Self-Management for Large Scale Distributed Systems

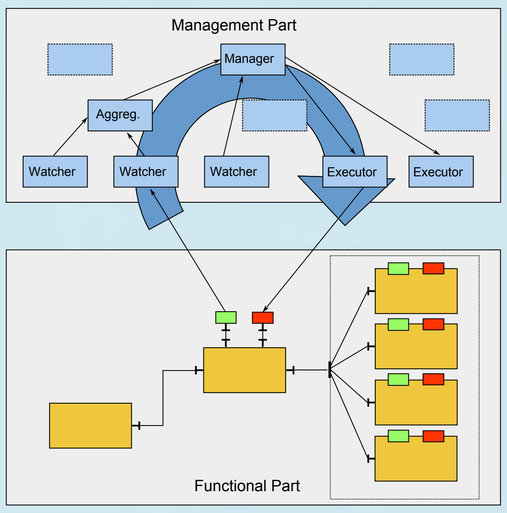
Niche

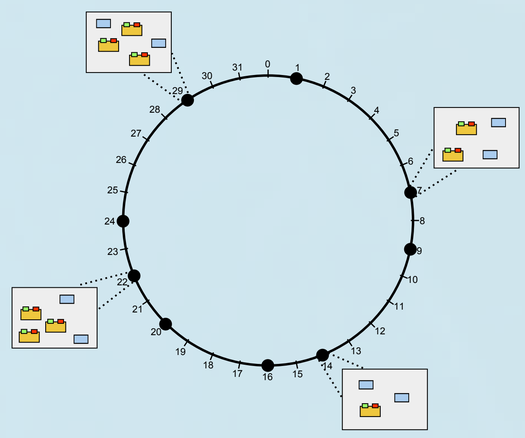
A Distributed Component Management System

Implements the Autonomic Computing Architecture

Targets large-scale and dynamic distributed environments and applications

Leverages Structured Overlay Networks for communication and for provisioning of basic services (DHT, Publish/Subscribe, Groups)



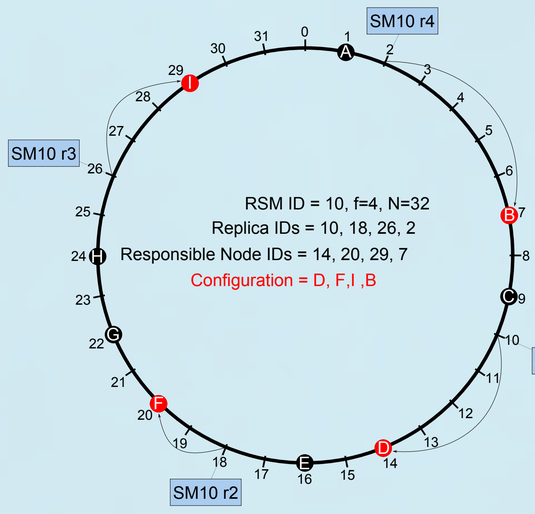


Automatic Reconfiguration of Replicated State Machines

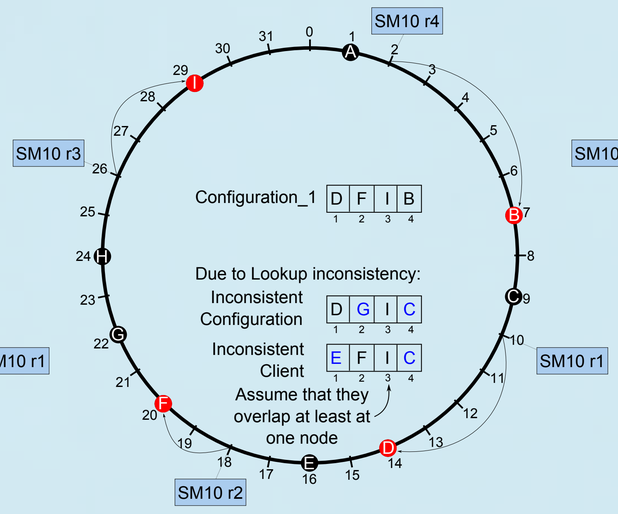
Uses the SMART protocol to reconfigure state machines

We developed a distributed algorithm to automate the reconfiguration

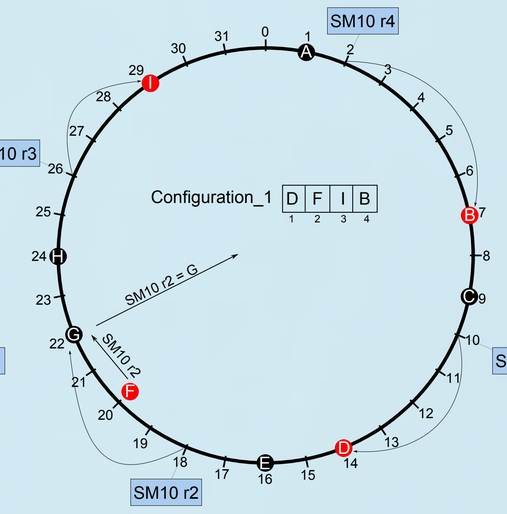
Can be used to implement robust services such as Robust Management Elements



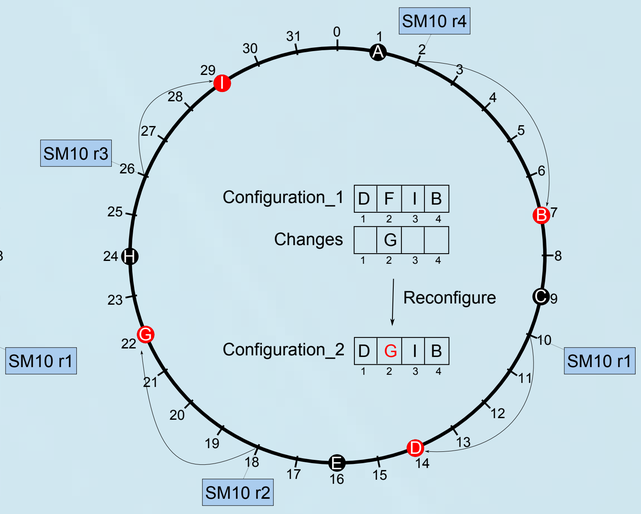
Symmetric replication scheme to select nodes



Direct references to avoid lookup inconsistency

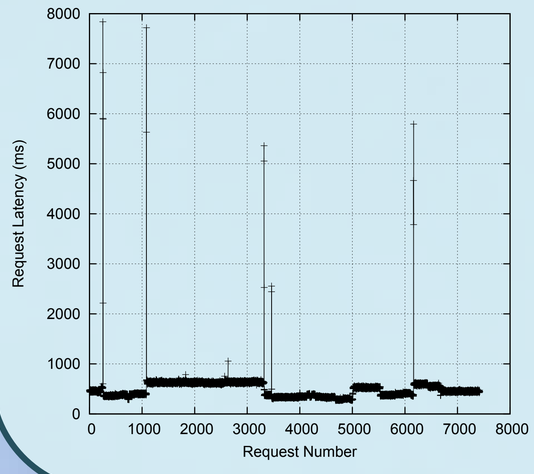


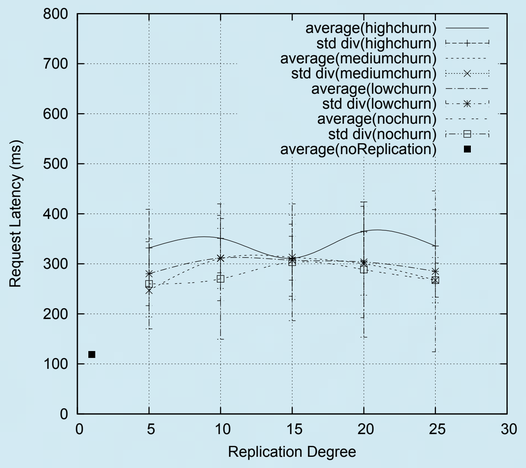
DHT techniques to handle churn



Extended state machine to receive changes and decide to reconfigure

Evaluation





Future Work

Apply control theory to distributed systems

Study elastic services in the Cloud

Develop generic techniques for self-management in the Cloud

Integrate all pieces into an elastic storage system

Further Readings

A. Al-Shishtawy, M. A. Fayyaz, K. Popov, and V. Vlassov, **"Achieving Robust Self-Management for Large-Scale Distributed Applications,"** Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2010), Budapest, Hungary, September 27-October 1, 2010

A. Al-Shishtawy, V. Vlassov, P. Brand, and S. Haridi, **"A design methodology for self-management in distributed environments,"** in IEEE International Conference on Computational Science and Engineering, 2009. CSE '09. vol. 1, (Vancouver, BC, Canada), pp. 430–436, IEEE Computer Society, August 2009.

A. Al-Shishtawy, J. Höglund, K. Popov, N. Parlavantzas, V. Vlassov, and P. Brand, **"Enabling self-management of component based distributed applications,"** in From Grids to Service and Pervasive Computing (T. Priol and M. Vanneschi, eds.), pp. 163–174, Springer US, July 2008.

KTH VETENSKAP OCH KONST

Software and Computer Systems
Information and Communication Technology
KTH Royal Institute of Technology
Stockholm, Sweden

Ahmad Al-Shishtawy (ahmadas@kth.se)
Advisors:
Vladimir Vlassov (vladv@kth.se)
Seif Haridi (seif@sics.se)

Swedish Institute of Computer Science
SICS