New Information Systems for the Network Age
— Utilizing Distributed Object Technology —

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OVERVIEW: With the advent of “Big Bang,” “deregulation,” and “mega competition,” society and industry are in an age of drastic changes. In May 1996, Hitachi announced the basic concept for future information systems, FOREFRONT with Cyberspace, with such facilities as Internet and intranets, security solutions, and Hitachi Commerce Solution for this age of changes. FOREFRONT system outline is shown in Fig. 1. These solutions meet the needs for speedy strengthening of competitiveness and structural changes in corporations, public institutions, and society as a whole. These solutions also meet the needs for planning management strategies and for better customer service. In addition, in July 1997, Hitachi systematized the solution for interworking individual information systems effectively by incorporating distributed object technology into its Network Objectplaza product. Hitachi’s goal is to develop an information system that allows corporate, public sector and household activities to be accomplished in a global network space. This article discusses demands on information systems for corporate activities and how information systems should evolve to support corporate activities. It also covers the goals, features, and effects of the new solution: Network Objectplaza. Using distributed object technology, Network Objectplaza allows efficient interworking among applications on different systems, such as mainframes and servers, to cope with the full-fledged network age of the future.

INTRODUCTION
IN this age of drastic changes, the financial and industrial worlds do not simply want information systems for efficient transactions within companies. They want a new information system that evolves by using new technologies. Business needs a system that supports corporate activities for value creation, boosts the speed of business, and allows planning management strategies and improving service through businesses associated directly with customers.

The introduction of distributed object technology is effective for constructing highly reliable information systems that accommodate the ever-changing corporate environment and technological innovations; and supports not only corporate activities but also public and household activities. This effectiveness is achieved because distributed object technology interconnects applications on a variety of platforms.

Distributed object technology has a strong affinity for the Internet. It can interwork with the resources of an existing mainframe for new tasks, facilitate changing or extending server systems, and ease the introduction of widely available application packages. Extensive utilization of distributed object technology is expected including applications for financial institutions facing deregulation, industries heading toward global standardization, and the public utility and power industry — which need interworking of multivendor systems. The following sections describe the features and effective application examples of the Hitachi solution utilizing the distributed object technology Network Objectplaza.

MARKET ENVIRONMENT, EXPECTATIONS, AND REQUIREMENTS FOR INFORMATION SYSTEMS
In this radically changing environment of society and industry — including financial deregulation, relaxation of the regulatory environment, and the advent of severe competition — the real challenge for firms is evolution toward becoming strong companies. At the same time, their hopes for information systems that have evolved in conjunction with the companies themselves are rising.
As the business environment changes, expectations for information systems change from efficiency-enhancement systems to value-creation systems.

Based on the concept FOREFRONT with Cyberspace, Hitachi’s goal is to create information systems to implement a networked computing environment for corporations, public sector and the home.

**Creation of a human and information-intensive society that permits global networking for corporate and public sector activities as well as household activities**

**Network evolution**
- Rapid progress of the Internet
  - 100 million servers
  - 1 billion users/year 2000
- Rapid proliferation of PC

**Changing business environment**
- Financial deregulation
- Relaxing of the regulatory environment
- Age of severe competition

**Problem with corporate information systems**
- Interconnecting different systems is difficult.
- Connecting a new system to the existing system is difficult.
- There is a lack of skilled employees or sufficient information to tackle the restructuring of existing systems.

**Expectations and needs for corporate information systems**

**Expectations for information systems**
- Change from efficiency-enhancement systems to value-creation systems

**Needs**
- Want to interconnect the systems within the company
- Want to interconnect to external systems and networks
- Connection with inter-company systems to extend business opportunities
- Connection with a consumer or public-service system

**Requirements for corporate information systems**
- Can accommodate environmental changes quickly
- Can extend to a value-added service
- Constructing an information system utilizing distributed object technology

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**Fig. 2—Expectations and Needs for Corporate Information Systems.**
As the business environment changes, expectations for information systems change from efficiency-enhancement systems to value-creation systems.
In past times of steady growth, information systems have been developed mainly for increasing business efficiency and labor saving within corporations. That is, information systems contributed to the progress of corporations in enhancing efficiency. However, in this age of changes and speed, supporting the evolution of new corporate activities is now de rigueur.

In other words, value-creation information systems are being called for that provide for increased business speed, planning of management strategies, and extension of business opportunities for corporations to survive severe competition (Fig. 2). Specific needs for current information systems include improving and boosting the speed of business by interconnecting individual systems existing in the company, constructing systems linked to other companies to extend business opportunities, and setting up systems directly connected to consumers and public institutions to provide customer services superior to those provided by other competitors.

However, it is difficult for the user to recreate a completely new system to meet the needs of these sophisticated information systems. The user rather wants to use and improve the existing backbone system or existing systems dispersed within the company, including the extensive and important management databases. When using and improving the existing system, though, the user inevitably confronts the difficulties in interconnecting different systems.

Interconnection among existing systems, or among the existing systems and new systems or other companies’ systems, requires a huge amount of time and expenses because the connection method differs for each system connected. Distributed object technology solves all these problems. This technology is quite effective in accommodating business environmental changes quickly with its superior expandability in implementing new value-added systems or services.

**CORPORATE INFORMATION SYSTEMS OF THE FUTURE, AND DISTRIBUTED OBJECT TECHNOLOGY**

Effects of Using Distributed Object Technology

Fig. 3 shows the effect of using distributed object technology for corporate information systems. Distributed object technology is indispensable to effectively meet the needs of the sophisticated information systems mentioned above. Hitachi proposes a scheme to construct systems by
interconnecting system-building objects (programs and data) through communications. This proposal is based on the international interface standard called CORBA (Common Object Request Broker Architecture) administered by the OMG (Object Management Group), an industry standardization body for distributed technology.

A system that uses this technology can perform interfaced processing independent of hardware type, operating system, and the programming language of the application on the connected machine. In addition, by using wrapping technology, such a system can handle existing systems as objects. This significantly shortens the time required to construct and extend a system that interconnects different existing systems. In addition, this technology increases the utility value of the existing mainframes and other systems.

A distributed object system uses the object-oriented development method that reuses program units called objects on a combined basis for application development. This allows the user to develop and change an application quickly.

Overview and Features of Network Objectplaza

Network Objectplaza systematizes distributed object technology-based products and services based on the distributed object technology and System Integration (SI) technology that Hitachi has developed through construction of large-scale backbone systems and alliances with other leading corporations.

Specifically, it consists of six elements. They are five types of software products: a distributed object infrastructure, inter-system glue services, applications, development environment, system management, and a solution service that supports the construction of sophisticated distributed systems (Fig. 4).

For details, refer to the other articles in this special issue. In particular, Network Objectplaza features include a group of wrapping tools for effective interconnection with new application servers by using resources of mainframes and client server systems in the system interconnection framework unchanged, an application framework that packages common components to construct applications quickly, and a solution service that supports the construction and operation of corporate information systems.

Solution Examples and Effects of System Improvement by Network Objectplaza

The following paragraphs show several examples of solutions that use the functions of Network Objectplaza to implement a value-added service by combining a new system while using the resources of the existing system.

(1) One-stop travel service system

Fig. 5 shows an example of a travel system that implements one-stop service by interconnecting with the existing multiple-application systems. This example shows how a new one-stop service is implemented by using and interconnecting the seat
**New Information Systems for the Network Age**

**Fig. 5—Travel System for One-Stop Service.**
An example of a travel system implementing a one-stop service by interconnecting existing multiple application systems.

Reservation system on an existing mainframe and the hotel system on a server system. Internally, it interconnects the existing customer management system and a new travel product and reserved ticket issuing system through an intranet using distributed object technology. It also interconnects the internal seat reservation system with the outside terminals of travel agencies via the Internet to provide customers with a total travel planning service.

**Fig. 6—Integrated Facility Management System by Interconnecting Multiple Application Systems.**
An example of a facility management system that improves efficiency by interconnecting application systems functionally.

(2) Integrated facility management system by interconnecting multiple application systems

Fig. 6 shows an example of a facility management system that allows the user to use the same operation from a single personal computer to handle several facility management systems that previously had been implemented and operated separately. This is done by interconnecting them using distributed object technology.
The management system for purchasing, accounting, and facility management — and the engineering system, which had been operated separately, are interconnected by distributed object technology. This streamlines the tasks and significantly improves the capability.

(3) Internet banking system that provides service directly to customer personal computers

Fig. 7 shows an example of Internet banking providing service directly to customers’ personal computers. With distributed object technology, the online system of the mainframe is used unchanged and connected to the new application server. This provides a differentiated service through direct connection to customers’ personal computers via the Internet. It also provides information quickly and facilitates the change or addition of services and development of new service products.

CONCLUSIONS

Distributed object technology is now used in solutions such as inter-computer electronic commerce (EC) and Internet banking that have been already proposed as Hitachi Commerce Solutions. It is expected that distributed object technology will be used even more widely in the coming network computing age of the Internet and intranets.

Hitachi has developed a suite of products and solutions systematized for the future as the Network Objectplaza. Hitachi can thus contribute to the construction of highly reliable and high-performance network computing systems to improve corporate, public sector, and household activities. In addition, Hitachi will develop the best solution tailored to individual needs by combining products from other manufacturers.

The succeeding articles will introduce the solutions, infrastructure technology, and development schemes of Network Objectplaza.

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