

LS/ABPM – An Agent-powered Suite for Goal-oriented Autonomic BPM

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ABSTRACT

In this paper we shortly describe the Living Systems[®] Autonomic Business Process Management (LS/ABPM) software product. LS/ABPM is an integrated environment, based on J2EE, Eclipse and Agent Technology, to support agile Business Process Management through goal-oriented process modeling, autonomic business process navigation and a multi-layer extensible architecture. The product comprises a *Process Development Suite*, to model, execute and test business processes, and a *Process Runtime Suite*, to run, manage and control business process instances in a production environment.

The innovation of LS/ABPM with respect to common BPM technologies lies both in the *GO-BPMN* modeling language, which enhances the standard BPMN with goal and plan structures and direct executability, and in the execution engine, which leverages the LS/TS multi-agent system platform to provide goal-oriented (BDI) process execution, runtime modifiability of process models for running instances and multi-instance cooperation and autonomic control.

Keywords

Business Process Management, Development Tools, Multi-Agent Systems, Software Product, Software Industry.

1. THE IDEA AND VALUE STATEMENT

The software product subject of the demonstration is Living Systems[®] Autonomic Business Process Management (LS/ABPM). It operates in the application domain of BPM, which by its very nature lends itself to different specializations when applied to different vertical domains. Still, the core technology can and should be made generic and application independent, proposing suitable modeling approaches and execution models. It is in both of these areas that Agent Technology can bring valuable contributions, and it actually acts as an enabler for LS/ABPM to innovate and improve the industrial state of the art in business process management.

1.1 Goal-oriented BPM

In day-to-day management operations, it is natural to set goals, decompose a goal into sub-goals, define or reuse plans, and routinely track and check the execution of chosen plans in order to detect problems as they occur (or even better before they do), and to take appropriate actions.

On the other hand, today's dominant IT approaches focus almost exclusively on procedures. The limiting consequence is that processes have become more efficient in execution but less flexible in adaptation. To maintain effectiveness without sacrificing agility, the concept of plan and goal must be brought back to center stage in BPM solutions.

For business process modeling, Whitestein has introduced the Goal-Oriented Business Process Modeling Notation (GO-BPMN). GO-BPMN is a visual modeling language for the specification of business processes, whose semantics allows direct model execution.

GO-BPMN enriches BPMN through the explicit modeling of goals, plans and their relationships. Moreover, GO-BPMN precisely specifies the operational semantics of all its elements, including those used from standard BPMN. This results in compliant and unambiguous model execution.

1.2 Autonomic BPM

Effectively managing complex business processes in the face of a dynamic and unpredictable environment requires striking a careful balance between flexibility and safety.

The definition and execution of business processes need to be easily changed during operation to adapt to unforeseen changes. It must also be possible to ensure that these changes are correct and do not incur any unfavorable consequences.

The only way out of this is to provide the system with means of self-management, as proposed by the Autonomic Computing idea and initiative. This implies that the system itself (i.e., the business process management engine) is able to monitor its own operation and, to a certain extent, recognize and counteract undesirable situations.

The original focus of Autonomic Computing was on IT infrastructure with the targeted problem being the administration and management of complex computing environments. In autonomic BPM, the "system" is the overall ensemble of software, hardware, human and physical resources, together with the norms and policies defining it. It is this system that exhibits self-management and in particular the self-* qualities.

2. THE SOFTWARE PRODUCT

LS/ABPM supports the creation, editing, execution, testing and operation of business processes defined with the goal-oriented GO-BPMN language and executed by a multi-agent system where

each process instance is interpreted and run by a software agent, acting as the autonomic controller for it. More complex, multi-instance autonomic feedback can be realized through agent cooperation.

The *Process Modeler* is an Eclipse-based, graphical tool that allows the complete construction of GO-BPMN models, supporting completely executable models through the specification of goal diagrams, plan diagrams, custom data types, tasks and functions. Beyond the use of graphical goal and plan diagram, *Java* and *Groovy* are supported as implementation languages for application-specific atomic model elements.

The *Execution Engine* is capable of running multiple instances of GO-BPMN models concurrently within a J2EE server environment. The agent-based execution model, relying on Whitestein's *LS/TS* agent infrastructure, is capable of directly executing and tracking the goal-oriented process models thanks to the BDI architecture of the executor agents. Moreover, the checkpointed, cluster-enabled execution model not only allows reliable process execution, but also adaptive *process navigation*, where different environment context trigger different behavior, but also where it is possible to re-apply another process model to the state of an already running instance.

Such a self-configurability of business processes is a primary need in various vertical BPM domains, where instances run for months or even years, and boundary conditions are simply bound to change along the way, for technical, business, or normative reasons.

The *Management Console* gathers into a single Eclipse-based tool all the common operation needs: user management, process model archival and upload, and monitoring of running process instances. The *End User GUI* is Web based, and has dynamically produced sections that are driven by the business process execution state, and input form structure is automatically derived from the type system information of the modeling language.

LS/ABPM is a commercial software product, released in its version 1.0 at the time of this writing, and whose version 1.1 is scheduled before the AAMAS conference, so that it will probably be used for the demonstrations. The actual planned demonstration will combine the presentation of the major product features with some technological insights highlighting how Agent Technology enables this kind of innovative and sophisticated approach to BPM.