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(54) **INFORMATION PROCESSING TERMINAL
AND CONTROL METHOD**

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Jan. 27, 2015, now Pat. No. 10,402,066.

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G06F 16/245 (2019.01)

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G06F 16/951 (2019.01)

(52) **U.S. Cl.**

CPC **G06F 3/04842** (2013.01); **G06F 3/0482**
(2013.01); **G06F 16/245** (2019.01); **G06F**
16/25 (2019.01); **G06F 16/951** (2019.01)

(58) **Field of Classification Search**

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G06F 16/25; G06F 16/951; H04L 67/51;
H04L 67/02

USPC 707/610, 769; 709/204; 715/751, 810
See application file for complete search history.

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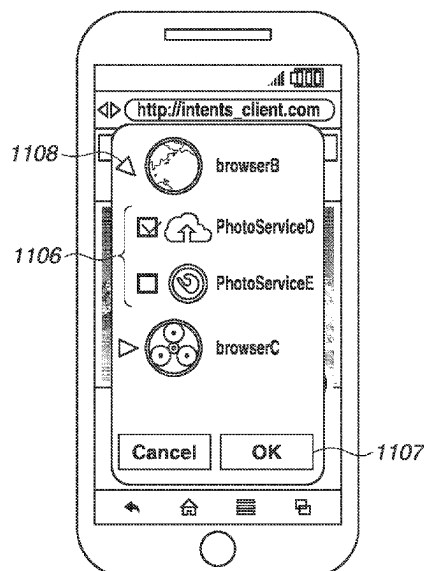
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Division

(57) **ABSTRACT**

A user agent (UA) .1 presents a selection screen for selecting
function information for calling a function provided by a
service in a network with use of the UA.1. Upon detecting
that an import button is pressed on the selection screen, the
UA.1 acquires a UA list with use of an Intent technique to
display the UA list. Upon a selection of a UA.2 from this list,
the UA.1 requests the function information to the UA.2, and
presents the selection screen in such a manner that the
function information acquired based on the request is further
included in the selection screen.

41 Claims, 21 Drawing Sheets



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				709/203

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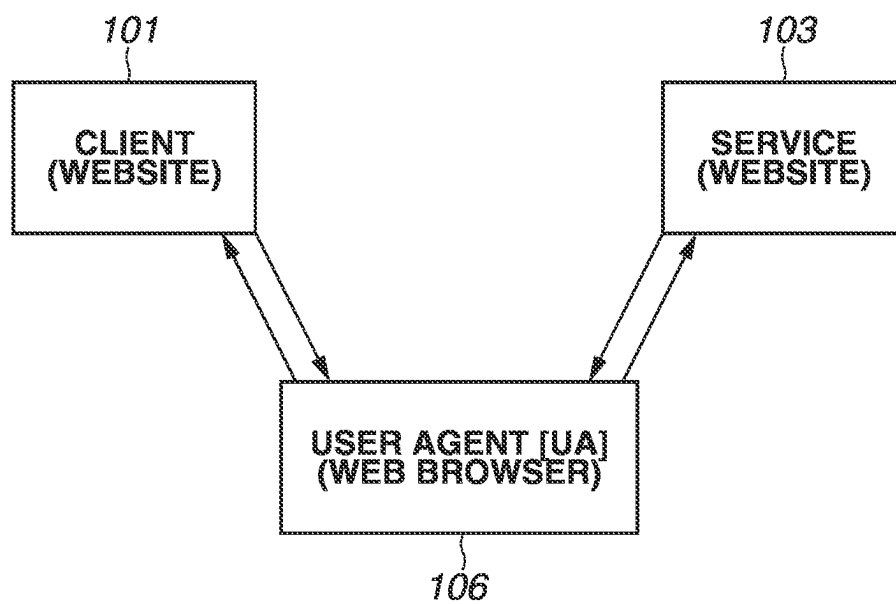
FIG.1

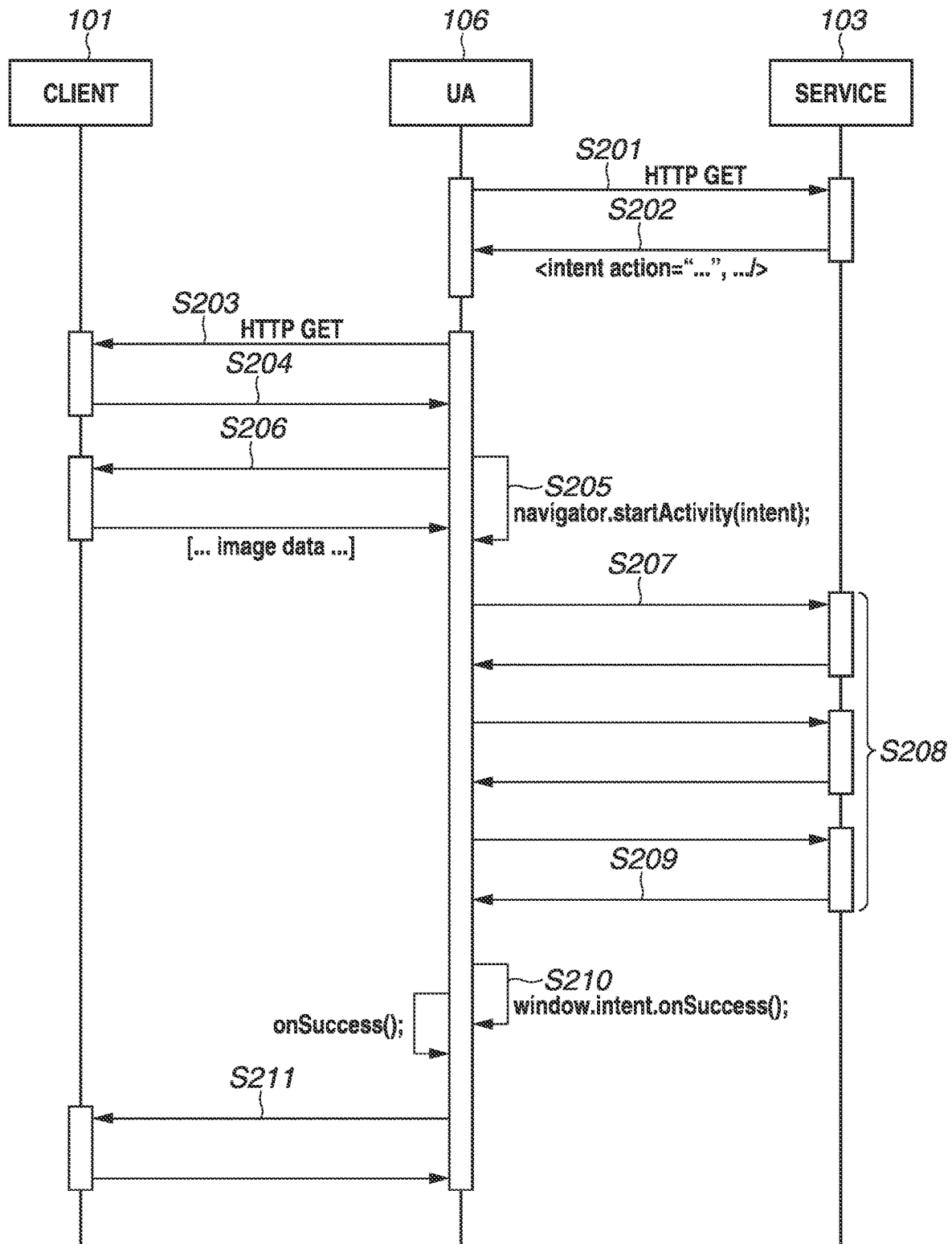
FIG.2

FIG.3A

```
<intent  
  action="http://webintents.org/share"  
  type="image/*"  
  href="share.html"  
  title="Share image using e-mail"  
  disposition="window"  
>
```

FIG.3B

```
document.getElementById('share-photo').addEventListener(  
  "click", function(){  
    var intent = new Intent(  
      {"action": "http://webintents.org/share",  
       "type": "image/jpeg",  
       "data": getImageFrom(...)});  
    navigator.startActivity(intent, onSuccess);  
  }, false);
```

FIG.4

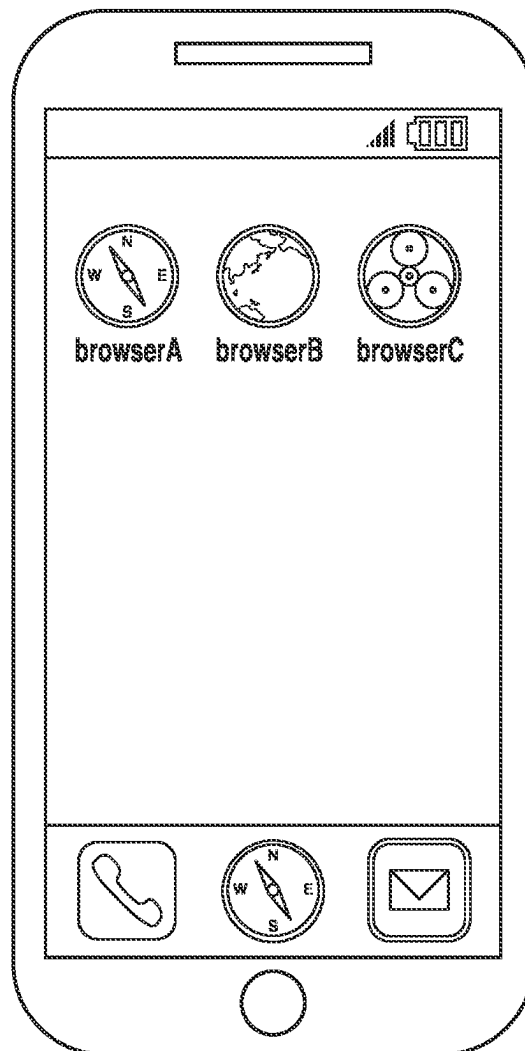


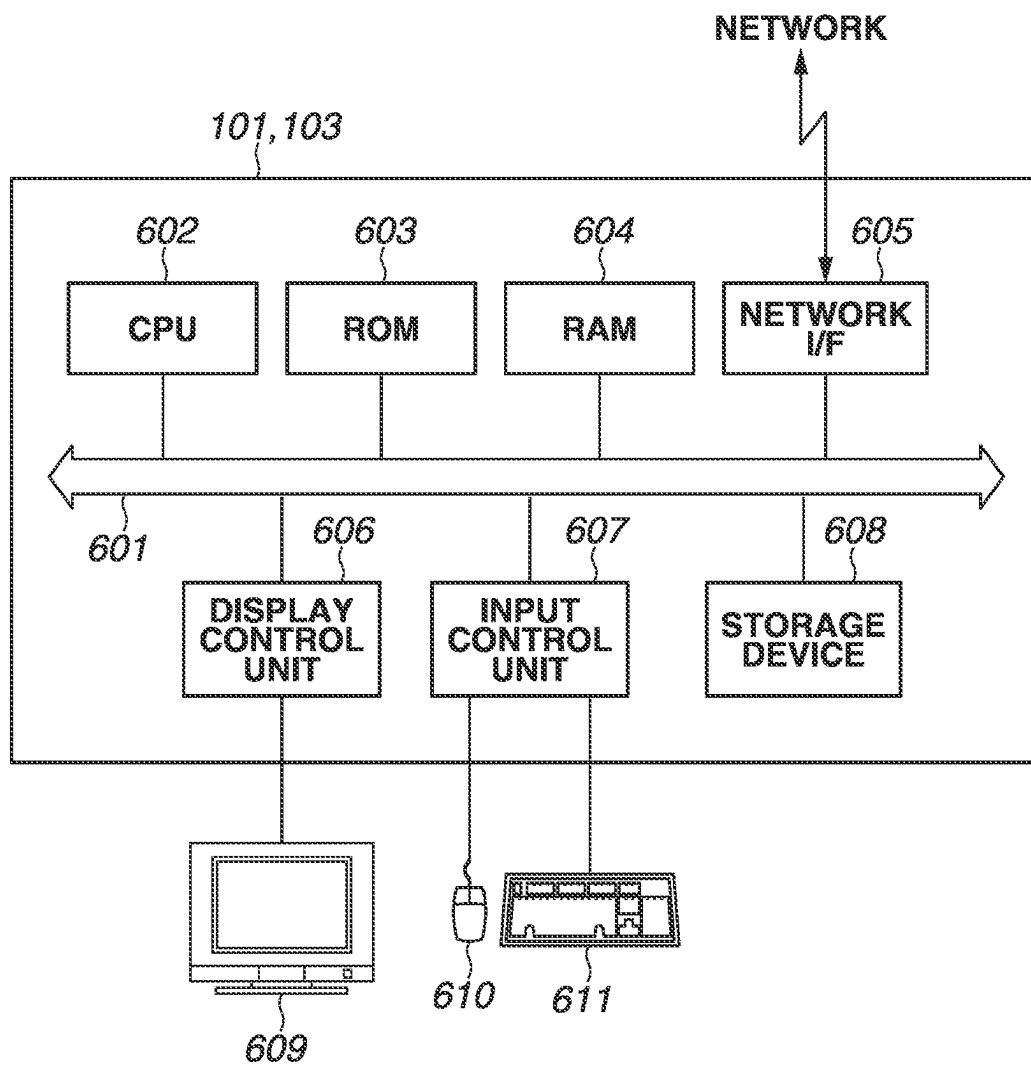
FIG.5

FIG. 6

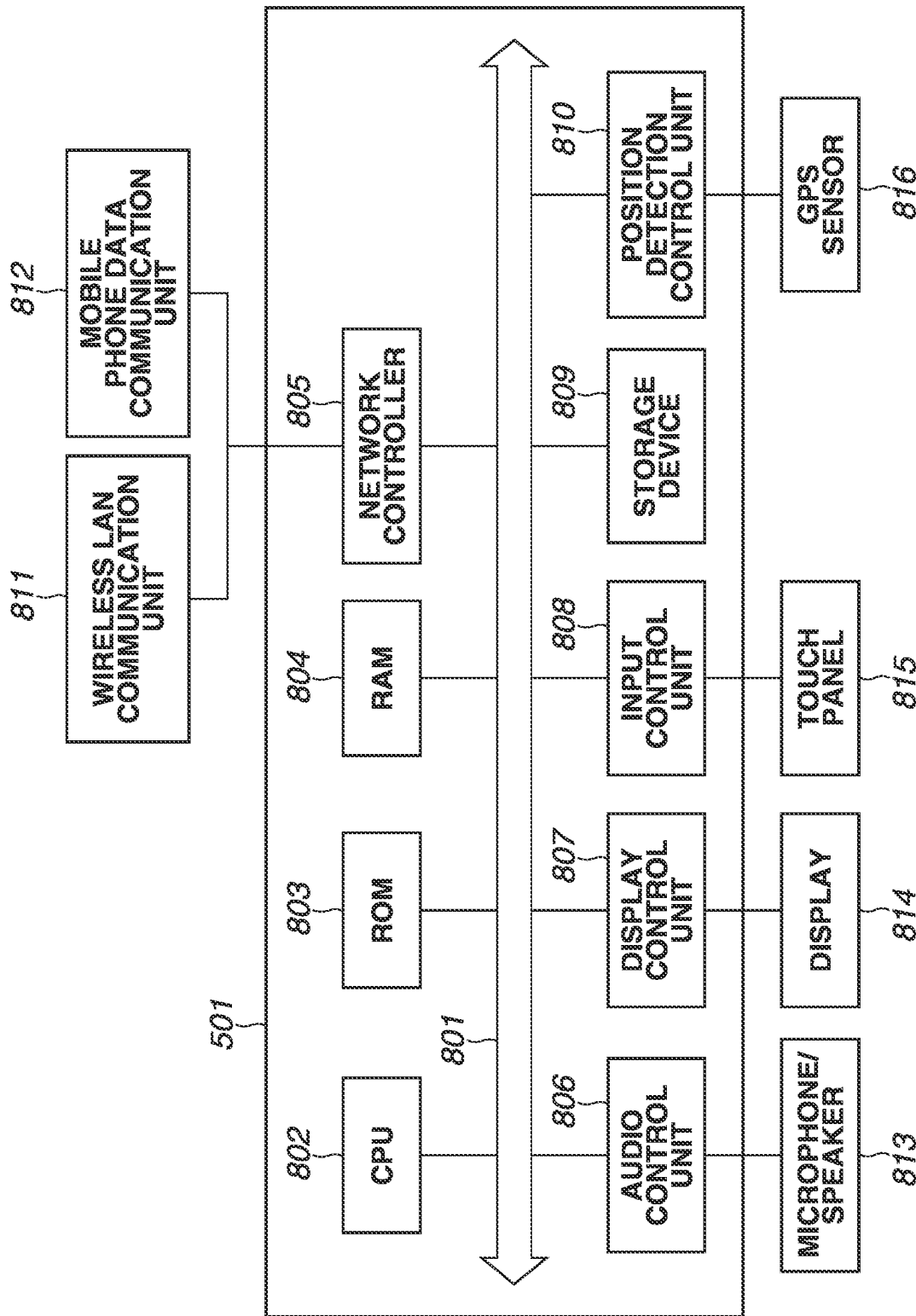


FIG. 7

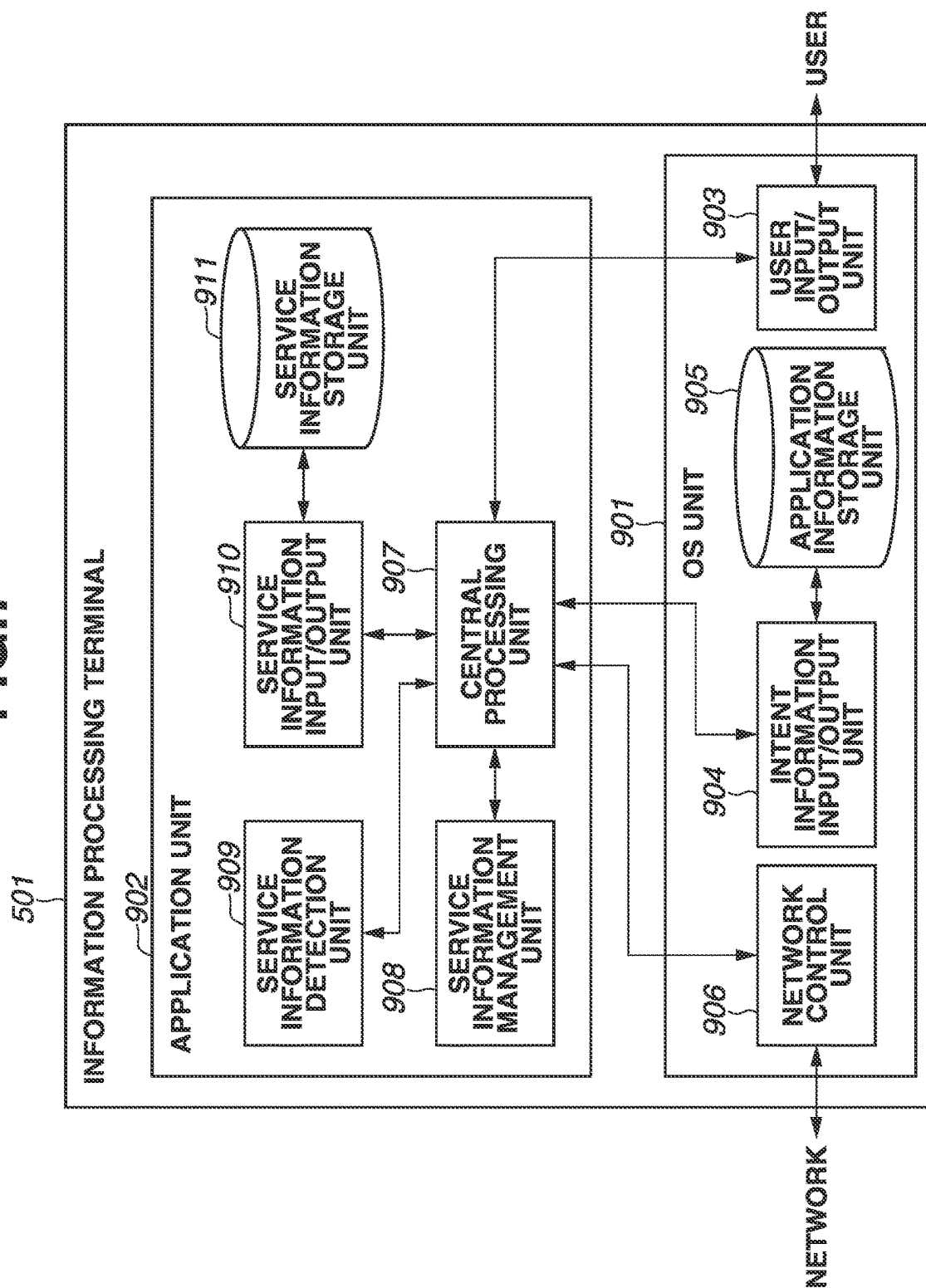


FIG.8

WEB INTENTS SERVICE LIST

WEB INTENTS SERVICE NAME	URI	ACTION	TYPE
INTENTS SERVICE	http://intent-service.com	SHARE	image/*
PHOTO SHARES	http://photo-shares.com	SHARE	image/*
...

1401

1402

1403

1404

FIG.9

FIG.9A

FIG.9B

FIG.9A

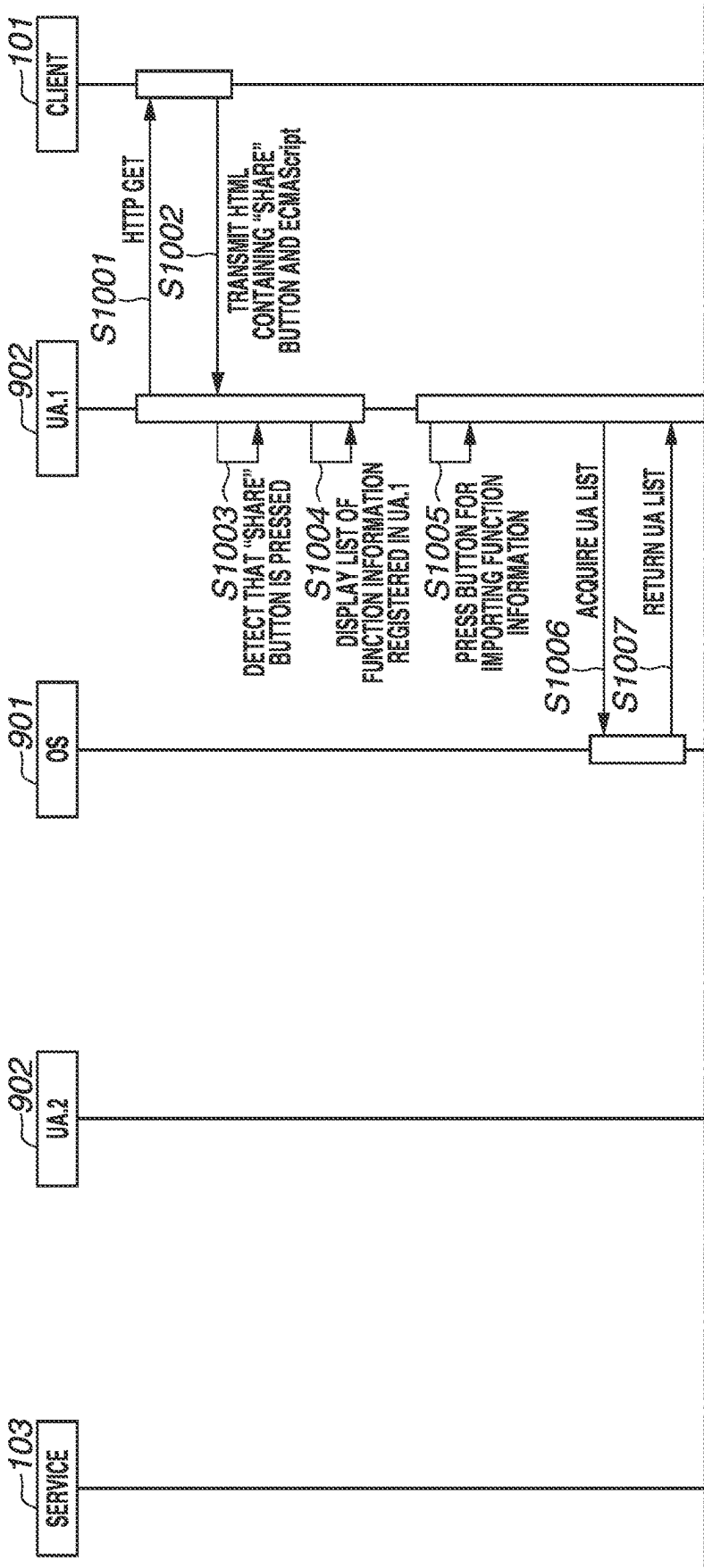


FIG. 9B

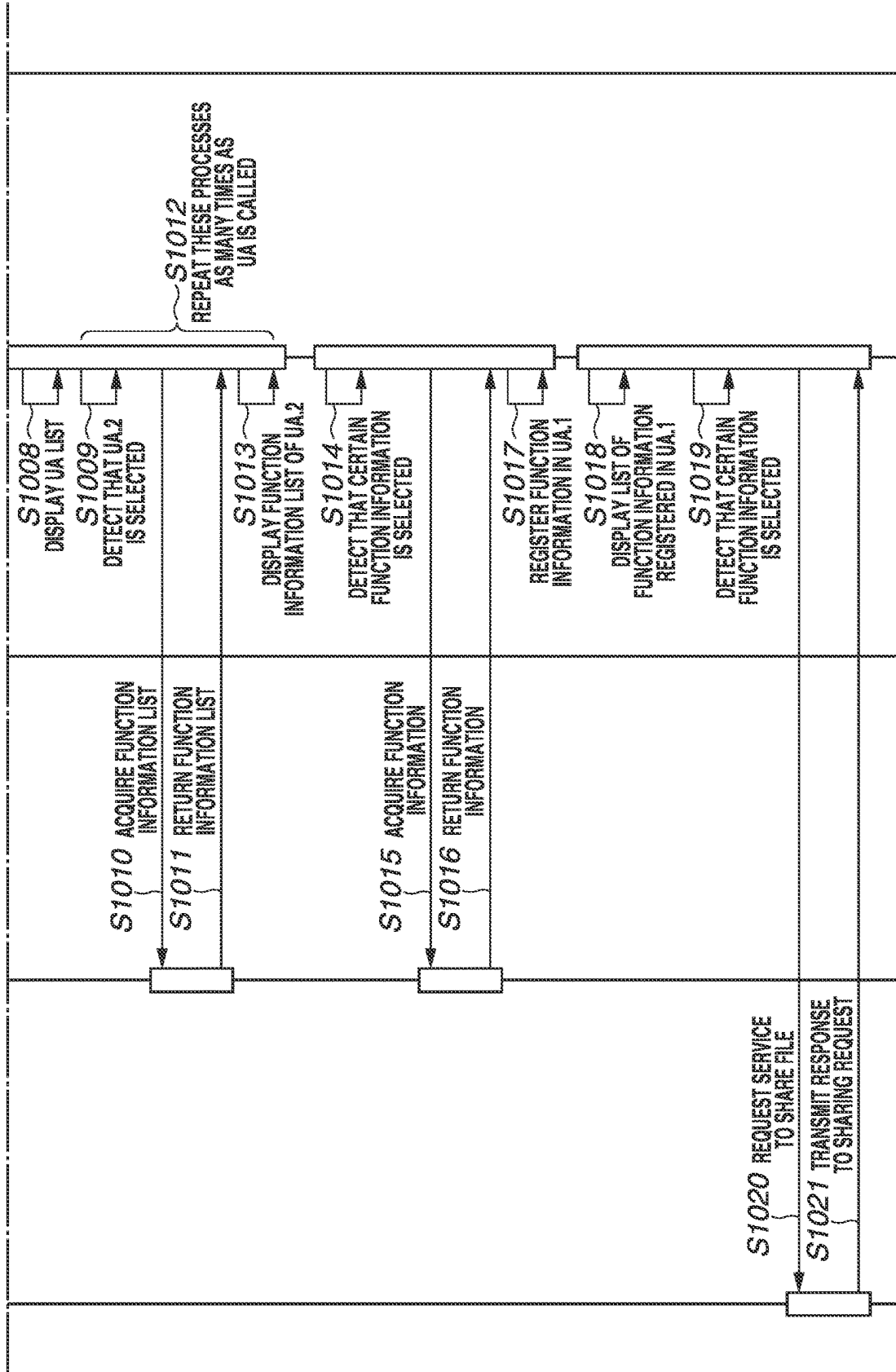


FIG.10A

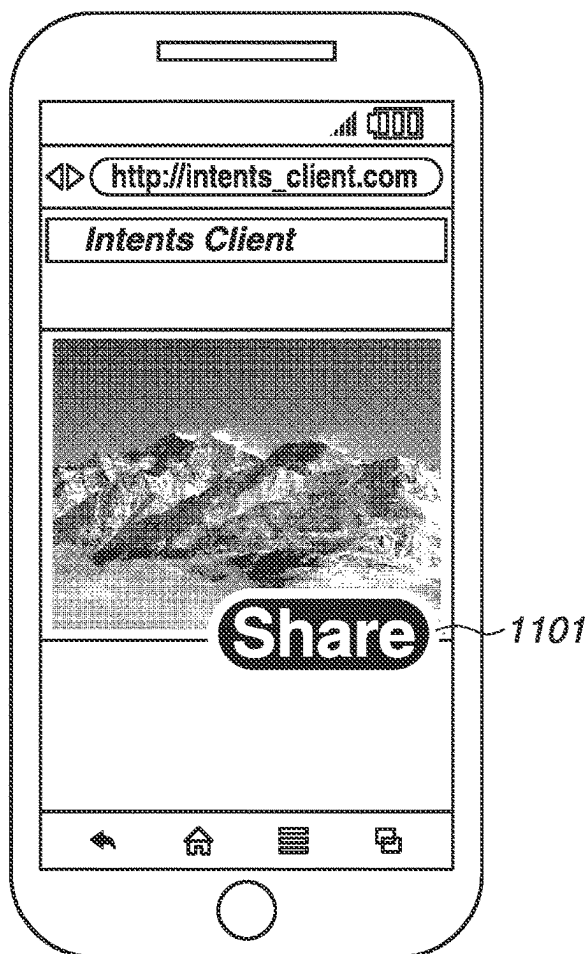


FIG.10B

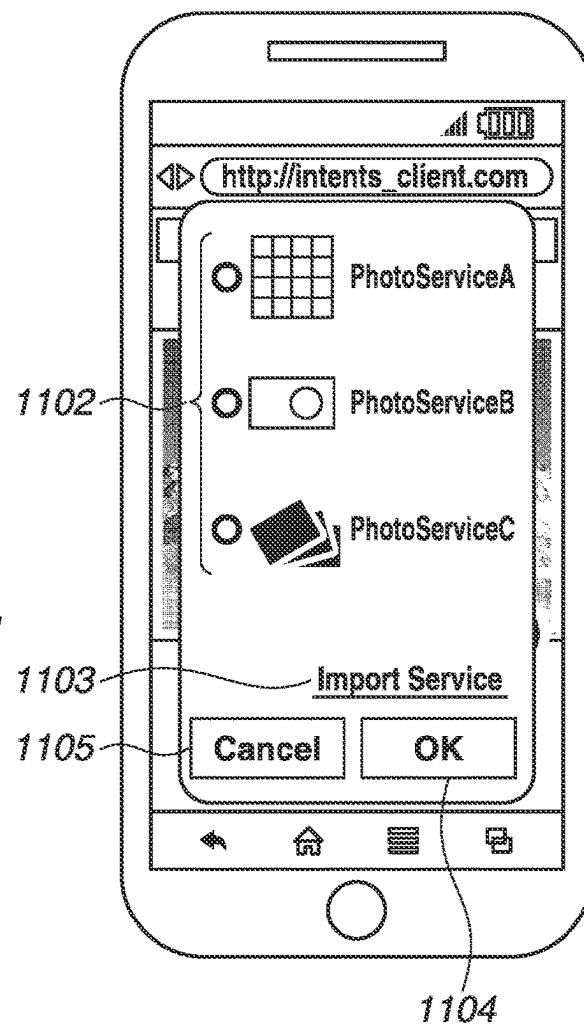


FIG.10C

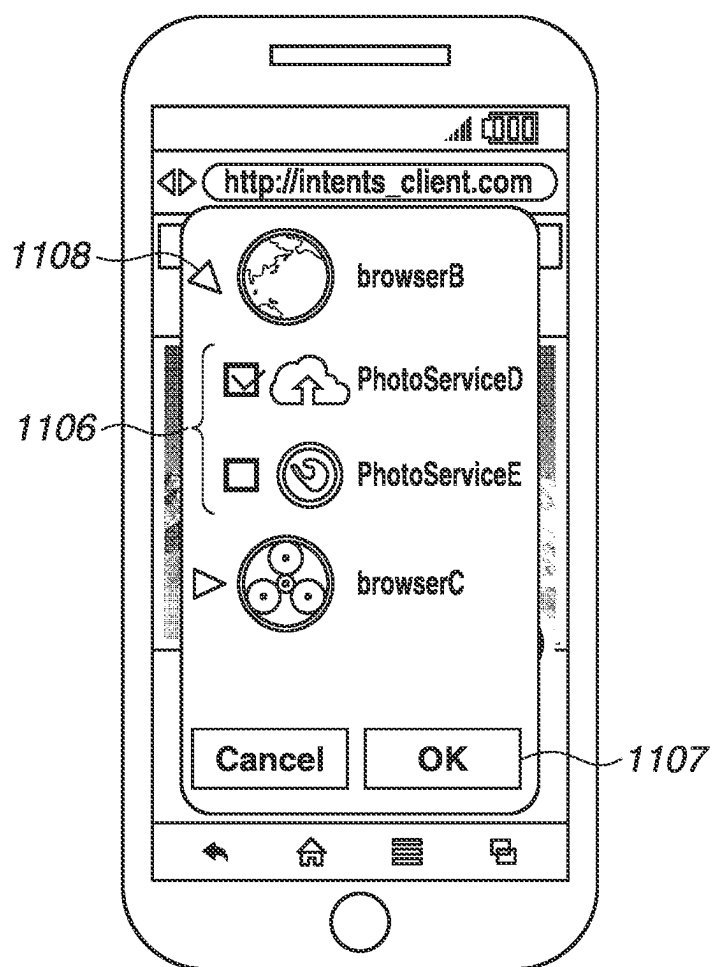


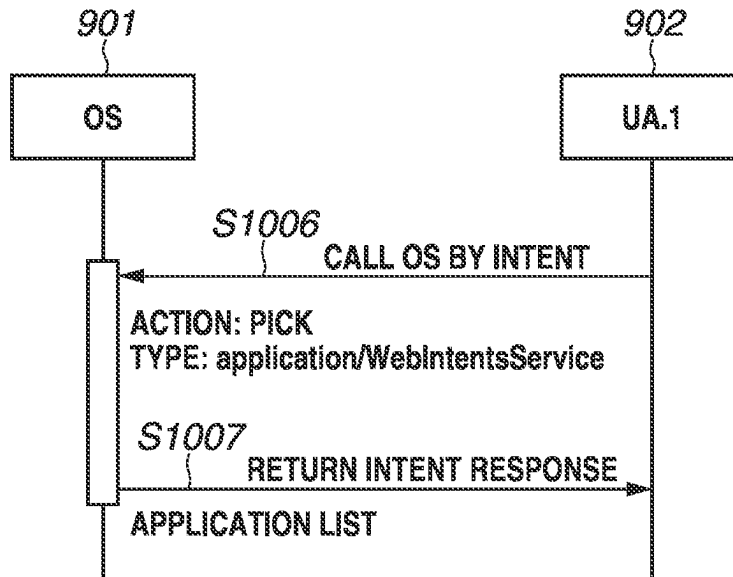
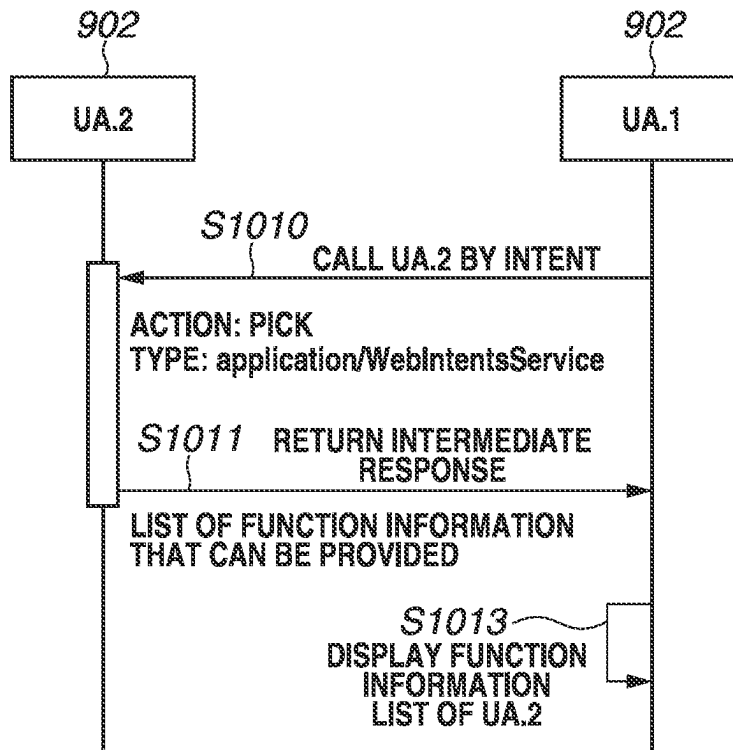
FIG.11A**FIG.11B**

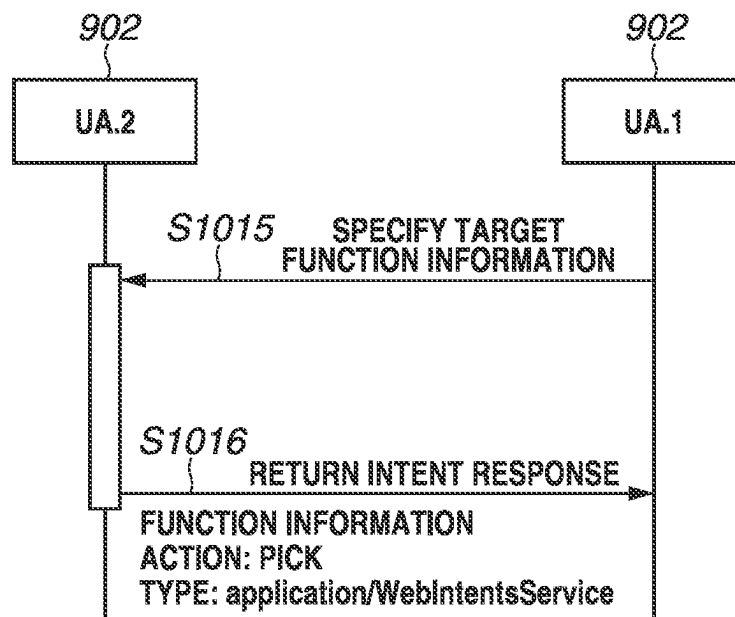
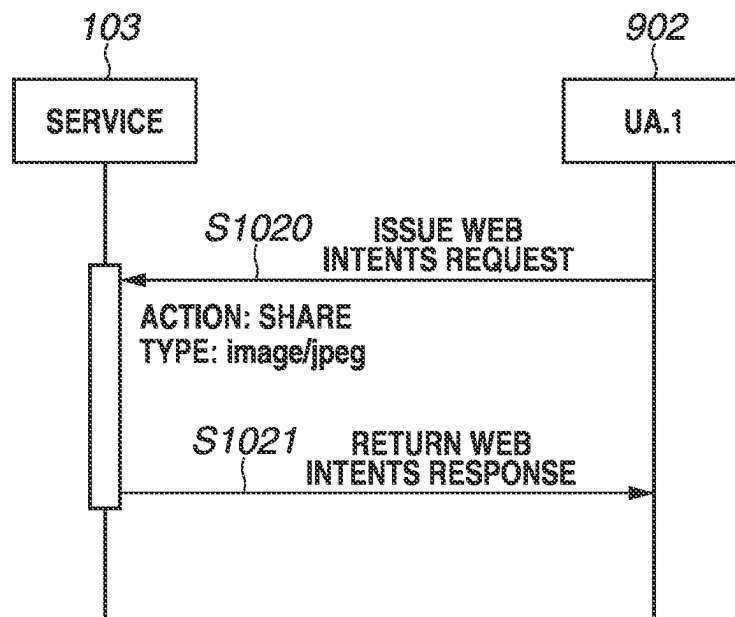
FIG.12A**FIG.12B**

FIG.13**DATA FILE TRANSMITTED AS INTENT**

	FILE TYPE	application/WebIntentsService
	SERVICE NAME	INTENTS SERVICE
	URI	http://intent-service.com
	ACTION	PICK
	TYPE	image/*

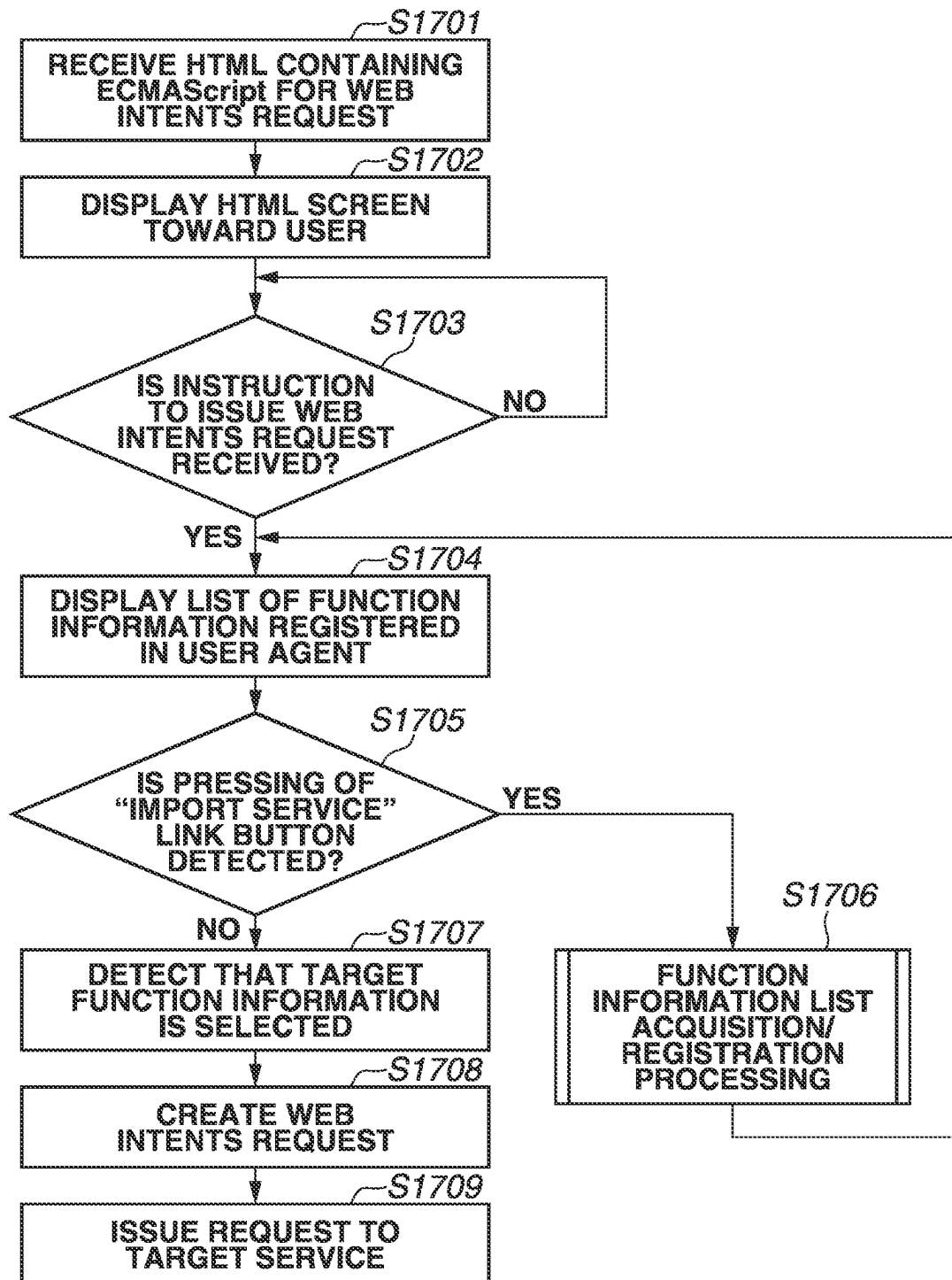
FIG.14

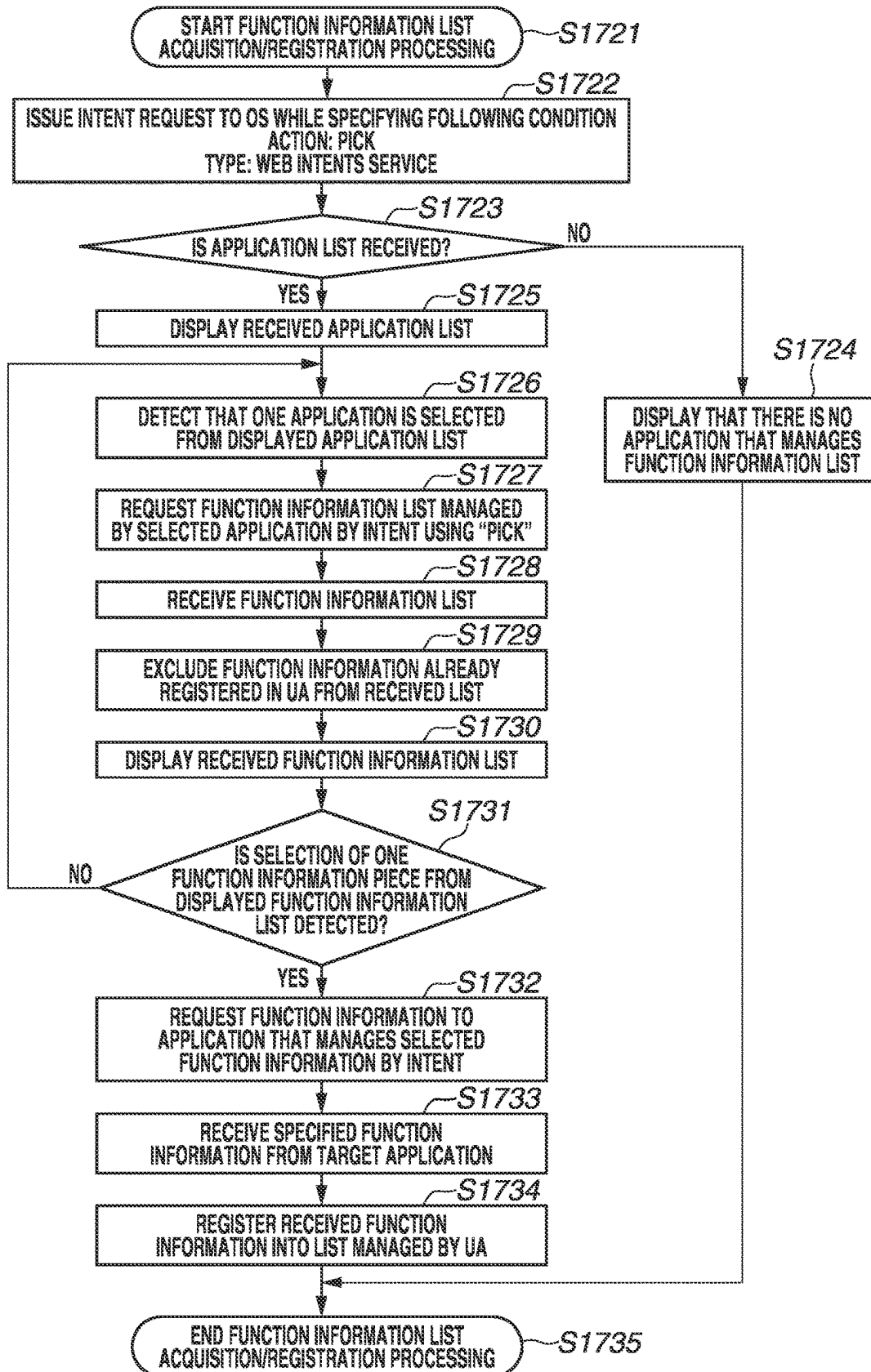
FIG.15

FIG.16

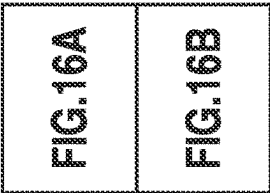


FIG.16A

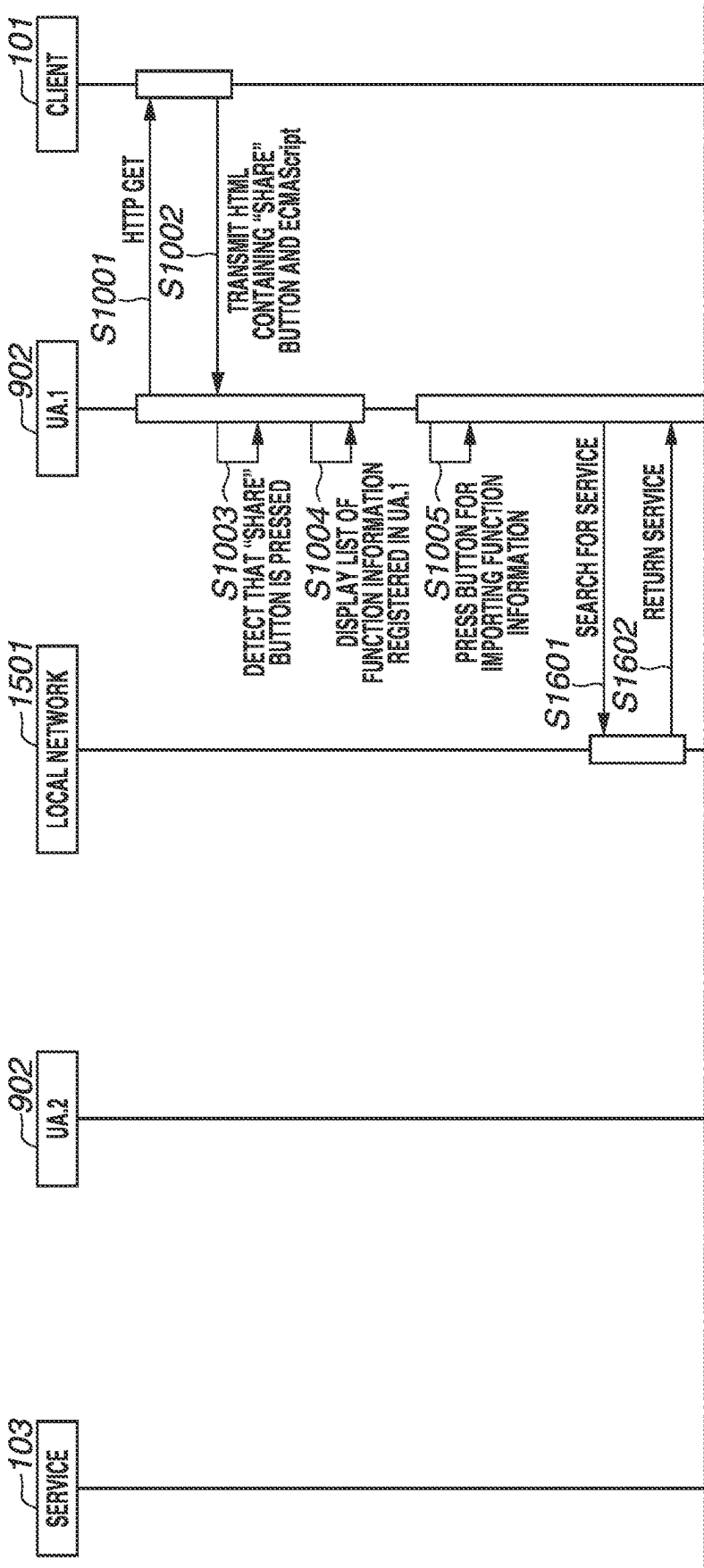


FIG. 16B

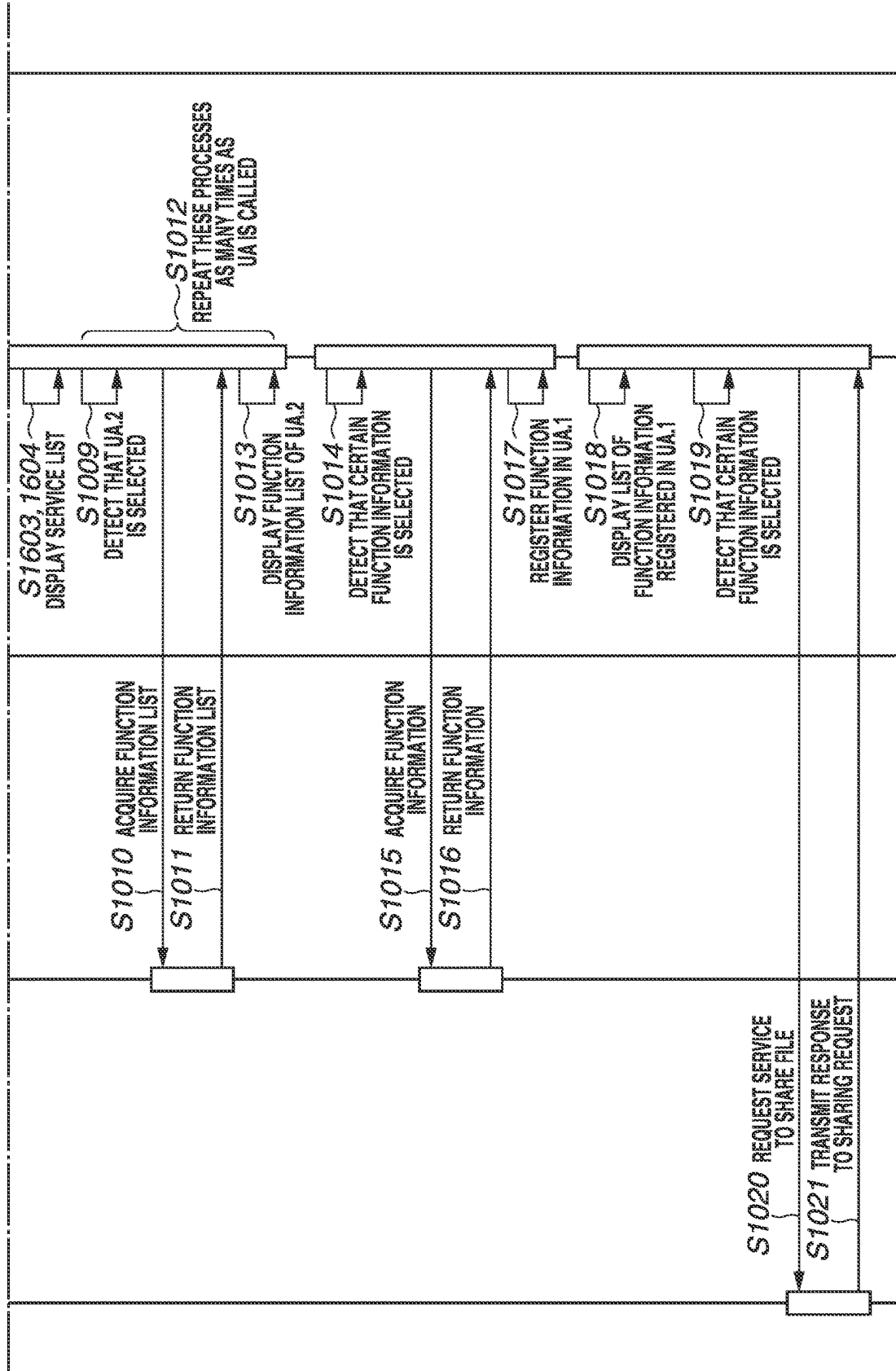


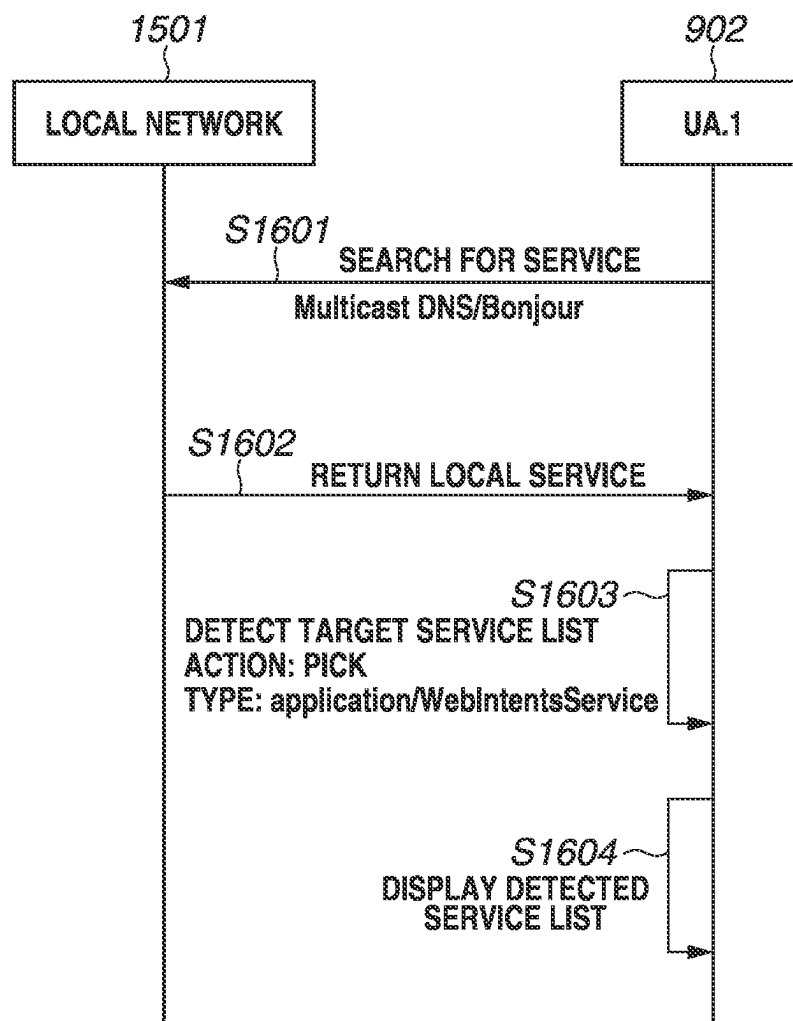
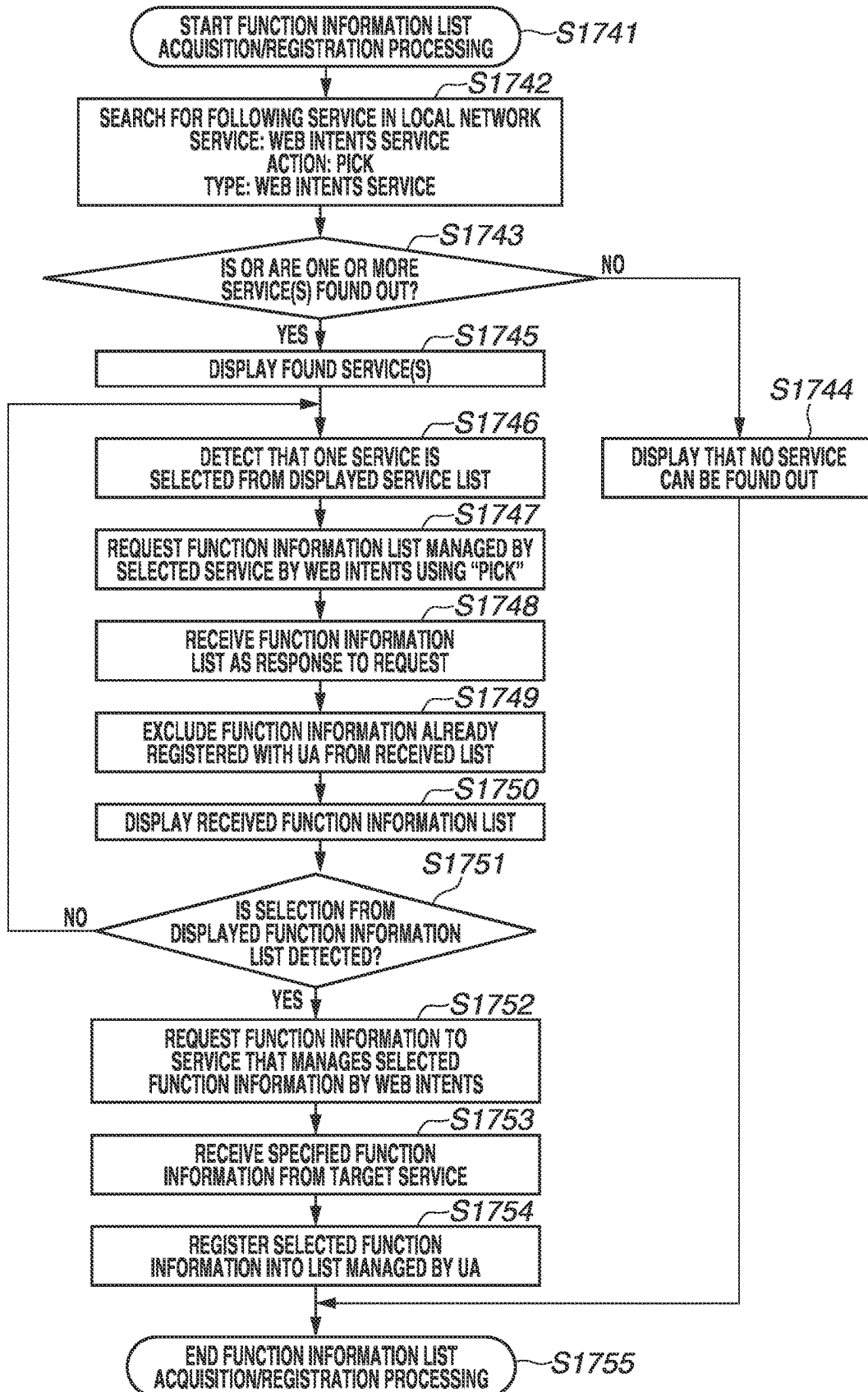
FIG.17

FIG. 18

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INFORMATION PROCESSING TERMINAL AND CONTROL METHOD

CROSS-REFERENCE TO RELATED APPLICATION

This application is a Continuation of U.S. application Ser. No. 16/515,966, filed Jul. 18, 2019; which is a Continuation of U.S. application Ser. No. 14/606,933, filed Jan. 27, 2015, now U.S. patent Ser. No. 10/402,066, issued on Sep. 3, 2019; which claims priority from Japanese Patent Application No. 2014-015339 filed Jan. 30, 2014, which are hereby incorporated by reference herein in their entireties.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a technique useful when a service using a mechanism such as “Web Intents” is provided.

Description of the Related Art

Conventionally, a transfer of processing between websites has required a function calling-side to know how to call a function such as an Application Programming Interface (API) or a Representative State Transfer (REST) interface of a function provider-side. Therefore, the function calling-side has had to perform processing of the calling-side according to each calling rule to realize cooperation with a different website. Further, authentication by the function provider-side is often required to allow the function calling-side to use the function. Therefore, the function user-side has had to store authentication information of the function provider-side or use an authentication foundation such as Security Assertion Markup Language (SAML). However, the storage of the authentication information may lead to the necessity of correctly and safely managing this authentication information, and the use of the authentication foundation such as SAML requires establishment of an agreement in advance between the function provider and the function user. These requirements have imposed a burden on the function user.

For example, conventionally, Japanese Patent Application Laid-Open No. 2009-199369 has discussed a technique for using a service provided on the Web.

There are also mechanisms that realize cooperation with an arbitrary web service (or a web application) without requiring using a special API. As one example thereof, there is proposed a mechanism called Web Intents that loosely couples a service receiver-side and a service provider-side by late runtime binding to realize cooperation therebetween.

According to the new cooperation mechanism such as the above-described Web Intents mechanism, a user agent (UA) processes a HyperText Markup Language (HTML) document that contains a markup for registering function information of a provided function and registers the function information as a Web Intent to use the provided function offered by a service in this mechanism. The UA can request execution of the provided function by connecting to the service with use of the function information registered in the UA. However, when there is a plurality of relay functions in an information processing terminal, processing for registering the function information is performed for each relay function individually, and the function information is managed for each relay function individually. Therefore, even if certain function information is registered for a certain relay

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function, this function information cannot be used from the other relay functions. Therefore, a user repeatedly have to perform the registration processing for each relay function even for the same function information, and thus this mechanism is not necessarily sufficiently user-friendly.

Therefore, various refinements to improve the usability will be further demanded, regarding the request to the service with use of this Web Intent and the registration of the Web Intent.

SUMMARY OF THE INVENTION

According to an aspect of the present invention, an information processing terminal includes a plurality of relay functions each configured to relay service provision between a client configured to manage data and a service configured to provide a function with use of the data via a network, a presentation unit configured to present a selection screen for selecting function information for calling the function provided by the service with use of a first relay function, and a request unit configured to request the function information from the first relay function to a second relay function. The presentation unit presents the selection screen in such a manner that the function information acquired based on the request by the request unit is included in the selection screen.

Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating an example of a basic system configuration of a Web Intents mechanism.

FIG. 2 is a sequence diagram illustrating an example of an overview of a basic operation of the Web Intents mechanism.

FIGS. 3A and 3B illustrate an example of a registration markup and an example of a processing request in the Web Intents mechanism, respectively.

FIG. 4 illustrates an example of a user interface (UI) of an information processing terminal in which a plurality of browsers is installed.

FIG. 5 is a block diagram illustrating an example of a hardware configuration of each of a client and a service.

FIG. 6 is a block diagram illustrating an example of a hardware configuration of the information processing terminal including a UA.

FIG. 7 is a block diagram illustrating an example of a software configuration of the information processing terminal including the UA.

FIG. 8 is an example of a table containing function information managed by the web browser.

FIG. 9 (consisting of FIGS. 9A and 9B) is a sequence diagram illustrating an operation of mutually using the function information according to a first exemplary embodiment.

FIGS. 10A, 10B, and 10C illustrate examples of screens displayed on the web browser, respectively.

FIGS. 11A and 11B are detailed sequence diagrams each illustrating a part of the sequence illustrated in FIG. 9.

FIGS. 12A and 12B are detailed sequence diagrams each illustrating a part of the sequence illustrated in FIG. 9.

FIG. 13 illustrates an example of a definition file of the function information.

FIG. 14 is a flowchart illustrating processing for mutually using the function information according to the first exemplary embodiment.

FIG. 15 is a detailed flowchart illustrating processing for acquiring the function information with use of an Intent technique.

FIG. 16 (consisting of FIGS. 16A and 16B) is a sequence diagram illustrating an operation of mutually using the function information according to a second exemplary embodiment.

FIG. 17 is a detailed sequence diagram illustrating a part of the sequence illustrated in FIG. 16.

FIG. 18 is a flowchart illustrating processing for mutually using the function information according to the second exemplary embodiment.

DESCRIPTION OF THE EMBODIMENTS

In the following description, exemplary embodiments of the present invention will be described with reference to the drawings.

<Basic Concept of how Web Intents Mechanism Works>

The Web Intents mechanism is one example of a mechanism that realizes cooperation with an arbitrary web service (or a web application) without use of a special API. First, a basic concept of how the Web Intents mechanism works will be described with reference to FIGS. 1 to 3. In the exemplary embodiments of the present invention, the Web Intents mechanism is employed as a specific example, but another similar mechanism can be also employed as a technique for realizing cooperation with an arbitrary web service (or a web application).

FIG. 1 is a block diagram illustrating an entire configuration of the Web Intents mechanism.

In FIG. 1, a Web Intents service (hereinafter referred to as a service) 103 provides a service or a function with use of the Web Intents technique. A Web Intents client (hereinafter referred to as a client) 101 uses the service 103. A User Agent (hereinafter referred to as a UA) 106 plays a role of transferring a request from the client 101 to the service 103 and transferring a result from the service 103 to the client 101. The UA 106 can be considered as a relay function for carrying out a request and transferring data between the client 101 and the service 103. Further, a Web Intent, which is function information for calling a provided function of the service 103, is registered in the UA 106.

In the present mechanism, for example, the client 101 is a website that manages data and has a button for calling the service 103 and the like disposed thereon, and the UA 106 is a web browser (a browser) that displays this website. Further, the service 103 is a website serving as a cooperation destination of the client 101, which receives the data managed by the client 101 via the UA 106 and processes the received data.

For example, if this mechanism is applied to a social networking service (SNS), the service 103 corresponds to a posting destination service that receives posting of photographs and comments managed by the client 101 to constitute a site for viewing them. If social buttons such as "Like", "Check", and "Share" on an SNS site are likened to the Web Intents mechanism, the client 101 corresponds to a website where the buttons are disposed. The UA 106 corresponds to a web browser. The service 103 corresponds to a service to which a comment such as "Like" is posted. If user authentication or an operation by a user is required when the service 103 provides the function, the user carries out the operation on the UA 106.

The UA 106 can be realized by not only the web browser but also an operating system (OS), an application, and the like that operate on an information processing terminal, as

long as it has a function for cooperating with the service 103 that will be described below. Examples of the information processing terminal include a personal computer, a smartphone, a tablet-type computer, and a car navigation system.

Further, regarding the service 103, for example, a device such as a camera, a printer, and a scanner mounted in the information processing terminal, other than a service provider in the Internet, such as the above-described positing destination service, can also become the service provider. Further, regarding the service 103, a peripheral device such as a printer, a scanner, and a network camera, a home appliance such as a refrigerator and a television, and the like connected via a network can also become the service provider. Further, the same also applies to the client 101, and various kinds of devices and applications mounted or installed in the information processing terminal, a peripheral device and a home appliance in a network, a program that runs thereon, and the like can also become the user that calls the service. Among the client 101, the UA 106, and the service 103, an arbitrary combination thereof may operate in a same system. More specifically, one possible example thereof is such a case that a document edition application or the like having a function equivalent to the web browser operates as a configuration including the client 101 and the UA 106. Further, some of the client 101, the UA 106, and the service 103 may be functions that operate on a same apparatus.

<Examples of Sequence Diagram and Data of Web Intents Mechanism>

FIG. 2 is a sequence diagram illustrating a basic operation regarding service provision with use of the Web Intents mechanism.

In step S201, the UA 106 accesses the service 103 in response to a user's operation. In step S202, the service 103 returns an HTML response that contains a registration markup for registering the function provided by the service 103 in the UA 106, to the UA 106.

FIG. 3A illustrates an example of the HTML document returned from the service 103 to the UA 106 in step S202. Now, the content of the HTML document returned from the service 103 to the UA 106 will be described with reference to the example illustrated in FIG. 3A.

Function information for identifying the function provided by the service 103 and calling the function provided by the service 103 is described in an <intent> tag. In this tag, "action" indicates category information (a category) of the provided function. In other words, "action" indicates the category information specifying what kind of function or service is offered by the provided function. Examples of the category information of the provided function include "Share", which is category information corresponding to a function of sharing data, "Edit", which is category information corresponding to a function of editing data, "View", which is category information corresponding to a function of viewing data, "Pick", which is category information corresponding to a function of acquiring data, and "Save", which is category information corresponding to a function of saving data. In other words, for example, any one of kinds of category information among "Share", "Edit", "View", "Pick", and "Save" is described in the above-described function information as the category information.

Further, "type" indicates a type of data or the like that the provided function can handle. In other words, "type" indicates a data type or the like that can be handled with respect to "action". Further, "href" indicates a connection destination (Uniform Resource Locator (URL)) of the provided function. Further, "title" indicates a title of the provided

function. Further, “disposition” indicates how the called provided function is displayed.

In the example illustrated in FIG. 3A, the category of the provided function is “share (sharing)”. The type of the data or the like that the provided function can handle is “image data in any format (*)”. The connection destination is “share.html”. Further, the title is “Share image using e-mail”. Further, this example indicates that this function will be displayed in another window via the UA 106.

Upon receiving the HTML reply in step S202, the UA 106 confirms to the user whether to register the provided function of the service 103 in the UA 106. For example, if the UA 106 is a web browser, the UA 106 displays a pop-up window, and prompts the user to select whether to register the function. If the user selects registration of this provided function as a Web Intent, the UA 106 performs registration processing for storing the information received in step S202 into the UA 106. More specifically, the information received in step S202 is stored in a storage area of the information processing terminal on which the UA 106 operates, and is registered in the UA 106 as a Web Intent.

In step S203, the UA 106 accesses the client 101 in response to a user’s operation. In step S204, the client 101 returns an HTML document in which use of the provided function (the Web Intent) of the service 103 is described, to the UA 106. For example, if an image and a “share” button are supposed to be displayed on the website as the client 101, this website returns an HTML document that contains a European Computer Manufacturers Association (ECMA) Script as illustrated in FIG. 3B, which is a request to process the Web Intent, to the UA 106.

FIG. 3B illustrates an example of the HTML document returned from the client 101 to the UA 106 in step S204. Now, the content of the HTML document returned from the client 101 to the UA 106 will be described with reference to the example illustrated in FIG. 3B.

The ECMAScript indicates that clicking a button having an identification (ID) “share-photo” in the HTML triggers execution of a specified unnamed function. First, the unnamed function creates a new Intent object, and calls a startActivity() function using this object as an argument. When this function is executed, the UA 106 extracts Web Intents each having an action and a type that match those of a specified Web Intent object among Web Intents registered in the UA 106 to then display them as a list, thereby requesting the user to select one of them. Further, the UA 106 acquires image data held by the client 101 by executing a getImageFrom() function called in the unnamed function.

In step S204, the UA 106 receives the HTML document transmitted from the client 101, and displays a screen based on this HTML document. In step S205, upon detecting that the “share” button on the screen is pressed by the user, the UA 106 executes the ECMAScript for launching the Web Intents mechanism as described above. Then, in step S206, the UA 106 acquires the image data held by the client 101. Further, when detecting that the “share” button is pressed in step S205, the UA 106 displays the list of the Web Intents registered in the UA 106. Upon detecting that the Web Intent indicating the provided function of the service 103 is selected from the displayed list by the user, in step S207, the UA 106 transmits a HyperText Transfer Protocol (HTTP) request (a Web Intents processing request) to the service 103 that offers the selected provided service. At this time, the UA 106 adds the content of the Web Intent object created by the ECMAScript illustrated in FIG. 3B to the transmission data.

Upon receiving the HTTP request transmitted from the UA 106 in step S207, then in step S208, the service 103

extracts the Web Intent object from the HTTP request, and realizes use of the selected provided function (“share” of the image data of the client 101 in this example) while interacting with the user via the UA 106.

For example, the user visits a site of a web storage (the client 101) managing photograph data that includes a button for calling Web Intents on a web browser (the UA 106), and presses this button. Then, the web browser (the UA 106) displays a pop-up window that includes a list of registered services. If the user selects a web-based electronic mail function in this pop-up window as the service 103, a site that provides this function is displayed in another window, and a new electronic mail to which photograph data is attached is created in this window as a processing result. As a result, the user can transmit the electronic mail.

Upon completion of the processing regarding the provided function, in step S209, the service 103 returns a reply that contains an ECMAScript notifying the client 101 of the processing result, to the UA 106. Upon receiving the reply transmitted in step S209, then in step S210, the UA 106 executes the ECMAScript contained in this reply, and calls a callback function onSuccess() specified as an argument in the startActivity() function executed in step S205. In step S211, the UA 106 returns the processing result to the client 101 by this callback function onSuccess().

This processing allows the client 101 to call the function (“share” of an image in this example) in the Web Intents mechanism that is provided by the service 103, via the UA 106.

<Example of UI of Information Processing Terminal According to Present Exemplary Embodiment>

FIG. 4 illustrates an example of a user interface (UI) of an information processing terminal according to the present exemplary embodiment.

In FIG. 4, an information processing terminal 501 is, for example, a commonly-used mobile terminal or smartphone. An OS such as Android (registered trademark), which is a platform developed for mobile information terminals, is installed in the information processing terminal 501.

In the example illustrated in FIG. 4, a plurality of web browsers (browserA, browserB, and browserC) is installed in the information processing terminal 501 as application programs. Each of these web browsers corresponds to the UA 106 illustrated in FIG. 1, and can use the Web Intents mechanism. In other words, the information processing terminal 501 includes a plurality of relay functions in the Web Intents mechanism.

When finding out a service corresponding to the service 103 illustrated in FIG. 1 while using the web browser, the user registers the service in the web browser if necessary. A list including a plurality of services managed by the web browser is prepared for each web browser. Therefore, normally, Web Intents registered in the web browser are different for each web browser.

Further, the present exemplary embodiment will be described with use of the smartphone-type information processing terminal illustrated in FIG. 4, but the type of the information processing terminal as the platform is not limited, and the present exemplary embodiment can be also applied to a commonly-used computer (for example, a personal computer).

<Example of Hardware Configuration of Client 101 and Service 103>

FIG. 5 is a block diagram illustrating an example of a hardware configuration of each of the client 101 and the service 103 illustrated in FIG. 1.

Each of the client **101** and the service **103** can be embodied by a general-purpose computer or the like. Each of the client **101** and the service **103** includes a central processing unit (CPU) **602**, a read only memory (ROM) **603**, and a random access memory (RAM) **604**. The CPU **602** reads out and executes a program stored in the ROM **603** or a storage device **608** that will be described below, thereby comprehensively controls the entire apparatus. The ROM **603** is a read-only memory for storing a boot program is to launch a system. The RAM **604** is a work memory when the CPU **602** executes the program.

A network interface (NETWORK I/F) **605** performs communication via a network (NETWORK). A display control unit **606** controls a display of a display device **609**. For example, the display control unit **606** controls a screen display for, for example, managing a web server. The display device **609** displays an output signal controlled by the display control unit **606** to an operator that is a web server administrator. An input control unit **607** controls an input signal received from an input device **610** or **611**. The input device **610** is, for example, a pointing device such as a mouse. The input device **611** is, for example, a keyboard. The input devices **610** and **611** each receive an input from the operator.

The storage device **608** is a nonvolatile storage device such as a magnetic disk and a flash memory that stores the program to be executed by the CPU **602** and various kinds of information. In the case of the client **101**, the storage device **608** also stores, for example, content information that the client **101** provides. Further, in a case of the service **103**, the storage device **608** also stores, for example, data and a program required for the service **103** to provide the function.

The CPU **602** of each of the client **101** and the service **103** reads out and executes the program stored in the storage device **608**, by which processing by each of the client **101** and the service **103** that will be described in the present exemplary embodiment is realized.

<Example of Hardware Configuration of Information Processing Terminal **501**>

FIG. **6** is a block diagram illustrating a hardware configuration of the information processing terminal **501**, and the UA **106** illustrated in FIG. **1** is executed on this hardware. The information processing terminal **501** illustrated in FIG. **6** is a commonly-used mobile terminal or smartphone. The operating system designed for small terminals, and programs for controlling a phone call and data communication are operating on the information processing terminal **501**.

Components of the hardware of the information processing terminal **501** are connected to a system bus **801**. A ROM **803** stores the operating system in the information processing terminal **501**, the applications for controlling a phone call and data communication, and the like, which are read out to be executed by a CPU **802**. Examples of the application for controlling data communication include electronic mail software and a web browser.

A RAM **804** is a work memory area for executing the program. Further, the RAM **804** is also a memory for temporarily storing webpage data that the web browser acquires from a web server, authentication information for accessing a web service, and the like. A storage device **809** is a nonvolatile storage device, and stores various kinds of operation mode settings, an operation log, and the like that is to be stored even after the information processing terminal **501** is restarted.

A network controller **805** controls communication of a wireless local area network (LAN) communication unit **811**

for participating in a wireless LAN, and a mobile phone data communication unit **812** for participating in a network provided by a mobile phone carrier. Generally, when the information processing terminal **501** can participate in the network of the wireless LAN, the network controller **805** prioritizes a connection to the wireless LAN via the wireless LAN communication unit **811**. When the information processing terminal **501** is located outside a network area covered by the wireless LAN, the network controller **805** participates in the wireless communication network provided by the mobile phone carrier via the mobile phone data communication unit **812**.

An audio control unit **806** is used mainly when the phone call application is launched and the user is speaking on a phone. Audio data is input and output by a microphone/speaker **813**, and the audio control unit **806** is in charge of mediation with a control program thereof. A display control unit **807** controls information to be output by a display **814** of the information processing terminal **501**. An input control unit **808** controls information instructed by the user via a button or a touch panel **815** of the information processing terminal **501**. Applications in the information processing terminal **501** present network communication information and various kinds of information of the information processing terminal **501** to the user with use of these audio control unit **806**, display control unit **807**, and input control unit **808**. A position detection control unit **810** acquires positional information of the information processing terminal **501** from a global positioning system (GPS) sensor **816**, and provides the acquired information to the operating system. These control operations are under control of the operating system that is running on the CPU **802**.

The CPU **802** in the information processing terminal **501** reads out and executes the program stored in the ROM **803**, by which the UA **106** according to the present exemplary embodiment is realized.

<Example of Software Configuration of Information Processing Terminal **501**>

FIG. **7** is a block diagram illustrating a software configuration of the information processing terminal **501** illustrated in FIG. **4**. The software configuration illustrated in FIG. **7** will be described, mainly focusing on a technique of the application relating to the present exemplary embodiment regarding issue of a Web Intents request, and a function of the application relating to the present exemplary embodiment regarding mutual use of function information with use of an Intent technique. The Intent technique is a technique for transmitting and receiving data between arbitrary applications. This is a technique usable on Android (registered trademark), which is the platform developed for mobile information terminals. Further, a similar technique is also implemented on another platform, but in the present exemplary embodiment, the technique for transmitting and receiving data between applications in the information processing terminal **501** will be referred to as the Intent technique.

In FIG. **7**, the information processing terminal **501** corresponds to the information processing terminal **501** illustrated in FIG. **4**. In FIG. **7**, the information processing terminal **501** will be described as a mobile terminal or a smartphone. Generally, an operating system (hereinafter referred to as an OS) for controlling a device is operating on an information processing terminal. In FIG. **7**, such an OS is illustrated as an OS unit **901**. Further, a plurality of applications can be installed in the information processing terminal **501**. In FIG. **7**, each of these applications is illustrated as an application unit **902**. FIG. **7** illustrates only

a single application unit **902**, but actually, the plurality of applications is installed in the information processing terminal **501**.

The present exemplary embodiment is based on the assumption that the information processing terminal **501** is used under such an environment that the plurality of applications, each of which operates as the UA **106** illustrated in FIG. **1** on the operating system in the information processing terminal **501**, works in the information processing terminal **501**. The present exemplary embodiment will be described while using the web browser as one example of the application that is operating as the UA **106**, but this application may be any application that can operate as the UA **106**. For example, an application such as spreadsheet software may provide the function of the UA **106**. Further, an example in which the OS operates as the UA **106** is also included in the present exemplary embodiment.

The application assumed to be used in the present exemplary embodiment is an application that can control the Web Intents mechanism as the UA **106**, like the web browser, and at the same time, an application that can transmit and receive data between applications. As the technique for transmitting and receiving data between applications, there is the Web Intents mechanism and the like, other than the Intent technique. In the first exemplary embodiment, data is transmitted and received between applications with use of the Intent technique. Further, in a second exemplary embodiment (described below), data is transmitted and received between applications with use of the Web Intents mechanism. However, the technique assumed to be used here may be any technique that allows data to be transmitted and received between arbitrary applications, and is not especially limited to the Intent technique and the Web Intents mechanism.

The CPU **802** in the information processing terminal **501** reads out and executes the OS and the application program stored in the ROM **803**, by which the OS unit **901** and the application unit **902** illustrated in FIG. **7** are realized.

First, the OS unit **901** will be described.

The OS unit **901** includes a network control unit **906**. The network control unit **906** controls the network controller **805** illustrated in FIG. **6**. The information processing terminal **501** is assumed to be used while the user is moving because it is a small mobile terminal, and the network control unit **906** automatically connects to an accessible network according to a location at that time. Further, the network control unit **906** performs outward communication in response to a communication request from the application unit **902**. Further, the network control unit **906** deals with a network connection request from the outside, and transfers the connection request to an appropriate application unit **902**.

The OS unit **901** further includes an Intent information input/output unit **904**, and an application information storage unit **905**. Upon receiving an Intent request from the application unit **902** together with information about an action and a type (hereinafter referred to as a data type), the OS unit **901** requests an application corresponding to these action and data type to the Intent information input/output unit **904**. Upon receiving the Intent request, the Intent information input/output unit **904** acquires a list of applications corresponding to the received action and data type from the application information storage unit **905**. Then, the Intent information input/output unit **904** transmits the acquired application list to the application unit **902**.

Further, the OS unit **901** includes a user input/output unit **903**, which comprehensively manages the audio control unit **806**, the display control unit **807**, and the input control unit **808** illustrated in FIG. **6**. When an instruction for a display

from the application unit **902** to the user is issued, the user input/output unit **903** displays the instructed data onto the display **814** via the display control unit **807**. Further, when the user provides an input via the touch panel **815**, the user input/output unit **903** transmits an input signal controlled by the input control unit **808** to the application unit **902**.

Next, the application unit **902** will be described.

The application unit **902** includes a service information management unit **908**, a central processing unit **907**, a service information detection unit **909**, a service information input/output unit **910**, and a service information storage unit **911**.

The central processing unit **907** plays a central role as the web browser. A basic role of this central processing unit **907** is the UA **106** in the Web Intents mechanism. Besides that, the central processing unit **907** also performs basic browsing processing, detection of the service **103**, data transmission/reception via the Intent technique, and the like. Further, when the Intent technique of the OS unit **901** is not used, the central processing unit **907** can also acquire or provide service information (function information) in the Web Intents mechanism from or to another application with use of the service information management unit **908**. The service information management unit **908** will be described in the second exemplary embodiment that will be described below.

The service information detection unit **909** detects the <intent> tag contained in the webpage received from the service **103** when accessing the service **103**, and recognizes the function information for registering the function provided by the service **103**. The service information input/output unit **910** controls an input and an output of the function information into and from the service information storage unit **911**. The service information storage unit **911** stores information illustrated in FIG. **8**.

FIG. **8** illustrates an example of the function information managed by the web browser as the UA **106**.

For example, in the example illustrated in FIG. **8**, the service information storage unit **911** stores information including a name **1401** of a provided function offered by a service, a URI **1402** in the service that accepts the provided function, an action (action) **1403** when a Web Intents request is received, a data type (type) **1404**, and the like.

Now, an operation of each module in the application unit **902** will be briefly described.

The user accesses a certain service (a website) that utilizes the Web Intents mechanism, with use of the web browser (corresponding to the UA **106**) that is the application in the information processing terminal **501**. Then, the service information detection unit **909** in the application unit **902** detects an <intent> tag contained in a webpage received from the service at the time of the access, and recognizes function information for registering a function provided by the service (Web Intents service information). Upon recognizing the function information of the accessed service, the central processing unit **907** prompts the user to select whether to register this function information as a Web Intent via the user input/output unit **903**. If the user instructs the information processing terminal **501** to register the function information at this time, the central processing unit **907** issues an instruction to store the function information identified by the above-described <intent> tag to the service information input/output unit **910**. Upon receiving the above-described instruction to store the function information, the service information input/output unit **910** stores the above-described function information into the service information storage unit **911**.

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Further, when the user requests a service to perform processing, the central processing unit 907 acquires function information pieces from the service information storage unit 911 via the service information input/output unit 910. Then, the central processing unit 907 displays a list of the acquired function information pieces, and transmits a Web Intents processing request and content information to a service corresponding to function information selected from this list.

If there is no function information corresponding to the function that the user wants to use in the list of the function information pieces acquired from the service information storage unit 911, this web browser can acquire function information from another web browser with use of the Intent technique. In this case, the central processing unit 907 of the web browser issues a request for acquiring a list of applications that can provide function information, to the Intent information input/output unit 904 in the OS unit 901. Then, as a result of this request, the central processing unit 907 receives the list of applications that provide function information. When the user selects an arbitrary application from this list of applications, the central processing unit 907 issues a request to acquire the function information to the selected application with use of the Intent technique, thereby acquiring the function information.

Further, upon receiving a request to provide the function information (an acquisition request) from an external application with use of the Intent technique, the central processing unit 907 acquires the function information from the service information storage unit 911 via the service information input/output unit 910. Then, the central processing unit 907 provides the acquired function information to the above-described external application.

<Example of Sequence Diagram Regarding Mutual Use of Function Information>

FIG. 9 (consisting of FIGS. 9A and 9B) is a sequence diagram illustrating an example of an operation of referring to and using a list of function information pieces managed by another web browser when the user utilizes the Web Intents mechanism with use of a certain web browser. In FIG. 9, an extension is added to the basic sequence of the Web Intents mechanism that has been described with reference to FIG. 2. In FIG. 9, each of the application units 902 indicates the web browser in the information processing terminal 501, and operates as the UA 106 in the Web Intents mechanism. In FIG. 9, there is a plurality of UAs, and a UserAgent.1 (hereinafter referred to as a UA.1) corresponds to the web browser that requests function information while a UserAgent.2 (hereinafter referred to as a UA.2) corresponds to the web browser that provides the function information.

Further, FIGS. 10A, 10B, and 10C illustrate examples of screens displayed on a web browser screen of the UA.1 902, respectively.

Further, FIGS. 11A and 11B, and 12A and 12B are detailed sequence diagrams each illustrating a part of the sequence illustrated in FIG. 9.

In step S1001 illustrated in FIG. 9, the UA.1 902 accesses the client 101 according to a user's instruction. Then, in step S1002, the UA.1 902 receives HTML information that contains an ECMAScript defining a start of processing by a "Share" button from the client 101. Then, a screen illustrated in FIG. 10A is displayed on the web browser screen of the UA.1 902. On this screen, the user can issue a request to share photograph content information to an arbitrary service by providing the photograph content information and pressing the "Share" button 1101.

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In step S1003, when the user presses the "Share" button 1101 to instruct the UA.1 902 to use a service, the UA.1 902 detects that the "Share" button 1101 is pressed. When the UA.1 902 detects that the "Share" button 1101 is pressed to thereby determine that the UA.1 902 is instructed to use a service by the user, the processing of the present sequence diagram proceeds to step S1004. In step S1004, the UA.1 902 acquires a list of function information pieces registered in the service information storage unit 911 (FIG. 7) based on the action indicating sharing the photograph content and the data type of the file, and displays a selection screen illustrated in FIG. 10B that includes the acquired function information list (menu) to present this list to the user.

As illustrated in FIG. 10B, the screen displayed in step S1004 includes a function information list 1102, and a link button 1103 labeled "Import Service" that allows the user to refer to function information registered with another UA. Further, this screen also includes an "OK" button 1104 for determining selected function information, and a "Cancel" button 1105 for canceling a selection of function information.

If there is no function information that the user wants to use in the function information list 1102 on the screen illustrated in FIG. 10B that has been displayed in step S1004, the user can use function information registered in another browser. In this case, in step S1005, the user presses the "Import Service" link button 1103 on the screen illustrated in FIG. 10B.

Upon detecting that the "Import Service" link button 1103 is pressed, in steps S1006 and S1007, the UA.1 902 searches for another application that can provide function information in the information processing terminal 501. In the first exemplary embodiment, this sequence will be described as a processing sequence that acquires function information with use of the Intent technique for Android (registered trademark) by way of example. The Intent technique is also a technique that allows data to be transferred between appropriate applications by the OS relaying a data type desired to be transferred and an action desired to be performed on this data, in a similar manner to the Web Intents mechanism.

Now, steps S1006 and S1007 will be described in detail with reference to FIG. 11A.

As illustrated in FIG. 11A, in step S1006, the UA.1 902 issues an Intent request to the OS unit 901 while specifying "application/Web Intents Service" as the data type and "pick" as the action for searching for an application that the UA.1 902 can request to provide data. In step S1007, the OS unit 901 acquires a list of applications that can each provide function information of a service by the Intent technique from the application information storage unit 905. Then, the OS unit 901 returns the acquired application list to the UA.1 902 as a UA list via the Intent information input/output unit 904.

Upon acquiring the UA list in step S1007, then in step S1008, the UA.1 902 displays the screen that includes the UA list to present this list to the user. If the user wants to use function information registered in a certain UA (assume that this UA is the UA.2 902 in this example), the user selects the UA.2 902 on this screen. In step S1009, the UA.1 902 detects that the UA.2 902 is selected. Upon this detection, in step S1010, the UA.1 902 issues a request to acquire a list of function information pieces registered with the UA.2 902.

Now, steps S1010 to S1013 will be described in detail with reference to FIG. 11B.

As illustrated in FIG. 11B, in step S1010, the UA.1 902 calls the UA.2 902 by the Intent technique, and requests

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processing while specifying “application/Web Intents Service” and “pick” as the data type and the action, respectively. In response to this request, the UA.2 902 transmits a list of function information pieces that the UA.2 902 can provide to the UA.1 902 as an intermediate response. This data transmission and reception is performed via the OS unit 901 actually, but is described here while omitting the details.

In step S1011, the UA.1 902 receives the function information list from the UA.2 902. Upon receiving the function information list, in step S1013, the UA.1 902 displays the function information list (menu) of the UA.2 902. FIG. 10C illustrates an example of the screen displayed on the information processing terminal 501 in step S1013. In FIG. 10C, the function information list is displayed in such a manner that a parent-child relationship between the UA list and the list of function information pieces managed by the selected UA is understandable. For example, in FIG. 10C, “PhotoServiceD” and “PhotoServiceE” (1106) are displayed as function information managed by “browserB” as the UA. However, only a list of function information pieces unregistered with the UA.1 902 may be displayed just as it is without the parent-child relationship displayed together. The user presses an “OK” button 1107 with any one or more function information piece(s) selected, thereby determining the selection of the function information. At this time, the UA.1 902 detects that the function information is selected.

In step S1012, the processing for detecting the selection of the UA and acquiring and displaying the list of the function information pieces registered with the selected UA, which is indicated in steps S1009 to S1013, is repeated as many times as the user selects a UA.

In step S1014, the UA.1 902 detects that the function information registered in the UA.2 902 is selected from the above-described function information list. Upon this detection, in step S1015, the UA.1 902 issues a request for acquiring the above-described selected function information to the UA.2 902, and acquires the above-described selected function information in steps S1015 and S1016.

Now, steps S1015 and S1016 will be described in detail with reference to FIG. 12A.

As illustrated in FIG. 12A, in step S1015, the UA.1 902 issues the acquisition request to the UA.2 902 with use of the mechanism of the Intent technique while specifying the function information that is an acquisition target with use of “pick” of the Intent technique. In step S1016, in response to this acquisition request, the UA.2 902 transmits the above-described specified function information as a response to the Intent issued in step S1015. The function information transmitted at this time is a definition file in which the function information is defined as illustrated in FIG. 13.

FIG. 13 illustrates an example of the definition file of the function information that is transmitted from the UA.2 902 in step S1016.

As illustrated in FIG. 13, a name of the function information, a URI that accepts the provided function, an action (action) when the provided function is offered, and a data type (type) are described in the definition file of the function information.

Now, returning to the description of the sequence diagram illustrated in FIG. 9, the following steps are performed subsequently.

Upon acquiring information required to register the function information in step S1016, then in step S1017, the UA.1 902 registers the above-described acquired function information in the UA.1 902. More specifically, the central processing unit 907 in the UA.1 902 stores the function information acquired in step S1016 into the service infor-

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mation storage unit 911 via the service information input/output unit 910. After that, in step S1018, the UA.1 902 displays the selection screen illustrated in FIG. 10B again to present the list of the function information pieces registered with the UA.1 902 to the user. In step S1019, the UA.1 902 detects that certain function information is selected by the user from the function information list displayed in step S1018. Upon this detection, the processing of the present sequence diagram proceeds to step S1020. In step S1020, the UA.1 902 transmits an HTTP request (a Web Intents processing request) for carrying out “share” to a service corresponding to the above-described selected function information (the service 103 in the present example).

Now, steps S1020 and S1021 will be described in detail with reference to FIG. 12B.

As illustrated in FIG. 12B, in step S1020, the UA.1 902 issues the Web Intents processing request with “image/jpeg” and “share” specified as the data type and the action, respectively, to the service 103. In step S1021, in response to this Web Intents processing request, the service 103 performs processing according to this Web Intents processing request, and returns a result of the execution as a response to the UA.1 902. Then, the UA.1 902 receives the response transmitted in step S1021.

<Example of Flowchart of Processing of UA According to First Exemplar Embodiment>

FIG. 14 is a flowchart illustrating an example of processing by the software since the UA 106 receives the ECMAScript from the client 101 until the UA 106 acquires the function information from the outside and issues the request to the service 103. The processing illustrated in this flowchart indicates a part of the processing by the software in the information processing terminal 501 illustrated in FIG. 7. The CPU 802 in the information processing terminal 501 loads the program stored in the ROM 803, the storage device 809, or the like into the RAM 804 as necessary to execute the program, by which the processing illustrated in this flowchart is realized.

In step S1701, the network control unit 906 in the information processing terminal 501 receives the HTML that contains the ECMAScript for issuing the Web Intents request from the client 101. Then, the processing of the present flowchart proceeds to step S1702.

In step S1702, the central processing unit 907 constructs a screen based on the received HTML information, and displays the screen illustrated in FIG. 10A via the user input/output unit 903 to present the received information to the user. Then, the processing of the present flowchart proceeds to step S1703. In step S1703, the central processing unit 907 determines whether an instruction to issue the Web Intents request is received from the user via an operation performed on the screen. If the central processing unit 907 detects that the “Share” button 1101 is pressed, the central processing unit 907 determines that an instruction to issue the Web Intents request is received (YES in step S1703).

If the central processing unit 907 determines that no instruction to issue the Web Intents request is received (NO in step S1703), the processing of the present flowchart returns to step S1703, in which the central processing unit 907 waits for an issue instruction from the user. If the information processing terminal 501 receives a request to move to another webpage by a user’s instruction, the central processing unit 907 exits from the processing of the present flowchart, and performs processing according to the request, although this case is not illustrated.

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On the other hand, if the central processing unit 907 determines that an instruction to issue the Web Intents request is received (YES in step S1703), the processing of the present flowchart proceeds to step S1704. In step S1704, the central processing unit 907 inquires about whether function information corresponding to the above-described Web Intents request is registered to the service information input/output unit 910. If corresponding function information is registered at this time, the central processing unit 907 displays the function information list 1102 illustrated in FIG. 10B via the user input/output unit 903 to present this list to the user. Then, the processing of the present flowchart proceeds to step S1705.

In step S1705, the central processing unit 907 determines whether the "Import Service" link button 1103 is pressed on the screen illustrated in FIG. 10B. If the central processing unit 907 determines that the "Import Service" link button 1103 is pressed (YES in step S1705), the processing of the present flowchart proceeds to step S1706. In step S1706, the central processing unit 907 performs function information list acquisition/registration processing. The details of step S1706 according to the first exemplary embodiment are illustrated in FIG. 15 that will be described below. Upon completion of the processing in step S1706, the processing of the present flowchart proceeds to step S1704, in which the central processing unit 907 displays the selection screen for the function information list that includes the information acquired in step S1706 (the screen illustrated in FIG. 10B).

On the other hand, if the central processing unit 907 determines that the "Import Service" link button 1103 is not pressed (NO in step S1705), the processing of the present flowchart proceeds to step S1707. In step S1707, the central processing unit 907 detects that the function information is selected by the user. Then, the processing of the present flowchart proceeds to step S1708. In step S1708, the central processing unit 907 creates the Web Intents request with use of the content information for which the issue instruction has been received in step S1703. Then, the processing of the present flowchart proceeds to step S1709. In step S1709, the central processing unit 907 issues the Web Intents request created in step S1708 to the service corresponding to the function information detected to be selected in step S1707, and then ends the processing of the present flowchart.

<Flowchart of Function Information List Acquisition/Registration Processing>

FIG. 15 is a flowchart illustrating the details of the function information list acquisition/registration processing, performed in step S1706 illustrated in FIG. 14, according to the first exemplary embodiment. The CPU 802 in the information processing terminal 501 loads the program stored in the ROM 803, the storage device 809, or the like into the RAM 804 as necessary to execute the program, by which the processing illustrated in this flowchart is realized.

In step S1721, the central processing unit 907 starts the function information list acquisition/registration processing indicated in step S1706 illustrated in FIG. 14. Then, the processing of the present flowchart proceeds to step S1722. In step S1722, the central processing unit 907 issues the Intent request to the OS unit 901 while specifying "pick" and "Web Intents Service" as the action and the data type, respectively. Then, the processing of the present flowchart proceeds to step S1723.

In step S1723, the central processing unit 907 determines whether the application list is received from the OS unit 901 as a response to the request issued by the Intent technique. If the central processing unit 907 determines that no application list can be received from the OS unit 901 (NO in step

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S1723), the processing of the present flowchart proceeds to step S1724. In step S1724, the information processing terminal 501 notifies the user that no corresponding application is found out in the device despite a search for a corresponding application by the Intent technique (for example, displays a message). Then, in step S1735, the central processing unit 907 ends the present function information list acquisition/registration processing.

On the other hand, if the central processing unit 907 determines that the application list is received from the OS unit 901 (YES in step S1723), the processing of the present flowchart proceeds to step S1725. In step S1725, the central processing unit 907 displays the application list acquired in step S1723 on the display 814 via the user input/output unit 903 to present the application list to the user. Then, the processing of the present flowchart proceeds to step S1726.

In step S1726, the central processing unit 907 detects that a single application is selected by the user from the application list displayed in step S1725. Then, the processing of the present flowchart proceeds to step S1727. In step S1727, the central processing unit 907 requests a list of function information pieces corresponding to the action "pick" and the data type "Web Intents Service" to the application selected in step S1726 with use of the Intent technique. Then, the processing of the present flowchart proceeds to step S1728.

In step S1728, the central processing unit 907 receives the function information list requested in step S1727. Then, the processing of the present flowchart proceeds to step S1729. In step S1729, the central processing unit 907 compares the function information list received in step S1728, and the function information already registered in the service information storage unit 911. The central processing unit 907 excludes the already registered function information as a result of this comparison. Then, the processing of the present flowchart proceeds to step S1730.

In step S1730, the central processing unit 907 displays the received function information list on the display 814 via the user input/output unit 903. At this time, the central processing unit 907 displays the screen illustrated in FIG. 10C.

In the example illustrated in FIG. 10C, in step S1726, the central processing unit 907 displays the application list that includes "browserB" and "browserC". If the user wants to acquire the function information list registered in "browserB", the user touches "browserB". Then, in step S1730, the central processing unit 907 displays the function information list 1106 registered in "browserB" while tilting a triangle on the left side of the screen, which indicates a directory structure, as indicated by a triangle 1108. The user selects one or more function information pieces that the user wants to introduce into the application from this function information list 1106.

Now, returning to the description of the flowchart illustrated in FIG. 15, the following steps are performed subsequently.

After the central processing unit 907 detects an operation performed on the screen displayed in step S1730, the processing of the present flowchart proceeds to step S1731. In step S1731, the central processing unit 907 determines whether a selection of function information that is to be introduced from the function information list displayed in step S1730 is detected. If the central processing unit 907 determines that no selection of function information is detected but a selection of an application (for example, "browserC") is detected (NO in step S1731), the processing of the present flowchart proceeds to step S1726.

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On the other hand, if the central processing unit **907** determines that a selection of function information that is to be introduced from the function information list displayed in step **S1730** is detected (YES in step **S1731**), the processing of the present flowchart proceeds to step **S1732**. In step **S1732**, the central processing unit **907** requests the above-described selected function information to the application that manages this selected function information with use of the Intent technique. Then, the processing of the present flowchart proceeds to step **S1733**.

In step **S1733**, the central processing unit **907** receives the above-described selected function information from the above-described target application. Then, the processing of the present flowchart proceeds to step **S1734**. In step **S1734**, the central processing unit **907** registers the received function information into the service information storage unit **911** via the service information input/output unit **910**. Then, in step **S1735**, the central processing unit **907** ends the function information list acquisition/registration processing.

As understood from the above description, when there is a plurality of UAs in a same information processing terminal, it is possible to acquire function information of a service registered in another UA from this UA to then utilize this function information with use of the mechanism of the Intent technology. Therefore, when there is a plurality of UAs in a same information processing terminal, it becomes possible to share function information pieces of services separately registered with the respective UAs.

In the above-described first exemplary embodiment, the configuration that acquires function information managed by another UA with use of, for example, the Intent technique designed for platforms based on Android (registered trademark), has been described. On the other hand, in the second exemplary embodiment, the configuration that acquires function information from another UA with use of the Web Intents mechanism developed by World Wide Web Consortium (W3C), instead of using the Intent technique, will be described.

The service information management unit **908** in the application unit **902** illustrated in FIG. 7 has a function as an HTTP client. The service information management unit **908** issues a request to acquire function information to an external application. Further, upon receiving the function information transmitted from the external application in response to this acquisition request, the service information management unit **908** issues a request to store the Web Intents service information to the service information input/output unit **910** via the central processing unit **907**.

Further, the service information management unit **908** has a function as a Web Intents service. Upon receiving a request to acquire function information together with the action and the date type information from an external application with use of the Web Intents mechanism, the service information management unit **908** acquires the function information from the service information storage unit **911** via the central processing unit **907** and the service information input/output unit **910**, and provides the acquired function information to the request source.

<Example of Another Sequence Diagram Regarding Mutual Use of Function Information>

FIG. 16 (consisting of FIGS. 16A and 16B) is a sequence diagram illustrating an example of another operation of referring to and using a list of function information pieces managed by another web browser according to the second exemplary embodiment. Similar steps to the steps illustrated in FIG. 9 are denoted by the same step numbers as the step

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numbers used in FIG. 9. In the following description, only differences from FIG. 9 will be described.

FIG. 17 is a detailed sequence diagram illustrating a part of the sequence illustrated in FIG. 16.

The processes of steps **1001** to **S1005** are similar to those in FIG. 9, and therefore descriptions thereof are omitted here. When the function information list acquired from the service information storage unit **911** does not include function information corresponding to a function that the user wants to use, the information processing terminal **501** according to the second exemplary embodiment searches a local area network (local network) **1501** for an application or a service (hereinafter simply referred to as a service) that can provide function information. More specifically, upon detecting that the "Import Service" link button **1103** (FIG. 10B) is pressed by the user in step **S1005**, in step **S1601**, the UA.1 **902** searches the local network **1501** for a service. Now, this search in the network will be described in detail with reference to FIG. 17.

As illustrated in FIG. 17, in step **S1601**, the UA.1 **902** searches the local network **1501** for a service. In the present example, the UA.1 **902** searches for a network service in a link local network with use of, for example, a Multicast Domain Name System (DNS) technique employed in Bonjour developed by Apple Inc., which is a Zero-configuration technique.

In step **S1602**, the UA.1 **902** receives a response from each service. Since the UA.1 **902** searches the local network **1501** according to the present exemplary embodiment, the UA.1 **902** can also receive a response from a service located within a range that the network can cover, in addition to receiving a response from a service in the same information processing terminal **501**.

Subsequently, in step **S1603**, the UA.1 **902** detects services corresponding to "application/Web Intents Service" as the data type and providing "pick" as the action from the services received in step **S1602**, and creates a list therefrom. If the UA.1 **902** cannot acquire sufficient information required for the detection at this time, the UA.1 **902** may acquire the sufficient information by accessing each service from which the UA.1 **902** has received the response in the step **S1602**. This processing allows the UA.1 **902** to search for a service that is located in the local area network and can provide function information.

Subsequently, in step **S1604**, the UA.1 **902** displays the list of the services detected in step **S1603** to present this list to the user. Then, the processing of the present sequence diagram proceeds to step **S1009**. Processes after that are similar to FIG. 9, and therefore descriptions thereof are omitted blow.

<Flowchart of Function Information List Acquisition/Registration Processing according to Second Exemplary Embodiment>

FIG. 18 is a flowchart illustrating the details of the function information list acquisition/registration processing performed in step **S1706** illustrated in FIG. 14 according to the second exemplary embodiment. The CPU **802** in the information processing terminal **501** loads the program stored in the ROM **803**, the storage device **809**, or the like into the RAM **804** as necessary to execute the program, by which the processing illustrated in this flowchart is realized.

In step **S1741**, the central processing unit **907** starts the function information list acquisition/registration processing in step **S1706** illustrated in FIG. 14. Then, the central processing unit **907** instructs and causes the service information management unit **908** to perform a process of step **S1742**. In step **S1742**, the service information management

unit **908** searches the local network **1501** for an application or a service (hereinafter simply referred to as a service) that provides a function using the Web Intents mechanism (corresponding to steps **1601** to **1604** illustrated in FIGS. **16** and **17**). The search target is a service with “pick” and “Web Intents Service” set as the action and the data type, respectively. A search request is issued with use of a service search protocol such as the Multicast DNS technique employed in Bonjour developed by Apple Inc. or the like.

Subsequently, in step **S1743**, the service information management unit **908** determines whether one or more corresponding services are found out as a result of the search in step **S1742**. If the service information management unit **908** determines that no corresponding service can be found out (NO in step **S1743**), the processing of the present flowchart proceeds to step **S1744**. In step **S1744**, the service information management unit **908** notifies the user that no corresponding service can be found out in a network search range as a result of the search for a service via the central processing unit **907** (for example, displays a message). Then, in step **S1755**, the service information management unit **908** ends the function information list acquisition/registration processing.

On the other hand, if the service information management unit **908** determines that one or more corresponding service (s) are found out (YES in step **S1743**), the processing of the present flowchart proceeds to step **S1745**. In step **S1745**, the service information management unit **908** displays the list of the services acquired via the user input/output unit **903** in step **S1743**, via the central processing unit **907**. Then, the processing of the present flowchart proceeds to step **S1746**.

In step **S1746**, the service information management unit **908** detects that a single service is selected by the user from the service list displayed in step **S1745**, via the central processing unit **907**. Then, the processing of the present flowchart proceeds to step **S1747**. In step **S1747**, the service information management unit **908** requests a list of function information pieces corresponding to the action “pick” and the data type “Web Intents Service”, to the service selected in step **S1746** with use of the Web Intents mechanism. Then, the processing of the present flowchart proceeds to **S1748**.

In step **S1748**, the service information management unit **908** receives the function information list requested in step **S1747**. Then, the processing of the present flowchart proceeds to step **S1749**. In step **S1749**, the service information management unit **908** compares the function information list received in step **S1748**, and the function information already registered in the service information storage unit **911** via the central processing unit **907**. The service information management unit **908** excludes the already registered function information as a result of this comparison. Then, the processing of the present flowchart proceeds to step **S1750**.

In step **S1750**, the service information management unit **908** displays the above-described function information list via the central processing unit **907** and the user input/output unit **903**. At this time, the service information management unit **908** displays, for example, the screen illustrated in FIG. **10C**. If the user wants to acquire a list of function information pieces registered in a certain application, the user touches “browserB”. Then, the screen shifts to such a state that the triangle on the left side of the screen, which indicates the directory structure, is tilted as indicated by the triangle **1108**, and the function information list **1106** indicated in step **S1750** is displayed. The user selects one or more function information pieces that the user wants to introduce into the application from this function information list **1106**.

Now, returning to the description of the flowchart, the following steps are performed subsequently.

After the service information management unit **908** detects an operation performed on the screen displayed in step **S1750**, the processing of the present flowchart proceeds to step **S1751**. In step **S1751**, the service information management unit **908** determines whether a selection of function information that is to be introduced from the function information list displayed in step **S1750** is detected via the central processing unit **907**. If the service information management unit **908** determines that no selection of function information is detected but a selection of an application (for example, “browserC”) is detected (NO in step **S1751**), the processing of the present flowchart proceeds to step **S1746**.

On the other hand, if the service information management unit **908** determines that a selection of function information that is to be introduced from the function information list displayed in step **S1750** is detected (YES in step **S1751**), the processing of the present flowchart proceeds to step **S1752**. In step **S1752**, the service information management unit **908** requests the function information to the service that manages the above-described selected function information with use of the Web Intents mechanism. Then, the processing of the present flowchart proceeds to step **S1753**.

In step **S1753**, the service information management unit **908** receives the above-described selected function information from the above-described target service. Then, the processing of the present flowchart proceeds to step **S1754**. In step **S1754**, the service information management unit **908** registers the received function information into the service information storage unit **911** via the central processing unit **907** and the service information input/output unit **910**. Then, in step **S1755**, the service information management unit **908** ends the function information list acquisition/registration processing.

As understood from the above description, when there is a plurality of UAs in a same information processing terminal, it becomes possible to acquire and use function information pieces of services separately registered for each UA with use of the Web Intents mechanism.

In the first exemplary embodiment, the example that realizes mutual use of the function information of the function provided by the service between the applications inside the information processing terminal **501** with use of the Intent technique, has been described. Further, in the second exemplary embodiment, the example that realizes mutual use of the function information with the application in the local network with use of the Web Intents mechanism, has been described.

However, when the user tries to acquire the function information, the other side of the mutual use does not necessarily have to be an application or a service within the apparatus or the local network, and may be a service in the Internet. For example, when registering function information in a web browser as the UA, the user also registers this function information in a service that manages a function information list in the Internet. After that, the user tries to use a service on another web browser, and presses the “Import Service” link button **1103** illustrated in FIG. **10B**. Then, the web browser is connected to the service that manages the function information list in the Internet, and issues a request to acquire the function information list. This configuration allows the function information list to be mutually used even between both sides of the mutual use that are not applications in the local network, thereby

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succeeding in acquiring an effect similar to the first and second exemplary embodiments.

When the user tries to acquire the function information list with use of the Web Intents mechanism as described according to the second embodiment, there may be function information that is usable on some web browsers but is unusable on the user's own web browser. For example, suppose that a URL of a function provided by a service existing in the information processing terminal 501 is a URL indicating a local loopback address (`http://127.0.0.1/ . . .`). Providing the function information including such a URL to the web browser that is the request source does not allow the web browser to which the function information is provided (the web browser that is the request source) to use the provided function of the service corresponding to this function information via the network.

In such a case, the web browser on the provider-side is configured to provide only usable function information according to a condition of the web browser that has requested the function information (the request-side). Further, in some cases, a function provided by a service may be used while not only a URL but also a special action and type are defined. Therefore, the provider-side is configured to provide only function information usable by the request side according to the action and the type requested by the request side. This configuration can prevent the function information unusable by the request source as described above from being wastefully registered, thereby improving the user's convenience.

Further, another possible method to avoid this inconvenience is that the web browser, which has received the function information, determines whether the function information is usable by the web browser itself when acquiring the function information, and does not display this function information to the user as a selectable choice if the received function information is unusable. This configuration can also prevent, for example, the function information unusable by the request source from being wastefully registered in a similar manner, thereby improving the user's convenience.

In this manner, according to the exemplary embodiments of the present invention, it is possible to improve the usability regarding the new cooperation mechanism such as the currently proposed Web Intents mechanism. For example, when a single information processing terminal includes a plurality of relay functions required to realize the new mechanism for cooperation among web services, such as the Web Intents mechanism, the exemplary embodiments of the present invention allow these relay functions to appropriately share at least a part of the function information among them. As a result, the user can be released from the necessity of repeatedly registering a same provided function for each relay function, whereby the user's convenience can be improved.

The structures and the contents of the above-described various kinds of data are not limited to the described ones, and it is to be understood that they can have any of various structures and contents according to an intended use and a purpose.

The exemplary embodiments have been described above, but the present invention can be also embodied as, for example, a system, an apparatus, a method, a program, or a storage medium. More specifically, the present invention may be applied to a system including a plurality of devices, and may be also applied to an apparatus including only a single device.

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Further, all of configurations generated by combining the above-described respective exemplary embodiments are also included in the present invention.

Other Embodiments

Embodiments of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions recorded on a storage medium (e.g., non-transitory computer-readable storage medium) to perform the functions of one or more of the above-described embodiment(s) of the present invention, and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more of a central processing unit (CPU), micro processing unit (MPU), or other circuitry, and may include a network of separate computers or separate computer processors. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)TM), a flash memory device, a memory card, and the like.

While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

What is claimed is:

1. A system including a website providing Hyper Text Markup Language (HTML) data to be interpreted by a web browser of an information processing terminal and the information processing terminal:

wherein the website is configured to provide HTML data including descriptions related to a share object and to data to be shared,

wherein the information processing terminal comprises, a display;

one or more memories storing instructions; and

one or more processors capable of executing the instructions causing the information processing terminal to: after the web browser of the information processing terminal has displayed a web page by using the HTML data provided by the website, display, based on a user instruction having been received on the share object in the displayed web page, a selection screen that includes information identifying a plurality of services installed on the information processing terminal as candidate services for providing the data to be shared related to the descriptions included in the HTML data; and provide with the data to be shared one service, information of which has been selected by a user via the selection screen,

wherein the one service has been installed on the information processing terminal, and

wherein displaying the selection screen is executed by not the web browser but an operating system of the information processing terminal.

2. The system according to claim 1, wherein, on the display, the selection screen overlaps in front of the web page displayed by the web browser.

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3. The system according to claim 1, wherein the selection screen is displayed by an operating system of the information processing terminal based on the user instruction having been received on the share object in the displayed web page.

4. The system according to claim 3,
wherein the website, as a part of the HTML data, further provides a share function, and
wherein the selection screen is displayed by the operating system in response to the share function called according to the user instruction to the share object on the web page displayed by the web browser.

5. The system according to claim 1, wherein the data to be shared is provided with the one service by an operating system of the information processing terminal.

6. The system according to claim 1, wherein the information included in the selection screen corresponds to a plurality of icons of each service of the plurality of services and the user selection is for selecting one icon corresponding to the one service.

7. The system according to claim 1, wherein the selection screen further includes a cancel button.

8. The system according to claim 1, wherein the network is the Internet.

9. The system according to claim 1, wherein the selection screen is displayed based on a communication between the web browser and an operating system of the information processing terminal in response to the user instruction to the share object.

10. The system according to claim 1, wherein the information processing terminal is a smartphone.

11. The system according to claim 1, wherein, in response to the sharing of the data, an application screen for a transmission of the data to be shared is displayed by an application of the information processing terminal corresponding to the one service.

12. The system according to claim 1, wherein applications corresponding to the plurality of services installed on the information processing terminal as candidate services for sharing target data are managed by not the web browser but an operating system of the information processing terminal.

13. A method for a system including a website providing Hyper Text Markup Language (HTML) data to be interpreted by a web browser of an information processing terminal and the information processing terminal including a display, the method comprising:

providing, by the website, HTML data including descriptions related to a share object and to data to be shared, after the web browser of the information processing terminal has displayed a web page by using the HTML data provided by the website, displaying, based on a user instruction having been received on the share object in the displayed web page, a selection screen that includes information identifying a plurality of services installed on the information processing terminal as candidate services for sharing the data to be shared related to the descriptions included in the HTML data; and

providing, by the information processing terminal, with the data to be shared one service, information of which has been selected by a user via the selection screen, wherein the one service has been installed on the information processing terminal, and
wherein displaying the selection screen is executed by not the web browser but an operating system of the information processing terminal.

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14. The method according to claim 13, wherein, on the display, the selection screen overlaps in front of the web page displayed by the web browser.

15. An information processing terminal being capable of communicating with a website via a network by using a web browser of the information processing terminal, wherein the website provides Hyper Text Markup Language (HTML) data to be interpreted by the web browser, the information processing terminal comprising:

a display;
one or more memories storing instructions; and
one or more processors capable of executing the instructions causing the information processing terminal to:
after the web browser of the information processing terminal has displayed a web page by using HTML data including descriptions related to a share object and to data to be shared, display, based on a user instruction having been received on the share object in the displayed web page, a selection screen that includes information identifying a plurality of services installed on the information processing terminal as candidate services for providing the data to be shared related to the descriptions included in the HTML data; and
provide with the data to be shared one service, information of which has been selected by a user via the selection screen,
wherein the one service has been installed on the information processing terminal, and
wherein displaying the selection screen is executed by not the web browser but the operating system of the information processing terminal.

16. The information processing terminal according to claim 15, wherein, on the display, the selection screen overlaps in front of the web page displayed by the web browser.

17. The information processing terminal according to claim 15,

wherein the website, as a part of the HTML data, further provides a share function, and
wherein the selection screen is displayed by the operating system in response to the share function called according to the user instruction to the share object on the web page displayed by the web browser.

18. The information processing terminal according to claim 15, wherein the data to be shared is provided with the one service by an operating system of the information processing terminal.

19. The information processing terminal according to claim 15, wherein the information included in the selection screen corresponds to a plurality of icons of each service of the plurality of services and the user selection is for selecting one icon corresponding to the one service.

20. The information processing terminal according to claim 15, wherein the selection screen further includes a cancel button.

21. The information processing terminal according to claim 15, wherein the network is the Internet.

22. The information processing terminal according to claim 15, wherein the selection screen is presented based on a communication between the web browser and an operating system of the information processing terminal in response to the user instruction to the share object.

23. The information processing terminal according to claim 15, wherein the information processing terminal is a smartphone.

24. The information processing terminal according to claim 15, wherein, in response to the sharing of the data, an

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application screen for a transmission of the data to be shared is displayed by an application of the information processing terminal corresponding to the one service.

25. The information processing terminal according to claim 15, wherein the plurality of services installed on the information processing terminal as the candidate service includes one or more application installed on the information processing terminal.

26. The information processing terminal according to claim 15, wherein the plurality of services installed on the information processing terminal as the candidate services are managed by not the web browser but an operating system of the information processing terminal.

27. A method for an information processing terminal being capable of communicating with a website via a network by using a web browser of the information processing terminal, wherein the website provides Hyper Text Markup Language (HTML) data to be interpreted by the web browser, the method comprising:

after the web browser has displayed a web page, on a display, by using HTML data including descriptions related to a share object and to data to be shared, displaying, based on a user instruction having been received on the share object in the displayed web page, a selection screen that includes information identifying a plurality of services installed on the information processing terminal as candidate services for providing the data to be shared related to the descriptions included in the HTML data; and

providing with the data to be shared one service, information of which has been selected by a user via the selection screen,

wherein the one service has been installed on the information processing terminal, and

wherein displaying the selection screen is executed by not the web browser but an operating system of the information processing terminal.

28. The method according to claim 27, wherein, on the display, the selection screen overlaps in front of the web page displayed by the web browser.

29. The method according to claim 27, wherein the website, as a part of the HTML data, further provides a share function, and

wherein the selection screen is presented by the operating system in response to the share function called according to the user instruction to the share object on the web page displayed by the web browser.

30. The method according to claim 27, wherein the data to be shared is provided with the one service by an operating system of the information processing terminal.

31. The method according to claim 27, wherein the information included in the selection screen corresponds to a plurality of icons of each service of the plurality of services and the user selection is for selecting one icon corresponding to the one service.

32. The method according to claim 27, wherein the selection screen further includes a cancel button.

33. The method according to claim 27, wherein the network is the Internet.

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34. The method according to claim 27, wherein the selection screen is presented based on a communication between the web browser and an operating system of the information processing terminal in response to the user instruction to the share object.

35. The method according to claim 27, wherein the information processing terminal is a smartphone.

36. The method according to claim 27, wherein, in response to the sharing of the data, an application screen for a transmission of the data to be shared is displayed by an application of the information processing terminal corresponding to the one service.

37. The method according to claim 27, wherein the plurality of services installed on the information processing terminal as the candidate service includes one or more application installed on the information processing terminal.

38. The method according to claim 27, wherein the plurality of services installed on the information processing terminal as the candidate services are managed by not the web browser but an operating system of the information processing terminal.

39. A non-transitory computer-readable storage medium storing a program for causing a computer to execute a method for an information processing terminal being capable of communicating with a website via a network by using a web browser of the information processing terminal, wherein the website provides Hyper Text Markup Language (HTML) data to be interpreted by the web browser, the method comprising:

after the web browser has displayed a web page, on a display, by using HTML data including descriptions related to a share object and to data to be shared, displaying, based on a user instruction having been received on the share object in the displayed web page, a selection screen that includes information identifying a plurality of services installed on the information processing terminal as candidate services for providing the data to be shared related to the descriptions included in the HTML data; and

providing with the data to be shared one service, information of which has been selected by a user via the selection screen,

wherein the one service has been installed on the information processing terminal, and

wherein displaying the selection screen is executed by not the web browser but an operating system of the information processing terminal.

40. The system according to claim 1, wherein displaying the selection screen is executed by the operating system as processing related to a script for a function called based on the user instruction having been received on the share object in the displayed web page.

41. The information processing terminal according to claim 15, wherein displaying the selection screen is executed by the operating system as processing related to a script for a function called based on the user instruction having been received on the share object in the displayed web page.

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