

Policies in a Resource Manager of Workflow Systems: Modeling, Enforcement and Management

Yan-Nong Huang and Ming-Chien Shan

Hewlett-Packard Laboratories

1501 Page Mill Road, 1U-4A

Palo Alto, California 94304

Electronic mail : ynhuang@hpl.hp.com, shan@hpl.hp.com

1 Abstract

We are interested in Workflow Management Systems (WFMS) [3, 4], and particularly, in Resource Management (RM) [1, 2] of WFMS. A WFMS consists of coordinating executions of multiple activities, instructing who (resource) do what (activity) and when. The “when” part is taken care of by the workflow engine which orders the executions of activities based on a process definition. The “who” part is handled by the resource manager that aims at finding suitable resources at the run-time for the accomplishment of an activity as the engine steps through the process definition. Resources of different kinds (human and material, for example) constitute the information system of our interest, their management consists of resource modeling and effective allocation upon users’ requests. Since resource allocation needs to follow certain general guidelines (authority, security, for example) - no matter who or what application issues requests: so those general guidelines are better considered as part of the resources’ semantics. That is the reason why we are interested in resource policy management in RM. Resource policies are general guidelines every individual resource allocation must observe. They differ from process specific policies which are only applied to a particular process. The policy manager is a module within the resource manager, responsible for efficiently managing a (potentially large) set of policies and enforcing them in resource allocation. We propose to enforce policies by query rewriting. A resource query is sent to the policy manager where relevant policies are first retrieved, then either additional selection criteria are appended to the initial query (in the case of requirement policies) or a new query is returned (in the case of substitution policies). Therefore, the policy manager can be seen as both a regulator and a facilitator where a resource query is either “polished” or given alternatives in a controlled way before submitted for actual resource retrieval. By doing so, returned resources can

always be guaranteed to fully comply with the resource usage guidelines. We studied several issues related to resource policies in Workflow Systems. A policy language was proposed allowing users to specify policies of different types. To enforce the policy, a resource query is first rewritten based on relevant policies, before submitted to the resource manager for actual retrieval. The originality of the present work is on the resource policy model, the policy enforcement mechanism and policy management techniques including relational representation of, and efficient access to, a large policy set. It seems that the interval-based representation proposed in the paper provides a general framework for effective storage and efficient retrieval of large Boolean expression sets. A prototype was implemented in Java on NT 4.0, with experimental policies managed in an Oracle database. An alternative implementation would load policies into the main memory (periodically or at start-up time), an in-memory query optimizer ought to be devised in this case. Comparisons of pros/cons of these two implementations are worth further investigating.

2 References

- [1] W. Du, G. Eddy and M.-C. Shan, “Distributed Resource Management in Workflow Environments”, Proc. of Database Systems for Advanced Applications (DAS-FAA), Melbourne, Australia, April, 1997.
- [2] Y. -N. Huang and M.-C. Shan, “Policies in a Resource Manager of Workflow Systems: Modeling, Enforcement and Management”, HP Tech. Report, HPL-98-156, Palo Alto, CA.
- [3] M. -C. Shan, J. Davis and W. Du, “HP Workflow Research: Past, Present and Future”, Proc. of NATO ASI on Workflow Systems and Interoperability, Springer-Verlag, Turkey, August 1997.
- [4] WFMC, “The Workflow Reference Model”, <http://www.aiim.org/wfmc/DOCS/refmodel/rmv1-16.html>.