Building Versatile Publish/Subscribe Infrastructures: An Empirical Study of Middleware Versatility Approaches and their Trade-offs

Motivation

In order to stay current with the constant evolution of application and networking requirements, Middleware must be versatile. The development of versatile middleware, however, is non-trivial. From the point of view of the infrastructure developers, it requires the right balance of software qualities such as configurability, extensibility, and maintainability; whereas from the point of view of the infrastructure users, it requires the right amount of performance, reusability and usability. Different versatility approaches have been adopted in the development of publish/subscribe infrastructures as follows:

1) Minimal core systems such as Siena and Scribe, that provide simple and generalized services.
2) Coordination languages as Linda, IBM TSpaces and JavaSpaces that provide a common vocabulary for the development of distributed applications.
3) One-size-fits-all infrastructures as CORBA-NS and READY that support a large and configurable set of features.

The lack of extensibility of these approaches motivated our development of YANCEES, a flexible (extensible and configurable) pub/sub infrastructure based on plug-ins and extensible languages.

Evaluation

This poster reports a quantitative and qualitative study that compares YANCEES with different open source publish/subscribe infrastructures (Siena, JavaSpaces, CORBA-NS) developed according to different versatility strategies above.

In our evaluation, we selected three feature-rich event-driven applications from different domains: EDEM for usability monitoring, CASSIUS awareness server and IMPROMPTU peer-to-peer file sharing. We abstracted their publish/subscribe requirements in the form of reference APIs, implementing these APIs, using the selected publish/subscribe infrastructures, as shown in Figure1.

We evaluated the implementations using different metrics such as performance, modularity, flexibility, usability and reusability. In order to stay current with the constant evolution of application and networking requirements, Middleware must be versatile. The development of versatile middleware, however, is non-trivial. From the point of view of the infrastructure developers, it requires the right balance of software qualities such as configurability, extensibility, and maintainability; whereas from the point of view of the infrastructure users, it requires the right amount of performance, reusability and usability. Different versatility approaches have been adopted in the development of publish/subscribe infrastructures as follows:

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