Distributed Object Technology Providing System Integration Solutions in Next-Generation Information Systems

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OVERVIEW: Hitachi, Ltd. already provides several distributed object technology (DOT) related products. These DOT products have been developed to meet the needs of next-generation enterprise management and DOT environments. Hitachi has also developed DOT services and has built new application systems. On the other hand, because DOT is still emerging, many brand-new products are being created around the world. So sometimes users experience difficulty building DOT systems themselves. Hitachi, Ltd., has been developing a lot of system integration (SI) solutions based on a system called “ForefrontSS.” By expanding this system, we have developed new solutions and service products, which utilize DOT as the basis of new information technology (IT).

INTRODUCTION
In the IT field, especially in the field of system development, the usage of computer systems is drastically changing. This is because client networks are expanding rapidly and users are re-evaluating existing systems like mainframes to see if they can still provide suitable infrastructure for new application systems. And emerging Internet/Intranet, thin-client, and more-than-2-tier system architectures being realized. Distributed-object technology (DOT) provides infrastructure for this system architecture. DOT can effectively use existing systems and reduce end-user total cost of ownership (TCO).

On the other hand, many different system
combinations have been made, and these combinations create problems resulting from very complex system configurations and operations. We should find a quick and simple solution to these problems. It is not only DOT systems but also other systems that suffer similar problems. So Hitachi, Ltd., has developed a new system called “Cyberfront” that will solve the problems involved in system development. This is one of the best “solution services” we can offer to meet each customer’s needs, regarding system development, operation, and usage. And DOT will be a key to provide effective solutions.

BASIC CONCEPT OF SOLUTION SYSTEM

Fig. 1 shows the concept of our system for providing solutions to information system problems.

(1) Service classification

On the left side of Fig. 1, we divide service products into three categories. At the bottom of the figure, “Communication/Network base” provides a system infrastructure, then “middleware/componentware” provides an open middleware layer, and finally “solution service” utilizes these two layers as a system integration (SI) layer.

(2) Infrastructure technology

Each layer has its own infrastructure technology. These technologies are shown on the right side of Fig. 1. In the “Communication/Network base” layer, we use a highly reliable and easy-to-use server-network technology. In the second layer, “Middleware/

Componentware,” we also use high-performance security technology. In the top layer, “Solution service,” we expand our existing method of system planning/design/development, called “HIPACE,” to form a new method for planning integrated/distributed systems.

(3) Service system

Each layer has its own service system. We can provide each service individually, but we can combine them to provide higher quality and more integrated services.

DISTRIBUTED OBJECT SOLUTION

System business and solution business are based on the concept of the solution system. However, we need to provide appropriate services to meet actual user needs. In the following chapter, we explain our service products based on DOT.

High-Performance SI for Making Real Solutions

One important target of DOT solutions is to reduce the time and cost of building new business services or products. To do this, we must consider the following points:

- Combining new application systems and existing legacy systems
- Combining very different systems
- Coping with rapid change in system environment

With these points in mind, Hitachi, Ltd. aims to provide high-efficiency SI. In other words, we will combine existing products by using the legacy system to achieve efficient and easy system combination.

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<th>Features of distributed object technology</th>
<th>Applicable mode</th>
<th>Benefits to customers (users, system divisions)</th>
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<tr>
<td>Effective use of existing systems</td>
<td>Integrating terminals</td>
<td>• Improved operability</td>
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<td>(reconstruction of corporate system)</td>
<td>Using existing systems</td>
<td>• Accelerated development through Internet use</td>
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<td>Advantages of system tie-ups (systematic links with other firms)</td>
<td>Connecting to special systems of other firms</td>
<td>• Links between division systems</td>
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<td>Accessing customers in general</td>
<td>• Reduced work redundancy through collaboration</td>
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<td>Connecting to systems of third-party organizations</td>
<td>• New work systems added</td>
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<td>• Some work areas downsized (package integration)</td>
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<th>Benefits to customers (users, system divisions)</th>
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<tr>
<td>• Improved mobility/more remote service</td>
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<td>• Security</td>
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<tr>
<td>• Better response to changes in other firms’ systems</td>
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<td>• Electronic commerce participation enabled</td>
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<td>• Use of all WWW services enabled</td>
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<tr>
<td>• Wide variety of services offered (quick response to user service needs)</td>
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<td>• Improved efficacy in seeking business partners</td>
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<tr>
<td>• Links established with needed business partners</td>
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<td>• Flexible response to changes in business partners’ systems</td>
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I shows how we will do this.

Significance of DOT-Based Service Products

The following explains what our DOT-based service products can provide;

- New value-added businesses and systems based on cooperation among very different systems
- Cooperative system solutions between mainframes and open systems
- Higher level and more efficient SI
- Mutual benefits for SI vendors and software vendors

Total System of Service Products

The whole system for providing service products is shown in Fig. 2. And in Fig. 3, the relationships between each service system are shown. We added five

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**Fig. 2—Overall System for Providing Service Products.**

Service products are added to distributed object systems. New products are classified under existing service product systems.

**Fig. 3—Relationships Between Service Systems.**

Services are offered to meet new needs in current businesses and system environments.
new services this time.

1) Planning services
   (a) Reconstructing service for planning strategic systems; total planning for transition to new system and connection between new systems and existing systems.
   (b) Architecture service for designing enterprise systems; planning system connection infrastructure.

2) System development support services
   (a) DOT-system-development support service; implementation of DOT to system infrastructure.
   (b) Services for applying existing system asset; cooperation multiple systems.

3) Application-design support services
   (a) Component-oriented application design support service; new-business application-system development.

In the next chapter, we introduce our two main services: “Architecture design service for enterprise system” and “Services for applying existing systems.” These two services provide the key to successful SI implementation in the future.

ARCHITECTURE SERVICE FOR DESIGNING ENTERPRISE SYSTEM

We recognize that this service will be the most important service for providing SI in the near future. In order to reconstruct the enterprise information system (EIS), it is important to develop technology for selecting and combining existing systems and new applications data. In a distributed system, it is necessary to use existing data, application packages, and third vendor software. And designing better system architecture shortens the time required to develop products.

The following services are provided by architecture design.

1) Analysis of system interoperability
   • flexibility of connection and operation
   • data connection, performance, and security
2) Analysis of system architecture
   • trends in standardization and technology
   • existing system architecture
   • Matching needs and architecture products
3) Development of prototypes
   • total configuration design
   • concrete guide of interoperability needs
   • prototype development and evaluation

SERVICES FOR APPLYING EXISTING SYSTEM ASSETS

Wrapping technology is effective for utilizing the existing system efficiently. The fundamental wrapping technology consists of a group of wrapper products. These products provide consultation for selecting and using existing systems (Fig. 4). The services provided are listed as follows:

1) Support for designing system models for efficiently utilizing existing systems and data
2) Proposing appropriate wrapping methods and products
3) Support for installing wrapper products

And as a result these services provide the following benefits:

1) Reuse of existing systems by minimizing changes...
in applications
(2) Speedy development of new business systems
(3) Real integration of existing systems and new systems by using DOT

CONCLUSIONS
In the field of “network generation,” “ubiquitous” is the new keyword. This trend is influenced by the development of IT infrastructure. But to make IT ubiquitous, corporations and society will have to drastically change their ways of doing business. So the IT infrastructure should also be changed; that is, not only styles of business or ways of developing information systems but also new guidelines for culture and society must be developed. “Network Objectplaza” is one of the most important technologies for constructing the IT backbone. And we will continue to provide the best solutions by using “Network Objectplaza.”

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