

DESCRIPTION

TERMINAL DEVICE, METHOD FOR CONTROLLING EXTERNAL DEVICE, AND COMPUTER-READABLE RECORDING MEDIUM

TECHNICAL FIELD

[0001]

The present invention relates to a terminal device that executes a Web application, a method for controlling an external device using a Web application, and a computer-readable recording medium recording a program for realizing the terminal device and the method.

BACKGROUND ART

[0002]

Recent increases in the speed of networks and improvements in the performance of server computers have been encouraging more and more companies and the like to use Web applications. Generally, a Web application means a piece of application software that runs in a Web browser introduced into a terminal device (see Patent Document 1, for example).

[0003]

Processing of a Web application is carried out while a Web server on a network and a Web browser of a terminal device perform communication with each other. Accordingly, there is no need to introduce application software into terminal devices in accordance with required processing, and this allows companies and the like to suppress the cost of equipment.

[0004]

Moreover, with a Web application, the terminal device only accepts input data and displays information by means of the Web browser, and management, processing, and the like of the input data are performed by the Web server. Thus, no important data remains in the terminal device, and therefore Web applications make it easier for

companies and the like to improve security.

[0005]

As described above, Web applications have many benefits and are expected to have a wider variety of uses in the future. In particular, Web applications are increasingly used in portable terminal devices such as smartphones and tablet terminal devices, because the portable terminal devices have smaller storage capacities than personal computers (PC).

LIST OF PRIOR ART DOCUMENTS

PATENT DOCUMENT

[0006]

Patent Document 1: JP 2009-1697300A

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0007]

However, conventional Web browsers have limited functionality, and this imposes restrictions on widening of the range of use of Web applications. Specifically, conventional Web browsers do not allow Web applications to directly control external devices connected to terminal devices, and it is thus difficult to use Web applications in systems in which external devices are used.

[0008]

It should be noted that even when a conventional Web browser is used, in an environment in which, for example, a device driver of a printer serving as an external device is installed on a terminal device, a user can cause the printer to be operated by the Web browser via the device driver. However, in this case, the printer is operated under directions from the user, and is not directly controlled by a Web application.

[0009]

It is an example of an object of the present invention to provide a terminal device, a method for controlling an external device, and a computer-readable recording

medium that address the foregoing problems and that can enable a Web application to control an external device.

MEANS FOR SOLVING THE PROBLEMS

[0010]

In order to achieve the above-described object, a terminal device according to an aspect of the present invention includes:

- a program execution unit that executes a Web application transmitted from a Web server;

- a communication unit that performs data communication with an external device; and

- a communication control unit that controls the external device via the communication unit in accordance with a direction from the Web application.

[0011]

Moreover, in order to achieve the above-described object, a method for controlling an external device according to an aspect of the present invention is a method for controlling an external device, the external device being connected to a terminal device that executes a Web application transmitted from a Web server, the method including the steps of:

- (a) executing the Web application; and

- (b) controlling the external device via a communication device in accordance with a direction from the Web application, the communication device being included in the terminal device and being capable of performing data communication with the external device.

[0012]

Furthermore, in order to achieve the above-described object, a computer-readable recording medium according to an aspect of the present invention is a computer-readable recording medium recording a program for controlling an external device, the external device being connected to a terminal device that executes a Web application transmitted from a Web server, the program including instructions that cause

a processor of the terminal device to execute the steps of:

(a) executing the Web application; and

(b) controlling the external device via a communication device in accordance with a direction from the Web application, the communication device being included in the terminal device and being capable of performing data communication with the external device.

ADVANTAGEOUS EFFECTS OF THE INVENTION

[0013]

As described above, according to the present invention, it is possible to enable a Web application to control an external device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

[Figure 1] Figure 1 is a block diagram showing the configuration of a terminal device according to an embodiment of the present invention.

[Figure 2] Figure 2 is a sequence diagram showing the operation of the terminal device according to the embodiment of the present invention.

[Figure 3] Figure 3 is a block diagram showing an example of a portable terminal device that can be used as the terminal device according to the embodiment of the present invention.

MODE FOR CARRYING OUT THE INVENTION

[0015]

Embodiment

Hereinafter, a terminal device, a method for controlling an external device, and a program according to an embodiment of the present invention will be described with reference to Figures 1 to 3.

[0016]

Device configuration

First, the configuration of the terminal device according to the present embodiment will be described using Figure 1. Figure 1 is a block diagram showing the configuration of the terminal device according to the embodiment of the present invention.

[0017]

As shown in Figure 1, a terminal device 10 according to the present embodiment is a terminal device that can execute a content program 21 transmitted from a Web server 20. The content program 21 is a so-called Web application and runs in a Web browser 14 of the terminal device 10. In the present embodiment, the terminal device 10 is connected to the Web server 20 via a network (not shown in Figure 1) such as a corporate LAN or the Internet.

[0018]

It should be noted that, as described later, the Web browser 14 has a function that conventional Web browsers do not have, and is therefore referred to as "extended Web browser 14" in the following description.

[0019]

Moreover, as shown in Figure 1, the terminal device 10 includes a program execution unit 11, a communication control unit 12, and a communication unit 13. Among these, the program execution unit 11 executes the content program 21, which is the Web application transmitted from the Web server 20.

[0020]

The communication unit 13 has a function of performing data communication with external devices 30 and 40. The communication control unit 12 controls the external devices 30 and 40 via the communication unit 13 in accordance with a direction from the content program 21, which is the Web application.

[0021]

In this manner, the terminal device 10 enables the content program 21 itself to directly control the external devices 30 and 40. Also, no user operation is required in order to operate the external devices 30 and 40.

[0022]

Here, the configuration of the terminal device according to the present embodiment will be described more specifically. First, in the present embodiment, the terminal device 10 is a portable terminal device such as a tablet terminal or a smartphone.

[0023]

Moreover, in the present embodiment, the content program 21 is constructed by, for example, writing a Java (registered trademark) program (JavaScript (registered trademark)) in an HTML file. The content program 21 is transmitted from the Web server 20 using a JSP (Java Server Pages) technology.

[0024]

Furthermore, as shown in Figure 1, in the present embodiment, the terminal device 10 includes an operating system 15. The operating system 15 provides basic functions that are jointly used by various programs, such functions including an input/output function and a memory management function.

[0025]

Moreover, the extended Web browser 14 is introduced into the operating system 15, and the program execution unit 11 is constructed of program modules that constitute the extended Web browser 14. Specifically, the extended Web browser 14 includes a program module that is called a JavaScript engine, a control module, a rendering engine, and the like as the program modules. It should be noted that these program modules are omitted from Figure 1.

[0026]

Among these, the JavaScript engine analyzes and executes JavaScript written in a content program. The control module controls the operating system 15 according to an instruction in JavaScript. The rendering engine executes content display processing. The program execution unit 11 is mainly constructed of the JavaScript engine and the control module.

[0027]

Moreover, in the present embodiment, the communication unit 13 is a communication device that is capable of performing wireless communication with the

external devices 30 and 40. Specifically, the communication unit 13 is a communication chip that is capable of executing communication using a short-range wireless communication technology such as Bluetooth (registered trademark).

[0028]

Furthermore, the communication control unit 12 is constructed of a device driver for operating a communication device that functions as the communication unit 13. This device driver is managed by the extended Web browser 14, and the control module that constitutes the program execution unit 11 can give directions to the device driver and receive data from the device driver. In this regard, the extended Web browser 14 differs from conventional Web browsers.

[0029]

In the present embodiment, the external device 30 is an information reading device that is capable of reading information from code or a recording medium. In the example in Figure 1, the external device 30 is a barcode reader, and the external device 40 is a printer. It should be noted that in the following description, the external device 30 is referred to as "barcode reader 30", and the external device 40 is referred to as "printer 40".

[0030]

Moreover, the barcode reader 30 includes a reading unit 32 including optical components for reading barcodes, a control circuit therefor, and the like. Furthermore, the printer 40 includes a printing unit 42 including various components for printing.

[0031]

In addition, the barcode reader 30 includes a communication unit 31, and the printer 40 includes a communication unit 41. The communication units 31 and 41 execute data communication with the communication unit 13 of the terminal device 10. Specifically, the communication units 31 and 41 are similar to the communication unit 13 and are communication chips that are capable of executing communication using a short-range wireless communication technology such as Bluetooth.

[0032]

Device operation

Next, the operation of the terminal device 10 according to the embodiment of the present invention will be described using Figure 2. Figure 2 is a sequence diagram showing the operation of the terminal device according to the embodiment of the present invention. In the description below, Figure 1 is taken into consideration as appropriate. Moreover, in the present embodiment, the method for controlling an external device is performed by causing the terminal device 10 to operate. Therefore, the description of the operation of the terminal device 10 below is substituted for a description of the method for controlling an external device according to the present embodiment.

[0033]

First, as shown in Figure 2, the Web server 20 transmits the content program 21 to the terminal device 10 (step A1). Next, in the terminal device 10, the program execution unit 11 obtains JavaScript from the transmitted content program 21 and executes the obtained JavaScript (step A2).

[0034]

Subsequently, if an instruction to the barcode reader 30 to read data is contained in the JavaScript, the program execution unit 11 analyzes this instruction and, based on the result of the analysis, directs the communication control unit 12 to read data (step A3).

[0035]

Next, when step A3 is executed, the communication control unit 12 directs the communication unit 13 to perform data communication (step A4). Thus, the communication unit 13 transmits a request to read data to the communication unit 31 of the barcode reader 30 (step A5).

[0036]

Next, in the barcode reader 30, when the communication unit 31 receives the request to read data, the communication unit 31 directs the reading unit 32 to read data (step A6). Thus, the reading unit 32 executes reading of data (step A7), and outputs the data that is thus read (hereinafter referred to as "read data") to the communication unit 31 (step A8).

[0037]

Next, the communication unit 31 transmits the read data to the communication unit 13 of the terminal device 10 (step A9). Subsequently, the communication unit 13 outputs the transmitted read data to the program execution unit 11 via the communication control unit 12 (step A10).

[0038]

Next, the program execution unit 11 transmits the received read data to the Web server 20 (step A11). Thus, the Web server 20 executes necessary data processing (step A12). Then, when the Web server 20 finishes the necessary data processing, the Web server 20 notifies the program execution unit 11 to that effect (step A13). It should be noted that the above-described steps A11 to A13 may also be executed by an application server that is different from the Web server 20.

[0039]

Next, if an instruction to the effect that "after execution of step A13, the printer 40 should print the result of data processing" is contained in the JavaScript, the program execution unit 11 analyzes this instruction and, based on the result of the analysis, directs the communication control unit 12 to print the result of data processing (step A14).

[0040]

Next, when step A14 is executed, the communication control unit 12 directs the communication unit 13 to perform data communication (step A15). Thus, the communication unit 13 transmits a request to print the result of data processing to the communication unit 41 of the printer 40 (step A16).

[0041]

Next, in the printer 40, when the communication unit 41 receives the request to print the result of data processing, the communication unit 41 directs the printing unit 42 to execute printing (step A17). Thus, the printing unit 42 prints the result of data processing (step A18).

[0042]

In the foregoing steps A1 to A18, although the user is required to hold the

barcode reader 30 over a barcode so that a reading surface thereof faces the barcode in step A7, the user is not requested to perform other operations (e.g., turning on/off the power). According to steps A1 to A18, the barcode reader 30 and the printer 40 are directly controlled by the content program 21, which is the Web application.

[0043]

A specific example of the above-described steps A1 to A18 is a case where the barcode reader 30 is used with a cash register at a retail store in order to read barcodes attached to articles of trade. In this case, the barcodes each contain an article number, the price, and the like as information, and in step A12, the Web server 20 records the information of an article that is bought in a database (not shown in Figures 1 and 2). Also, in this case, the printer 40 prints a receipt to be given to the customer who bought the article, and therefore the receipt is automatically printed by the user merely applying the barcode reader to the barcode of the article.

[0044]

Program

Any program that causes the terminal device 10 to execute steps A2 to A5, A10, A11, and A14 to A16 shown in Figure 2 can be used as the program of the present embodiment. The terminal device 10 and the method for controlling an external device of the present embodiment can be realized by installing and executing this program on a terminal device. In this case, a CPU (Central Processing Unit) of the terminal device functions as the program execution unit 11 and the communication control unit 12 and performs the processing.

[0045]

Then, a portable terminal device that realizes the terminal device 10 by executing the program of the present embodiment will be described using Figure 3. Figure 3 is a block diagram showing an example of a portable terminal device that can be used as the terminal device according to the embodiment of the present invention.

[0046]

As shown in Figure 3, a portable terminal device 50 includes a CPU 51, a memory 52, a display 53, a storage medium 54, a communication module 55, and a

touch panel 56. These units are connected via a bus 57 so that data communication can be performed between these various units.

[0047]

The CPU 51 loads the program (code) of the present embodiment, the program being stored in the storage device 54, into the memory 52, and executes the program in a predetermined order, thereby carrying out various kinds of operations. The memory 52 may typically be a volatile memory such as a DRAM (Dynamic Random Access Memory).

[0048]

Moreover, the program of the present embodiment may be provided in a state in which the program is stored in a computer-readable recording medium, or may be transmitted over the Internet to which connection is established via the communication module 55. Specific examples of the recording medium include versatile semiconductor storage devices such as a CF (Compact Flash (registered trademark)) and an SD (Secure Digital).

[0049]

Moreover, specific examples of the storage device 54 include semiconductor storage devices such as a hard disk and a flash memory. The touch panel 56 is an input device that accepts user input. The display 53 is a display device such as a liquid crystal display. The communication module 55 includes either one or both of a device for realizing communication over a wireless LAN and a device for realizing communication using a mobile phone network, as well as a communication device that functions as the communication unit 13.

[0050]

Moreover, in the present embodiment, the terminal device 10 is not limited to the above-described portable terminal devices such as tablet terminals and smartphones, and may also be a personal computer such as a laptop PC, an electronic paper, or the like.

[0051]

While the invention of this application has been described above with reference

to an embodiment, the invention is not to be construed as being limited to the foregoing embodiment. Various modifications that will be understood by those skilled in the art can be made to the configuration and the details of the invention within the scope of the invention.

[0052]

This application claims the benefit of priority from Japanese Patent Application No. 2012-282422, filed on December 26, 2012, the entire disclosure of which are incorporated herein by reference.

INDUSTRIAL APPLICABILITY

[0053]

As described above, according to the present invention, it is possible to allow a Web application to control an external device. The present invention is useful for a Web system that provides a Web service.

REFERENCE SIGNS LIST

[0054]

- 10: Terminal device
- 11: Program execution unit
- 12: Communication control unit
- 13: Communication unit
- 14: Extended Web browser
- 20: Web server
- 30: External device (barcode reader)
- 31: Communication unit
- 32: Reading unit
- 40: External device (printer)
- 41: Communication unit
- 42: Printing unit
- 50: Portable terminal device

- 51: CPU
- 52: Memory
- 53: Display
- 54: Storage device
- 55: Communication module
- 56: Touch panel
- 57: Bus

CLAIMS

1. A terminal device comprising:
 - a program execution unit that executes a Web application transmitted from a Web server;
 - a communication unit that performs data communication with an external device; and
 - a communication control unit that controls the external device via the communication unit in accordance with a direction from the Web application.
2. The terminal device according to claim 1,
 - wherein when the external device is an information reading device that is capable of reading information from code or a recording medium,
 - the communication control unit operates the information reading device via the communication unit in accordance with a direction from the Web application, and causes information read by the information reading device to be output to the program execution unit.
3. A method for controlling an external device, the external device being connected to a terminal device that executes a Web application transmitted from a Web server, the method comprising the steps of:
 - (a) executing the Web application; and
 - (b) controlling the external device via a communication device in accordance with a direction from the Web application, the communication device being included in the terminal device and being capable of performing data communication with the external device.
4. The method for controlling an external device according to claim 3,
 - wherein when the external device is an information reading device that is capable of reading information from code or a recording medium,

in the step (b), the information reading device is operated via the communication device in accordance with a direction from the Web application, and information read by the information reading device is obtained.

5. A computer-readable recording medium recording a program for controlling an external device, the external device being connected to a terminal device that executes a Web application transmitted from a Web server, the program comprising instructions that cause a processor of the terminal device to execute the steps of:

(a) executing the Web application; and

(b) controlling the external device via a communication device in accordance with a direction from the Web application, the communication device being included in the terminal device and being capable of performing data communication with the external device.

6. The computer-readable recording medium according to claim 5, wherein when the external device is an information reading device that is capable of reading information from code or a recording medium,

in the step (b), the information reading device is operated via the communication device in accordance with a direction from the Web application, and information read by the information reading device is obtained.