Title: ESTABLISH CLIENT-HOST CONNECTION

Abstract: Example embodiments disclosed herein relate to establishing a connection over a network between a first host device and a client device. The client device transmits client information over the network related to the first host device. Display information is transmitted by the first host device to be output by the client device.

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ESTABLISH CLIENT-HOST CONNECTION

BACKGROUND

[0001] Some types of client devices, such as zero clients, do not have an operating system (OS) installed or only a small portion of the OS installed. Instead, these client devices connect over a network to a host device, such as a server, which performs all or a majority of functionalities requested by users of the client devices.

[0002] Client devices may consume fewer resources, require less space and be lower in cost than traditional computing devices. As network complexity increases, such as in a multi-host environment, establishing a connection between the client device and the host device may become increasingly challenging.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The following detailed description references the drawings, wherein:

[0004] FIG. 1 is an example block diagram of a system including a first host device having instructions for establishing a client-host connection;

[0005] FIGS. 2A-2D are an example flowchart of a method for establishing a client-host connection at a first host device; and

[0006] FIGS. 3A-3C are an example flowchart of a method for establishing a client-host connection at a client device.
DETAILED DESCRIPTION

[0007] Specific details are given in the following description to provide a thorough understanding of embodiments. However, it will be understood by one of ordinary skill in the art that embodiments may be practiced without these specific details. For example, systems may be shown in block diagrams in order not to obscure embodiments in unnecessary detail. In other instances, well-known processes, structures and techniques may be shown without unnecessary detail in order to avoid obscuring embodiments.

[0008] A client device, such as a zero client, may not have an operating system (OS) installed or only a small portion of the OS installed. Instead, the client device may connect to a host device, such as a server, which carries out all or a majority of functionalities requested by users using the client device.

[0009] Client devices may consume fewer resources, require less space, are lower in cost and/or easier to manage than traditional computing devices, such as a thick client, which includes an OS. However, forming a connection between the thin client and the host device may prove more challenging in a multi-client and/or multi-host environment. The client device may include additional functionality to choose from a plurality of host devices and the host device may seek additional information to distinguish between a plurality of host devices and/or determine a location of the client device.

[0010] Significantly increasing functionality at the client device, such as by installing the OS or a larger portion of the OS, may also significantly increase a complexity of the zero client. As such, at the very least, manageability of the zero client will become more cumbersome. For example, the OS at each of the client...
devices may require updates and/or a greater number of hardware components may be installed or replaced for the client devices in the future.

[0011] Embodiments allow the client device to select from a plurality of host devices without significantly increasing a complexity of the client device. For example, the client device may send out a client code indicating the selected host device without having an OS installed at the client device. Further, embodiments allow information of a host or client device to be modified from a central location, such as one of the host devices. Hence, the client devices may be more easily modified remotely, such as for updating information. Thus, manageability costs may decrease as the client devices may not need to be physically accessed. Moreover, the client devices may remain low in cost, low in power consumption and small in size, allowing for easier removal or replacement of the client devices.

[0012] Referring now to the drawings, FIG. 1 is an example block diagram of a system 100 including a first host device 120 having instructions for establishing a client-host connection. In the embodiment of FIG. 1, the system 100 includes a network 110, the first host device 120 and a first client device 150.

[0013] The network 110 may include one or more interconnected devices, such as network interface cards, repeaters, hubs, bridges, switches, routers, firewalls, and the like. The interconnected devices may share resources or information. While the system 110 is shown to include only a single host device 120 and a single client device 150, embodiments of the system 110 may include a plurality of client devices capable of connecting to a plurality of host devices. For instance, different host devices may provide different services, resources, and/or serve different types of users via the client devices. The first host device 120 and
the first client device 150 may communicate with each other via communications protocols, such as Ethernet or the Internet Protocol Suite, over the network 110.

[0014] The first host device 120 and the first client device 150 may be part of a client-server architecture, where a user interacts with the first client device 150 to request a service from the first host device 120. The first client device 150 may be a computing device that relies on a server, such as the first host device 120, to fulfill its traditional computational roles. For example, the first client device 150 may not run a full OS. Instead, the first host device 120 may run all or most of the OS and/or process most or all of the first client device's 150 business logic.

[0015] Embodiments of the first client device 150 may include, for example, a thin client, an ultra thin client, a zero client and the like. The first client device 150 may include the components necessary to establish a connection with one of the plurality of host devices, such as the first host device 120, and to display an output from the connected host device, such as the first host device 120. For example, the first client device 150 may include a network controller (not shown) to interface with the network 110, a video decoder (not shown) to decode display data output from the first host device 120 and other peripheral equipment, such as a display (not shown), a keyboard (not shown), and memory (not shown).

[0018] The first host device 120 includes a processor 130 and a machine-readable storage medium 140 including instructions 142, 144 and 146 for establishing a client-host connection. The first host device 120 may be a computing device running software to provide a resource or service to a service requester or client, such as the first client device 150, or any other device capable of executing the instructions 142, 144 and 146. Examples of the first host device
include a database server, file server, mail server, print server, web server, DHCP server and the like.

The processor may be, at least one central processing unit (CPU), at least one semiconductor-based microprocessor, at least one graphics processing unit (GPU), other hardware devices suitable for retrieval and execution of instructions stored in the machine-readable storage medium, or combinations thereof. The processor may fetch, decode, and execute instructions to implement establishing a client-host connection. As an alternative or in addition to retrieving and executing instructions, the processor may include at least one integrated circuit (IC), other control logic, other electronic circuits, or combinations thereof that include a number of electronic components for performing the functionality of instructions.

The machine-readable storage medium may be any electronic, magnetic, optical, or other physical storage device that contains or stores executable instructions. Thus, the machine-readable storage medium may be, for example, Random Access Memory (RAM), an Electrically Erasable Programmable Read-Only Memory (EEPROM), a storage drive, a Compact Disc Read Only Memory (CD-ROM), and the like. As such, the machine-readable storage medium can be non-transitory. As described in detail below, machine-readable storage medium may be encoded with a series of executable instructions for establishing a client-host connection.

Moreover, the instructions, when executed by a processor (e.g., via one processing element or multiple processing elements of the
processor) can cause the processor to perform processes, such as, the process of FIGS. 2A-2D. In operation, the client device 150 may prompt the user to select one of the plurality of host devices after, for example, being powered on from an off state or reset from a previous session. In turn, the user may press a key (e.g. A-B, a-b, 1-0, F1-F12, etc.) of a keyboard (not shown) connected to the first client device 150 and a scancode of the pressed code may be sent from the keyboard to the first client device 150. Scancodes of different keys of the keyboard may correlate to different host devices.

[0020] The first client device 150 may transmit first client information including the scancode of the pressed code across the network 110. The scancode included in the client information may be referred to as a client code. The first client information may also include other information of the first client device 150, such as a name, location, an access permission, a device or a status field of the first client device 150. The name included in the client information may be a term or phrase used to identify the client device.

[0021] The location included in the client information may be a label used to indicate where the client device is located with respect to the network 110, such as such as an Internet Protocol (IP) network address or a group. The access permission included in the client information may indicate which fields, such as other data included in the client information, are modifiable and/or accessible, such as via a password. The device field included in the client information may indicate information about the hardware of the client device, such as a computing platform or model number. The status included in the client
information may indicate an operation state of the client device, such as on, busy, or off.

[0022] One or more of the host devices may be listening for the client information on the network 110. For example, the detect instructions 142 of the first host device 120 may be executed by the processor 130 to detect client information transmitted by the first client device 150 over the network 110 including the plurality of host devices.

[0023] The transmit instructions 144 may be executed by the processor 130 to transmit first host information to the first client device 150 to establish a connection with the first client device 150, if the detected client code included in the first client information indicates the first host device 120. The first host device 120 and/or another network device may store the first client information and first client device 150 may store the transmitted first host information.

[0024] The first host information may include, for example, a name of the first host device 120. Each of the plurality of host devices may store a different host code, such as a different scancode. The first host device 120 may compare its host code to the client code included in the first client information transmitted by the first client device 150. If the host and client codes match, the first host device 120 may transmit the first host information, which may include, for example, a name of and/or acknowledgement by the first host device 120. Additional information may also be communicated between the first host device 120 and the first client device 150 to establish the connection, such as information related to a Transmission Control Protocol (TCP) connection. The
first host device 120 may include a communication component, such as a network interface card, to communicate with the first client device 150.

[0025] After the connection is established between the first host device 120 and the first client device 150, the output instructions 142 may be executed by the processor 130 to output display information, such as video data, to the first client device 150. The display information may be generated by an operating system (OS) at the first host device 120. The first client device 150 may not include an OS but may output the display information to a display through a video decoder. Alternatively, the first client device 150 may output raw video data included in the display information.

[0028] The machine-readable storage medium 120 may also include instructions (not shown) to view and/or modify information of other host devices or client devices, as explained below with respect to FIGS. 2A-2D. For example, the first host device 120 may reassign a client device to a different host device or modify client information of a client device. As such, embodiments may allow client devices at remote locations to be managed from a central location. For example, the first host device 120 or another network device, may include an interface, such as a graphical user interface (GUI) as well as instructions to display client information stored at the plurality of host devices and to modify the client information of a second client device connected at least one of the plurality of host devices.

[0027] FIGS. 2A-2D are an example flowchart of a method 200 for establishing a client-host connection at a first host device 120. Although execution of method 200 is described below with reference to the first host device 120, other suitable
components for execution of the method 200 can be utilized. Additionally, the components for executing the method 200 may be spread among multiple devices (e.g., a processing device in communication with input and output devices). In certain scenarios, multiple devices acting in coordination can be considered a single device to perform the method 200. The method 200 may be implemented in the form of executable instructions stored on a machine-readable storage medium, such as storage medium 140, and/or in the form of electronic circuitry.

[0028] As explained above, the first host device 120 may be one of a plurality of host devices connected to the network 110 and the first client device 150 may be one of a plurality of client devices connected to the network 110. Initially, the first host device 120 is listening for client information sent out by a client device. In FIG. 2A, at block 202, the first host device 120, detects first client information transmitted by the first client device 150. The first client information includes a client code indicating one of the plurality of host devices, as explained above in more detail. Then, at block 204, the first host device 120 determines whether the client code included in the first client information indicates the first host device 120. If the client code does not indicate the first host device 120, the first host device 120 continues to listen for other incoming client information, at block 228.

[0029] If the client code does indicate the first host device 120, the first host device 120 transmits first host information to the first client device 150 to establish a connection with the first client device 150, at block 208. The first host information is explained in more detail above. Alternatively, in embodiments where there are no client devices other than the first client device
150, the first host device 120 may transmit the first host information without reading the client code and instead attempt to establish a connection with any client device detected.

[0030] Once the connection is established, the first host device 120 outputs display information to be displayed by the first client device, at block 208. The display information is generated by an OS at the first host device 120 and the display information is to be output to a display of the first client device 150, as explained above. Examples of the display may include an LCD, CRT, projector, etc.

[0031] An administrator may, for example, access the first host device 120, another of the plurality of host devices, or another network device, to modify client or host information of one or more host or client devices from a central location. In FIG. 2B, at block 210, the first host device 120 determines whether there is a request, such as from the administrator, to change the first client information of the first client device 150 and/or the first host information of the first host device 120. If there is no such request, the method 300 may flow to block 216, as described below. If there is such a request, at block 212, the first host device 120 modifies the first host information and/or the first client information.

[0032] For example, modifying the first host information may include changing the name of the first host device 120 to assign the first client device 150 from the first host device 120 to another of the plurality of host devices. In another example, modifying the first client information may include changing the location of the first host device 120 to assign the first client device 150 to at
least one of a different group and address. In yet another example, modifying the first client information may include changing the access permission of the first client device 150 to at least one of lock a field of the first client device 150 and modify a password of the first client device 150.

[0033] Then, at block 214, the first host device 120 transmits the modified at least one of first host information and the first client information to the first client device 150. Next, in FIG. 2C, at block 216, the first host device 120 determines whether there is a request, such as from the administrator, to view host information of other host devices or client information of the client devices. If there is no such request, the method 200 flows to block 228, where the first host device 120 continues to listen for other incoming client information.

[0034] If there is such a request, at block 218, the first host device 120 views second host information of a second host device of the plurality of host devices, the second host information may include a name of the second host. Next, at block 220, the first host device 120 views second client information of a second client device (not shown) of the plurality of host devices connected to the second host device. The second client information may similarly include at least one of a name, location, an access permission, a device and a status of the second client device.

[0035] Then, in FIG. 2D, at block 222, the first host device 120 determines whether there is a request, such as from the administrator, to change the second client information of the second client device or the second host information of the second host device. If there is no such request, the method 200 flows to block 228, where the first host device 120 continues to listen for
other incoming client information. If there is such a request, at block 224, the first host device 120 modifies at least one of the second host information of the second host and the second client information of the second client device. Next, at block 226, the first host device 120 transmits the at least one of modified second host information and the second client information to at least one of the second client device and the second host device. Lastly, the first host device 120 continues to listen for other incoming client information. Should the first host device 120 detect any client information from a client device, the first host device 120 may again carry out the method 200. While the above method 200 is described with respect to the first host device 120, the method 200 may be carried out with respect to any of the plurality of host devices.

[0036] FIGS. 3A-3C are an example flowchart of a method 300 for establishing a client-host connection at a client device. Although execution of method 300 is described below with reference to the first client device 150, other suitable components for execution of the method 200 can be utilized. Additionally, the components for executing the method 300 may be spread among multiple devices (e.g., a processing device in communication with input and output devices). In certain scenarios, multiple devices acting in coordination can be considered a single device to perform the method 300. The method 300 may be implemented in the form of executable instructions stored on a machine-readable storage medium and/or in the form of electronic circuitry.

[0037] As explained above, the first client device 150 may be, for example, a zero client. In FIG. 3A, at block 302, a first key is entered at the first client device 150. The first key indicates a first host device 120 of a plurality of host
devices. As noted above, the user may press one of the keys of a keyboard to select one of the plurality of host devices.

[0038] Then, at block 304, the first client device 150 transmits first client information including a client code related to the first host device 120 across a network 110 including the plurality of host devices. As explained above, the client code may be a scancode of the key pressed by the user. Next, at block 306, the first client device 150 receives first host information from the first host device after the client information is transmitted to the first host device 150. As noted above, the first host information relates to establishing a connection between the first host device 120 and the first client device 150. Afterward, at block 308, the first client device 150 receives display information from the first host device 120, the display information to be output to a display of the first client device 150, the display information to be generated based on an OS executed at the first host device 120. The display information may include, for example, graphical information, a video stream, and the like, to be displayed on the display of the first client device 150.

[0039] Next, in FIG. 3B, at block 310, the first client device 150 determines whether a request has been received, such as from the first host device 150, to modify the first client information stored at the first client device 150. If no such request has been received, the method 300 flows to block 312, as explained below. Otherwise, if such a request is received, the first client device 150 receives modified first client information from the first host device 120. Next, at block 314, the first client device 150 changes the first client information stored at the first client device 150 based on the received modified first client information,
such as changing a name, location, an access permission, a device and or a status of the first client device 150.

[0040] Then, in FIG. 3C, at block 316, the first client device 150 determines whether a new session has been initiated. The new session may be initiated, for example, if the first client device 150 is reset, such as after the user logs off the first client device 150 or the first client device 150 is powered on from an inactive state (e.g. an off state, a hibernate state, a sleep state). Alternatively, the first client device 150 may continue to connect to a previously selected host device until the user selects a different host device. If no new session is initiated, the first client device 150 remains at block 318 and maintains the connection established with the current host device, such as the first host device 120, until the new session is initiated. If the new session is initiated, the first client device 150 is initialized at block 318, which may include, for example, clearing data specific to the previous session and prompting the user to select a new host device. After the first client device 150 is initialized, the user enters a second key at block 320, such as by pressing a second key of the keyboard connected to the first client device 150. The second key indicates a second host device of the plurality of host devices.

[0041] With the above approaches, a client device may connect to a host device over a network including a plurality of host devices, without significantly increasing complexity at the client device. For example, the client device may transmit a client code across the network indicating one of the plurality of host devices in response to a user pressing a single key of a keyboard. The transmitted client code may initiate establishment of a connection between the
client device and the selected host device. Furthermore, the above operation may be carried out by the client device without installing an OS at the client device. Moreover, one or more of the client devices may be managed from a central location, such as one of the host devices.
CLAIMS

What is claimed is:

1. A method for establishing a client-host connection, comprising:
   detecting, at a first host device of a plurality of host devices, first client
   information transmitted by a first client device over a network including the
   plurality of host devices, the first client information to include a client code
   associated with one of the plurality of host devices;
   transmitting, at the first host device, first host information to the first client
   device to establish a connection with the first client device, if the detected client
   code included in the first client information is associated with the first host
   device; and
   outputting, at the first host device, display information to be displayed by the
   first client device.

2. The method of claim 1, wherein,
   the first client information further includes at least one of a name, location,
   an access permission, a device and a status field of the first client device, and
   the first host information includes a name of the first host device.

3. The method of claim 2, further comprising:
   modifying, at the first host device, at least one of the first host information
   and the first client information; and
   transmitting, at the first host device, the modified at least one of first host
   information and first client information to the first client device.
4. The method of claim 3, wherein the modifying the first host information includes changing the name of the first host device to assign the first client device from the first host device to another of the plurality of host devices.

5. The method of claim 3, wherein the modifying the first client information includes changing the location of the first host device to assign the first client device to at least one of a different network group and address.

6. The method of claim 3, wherein the modifying the first client information includes changing the access permission of the first host device to at least one of lock content of the first host device and to modify a password of the first host device,

7. The method of claim 1, further comprising:

   viewing, at the first host device, second host information of a second host device of the plurality of host devices, the second host information to include a name of the second host; and

   viewing, at the first host device, second client information of a second client device connected to the second host device, wherein

   the second client information includes at least one of a name, location, an access permission, a device and a status of the second client device.

8. The method of claim 7, further comprising:
9. The method of claim 1, wherein,
   the display information is generated by an operating system (OS) at the first host device, and
   the display information is to be output to a display of the first client device.

10. A method for establishing a client-host connection, comprising:
   entering, at a client device, a first key associated with a first host device of a plurality of host devices;
   transmitting, at the client device, client information including a client code related to the first host device across a network including the plurality of host devices;
   receiving, at the client device, first host information from the first host device, the first host information to relate to establishing a connection between the first host device and the client device; and
   receiving, at the client device, display information to be output on a display of the client device, the display information to be generated based on an operating system (OS) executed at the first host device.
11. The method of claim 10, further comprising:

entering a second key, at the client device, the second key to indicate a
second host device of a plurality of host devices; and

initializing the client device before entering at least one of the first and
second keys.

12. The method of claim 11, wherein,

the entering the first key includes a user pressing a first key of a keyboard of
the client device, and

the entering the second key includes the user pressing a second key of a
keyboard of the client device.

13. The method of claim 10, further comprising,

receiving, at the client device, modified client information from the first host
device; and

changing, at the client device, the client information stored at the client
device based on the received modified client information, wherein

the client information further includes at least one of a name, location, an
access permission, a device and a status of the client device.

14. A non-transitory computer-readable storage medium storing instructions
that, if executed by a processor of a first host device of a plurality of host
devices, cause the processor to:

detect client information transmitted by a first client device over a network
including the plurality of host devices, the client information to include a client
code associated with one of the plurality of host devices;

transmit first host information to the first client device to establish a
connection with the first client device, if the detected client code included in the
client information is associated with the first host device; and

output, at the first host device, display information to be displayed by the first
client device, the display information generated by an operating system (OS) at
the first host device.

15. The non-transitory computer-readable storage medium of claim 14,
further comprising instructions that, if executed by the processor, cause the
processor to:

display client information of the plurality of host devices; and

modify the client information of a second client device connected at least one
of the plurality of host devices, wherein

the client information further includes at least one of a name, location, an
access permission, a device and a status of the second client device.
Detecting, at a first host device of a plurality of host devices, first client information transmitted by a first client device over a network including the plurality of host devices, the first client information to include a client code indicating one of the plurality of host devices.

204

Detected client code indicate the first host device?

No A

Yes

Transmitting, at the first host device, first host information to the first client device to establish a connection with the first client device.

Outputting, at the first host device, display information to be displayed by the first client device.

B
FIG. 2B

Change first client or first host information?

Yes

Modifying, at the first host device, at least one of the first host information and the first client information

Transmitting, at the first host device, the modified at least one of first host information and the first client information to the first client device

No

C
FIG. 2C

View other host devices?

Yes

viewing, at the first host device, a second host device of the plurality of host devices

No

A

D

Viewing, at the first host device, a second client device connected to the second host device
FIG. 2D

D

Change second client information or second host information?

Yes

Modifying, at the first host device, second client information of the second client device

Transmitting, at the first host device, the at least one of modified second host information and the second client information to at least one of the second client device and the second host device

A

Listening, at the first host device, for the client information
FIG. 3A

Entering, at a client device, a first key to indicate a first host device of a plurality of host devices

Transmitting, at the client device, client information including a client code related to the first host device across a network including the plurality of host devices

Receiving, at the client device, first host information from the first host device after the client information is transmitted to the first host device, the first host information to relate to establishing a connection between the first host device and the client device

Receiving, at the client device, display information to be output to a display of the client device, the display information to be generated based on an operating system (OS) executed at the first host device
FIG. 3B

310

Client information modification request?

Yes

Receiving, at the client device, modified client information from the first host device

312

Changing, at the client device, the client information stored at the client device based on the received modified client information

314
FIG. 3C

C

316

New Session?

318

Initializing the client device

320

Entering a second key, at the client device, the second key to indicate a second host device of a plurality of host devices
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

G06F 15/16(2006.01)i, G06F 3/14(2006.01)1, G06F 9/22(2006.01)1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F 15/16; G06F 17/00; G06F 15/13; G06F 9/00; H04L 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: client, sever, host, connection, client code, display

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 7457878 Bl (MATHISKE, BE®ND J. et a1.) 25 November 2008 See column 4, line 4 - column 5, line 30; claims 1-3; figures 1-4.</td>
<td>1-15</td>
</tr>
<tr>
<td>A</td>
<td>US 2010-0082734 Al (ELCOCK, DAVID) 01 April 2010 See paragraphs [0016][H0021] , [0029][H0031]; figures 1, 2.</td>
<td>1-15</td>
</tr>
<tr>
<td>A</td>
<td>US 2004-0043818 Al (WILLIS, DANIEL) 04 March 2004 See paragraphs [0032] , [0041]-[0042]; claims 13-22; figures 1, 4a.</td>
<td>1-15</td>
</tr>
<tr>
<td>A</td>
<td>US 2005-0193396 Al (STAFFORD-FRASER, JAMES et a1.) 01 September 2005 See abstract; paragraphs [0055]-[0063]; claims 1-6, 15.</td>
<td>1-15</td>
</tr>
</tbody>
</table>

[ ] Further documents are listed in the continuation of Box C.  [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search 11 JULY 2012 (11.07.2012)
Date of mailing of the international search report 12 JULY 2012 (12.07.2012)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-70 1, Republic of Korea
Facsimile No. 82-42-472-7140

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<table>
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