ISR
Institute for Software Research
UNIVERSITY OF CALIFORNIA, IRVINE

Yancees

A versatile publish/subscribe infrastructure

UCIrvine
University of California, Irvine

Motivation

Event notification servers have been used as the basic publish/subscribe infrastructure in a vast set of event-driven applications, including user interfaces and software monitoring, groupware, awareness, workflow management systems, mobile applications and many others. They implement a distributed loosely-coupled event-based communication style that intermediates the communication between information producers, that publish events, and information consumers that express interest on events by means of subscriptions.

The increasing popularity of the publish/subscribe communication style has demanded new functionality that goes beyond the traditional publication and subscription of events. Current commercial and research infrastructures strive to address this problem by:

- Developing new infrastructures from scratch, supporting the required functionality (such as CASSIUS, Khronika, GEM, YEAST and so on);
- Adopting monolithic one-size-fits all approaches such as CORBA-NS, JMS or READY, as one-size-fits all solutions.
- Or using minimal core services such as Siena and Elvin, implementing the required functionality in the client application.

The majority of these infrastructures fall short of mechanisms that allow their customization and configuration to comply with the requirements of different application domains, being not versatile enough to support the new features demanded by continuously evolving applications.

Versatile Event Notification Service

Our research goal is to add versatility to publish/subscribe infrastructures. As a result, we have developed ***YANCEES (Yet Another Configurable and Extensible Event Service)*** that provides a plug-in oriented component framework based on extensible event, subscription, notification, publication, protocol and routing models, which allows the development of customized notification services to accommodate the requirements of different applications (Figure 1).

Extensibility is provided by the combined use of plug-ins and extensible languages. Configurability is achieved by the use of configuration managers, while dynamism is provided by dynamic parsers that allocate plug-ins according to user-provided subscription commands.

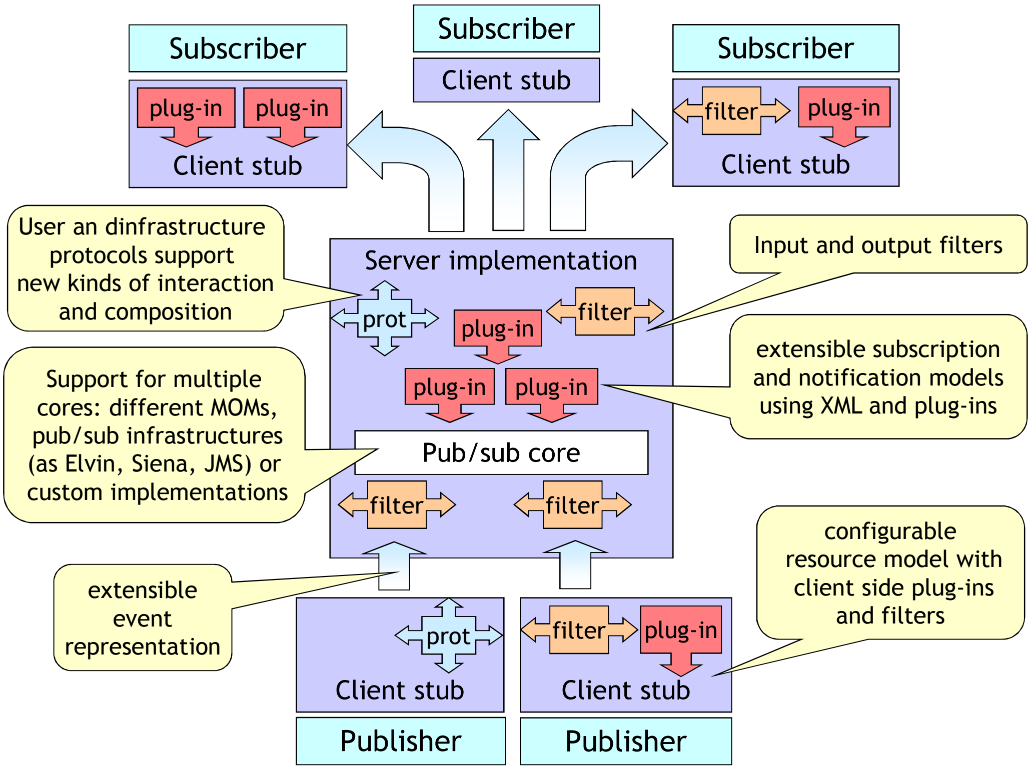
Subscriber
Subscriber
Subscriber
Client stub
plug-in
plug-in
Client stub
filter
plug-in
Client stub
User an dinfrastructure protocols support new kinds of interaction and composition
Server implementation
prot
plug-in
filter
Input and output filters
plug-in
plug-in
extensible subscription and notification models using XML and plug-ins
Support for multiple cores: different MOMs, pub/sub infrastructures (as Elvin, Siena, JMS) or custom implementations
Pub/sub core
filter
filter
configurable resource model with client side plug-ins and filters
extensible event representation
prot
Client stub
filter
plug-in
Client stub
Publisher
Publisher

Figure 1: YANCEES enhances publishers and subscribers with plug-ins and languages providing a versatile platform for a large set of applications

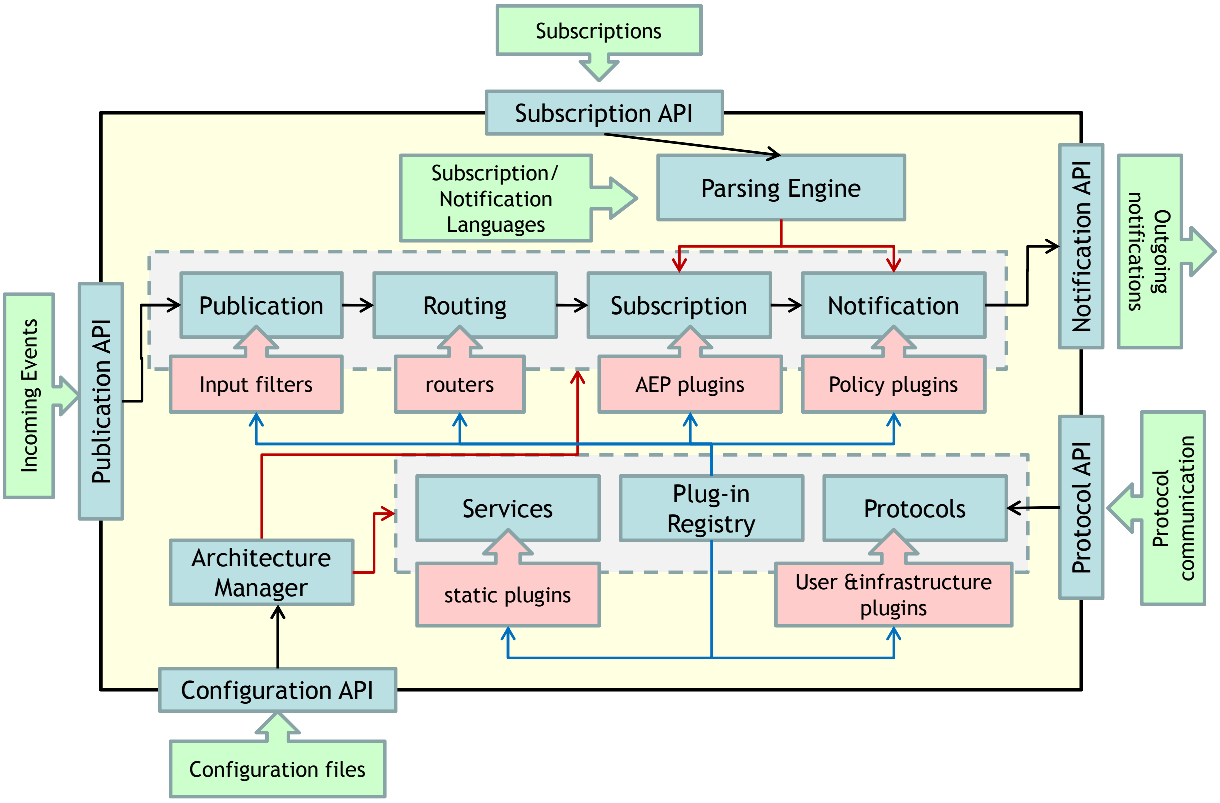

Figure 2: Internally, YANCEES combines plug-ins and filters in the implementation of customized notification, subscription, protocol and event models, achieving the versatility demanded by new applications

Extensible Architecture

YANCEES' dynamism and architecture rely on the dynamic and static combination of extensible languages defined in XML and plug-ins implemented in Java. Any new functionality defined in a notification server language is matched by plug-ins installed in the framework along the main publish/subscribe process (Figure 2). Dynamic parsers combine existing plug-ins to address the specific requirements of each subscription and notification commands. This approach allows the allocation of resources according to the subscriber's need, besides promoting the reuse of plug-ins.

YANCEES' can also interoperate with existing content-based publish/subscribe systems as Siena, Elvin, CORBA-NS, and others, that can be installed as alternative routers in the infrastructure.

Key benefits

The extensibility and configurability characteristics of the YANCEES framework provide the following set of benefits compared to current event-notification services:

- Extensibility of subscription, notification, publication, routing, event and protocol models with new functionality in the form of plug-ins and language extensions;
- Configurability: allowing the customization of the infrastructure to specific application needs;
- Reuse of existing functionality by the smart composition of plug-ins;
- Distribution of processing, allowing the definition of client and server-side plug-ins;
- Dynamic change: support for runtime upgrade and change of plug-ins;
- Support for different protocols other than the common publish/subscribe;
- Interoperability with existing publish/subscribe cores (Elvin, Siena and others);

Contact Information

Professor David F. Redmiles
Roberto S. Silva Filho
Information and Computer Science
University of California
Irvine, California 92697-3425

{rsilvafi, redmiles}@ics.uci.edu
949-824-4121 and 949-824-1715

To learn more about YANCEES and have access to a prototype of the system and documentation, please visit the website:
http://isr.uci.edu/projects/yancees

Effort sponsored by This research was supported by the U.S. National Science Foundation under grant numbers 0534775, 0205724 and 0326105, an IBM Eclipse Technology Exchange Grant, and by the Intel Corporation.

June 2008