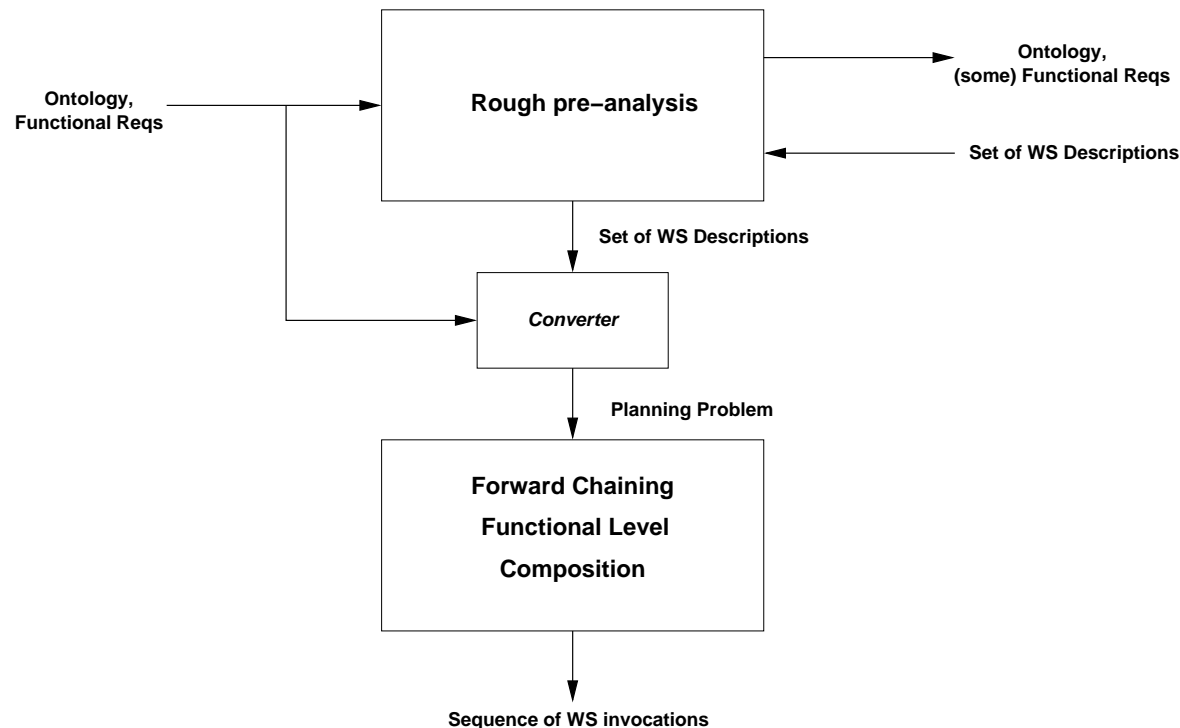
Opening the boxes... Discovery

- EPFL has know-how on this...
- ...key idea: consider not just “plug-in” matching but also “partial matching”
- Issue: currently based on range representation of types, must be bridged with ontology representation

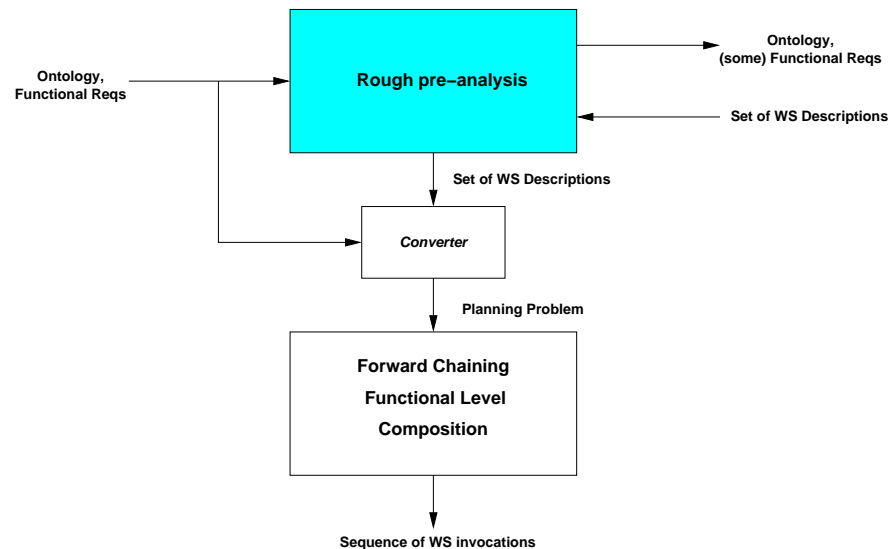


Opening the boxes... FLC

- DERI and IRST have know-how on this...
- Key idea: use forward-chaining → get sequence of WS calls
- Issue: must know a priori the domain, i.e. the “interesting services”
- Solution: “rough” pre-analysis interacting with discovery, obtaining set of candidate WSs



Opening the boxes... FLC(2)



Rough analysis: how (some ideas)

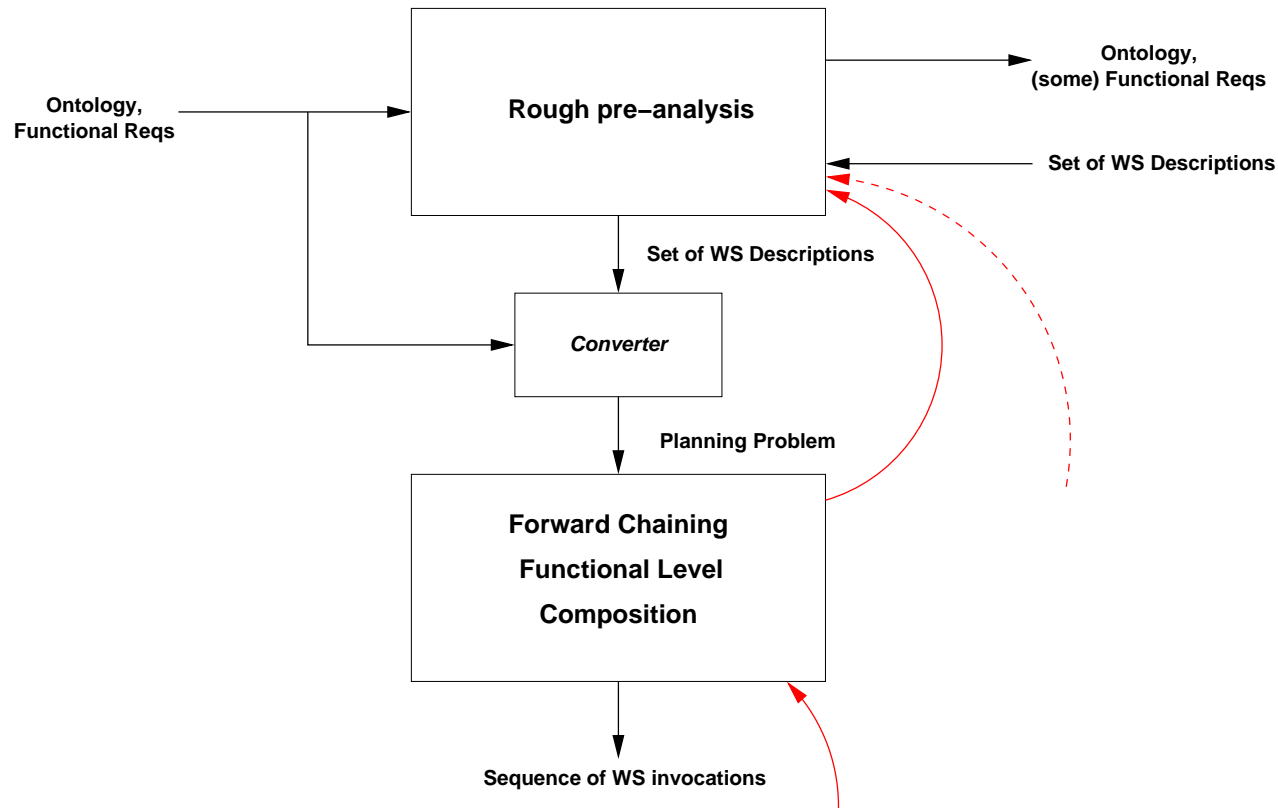
- Fwd fixpoint “accumulation” of useful services, using a “relaxed conformant” forward image
- Same, but bwd or mixed-direction or directionless
- Use EPFL’s “switch-making” FLC phase for finding goal coverage
- Several search stop criteria may be adopted, e.g. minimal coverage, fixpoint, ...

Opening the boxes... PLC

- IRST has competence on this
- Issue: how/whether to reuse dataflow info from FLC here
- Issue: how to convert ontology info here
- Issue: KL composition vs. ground level composition?

More general issues

- Feedback loop no.1: failure of FLC
- Feedback loop no.2: failure of PLC
- State persistence during feedback loops



Extensions: reputation

- A mechanism to drive discovery to *reputable* WSs
- (Almost) transparent outside discovery
- EPFL's competence

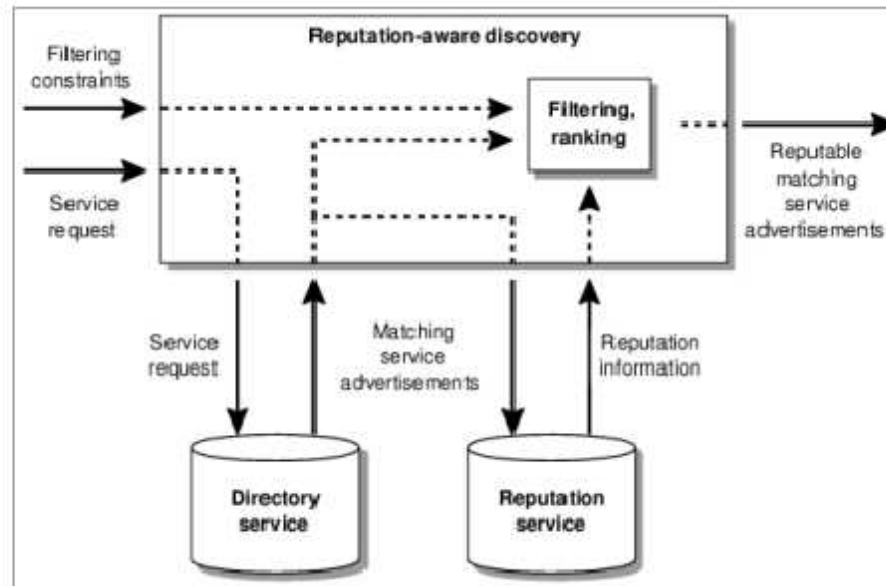


Figure 6.1: A wrapper for service discovery filters and ranks matching service advertisements according to their reputation.

Next steps

- Define workplan
- Define test domain
- Establish (using domain) ontology subset and its mapping to planning domain
- Clarify (using domain) interfaces between components
- Monitor progress, and implement our part (likely: interface to PLC)