Abstract

Large-scale distributed systems such as global enterprise systems, E-commerce and E-service systems are critical for businesses and complex to build and run. Their design requires an advanced technology of system integration that guarantees satisfaction of various customer requirements. This paper advocates a holistic approach to system integration that supports an end-to-end systematic design: Business Process -> Workload Pattern -> Virtual System -> Configuration -> Data and Application Deployment. This approach is implemented as a **System Factory**, an integrated environment that incorporates and consolidates matching system analysis technique. The functionality and structure of a System Factory prototype that is under development at HP Laboratories is described in the paper. The center of the factory is **Repository** that accumulates system solutions, patterns, and templates for specific business segments. Specialized **Shops** with a common modeling and analysis base provide convenient means to find customized solutions.

1. Introduction

Rapidly converging computer and communication technologies and, specifically, explosive growth of net-enabled technologies bring us to a new IT landscape. It is mainly formed by complex systems that integrate hardware, software, networks, middleware, applications and data into multi-tiered systems, ranging from clusters of servers up to enterprise-wide computing infrastructures and global massively distributed internet-based systems. These systems consist of large number of components of a vast variety: from high-end servers and huge databases to laptops, handholds, personal appliances, and mobile devices. They have sophisticated connectivity and high traffic densities, implement newest technologies of storing, manipulating, and delivering of various types of data, including complex texts, voice, graphics, and video. As a result, the variety of feasible system architectures and their complexity are rapidly increasing. The main problem of these systems is that though they are built of highly reliable and efficient components they may exhibit bad global behavior and performance due to bad application and data partitioning, wrong traffic organization (load balancing), inappropriate security policies, etc.

**Systems of Systems** represent a challenge for the design and integration. On one hand, the solution space is huge and complex. On the other hand, these systems are increasingly critical for businesses. The cost of their deployment and management amounts to a quite substantial part of corporate budgets. It is very difficult to pick good solutions that are adequate to growing customers’ requirements.

To meet the new level of system complexity and to deliver much better tailored systems and E-services than the competition, system and service providers need an advanced system integration technology with **customization** as an important market differentiator. Such a technology should be a breakthrough in system design, integration, reengineering, and management. It should radically speed up the system delivery, increase cost/performance, reliability and security of delivered systems, as well as reduce cost of ownership and improve systems’ manageability and reactivity to business.

**System Factory** is a metaphor that being implemented provides such a technology in the form of an efficient working environment for system designers and integrators. It includes various modeling and analysis tools for addressing various aspects of system design, a repository for accumulating system patterns, templates, and solutions as well as specialized shops supporting different stages of the system analysis, modeling, synthesis, and management.

Why a factory is better than just a tool set? The factory moves the system integration from craftsmanship to industrial setting, emphasizing priority of systematic quantitative methods of analysis and making decisions. It promotes standards and well-defined interfaces for data exchange between different tools and supports the usage of patterns, templates, and prefabricated solutions and, as a result, speeds-up (time-to-market!) the system integration process and makes it more reliable. Finally, the factory provides a common frame for incorporation of new tools and technologies, builds-up a common logistics for user interface, visualization, and documenting.