



dependable evolvable pervasive software engineering group

Overlay Self-Organization for Traffic Reduction in Multi-Broker Publish-Subscribe Systems

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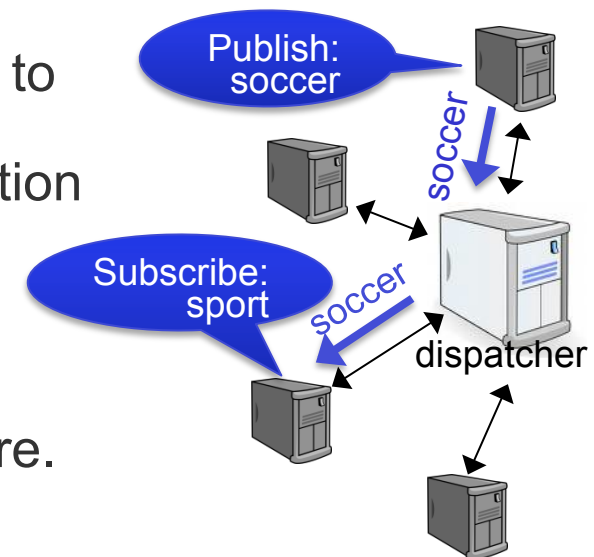
Publish-Subscribe Systems

- **Characteristics:**

- Many components and a dispatcher;
- Components may send messages and subscribe to some classes of messages;
- The dispatcher forwards received messages to the correct subscribers;
- Asynchronous (loosely-coupled) communication model.

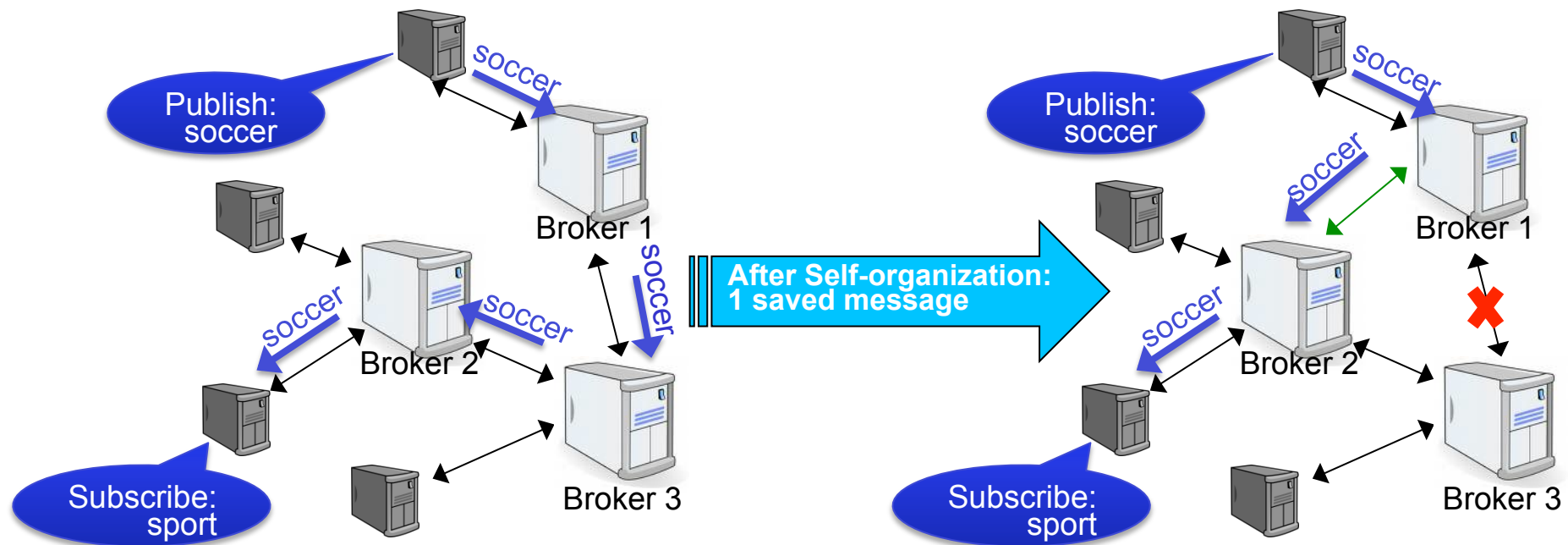
- **Problem:**

- The dispatcher may be a single point of failure.
- Need of a dispatcher composed of multiple elements (called brokers).
- Finding the optimal overlay network for these brokers to reduce the total traffic.



Idea: Overlay Self-Organization

- Finding a method to self-optimize the broker overlay network spontaneously.
- Use only simple local rules and the limited local knowledge of each broker.



Overlay Self-Organization Algorithm

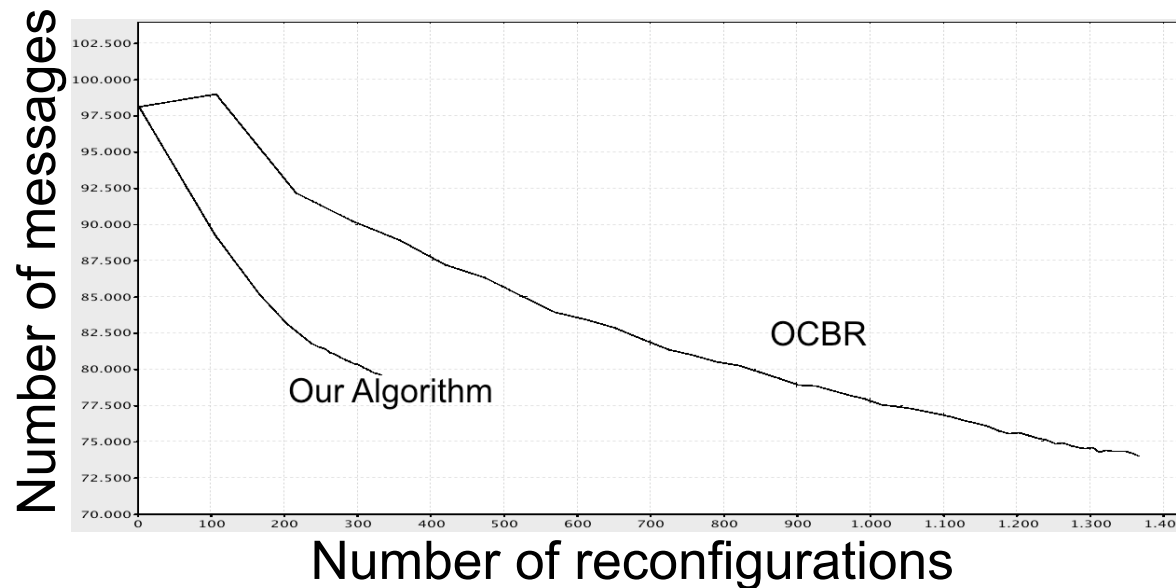
Phase 1: Training

- Collect traffic information.
- Count how much traffic belonging to a certain class (subscription) has been received/forwarded to neighbor brokers.

Phase 2: Reconfiguration

- Use information collected during Phase 1 to predict the effects of a reconfiguration using a **utility function**.
- Evaluate such function for a significant amount of possible reconfigurations and apply the one that maximizes it.

Results and Conclusions



- **What we have learned from experimental results:**
 - The algorithm scales well;
 - Convergence is preserved also in case of churn and selfishness;
 - Artificially added noise to increase the optimality of the solution.
- **Feel free to come and see our poster for more details.**