

Enterprise Portal for Internet Business

●Masaaki Nishikiori

(Manuscript received August 31, 2000)

The emerging Internet technology has brought about a new business situation in which there are various services and contents distributed inside and outside the company environment. Because of this distribution, companies have difficulty finding target information and using these services. Therefore, many companies need an enterprise portal system that provides them with a better work environment. This paper describes the features of INTERSTAGE Portal Server, which is an enterprise portal system provided by Fujitsu. INTERSTAGE Portal Server realizes our goals for portal server construction and administration. These goals are to make good use of existing systems and to enable the user to construct a portal server smoothly without the need to develop new applications.

1. Introduction

Emerging Internet technologies are making it easier to access and develop services and contents in the Internet/intranet environment. However, because services and contents are distributed both inside and outside the company environment, many companies find it difficult to access information and services quickly. An enterprise portal system enables access to contents, information, and services on a legacy system within a company and on a groupware server, Web server, or DWH server. Moreover, it helps the user obtain a quick response and increases business opportunity.

In short, an enterprise portal system is a front-end system that adds value to human work and enterprise activities.^{1),2)}

2. Background

2.1 Current issues

An important issue regarding the typical company environment is that many systems are designed to be used for one purpose only and are

not adaptable for other uses (**Figure 1**).

Also, it is difficult to obtain and store information from multiple systems because of the different access methods and formats that are in use. Therefore, different applications have to be developed for different users in order to provide them with the information they need and enable them to use the systems effectively.

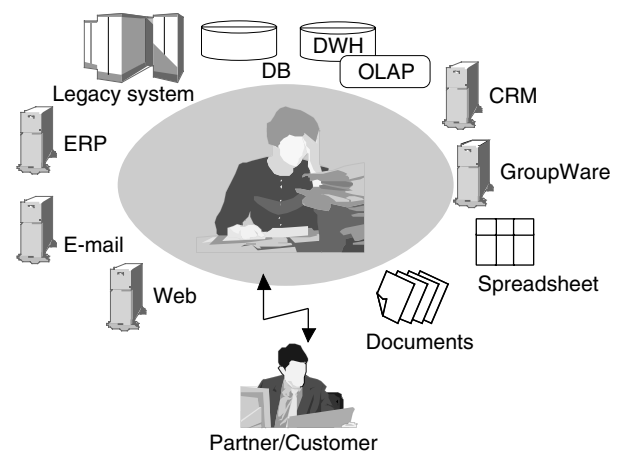


Figure 1
Typical company environment.

Moreover, companies compete with each other, so they must quickly provide their services to customers and strengthen co-operation with their partners. They should not have to spend time to develop applications by themselves.

2.2 Enterprise portal system

To cope with the above situation, we propose the enterprise portal system. We have already mentioned that an enterprise portal system is a front-end system which can create added value for companies. It differs from the conventional approach used to improve a system. Company workers, consumers, and business partners can benefit from it by using their own portal view.

Company workers can use it to get information and services quickly, publish required information, and accurately assess the business environment.

Also, an enterprise portal system makes it easier for consumers to find goods and for companies to offer customized services for their customers and find new customers.

3. Concept

3.1 Focus on human work

INTERSTAGE Portal Server is server software that constructs a flexible enterprise portal system that focuses on information-oriented tasks performed by humans.

To provide information and services on time when demanded, we introduce the idea of the *role* and *task* (Figure 2).

A task is a unit job, which is similar to a component of software. A role is an integration of various tasks and has *properties*. A property is a status such as “manager,” “worker,” or “strength of a partnership.” In the case of consumers, a property is a status such as “gold member” or “bronze member.” Tasks use the services and contents in a backend server and change their behavior according to the properties of the roles, for example, they can change to indicate different retrieval conditions and contents. Tasks can be reused as

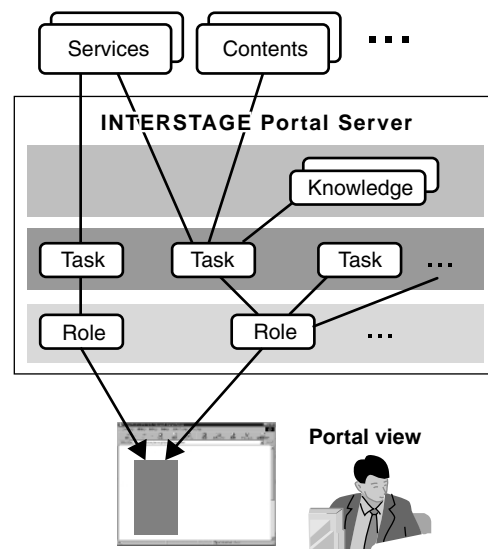


Figure 2
Roles and tasks.

know-how by storing executed operations as knowledge.

We maintain the flexibility to adapt to different business environments by managing the roles, tasks, knowledge, and service contents independently and connecting them dynamically.

3.2 Example role and task

The role in this example is a sales promotion manager responsible for finding markets for new products developed by the Product Development department. This manager performs the following tasks:

- Refers to the information of similar products
- Selects an organization to do business with and devises the contract conditions
- Negotiates with the organization
- Obtains the approval of superiors
- Gives instructions to the production line.

Business activities involve many kinds of roles, and these roles need to be categorized, organized, and assigned to employees.

Here is another example. Person A has the role of sales promotion manager and also that of an employee (Figure 3). In this case, A's portal view presents A with only the information related to A's roles. Another user with a different role

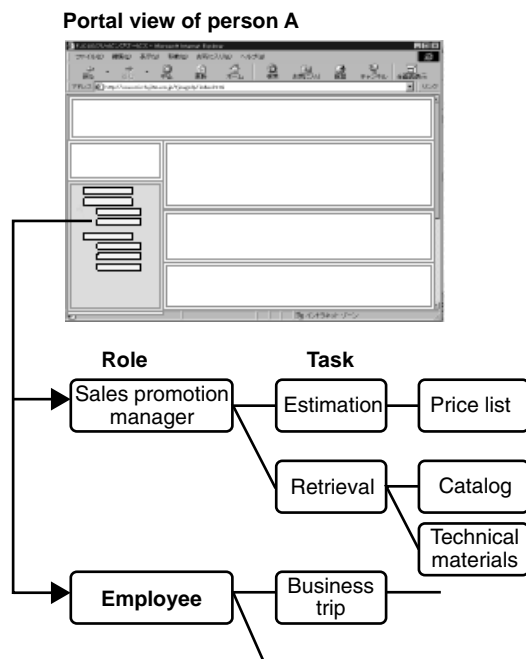


Figure 3
Portal view and roles/tasks of person A.

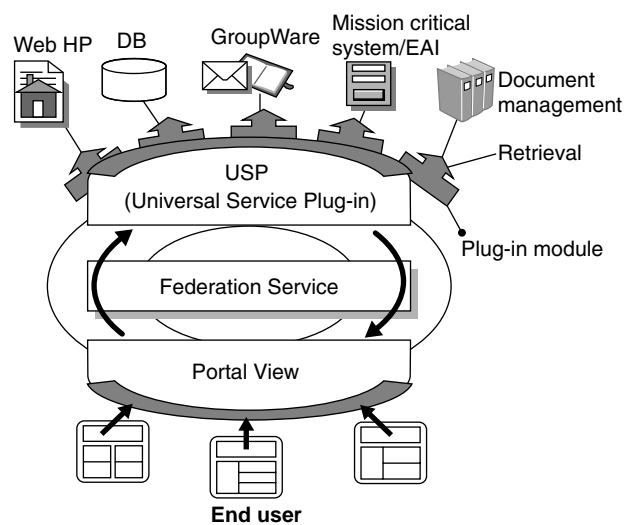


Figure 4
Architecture of INTERSTAGE Portal Server.

will be presented with different information.

As shown in this example, an enterprise portal system can provide different portal views to each user that are categorized according to the users' roles.

4. Architecture

4.1 Overview

So far, we have described the effect of introducing an enterprise portal system and its concept. Now, we will look at the architecture of Fujitsu's INTERSTAGE Portal Server.

INTERSTAGE Portal Server consists of the following components (**Figure 4**).

- **Portal View:** Provides a personalized work environment
- **USP:** Provides a standard interface between INTERSTAGE Portal Server and backend servers such as Web, database, groupware, mainframe, and document management servers.
- **Federation Service:** Manages the location of

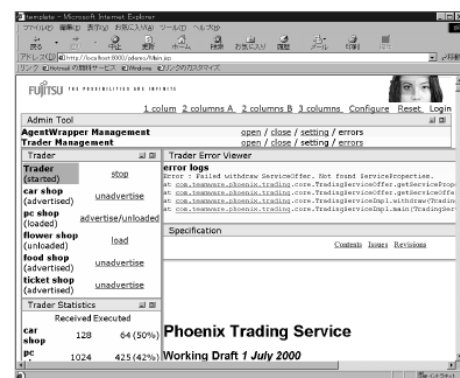


Figure 5
Example Portal View.

services and contents at the backend and collects them.

These three components are outlined below.

4.2 Portal view

The Portal View provides a customized view for each user. The users can personalize their own views according to their roles, for example, whether they are managers, workers, partners, or consumers (**Figure 5**). Also, they can determine the usage levels of services and contents they provide by referring to their partners' rank.

For example, a sales agent with a special

additional contract could refer to the technical information of your company but a sales agent with only a normal contract could not. Furthermore, you can present a different price list to each partner according to their rank.

Of course, you can also customize the view as required. For example, the size of the frames on the screen can be changed and the services displayed on the launch pad can be selected and reordered. Single sign-on, (SSO) is available for the services if needed.

4.3 Universal Service Plug-in (USP)

USP is the platform of the plug-in modules that provide a standard interface between INTERSTAGE Portal Server and backend servers. INTERSTAGE Portal Server accesses the data and services on backend servers via USP plug-in modules.

Portal server provides the following standard plug-in modules:

- HTML plug-in: Accesses HTML data on the Internet and intranets.
- Mainframe plug-in: Accesses mainframe computers without the need for special software.
- Application server plug-in: Accesses Java/Servlet/JSP applications on an INTERSTAGE application server.
- Database plug-in: Accesses databases.
- Information retrieval plug-in: Retrieves information from servers on the Internet and intranets.
- Communication service plug-in: Accesses information by using a standard protocol, for example, SMTP, IMAP4/POP3, NNTP, LDAP, iCAP, or WebDAV.

4.4 Federation Service

The Federation Service integrates multiple types of information and services of the Internet and intranets. It provides information and services that are integrated and transformed according to the requirements of end users.

The Federation Service uses the Portal View

for UI and uses USP for connections to backend servers.

The Federation Service provides a framework for managing the end-user, information, and services on the network. An example Federation System structure is shown in **Figure 6**.

The Federation System has the following functions:

- Personal Agent: Manages the profiles of end users, operation histories, and access conditions.
- Mediator Function: Automatically detects and manages information about backend servers.
- Field Reactor Function: Provides a kind of software-bus between services.
- Recipe: Describes the broker's know-how in a list of simple inquiry descriptions.

If needed, the Recipe can be:

- Merged with User Profiles
- Input by the user
- Instructed to calculate a required value from input values and constants contained in the Recipe.

Also, inquiry descriptions can include a script description.

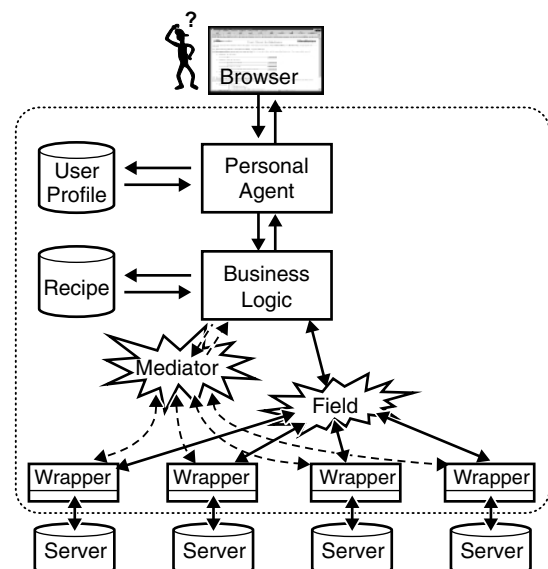


Figure 6
Example Federation System structure.

- **User Profile:**
This contains profile information about end users or a group, for example, a name, address, phone number, current location, and the relationship with the partner.

An outline of the operation of the Federation Service is given below (**Figure 7**):

- 1) An end user calls the Personal Agent via a Web browser.
- 2) The Personal Agent reads the User Profile and calls the Business Logic with the User Profile.
- 3) The Business Logic reads the Recipe, merges it with the User Profile, and makes a concrete request.
- 4) The Business Logic selects the backend servers by using the Mediator Function and communicates with selected servers via the Field Function.
- 5) The Business Logic presents the result to the end user.

This system 1) permits abstract requests by the end user, 2) minimizes input operations by the end user, and 3) makes it possible to obtain the detailed results from backend servers.

The logic and structure of the Federation Service are patent pending.

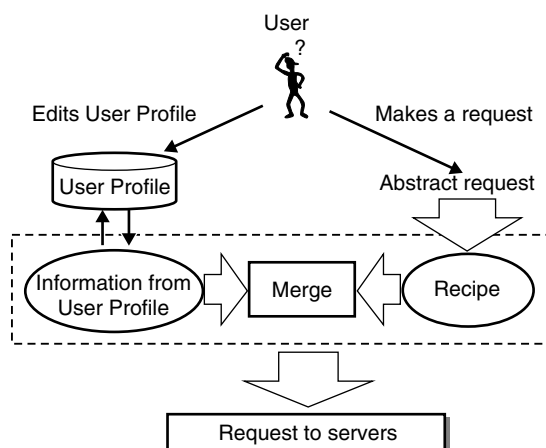


Figure 7
Merging of Recipe and User Profile.

5. Examples

5.1 Example 1

Now, we will explain the advantages of using INTERSTAGE Portal Server using an example of Web crawling, which is a typical activity.

Figure 8 shows an example in which information (e.g., product catalogs) is retrieved through various kinds of published Web contents. Conventionally, the information made available by selecting links is collected and the information in each Web site is retrieved piece by piece. The work required to perform these tasks can lower the quality of the work and slow the management speed.

The lower part of Figure 8 shows how the portal server system solves these problems.

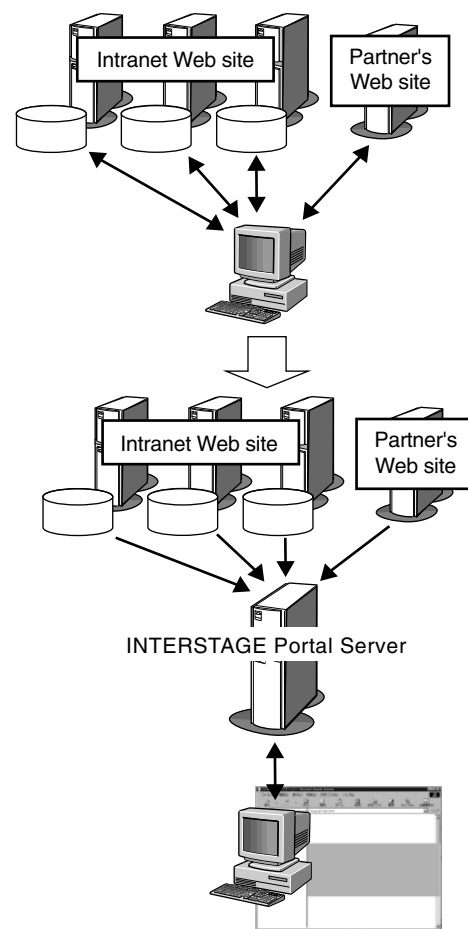


Figure 8
Access to Web sites.

In Figure 8, the conventional retrieval system, which crawled individually, is replaced with INTERSTAGE Portal Server. INTERSTAGE Portal Server utilizes information such as the category and price of products as a retrieval condition instead of ordinary keywords. It determines which server to retrieve through and then references that server according to the condition that was input. The retrieval results can be represented as a list of products.

In this example, INTERSTAGE Portal Server forms a retrieval system that meets demands without needing to store contents that are distributed over multiple locations. It can reference backend servers using just the server addresses and keywords.

The retrieval results are presented on a browser created by the Dynamic Create Function, which creates the view dynamically by storing the contents as XML files.

The advantage here is that the amount of work the user must do to retrieve information does not increase when the number of Web sites which contain product catalogs increases. Also, there is no need to stop the server when applications are added and the server contents stay in good condition.

5.2 Example 2

In Example 1, several Web sites are integrated. Example 2 illustrates the handling of mission critical data and analysis results from OLAP.

At present, when a user wants to know about the previous transactions made with a partner, the user must use different tools, because usually the format and media of the various bodies of information are different (e.g., contract documents are retrieved from a cabinet by hand, sales information is retrieved using an OLAP tool, and information about recent transactions is retrieved using a legacy system). Moreover, users have to put the retrieved information in order by themselves.

In this kind of work environment, the user

cannot achieve the following targets:

- A faster production cycle
- Creation of optimal strategies for channel marketing

However, by using INTERSTAGE Portal Server, users can get information easily and overcome these problems because it integrates different types of information, including information from legacy systems, into a single view (Figure 9).

5.3 Example 3

A company plans to establish a new office in Tokyo. To do this, many things have to be done.

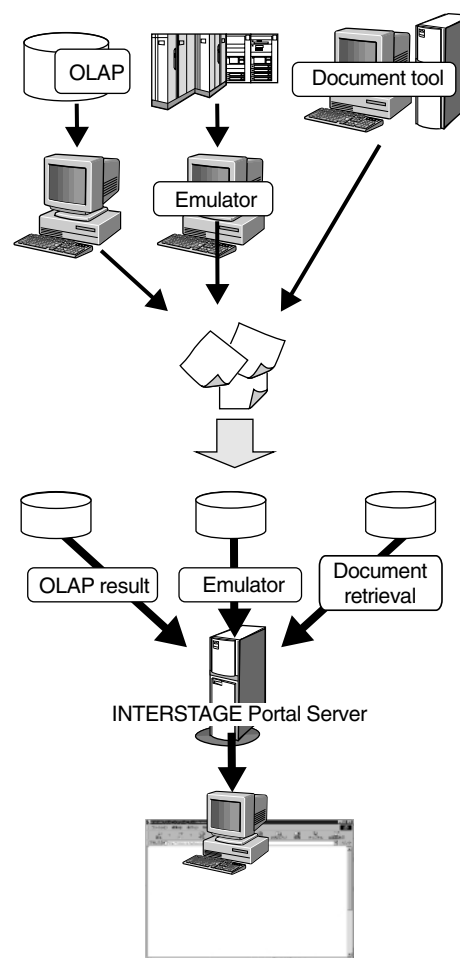


Figure 9
Access to different types of information.

For example:

- Find appropriate real estate.
- Select the office furniture.
- Select the office equipment.

Furthermore, the number of workers, location of the real estate, relationships with trading partners, and other details need to be considered. Normally, the person in charge of such a project must decide which details are important and which are not so important. Because these decisions are difficult to make correctly, the person in charge usually needs to be skilled in this particular field.

In our model, the Federation Service only requires that:

- The broker describes his or her skills in a list of simple inquiry descriptions.
- The broker provides the business logic.
- The end users prepare a profile that describes their personal information.

An abstract request from an end user such as "Establish a small office downtown for 10 people" is converted to concrete requests sent to backend servers by using the Recipe and User Profile. Then, the Federation Service receives the detailed results, which are a combination of estimations from backend servers.

The end user can then select the appropriate offers from candidates and use the purchase system to order the required items.

In this way, the end user can estimate the cost of a new office with no special skills in this field.

The INTERSTAGE Portal Server provides a development environment for this kind of federation application program.

6. Conclusions and future directions

By using the Federation Service on the INTERSTAGE Portal Server, customers can develop various types of application programs that federate with servers on the Internet and

intranets.

Our goals for portal server construction and administration are 1) to make good use of current systems and 2) to enable the user to construct a portal server smoothly without the need to develop new applications. The INTERSTAGE Portal Server realizes these goals and adds value to human work and enterprise activities.

We are planning to provide the following services and functions in the near future:

- Implementation of various connectors to federate with the current system.
- An enhanced Federation Service that can federate with backend servers by using just a script.
- Various services for constructing portal systems such as retrieval systems, FAQ, and BI.
- Functions for using employee information and customer databases.
- Simple administration of INTERSTAGE Portal Server using GUI tools.

References

- 1) Y. Takada, T. Mohri, and H. Fujii: Multi-agent System for Virtually Integrated Distributed Databases. *FUJITSU Sci. Tech. J.*, **34**, 2, pp.245-255 (December 1998).
- 2) T. Iwao, M. Okada, Y. Takada, and M. Amamiya: Flexible Multi-Agent Collaboration using Pattern Directed Message Collaboration of Field Reactor Model. PRIMA'99, 1999.12.2-3, LNAI 1733, pp.1-16.



Masaaki Nishikiori received the B.S. and M.S. degrees in Applied Physics from Tokai University, Hiratsuka, Japan in 1981 and 1983, respectively. He joined Fujitsu Ltd., Kawasaki, Japan in 1983 and has been engaged in development of application software (e.g., decision support systems, data transfer systems, groupware systems) for mainframe, UNIX, and PC environments.