Making YAWL and SmartPM Interoperate

Managing Highly Dynamic Processes by Exploiting Automatic Adaptation Features

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Introduction

The trade-off between **flexibility** and support has become a leading issue in workflow technology. Classical PMSs offer good process support as long as the processes are structured and do not require much flexibility. In highly-dynamic scenarios, a PMS should provide a high degree of both flexibility and support.

- new situations coming from the environment might be such that the PMS is no more able to carry out the process instance
- need of deviating at run-time from the execution path prescribed by the process, without completely replacing it

YAWL

A highly expressive workflow language with formal foundation, providing comprehensive support for procedural workflow modeling and for the workflow patterns

- full-fledged open source support environment
- service-oriented system architecture and pluggable framework with well-defined standard interfaces

Flexibility as a Service (FAAS) approach

- dedicated custom services can be built to execute tasks corresponding to subprocesses, defined and managed using different approaches (e.g., Worklets and Declare)

Powerful exception handling language and capabilities

- anticipated exceptions: managed by defining exception handling processes (exlets) dynamically selected and incorporated in running process instances
- unanticipated exceptions: managed by manually designing, adapting or selecting exception handling processes

SmartPM

A modeling approach towards a **declarative** specification of processes, where *tasks are described in terms of their preconditions and effects*, consume input data and produces output data

- the environment, services and tasks are grounded in domain theories described in *Situation Calculus*. Process schemas are *IndiGolog* programs

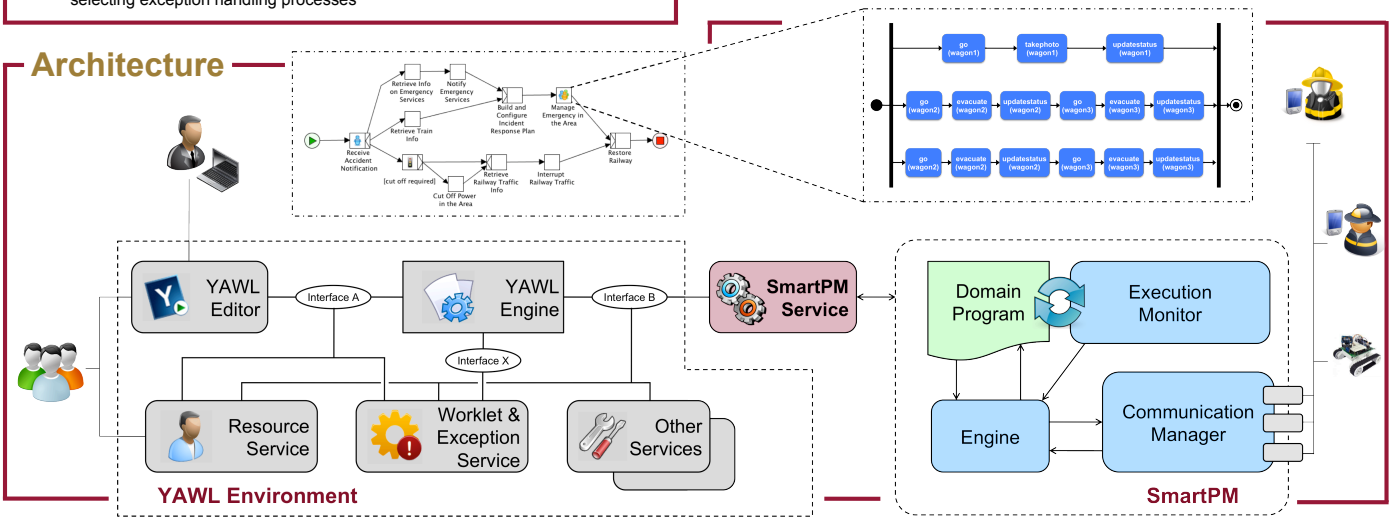
Service-based approach to process management

- a Communication Manager mediates between actors and the system in order to make such actors appear as services

Run-time synthesis of recovery processes without explicitly defining handlers/policies at design time

- an Execution Monitor is continuously looking for the occurrence of exceptions and senses the environment, in order to catch exogenous events
- if an exception occurs, the process is automatically adapted to mitigate the effects

Architecture



Adaptivity

In SmartPM, data are the drivers of process adaptivity. Process Adaptivity is the ability of the PMS to reduce the gap from the *expected reality* Φ - the (idealized) model of reality that is used by the PMS to reason - and the *physical reality* Ψ - the real world with the actual values of conditions and outcomes. If a discrepancy between the two realities is sensed, the following steps are performed:

- the execution of the main process is stopped
- a planning problem is built, by taking Φ as initial state, Ψ as the goal and the set of task definitions as the planning domain
- a planner is invoked by giving the just defined planning problem as input
- when a recovery plan is found, it is executed exactly in the point in which the deviation was identified
- when the recovery process completes, the process can resume with its execution

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