New Web Service Based on Extended DACS Scheme

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Summary
Web pages are often used as a communication mean other than E-mail and telephone in the organization. It will be useful to send the related information to respective users by using Web pages. The related information is gathered by the search and extraction of user’s information in databases. Then, it will be notified to user by the program such as CGI on the server. To realize these processings, a large-scaled mechanism will be needed to gather the distributed data on the network and to create Web pages, dynamically. Therefore, a new Web Service based on the extended DACS Scheme is proposed and examined. The DACS Scheme is developed by authors. In the new Web Service, it is possible to display the information related to user only by inputting an URL on Web Browser. As the result, it is possible to display the information on the window divided by the frames on Web Browser. Then, the information is extracted from each server. If the static Web page can be created in HTML, user can create the useful Web page efficiently and freely. The new application form of the information usage is developed by using the proposed extended DACS Scheme.

Key words: web service, cgi, destination nat, packet filtering, name resolution

1. Introduction
Web pages are often used as a communication mean other than E-mail and telephone in the organization. One method is to transmit the information on the static Web page as a communication mean, while the other method is to transmit the information dynamically through Web Service, which can change contents of Web page as portal. The portal can display the information differently for respective individual users by using the program such as CGI [1] [2]. In this paper, the portal is called “Personal Portal” in the meaning of the information window for respective individuals.

In the case of the static Web page, its page is suitable for the unspecified number of users as a communication mean. In that case, there are some advantages as follows. Only releasing Web pages on the network is necessary after creating Web pages. Then, only starting up Web Service is necessary for the system administrator and other works do not occur very often. However, it is unsuitable to communicate to respective individual users or to a certain plural users (a user group). It is possible to limit user’s access by the authentication mechanism on Web Server. In that case, only the right or wrong of reference for a certain Web page is controlled without showing the necessary information to respective users.

To display the necessary information for individual user on Web Browser, it will be effective for Web Service to change Web pages dynamically. Then, it is necessary to search and extract the respective information for user from the information storage such as databases and notify the information to user by the program such as CGI. To introduce such mechanism, there is a method to introduce commercial products or a method to build it from the beginning. As for either method, Web pages are created dynamically. It is very convenient mechanism, because the information for individual user is displayed on one window. On the other hand, it is necessary to build an integrated mechanism in which databases cooperate with Web Server. User can access through Web Browser. Since each system with database is distributed on the network, the mechanism to pick up the information from them, will be large-scaled. Then, Web Service by Web Server and Web Browser is the service which promises an anonymity use on the network. To display the information for individual users on Web Browser, it is necessary to identify the user on Web Server side. The data for user is searched and extracted from the databases for the identification. In the conventional network scheme, such mechanism is used necessarily to extract the data from the distributed system on the network. However, if the information can be gathered effectively in the distributed environment, new application form of the information usage is realized. In this paper, the function of a DACS (Destination Addressing Control System) Scheme [3] [4] [5] is extended. A new application form of the information usage is proposed and examined in the extended DACS Scheme. The DACS Scheme is conventionally proposed by authors, which is the network scheme for the new operation and management by communication control on a client computer (client). In the conventional DACS Scheme, different IP addresses and port are assigned for
the same host name by user unit. As the result, it becomes possible to control the communication on the client. The network service in the server side is not needed to be extended.

In this paper, it is shown that a new use of network service is enabled by the extension of the DACS Scheme and correspondence of network service to the extended DACS Scheme. As a concrete example, Web Service is described, which is provided with Web Server and Web Browser. New application form of the information usage is proposed and examined by showing an example of the system, which is realized by the program on Web Server based on the extended DACS Scheme.

2. Basic Mechanism of Personal Portal Corresponding to Existing Network Scheme

As a study example of Personal Portal, HInT (Hannan Internet Community Tool for E-Education) [6] is well-known. In addition, it is possible to realize Personal Portal by a commercial product. In which case, basic mechanism is shown in Fig.1. First, an arrow of a dotted line in Fig.1, shows the movement to which user performs for a Web Browser. Also, an arrow of a solid line shows processing movement. User inputs URL into a Web Browser (1). Then, Web Server corresponding to URL is accessed (2) and the program corresponding to URL is executed. At that time, since the program in Web Server side does not grasp user information (a user name and a password), the input demand of user information is performed on Web Browser side (3). Then, user inputs user information (4) and it is sent to the program on Web Server (5). In existing mechanism, user authentication is performed at this point. As the result, if an access is permitted, the information related to user is searched from the data which is accumulated beforehand (6). To accumulate the data, there is a method with relational data base or a method with text file for example. It may not be accumulated on one server. It can be accumulated on the plural servers on the network. After the search, user’s data are extracted (7). The Web Server side program which received the data, generates a Web page dynamically from the data and Web page is sent to Web Browser side (8). It is possible for user to see the information related to oneself, that was displayed in the form of Web page (9).

A characteristic of this mechanism is the next two processings on Web Server.

(a) User authentication is performed by user information.
(b) Information related to user is searched and extracted from data which is accumulated beforehand.

Processing of (a) is performed after processing of (5) in Fig.1. This processing is necessary to perform processing of (b) and becomes essential so that Web Service premises anonymous user.

At the time of a request from user in Fig.1, it is not always necessary to execute processing of (a) on Web Server side, if the user who requested can be identified by the program on Web Server. It is difficult to realize such mechanism in the conventional network. However, if the extended DACS Scheme is used, it is possible to realize it. As the explanation, a summary of the conventional DACS Scheme is explained in Chapter 3. In chapter 4, Web Service corresponding to DACS Scheme and an extension
of DACS Scheme are explained. An example of Web Service based on DACS is showed in chapter 5.

3. Synopsis of DACS Scheme

3.1 Basic Principle of DACS Scheme

Fig.2 shows the basic principle of the network services by DACS Scheme. At the timing of the (a) or (b) as shown in the following, DACS rules (rules defined by user unit) are distributed from DACS Server to DACS Client.

(a) At the time of user’s logging in the client
(b) At the time of a delivery indication from the system administrator

According to distributed DACS rules, DACS Client performs (1) or (2) operation as shown in the following. Then, communication control of the client is performed for every login user.

(1) Destination information on IP Packet, which is sent from application program, is changed.
(2) IP Packet from the client, which is sent from the application program to the outside of the client, is blocked.

An example of the case (1) is shown in Fig.2. In Fig.2, the system administrator can distribute a communication of the login user to the specified server among servers A, B or C. Moreover, the case (2) is described. For example, when the system administrator wants to forbid user to use MUA (Mail User Agent), it will be performed by blocking IP Packet with the specific destination information. In order to realize DACS Scheme, the operation is done by DACS Protocol as shown in Fig.3. As shown by (1) in Fig.3, the distribution of DACS rules is performed on communication between DACS Server and DACS Client, which is arranged at the application layer. The application of DACS rules to DACS Control is shown by (2) in Fig.3. The steady communication control, such as a modification of the destination information or the communication blocking is performed at the network layer as shown by (3) in Fig.3.
3.2 Assuming Scope

To change destination information on IP Packet and block IP Packet by destination information, the system administrator needs to know the IP address of a network server. For that reason, the intranet under management of the system administrator becomes the scope of DACS Scheme mainly.

3.3 Comparison with Existing Technology

Here, the difference between DACS Scheme and the existing technology is explained. Specifically, the difference from the technology of name resolution service (ex, WINS,DNS) and server load balancing is discussed.

First, the difference from the name resolution service is explained. Although the mapping of a host name and an IP address is performed in the existing name resolution service, the mapping of the group of a host name, a user name and an IP address can be performed altogether by DACS Scheme. As the result, the IP address to be different for every user can be determined for the same host name. Next, the difference from server load balancing technology is explained. To realize server load balancing, there are methods by DNS round robin [7] and by the load balancer [8] [9]. Then, the difference from how to use the load balancer using Destination NAT is explained. The large difference from DACS Scheme is the place which arranges Destination NAT. Although the load balancer arranges Destination NAT on the network course, it is arranged on the client in DACS Scheme. When Destination NAT is arranged on the network course, it cannot be specified whether IP Packet was sent by which user. For the reason, it is difficult to control communication per user. However, it can be guaranteed in DACS Scheme by arranging on the client that all IP Packet at the time of Destination Nat conversion is sent by the login user. But, when the client is multi-user system, the mechanism in the no login from remoteness is required. It is confirmed that the communication is sent by the user who sits down before a client and logs in directly, by the method of intercepting the unnecessary communication from the client outside.

4. New Web Service Based on DACS Scheme

In this chapter, the mechanism of the new Web Service corresponding to DACS Scheme and an extension of DACS Scheme are explained. It is assumed that the extended DACS Scheme is introduced on the network. In that case, the program on Web Server is implemented in corresponding to a DACS Scheme. At first, starting the new Web Service corresponding to DACS Scheme (initialization processing) is explained in Fig.4. After user logs in to the client (a), DACS CL requests it so that DACS SV transmits DACS rules to itself (b). DACS rules transmitted from DACS SV is applied to DACS CL (DACS CTL) (c). This processing is same as initialization processing of the DACS Scheme. Furthermore, in the extended DACS Scheme, after the processing of (b), login information (user name and the IP address of the client) is notified from DACS SV to the program on Web Server corresponding to DACS Scheme (d). A characteristic of the extended DACS Scheme is that the server side program on Web Server specifies user by checking the login information and the source IP address of communication from the client. After those processing, the new Web Service corresponding to DACS Scheme begins a normal operative state (steady state). Next, summary of the new Web Service corresponding to DACS Scheme is explained. The user who logs in to the client inputs URL into Web Browser for executing the server side program (1). The request from Web Browser reaches to Web Server after changing a communication address by DACS CL (DACS CTL) (2). The Web Server side program can acquire the IP address of the client with request through an environment variable of Web Server. The requested user is specified by checking the login information and the IP address. Then, information related to user is searched (4) and extracted (5) from data which is accumulated beforehand. Thus, Web page is created from the information and sent to Web Browser side (6). It is possible for user to see the information related to oneself, that is displayed in the form of Web page on Web Browser (7). In the new Web service based on DACS Scheme, the information related to user is displayed on Web Browser by only executing the server side program by inputting URL into Web Browser.

5. Use of New Web Service

In Web Service based on the extended DACS Scheme in Section 4, the new constitution of the system is enabled as shown in Fig.5. First, in Fig.5, Server A ~ C which has programs corresponding to DACS Scheme (1) and data (2), respectively, are distributed on the network. In the extended DACS Scheme, information related to user is displayed on Web Browser by only inputting the URL. The following mechanism is built based on this principle. One window of Web Browser is divided into some frames. For example, it is divided into three frames (Frame A-C). The static HTML file with each URL (URLA ~C) is created for displaying Web page as Personal Portal. The static HTML File is put on Web Server or on the client. When the static HTML file is opened through Web Browser, information extracted from each server is
distributed on Web Browser. In the conventional scheme, dispersed data on the network is collected and Web page is created by the program dynamically. In the extended DACS Scheme, URL corresponding to each server is only incorporated in the static HTML file. Thus, if the static Web page is created, user can create Web page as Personal Portal easily. Since the Personal Portal is created easily and freely by oneself than the conventional one.

6. Conclusion

In this paper, a new form of the information usage by application of the extended DACS Scheme is proposed and examined. DACS Scheme is a network scheme for operation and management, which is proposed by authors in the previous studies [2] [3] [4]. By the extension of the DACS Scheme and correspondence of network service to the extended DACS Scheme, a new form of Web Service is enabled. The form is unable to be realized in the conventional network scheme. In the conventional network scheme, to let Web Browser display the necessary information as Personal Portal, the data is extracted effectively from the servers distributed on the network, and Web page is dynamically created from the data. However, it is possible to display the data of each server on each frame of Web page, which is divided into frames by the static HTML file. Therefore, it is possible to use the information as Personal Portal with the system constitution distributed on a network. Moreover, if user can create Web page, its’ page can be created freely by user oneself. As the result, the information can be used more freely and a new application form is generated in the organization.

References


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