

AGENP: An ASGrammar-based GENerative Policy Framework



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New Generation Policy-based Management Systems (PBMS)

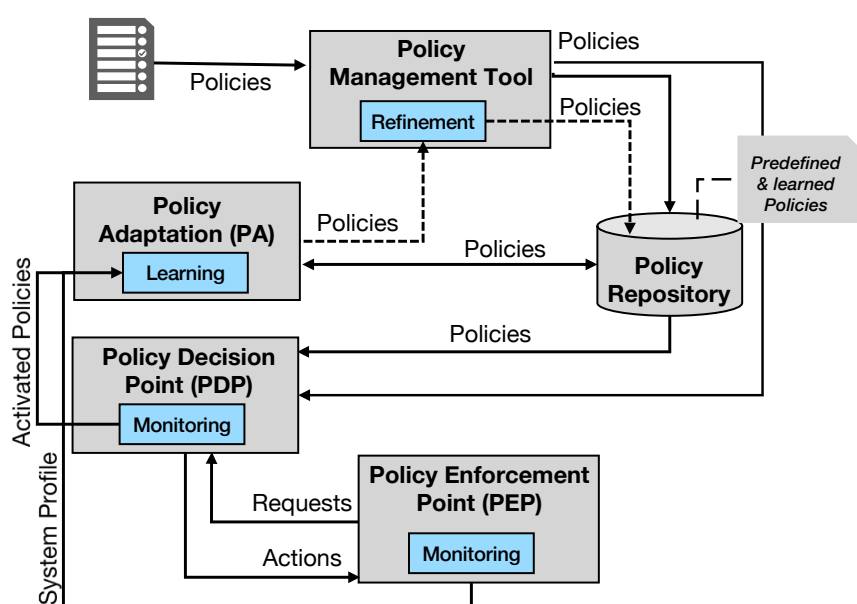


Figure 1. New Generation PBMS

- Evolved PBMS include adaptation and learning mechanisms that support the creation of generative policies not considered by traditional PBMS.
- Generative policies (self-generated policies) enable devices/systems to determine their own behavior under certain constraints.

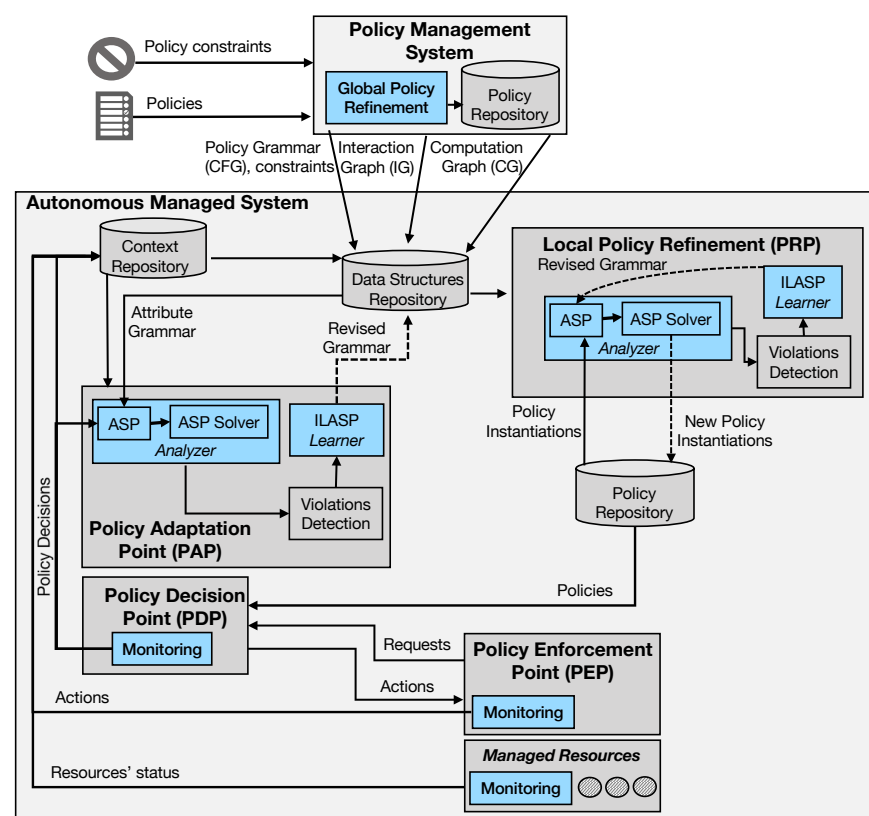
Learning Generative Policy Models with Inductive Logic Programming (ILP) and Answer Set Programs (ASP)

ILP finds a hypothesis, that together with a given background knowledge, explains a set of observations (i.e., positive examples).

ASP is a highly declarative programming paradigm.

- Hypotheses learned as ASP grammars can be used to represent generative policy models.
- Learned hypothesis can be expressed in plain English.

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**Figure 2. AGENP Framework's
Components.**

- A Policy Adaptation Point (PAP) uses the latest attribute grammar, the history of policy decisions, and context information to both identify policy violations and to learn a new policy model (ASGrammar).
- A Policy Refinement Point (PRP) updates the policy model ('revised' version) using policy examples, and instantiate policies according to the policy model.

References:

S. Calo, I. Manotas, D. Verma, E. Bertino, M. Law, and A. Russo. AGENP: An ASGrammar-based GENerative Policy Framework. 2nd International Workshop on Policy-based Autonomic Data Governance, 2018.

M. Law, A. Russo, and K. Broda. Learning weak constraints in answer set programming. *Theory and Practice of Logic Programming*, 15(4-5): 511–525, 2015.