

DESCRIPTION

TERMINAL DEVICE, DATA COORDINATION METHOD, AND
COMPUTER-READABLE RECORDING MEDIUM

5 Technical Field

[0001] The present invention relates to a terminal device configured to execute a Web application, a method for coordinating data between Web applications, and a computer-readable recording medium on which a program for realizing the same is recorded.

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Background Art

[0002] In recent years, use of Web applications has increased in companies and the like due to faster network speeds and improved server computer capabilities. "Web application" generally means application software that operates in a Web browser
15 installed in a terminal device (e.g., see Patent Document 1).

[0003] With a Web application, processing is carried out while a Web server on a network and a Web browser of a terminal device communicate with each other. Accordingly, application software does not need to be installed in terminal devices according to necessary processing, and it is possible to reduce equipment costs in a
20 company or the like.

[0004] Also, with a Web application, a terminal device merely receives input data, displays information, and the like using the Web browser, and management, processing, and the like of the input data are performed by the Web server. Because of this, important data does not remain in the terminal device, and therefore, with the
25 Web application, it is easy to achieve an improvement in security at a company or the

like.

Citation List

Patent Document

- 5 [0005] Patent Document 1: JP 2009-1697300A

Disclosure of the Invention

Problem to be Solved by the Invention

- [0006] Incidentally, although multiple Web applications are executed in a Web
10 browser, sharing of data between Web applications is not permitted. Accordingly,
even if a Web application wishes to use data stored by another application, that
application needs to acquire the data through an external server. For this reason,
conventional Web applications have been problematic in that an improvement in
processing speed cannot be achieved.
- 15 [0007] On the other hand, it is also thought that the above-mentioned problem can be
solved by storing data used by Web applications in a storage device of a terminal device
and managing the data using the terminal device. However, in such a case, leakage
of data from the terminal device is foreseeable in cases where the terminal device is
lost or stolen, and thus security decreases.
- 20 [0008] An example of an object of the present invention is to solve the foregoing
problems, and to provide a terminal device, a data coordination method, and a
program, according to which a decrease in security is suppressed, and data sharing
between Web applications is enabled.

- 25 Means for Solving the Problem

[0009] In order to achieve the above-described object, a terminal device according to one aspect of the present invention is a terminal device configured to execute content programs transmitted from a Web server, the terminal device including:

an operating system;

5 content display units constructed for each content program, the content display units each being configured to display a piece of content defined by a corresponding content program; and

a control unit configured to control the operating system according to an instruction from a corresponding content display unit,

10 wherein the control unit constructs a shared region using virtual memory of the operating system and performs storage of data in the shared region or acquisition of data from the shared region according to an instruction from a corresponding content display unit, via the operating system.

[0010] Also, in order to achieve the above-described object, a data coordination method according to an aspect of the present invention is

15 a method for, in a terminal device including an operating system, content display units constructed for each content program transmitted from a Web server, the content display units each being configured to display a piece of content defined by a corresponding content program, and a control unit configured to control the operating system according to an instruction from a corresponding content display unit,

20 performing data coordination between the content display units, the method including:

(a) a step in which the control unit constructs a shared region using virtual memory of the operating system; and

25 (b) a step in which the control unit performs storage of data in the shared

region or acquisition of data from the shared region according to an instruction from a corresponding content display unit, via the operating system.

[0011] 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 storage medium on which is recorded a program for, in a terminal device including an operating system, content display units constructed for each content program transmitted from a Web server, the content display units each being configured to display a piece of content defined by a corresponding content program, and a control unit configured to control the operating system according to an instruction from a corresponding content display unit,

performing data coordination between the content display units, the recorded program including commands for causing the control unit to execute:

- (a) a step of constructing a shared region using virtual memory of the operating system; and
- (b) a step of performing storage of data in the shared region or acquisition of data from the shared region according to an instruction from a corresponding content display unit, via the operating system.

Effects of the Invention

[0012] As described above, according to the present invention, it is possible to suppress a decrease in security and enable data sharing between Web applications.

Brief Description of the Drawings

[0013]

FIG. 1 is a module configuration diagram showing a configuration of a

terminal device according to an embodiment of the present invention.

FIG. 2 is a diagram showing an example of a screen of the terminal device according to the embodiment of the present invention.

FIG. 3 is a sequence diagram for a terminal device 10 according to the
5 embodiment of the present invention, the diagram showing processing at a time of storing data in a shared region.

FIG. 4 is a sequence diagram for the terminal device 10 according to the embodiment of the present invention, the diagram showing processing at a time of acquiring data from a shared region.

10 FIG. 5 is a diagram showing a sequence of the terminal device 10 according to the embodiment of the present invention, the diagram showing processing at a time when any content display unit calls another content display unit.

FIG. 6 is a diagram showing an example of a content program used in Embodiment 1 of the present invention.

15 FIG. 7 is a diagram showing an example of a content program used in Embodiment 1 of the present invention.

FIG. 8 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.

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Description of Embodiments

[0014] Embodiment

Hereinafter, a terminal device, a data coordination method, and a program according to an embodiment of the present invention will be described with reference
25 to FIGS. 1 to 8.

[0015] Device Configuration

First, a configuration of a terminal device according to the present embodiment will be described with reference to FIG. 1. FIG. 1 is a module

5 configuration diagram showing a configuration of a terminal device according to an embodiment of the present invention.

[0016] As shown in FIG. 1, a terminal device 10 according to the present embodiment is a terminal device that can execute content programs 15a and 15b, which are transmitted from a Web server 20. In the present embodiment, the terminal device
10 10 is connected to the Web server 20 via a network (not shown in FIG. 1) such as an intra-office LAN or the Internet.

[0017] Also, although FIG. 1 shows only two content programs, the number of content programs is not limited thereto in the present embodiment. Note that in the terminal device 10, since the amount of reservable memory is limited, an upper limit is
15 set for the number of content display units, which will be indicated below. Accordingly, an upper limit is set in the number of content programs as well.

[0018] Also, as shown in FIG. 1, the terminal device 10 includes an operating system (OS) 11, content display units 14a and 14b, and a control unit 13. Among these units, in the terminal device 10, the operating system 11 is software that provides basic
20 functions used in common by various programs, such as an input/output function, and memory management, and performs overall management of the terminal device 10.

[0019] The content display units 14a and 14b are constructed for each content program. In the present embodiment, the content display units 14a and 14b are program modules that operate in the operating system 11. Also, the content display
25 units 14a and 14b each cause a piece of content defined by a corresponding content

program to be displayed on the screen of the terminal device 10 (see later-described FIG. 2).

[0020] The control unit 13 controls the operating system 11 according to instructions from the respective content display units 14a and 14b. In the present embodiment, 5 the control unit 13 is also a program module that operates in the operating system 11.

[0021] Incidentally, in the present embodiment, in addition to the function of controlling the above-described operating system, the control unit 13 also includes a function of constructing the shared region 16 using the virtual memory of the operating system 11. Furthermore, the control unit 13 can also perform storage of 10 data in the shared region 16 or acquisition of data from the shared region 16 via the operating system 11, according to instructions from the content display units 14a and 14b.

[0022] In other words, unlike with conventional techniques, with the terminal device 10, sharing of data between Web applications (content programs) is permitted via the 15 shared region 16. Also, the shared region 16 is constructed in the virtual memory, and the data stored in the shared region 16 is erased when the corresponding content program ends. As described above, according to the terminal device 10, it is possible to suppress a decrease in security and enable data sharing between Web applications.

[0023] Here, the configuration of the terminal device 10 according to the present 20 embodiment will be described with greater detail. First, in the present embodiment, the terminal device 10 is a portable terminal device such as a tablet terminal or a smartphone, and the operating system 11 is an operating system for a portable terminal device.

[0024] Also, in the present embodiment, as shown in FIG. 1, a rendering engine 12 25 for generating image data for display and the like is constructed in the operating

system 11, and the control unit 13 is controlled by the rendering engine 12. The rendering engine 12 is a Web browser component, specific examples of which include “Webkit”.

[0025] Also, in the present embodiment, the content programs 15a and 15b are

5 constructed by, for example, writing a Java (registered trademark) program (JavaScript (registered trademark)) in an HTML file. The content programs 15a and 15b are transmitted from the Web server 20 using a JSP (JavaServerPages) technique.

[0026] Furthermore, in the present embodiment, the content display units 14a and 14b are programs called Widgets, for example, which acquire content data included in

10 the JavaScript written in the content program. Also, the content display units 14a and 14b instruct the control unit 13 to execute a command included in the acquired JavaScript.

[0027] In the present embodiment, the control unit 13 includes a JavaScript function group 17 for executing the commands instructed by the content display units 14a and

15 14b. Using the JavaScript function group 17, as described above, the control unit 13 can control the operating system 11 according to the instructions from the content display units 14a and 14b.

[0028] Then, for example, if a command included in the JavaScript is for content display, the control unit 13 uses the corresponding JavaScript function to instruct

20 content display to the operating system 11. Accordingly, the operating system 11 activates the rendering engine 12 and causes the instructed piece of content to be displayed on the screen.

[0029] Specifically, in this case, as shown in FIG. 2, windows 41a to 41e that

correspond to the content display unit are displayed on a screen 40 of the terminal

25 device 10, and pieces of content 42a to 42e are displayed in the windows 41a to 41e.

FIG. 2 is a diagram showing an example of a screen of a terminal device according to an embodiment of the present invention. Note that in the example shown in FIG. 2, unlike the example shown in FIG. 1, it is assumed that five content programs have been transmitted and five content display units have been constructed.

5 [0030] Also, if the command included in the JavaScript is for storage of data in the shared region 16, the control unit 13 uses the corresponding JavaScript function to instruct data storage in the shared region 16 to the operating system 11.

Furthermore, if the command included in the JavaScript is for acquisition of data from the shared region 16, the control unit 13 instructs acquisition of data from the shared
10 region 16 to the operating system 11.

[0031] Incidentally, “Webview”, which is a conventional Web browser component, can also cause the operating system 11 to perform content display according to an instruction from the content display unit. However, with the conventional Webview, it is not possible to construct the shared region 16 or to perform storage and acquisition
15 of data in and from the shared region 16, and the control unit 13 is different from Webview.

[0032] In addition, if any content display unit performs an instruction to call another content display unit, the control unit 13 causes the operating system 11 to perform preparation processing for causing the other content display unit to operate, and
20 thereafter, the other content display unit can be caused to operate.

[0033] Device Operation

Next, operations of the terminal device 10 according to the embodiment of the present invention will be described with reference to FIGS. 3 to 5. In the following
25 description, FIGS. 1 and 2 will be referred to as needed. Also, in the present

embodiment, the data coordination method is carried out by allowing the terminal device 10 to operate. Accordingly, a description of the operations of the terminal device 10 will be given below instead of a description of the data coordination method according to the present embodiment.

5 [0034] First, processing for storage of data in the shared region 16 will be described with reference to FIG. 3. FIG. 3 is a sequence diagram for the terminal device 10 according to an embodiment of the present invention, the diagram showing processing at a time of storing data in a shared region. In the example shown in FIG. 3, the content display unit 14a instructs storage of data in the shared region 16.

10 Furthermore, the control unit 13 constructs the shared region 16 in advance using the virtual memory of the operating system 11.

[0035] As shown in FIG. 3, first, the content display unit 14a acquires content data from the content program 15a (step A1) and causes a piece of content to be displayed on the screen (step A2). Note that in FIG. 3, the details of the processing for causing
15 the piece of content to be displayed on the screen are not shown.

[0036] Next, when the command for storage of data in the shared region 16, which is written in the content data, is loaded, the content display unit 14a instructs storage of data to the control unit 13 (step A3). Specifically, the content display unit 14a gives a command to the JavaScript function group 17 of the control unit 13 to call the
20 corresponding JavaScript function.

[0037] Next, in the control unit 13, the JavaScript function group 17 uses the corresponding JavaScript function to give a command to the operating system 11 to store the data in the shared region 16 (step A4).

[0038] Next, the operating system 11 executes processing for performing storage of
25 data, such as acquisition of data to be stored, addition of key data (unique data) to the

acquired data, and the like (step A5).

[0039] Thereafter, the operating system 11 outputs the data to be stored to the shared region 16 and instructs storage of the data thereto (step A6), thereby causing the data to be stored in the shared region 16 (step A7). With the execution of step A7,
5 the stored data enters a state in which it can be accessed by any of the content display units without using the Web server 20.

[0040] Next, processing for acquisition of data from the shared region 16 will be described with reference to FIG. 4. FIG. 4 is a sequence diagram for the terminal device 10 according to an embodiment of the present invention, the diagram showing processing at a time of acquiring data from a shared region. In the example shown in
10 FIG. 4, the content display unit 14b acquires the data stored in the shared region 16 by the content display unit 14a.

[0041] As shown in FIG. 4, first, the content display unit 14b acquires the content data from the content program 15b (step B1) and causes a piece of content to be
15 displayed on the screen (step B2). Note that steps B1 and B2 are steps that are similar to steps A1 and A2 shown in FIG. 3. In FIG. 4 as well, the details of the processing for causing the piece of content to be displayed on the screen are not shown.

[0042] Next, when the command for acquisition of data from the shared region 16, which is written in the content data, is loaded, the content display unit 14b instructs
20 acquisition of data to the control unit 13 (step B3). Specifically, in step B3 as well, similarly to step A3 shown in FIG. 3, the content display unit 14b gives a command to the JavaScript function group 17 of the control unit 13 to call the corresponding JavaScript function.

[0043] Next, in the control unit 13, the JavaScript function group 17 uses the
25 corresponding JavaScript function to give a command to the operating system 11 to

acquire the data from the shared region 16 (step B4).

[0044] Next, the operating system 11 executes processing for performing acquisition of data, such as specification of key data attached to the data to be acquired (step B5).

[0045] Thereafter, the operating system 11 instructs the shared region 16 to output
5 the data to be acquired (step B6) and causes the shared region 16 to output the data to the content display unit 14b (step B7). With the execution of step B7, the content display unit 14b can use the data stored by the content display unit 14a without accessing an external server.

[0046] Next, processing at the time when one content display unit calls another
10 content display unit will be described with reference to FIG. 5. FIG. 5 is a sequence diagram for the terminal device 10 according to an embodiment of the present invention, the diagram showing processing at a time when any content display unit calls another content display unit. In the example shown in FIG. 5, the content display unit 14a outputs an instruction to call the content display unit 14b.

[0047] As shown in FIG. 5, the content display unit 14a instructs the control unit 13
15 to call the content display unit 14b and cause the content display unit 14b to execute processing (step C1). Specifically, in step C1 as well, similarly to step A1 shown in FIG. 3, the content display unit 14b gives a command to the JavaScript function group 17 of the control unit 13 to call the corresponding JavaScript function.

[0048] Next, in the control unit 13, the JavaScript function group 17 uses the
20 corresponding JavaScript function to give a command to the operating system 11 to perform preparation processing for causing the content display unit 14b to operate (step C2).

[0049] Next, the operating system 11 executes processing for causing the content
25 display unit 14b to operate, such as reserving an available memory region (step C3),

and when the processing is complete, the operating system 11 notifies the control unit 13 that it is complete (step C4).

[0050] Next, upon receiving the notification in step C4, the control unit 13 uses the JavaScript function group 17 to give a command to the content display unit 14b to

5 execute the processing instructed by the content display unit 14a in step C1 (step C5).

Also, in step C5, the control unit 13 executes processing such as loading of data as necessary.

[0051] Upon step C5 being executed, the content display unit 14b executes the instructed processing (step C6). For example, the content display unit 14b loads the

10 data stored in the shared region 16 by the content display unit 14a and changes the content of the displayed piece of content. Note that the processing performed by the content display unit 14b is JavaScript processing. Also, in FIG. 5 as well, the details of the processing in step C6 are not shown.

[0052] Thus, in the present embodiment, as shown in steps C1 to C6, it is possible for

15 any content display unit (Widget) to control another content display unit (Widget) and to dynamically change the content of the piece of content displayed by the other content display unit, without using the Web server 20.

[0053] Here, a content program that causes a content display unit to perform the processing shown in FIGS. 3 to 5 will be illustrated with reference to FIGS. 6 and 7.

20 FIGS. 6 and 7 are diagrams showing an example of a content program used in Embodiment 1 of the present invention.

[0054] The example shown in FIG. 6 shows a code for storing data in a shared region, and a code for controlling another content display unit (another Widget). If the codes shown in FIG. 6 have been written in the content program, the content display unit

25 stores data in the shared region and thereafter executes calling of another content

display unit.

[0055] Also, the example shown in FIG. 7 shows a code for acquiring data from a shared region and a code for dynamically changing the content using the acquired data.

If the codes shown in FIG. 7 have been written in the content program, the content

5 display unit acquires data from the shared region and thereafter changes the displayed piece of content using the acquired data.

[0056] Program

A program according to the present embodiment need only be a program for
10 causing a terminal device to execute steps A1 to A7 in FIG. 3, steps B1 to B7 in FIG. 4, and steps C1 to C6 in FIG. 5. By installing the program in the terminal device and executing it, it is possible to realize the terminal device 10 and the data coordination method according to the present embodiment. In this case, processing is performed with the CPU (Central Processing Unit) of the terminal device functioning as the
15 operating system 11, the rendering engine 12, the control unit 13, and the content display units 14a and 14b.

[0057] A portable terminal device that realizes the terminal device 10 by executing the program according to the present embodiment will be described next with reference to FIG. 8. FIG. 8 is a block diagram showing an example of a portable
20 terminal device that can be used as the terminal device according to an embodiment of the present invention.

[0058] As shown in FIG. 8, a portable terminal device 30 includes a CPU 31, a memory 32, a display 33, a storage medium 34, a communication module 35, and a touch panel 36. These units are mutually connected via a bus 37 to as to be able to
25 communicate data.

[0059] The CPU 31 carries out various calculations by expanding the program (code) according to the present embodiment, which is stored in the storage device 34, in the memory 32, and executing them in a predetermined sequence. The memory 32 is typically a volatile memory such as a DRAM (Dynamic Random Access Memory).

5 [0060] Also, the program according to the present embodiment may be provided in a state of being stored in a computer-readable recording medium, and it may be transmitted from the Internet, which is connected to via the communication module 35. Specific examples of the recording medium include general-use semiconductor storage devices such as a CF (Compact Flash (registered trademark)) and an SD (Secure
10 Digital).

[0061] Also, specific examples of the storage device 34 include a hard disk and semiconductor storage devices such as and a flash memory. The touch panel 36 is an input device that receives input from a user. The display 33 is a display device such as a liquid crystal display device. The communication module 35 is a device for
15 realizing communication by means of a wireless LAN, or communication using a mobile phone network.

[0062] Also, in the present embodiment, the terminal device 10 is not limited to the above-described portable terminal device, such as a tablet terminal or a smartphone, and it may be a personal computer such as a laptop PC, electronic paper, or the like.

20 [0063] Although the present invention has been described above with reference to the embodiments, the present invention is not limited to the above-described embodiments. Various modifications of configurations and details of the present invention that can be understood by a person skilled in the art are possible within the scope of the present invention.

25 [0064] This application claims priority under Japanese Patent Application No.

2012-279886, filed December 21, 2012, which is incorporated herein in its entirety.

Industrial Applicability

[0065] As described above, according to the present invention, it is possible to

5 suppress a decrease in security and enable data sharing between Web applications.

The present invention is useful for Web systems providing Web services.

Descriptions of Reference Numerals

[0066]

10	10	Terminal device
	11	Operating system
	12	Rendering engine
	13	Control unit
	14a, 14b	Content display unit
15	15a, 15b	Content program
	16	Shared region
	17	JavaScript function group
	20	Web server
	30	Portable terminal device
20	31	CPU
	32	Memory
	33	Display
	34	Storage device
	35	Communication module
25	36	Touch panel

37 Bus

CLAIMS

1. A terminal device configured to execute content programs transmitted from a Web server, the terminal device comprising:
 - an operating system;
 - 5 content display units constructed for each content program, the content display units each being configured to display a piece of content defined by a corresponding content program; and
 - a control unit configured to control the operating system according to an instruction from a corresponding content display unit,
 - 10 wherein the control unit constructs a shared region using virtual memory of the operating system and performs storage of data in the shared region or acquisition of data from the shared region according to an instruction from a corresponding content display unit, via the operating system.
- 15 2. The terminal device according to claim 1, wherein
 - if one content display unit performs an instruction to call another content display unit, the control unit causes the operating system to perform preparation processing for causing the other content display unit to operate, and thereafter causes the other content display unit to operate.
- 20 3. A method for, in a terminal device including an operating system, content display units constructed for each content program transmitted from a Web server, the content display units each being configured to display a piece of content defined by a corresponding content program, and a control unit configured to control the operating
- 25 system according to an instruction from a corresponding content display unit,

performing data coordination between the content display units, the method comprising:

(a) a step in which the control unit constructs a shared region using virtual memory of the operating system; and

5 (b) a step in which the control unit performs storage of data in the shared region or acquisition of data from the shared region according to an instruction from a corresponding content display unit, via the operating system.

4. The data coordination method according to claim 3, further comprising:

10 (c) a step in which, if one content display unit performs an instruction to call another content display unit, the control unit causes the operating system to perform preparation processing for causing the other content display unit to operate, and thereafter causes the other content display unit to operate.

15 5. A computer-readable recording medium on which is recorded a program for, in a terminal device including an operating system, content display units constructed for each content program, the content display units each being configured to display a piece of content defined by a corresponding content program, and a control unit configured to control the operating system according to an instruction from a
20 corresponding content display unit,

performing data coordination between the content display units, the recorded program including commands for causing the control unit to execute:

(a) a step of constructing a shared region using virtual memory of the operating system; and

25 (b) a step of performing storage of data in the shared region or acquisition of

data from the shared region according to an instruction from a corresponding content display unit, via the operating system.

6. The program according to claim 5, for further causing the control unit to
5 execute:

 (c) a step of, if one content display unit performs an instruction to call another content display unit, causing the operating system to perform preparation processing for causing the other content display unit to operate, and thereafter causing the other content display unit to operate.