(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 June 2013 (06.06.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/078548 A1

(51) International Patent Classification:
H04L 12/24 (2006.01)

(21) International Application Number:
PCT/CA2012/001 106

(22) International Filing Date:
3 December 2012 (03.12.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/566,297 2 December 201 1 (02. 12.201 1) US

(71) Applicant: **GROUPE IWEB INC.** [CA/CA]; 20, Place du Commerce, Montreal, Quebec H3E 1Z6 (CA).

(72) Inventors: **LECLAIR, Martin;** 4640, Rue de Lombardie, Brossard, Quebec J4Y 0J3 (CA). **MERTES, Cyrille;** 201-1100, Jeanne-Mance, Montreal, Quebec H2Z 1L7 (CA). **BOULET, Simon;** 3140, rue Archambault, Longueil, Quebec J4M 2W3 (CA). **MOREL, Bruno;** 1456A, De Maisonneuve Est, Montreal, Quebec H2L 2A9 (CA).

(74) Agent: **BROUILLETTE, Robert;** Brouillette & Associes/Partners, 377, de la Commune West, Montreal, Quebec, H2Y 2E2 (CA).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available):* AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available):* ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: SYSTEM AND METHOD FOR AUTOMATICALLY CONFIGURING AND UPDATING A VIRTUAL SERVER

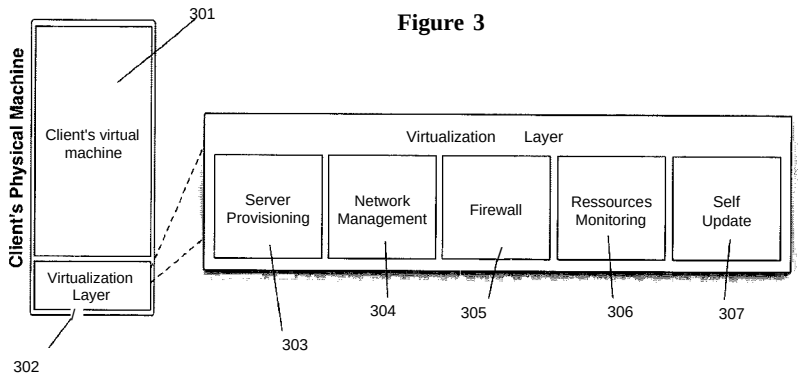


Figure 3

(57) Abstract: The present invention relates to system and method for increasing the automation of the configuration and maintenance of physical computers or virtual machines. The automation process is mostly used within the hosting service provider industry to optimize the productivity and efficiency of the deployment of a new configured host and to easily update or upgrade an existing host. **A** system in accordance with the present invention may comprise a virtualization layer and the related subcomponents within a physical computer in order to configure and update a physical or virtual computer.

WO 2013/078548 A1

Title of the Invention

System and Method for Automatically Configuring and Updating a Virtual Server

Cross-Reference to Related Applications

[0001] The present patent application claims the benefits of priority of U.S. Provisional Patent Application No. 61/566,297, entitled "System and Method for Automatically Configuring and Updating a Virtual Server" and filed at the United States Patent and Trademark Office on December 2, 2011.

Field of the Invention

[0002] The present invention generally relates to the field of the automation of the configuration and the updating of servers, more specifically to the field of automatic configuration and updating of physical computers and virtual machines.

Background of the Invention

[0003] Since the dawn of the Internet age, the popularity of hosting services has skyrocketed. At the beginning, hosting services mostly provided web servers hosting static web sites. As the Internet gained in popularity and as the technology eased the development of complex web applications, hosting services have evolved to provide more powerful, faster and more diversified online hosting services. Lately, the growing demand for file storage services and software as a service application type has significantly increased the need for hosting services.

[0004] Typically, a hosting provider must complete a plurality of configuration steps to fulfil requests from the users. In order to provide hosting services, a provider must select and configure the hardware components of a physical computer. Once assembled, an operating system and the related software programs must be installed on the computer in order to provide a server configuration. Configured, the computer may be added to the provider's internal network and may be externally accessed by any user having an account.

[0005] The different steps required to configure a hosting server may be lengthy and may require technical personnel for each host installation. To minimize the setup configurations steps, a hosting services provider may divide a physical computer between many users to provide a shared hosting environment. Consequently, the configuration process is simplified but the server performances are decreased as the physical computer must process the requests for all the client accounts. In order to automate the deployment of such shared services, solutions using virtualization tools have been used. However, the virtualization layer uses a portion of the resources of the computer host, such as memory, bus bandwidth and storage space. Also, the upgrading process of the physical server running the virtualization layer represents a complex task since the configuration of the hosting service must remain untouched and transparent to the client.

[0006] While being a more powerful solution, a dedicated host requires a great amount of configuration steps in order to provide hosting service for a single client. Furthermore, a client willing to upgrade to a more powerful server typically needs to rent a second server, configure the said server with the required software and test the new configuration in order to ensure no error.

[0007] Thus, there is a need for a method to automatically configure and update a virtual machine and to ease the upgrading process of such virtual machine.

Summary of the Invention

[0008] In order to at least mitigate the aforementioned and possibly other problems, a method for automatically configuring and updating a virtual server in accordance with the principles of the present invention is presented.

[0009] The aforesaid and other objectives of the present invention are realized by generally providing a system and method for automatically configuring and updating a virtual server. A method for automatically configuring and updating a virtual server allows a hosting service provider to quickly deploy a new configured host and to easily update or upgrade an existing host. The described method comprises a plurality

of steps for assembling, setting up and configuring a physical computer on the service provider network. Also, the method may comprise the steps to physically assemble a physical computer, to reserve a physical location for a physical computer, to setup a physical computer at a selected physical location, to run a program that automatically validates the selected physical location, and to program and install a removable configuration device on the physical computer. Upon completion of these steps, the physical computer might be offered to be used by a client.

[0010] On reservation of a physical computer by a client, a method for automatically configuring and updating a virtual server comprises a plurality of steps for automatically configuring a server based on the specifications required by at least one client.

[0011] A system for automatically configuring and updating a virtual server comprises a virtualization layer and the related subcomponents within a physical computer. A client physical computer comprises at least one virtual machine and at least one virtualization layer. A virtualization layer allows the deployment of a plurality of dedicated servers such as network configuration, resources monitoring and security parameters. A virtualization layer allows the direct configuration of the network, the security parameters and the different resources.

[0012] Within the scope of the invention, a virtualization layer should be defined as a hypervisor having additional functionalities to provide automatic updates and autonomous operations of the described layer. More specifically, a virtualization layer comprises at least one software component running at the host level within a virtualization environment. A virtualization layer allows rapid on demand deployment of a plurality of dedicated computers, as well as automated configuration such as network configuration, resources monitoring and security parameters, such as the configuration of a firewall. Also, a virtualization layer may leverages the emulation of keyboard, video and mouse provided by the virtualization layer in order to provide at least one client with complete control of at least one server. Contrary to traditional methods, a virtualization layer aims at eliminating the need to access the client's virtual machine in order to perform these configurations. All configurations may be performed from within the host and hypervisor level. Additionally, a virtualization

layer comprises a self-update reprogramming functionality that allows the redeployment of future releases and bugs fixes of a virtualization layer without having to interrupt the client's virtual machine.

[0013] A virtualization layer may be stored on an external storage on each host, such as an USB flash drive, to allow dedication of the host storage to the client's virtual machine. Alternatively, storing the virtualization layer locally allows faster boot time and, in the event of a major power outage affecting several servers, prevents network congestion and many problems related to faulty network equipment or network auto-negotiation delays, compared to traditional network boot methods, such as PXE boot.

[0014] Within the scope of the invention, virtualization is defined as a method to run at least one different operating system environment on any guest environment through a hypervisor or a virtual machine monitor hosted on a physical computer. The hardware virtualization allows the hiding of physical characteristics of a computer platform or hardware to the client operating system. A hypervisor may run multiple virtual machines, each virtual machine having their own operating system.

[0015] Within the scope of the invention, an hypervisor refers to an apparatus disclosed by the U.S. Patent Application published under the number US 201 1/0202919 and a physical computer refers to any computing device such as server, desktop computer, rack computer or any device allowing at least one software program to be executed.

[0016] The features of the present invention which are believed to be novel are set forth with particularity in the appended claims.

Brief Description of the Drawings

[0017] The above and other aspects, features and advantages of the invention will become more readily apparent from the following description, reference being made to the accompanying drawings in which:

[0018] Figure 1 is a workflow diagram presenting the initial steps in accordance with the invention of a method for automatically configuring and updating a virtual server.

[0019] Figures 2A and 2B is a workflow diagram presenting the steps in accordance with the invention of a method for automatically configuring and updating a virtual server for a client to reserve and order a host computer from a hosting service provider.

[0020] Figure 3 is a diagram presenting a virtualization layer and its related subcomponents within a physical computer in accordance with the invention of a system and method for automatically configuring and updating a virtual server.

[0021] Figure 4 is an architecture diagram presenting a virtualization layer within a hosting service provider environment allowing automatic reservation of physical computer by at least one client in accordance with the invention of a system and method for automatically configuring and updating a virtual server.

Detailed Description of the Preferred Embodiment

[0022] A novel system and method for automatically configuring and updating a virtual server will be described hereinafter. Although the invention is described in terms of specific illustrative embodiments, it is to be understood that the embodiments described herein are by way of example only and that the scope of the invention is not intended to be limited thereby.

[0023] The method for automatically configuring and updating a virtual server allows a hosting services provider to quickly deploy a new configured host and to easily update or upgrade an existing host. In order to optimize the deployment speed and the ease of configuration, a virtualization layer is installed on the computer host. Such layer provides an environment to run a virtual machine having at least one container for running an operating system. The virtualization layer minimizes the memory footprint on the physical computer. To ensure optimal performance, it is desirable to have only one virtual machine for each physical computer. However, other

embodiments may allow the use of more than one virtual machine for one physical computer.

[0024] Now referring to Figure 1, a method for setting up a physical server 100 is presented. The method for configuring a virtual server comprises a plurality of steps for assembling, setting up and configuring a physical computer on the service provider network. A hosting services provider may set up at least one physical computer as a hosting server to ensure a timely delivery of a server requested by a client. The method may comprise the steps to physically assemble the physical computer 101, to reserve a physical location for the physical computer 102, to setup the physical computer at a selected physical location 103, to run a program that automatically validates the selected physical location, such as power and switched power distribution unit and testing the physical network connectivity 104, to program and physically install a removable configuration device on the physical computer 105. The programming process of a removable configuration device 105 may comprise the steps to copy a virtualization layer on the removable device and to pre-configure virtualization layer parameters based on the specifications of the physical computer. Upon completion of these steps, the physical computer may be offered for usage by a client 106.

[0025] Now referring to Figures 2A and 2B, a method for automatically configuring a physical or virtual server 200 is presented. The method for configuring a server comprises a plurality of steps for automatically configuring a server based on the specifications required by at least one client. In a preferred embodiment, the client requests a physical computer through a communication method 201, such as a computer network, the Internet, a phone call or a fax. On reception of the request, a server corresponding to the specifications required by the client is reserved 202. The reservation process comprises the step to store the reservation information within a reservation registry.

[0026] On reservation, a software program is run on the reserved server to confirm the proper operation of the physical computer and all the related components 203. The validation software program comprises a plurality of known tests to evaluate the status of the system and its components, such as testing the hard disk drive(s) for bad

sectors and other defects, testing the network configuration and connectivity, ensuring a minimum level of performance and validating the configuration by identifying any difference that may exist between the hardware specifications ordered by the client and the actual physical parts in the physical computer. In the event where the validation process confirms the proper operation of the system, at least one address must be reserved within a virtual network 204, such as a local or public VLAN and at least one network address, such as an IP address, must be reserved for a local area network and the wide area network 205.

[0027] In the event where the validation process fails, an alarm notification may be sent to at least one automatic deployment system in order for the automatic deployment system to configure a different physical computer.

[0028] Still referring to Figures 2A and 2B, the process to install a virtual machine on the physical computer is presented at 206 to 210. In order to prepare the installation of a virtual machine on the physical computer, the virtual machine must be preconfigured by configuring different parameters 206 such as the network port speed, the firewall entries and any parameters required by the client. Based on such client's parameter, a method for installing a customized virtual machine is generated by a software program 207. This method may be based on at least one pre-defined template or may use at least one software installation package. During this process or subsequently, a virtual network shall be configured within a network switching device 208, such as an IP switch, a router or any other switching device. On completion of the network configuration process 208, the virtual machine is launched on the physical computer 209. In a preferred embodiment, the virtual machine shall be started through an installation mode and installation of the virtual machine shall be deemed completed if no problem occurs 210. The installation mode defines the state during which the installation and configuration process of the virtual machine is being completed.

[0029] Still referring to Figures 2A and 2B, a process for configuring the network parameters of the client is presented at 211 to 213, wherein such process is launched on completion of the installation process. Such process comprises the steps to configure at least one virtual network within a switching device and on a distribution

routing device 211, to configure the speed of the switching device based on the parameters requested by the client 212 and to configure the public local area and wide area network addresses on a routing device 213.

[0030] Based on the specification inputted by the client, memory shall be allocated on the physical computer and shall be reserved for the virtualization layer 214. The quantity of memory shall be determined based on different parameters such as the version number of a virtualization layer, the total amount of memory present on the physical computer, the hard disk drive(s) size and configuration.

[0031] On completion of the network configuration, the virtual machine shall be started using a "first start" mode. Such mode allows the virtual machine to run a plurality of tests that confirm the proper operation of the hosting server 215. Based on the first start of the virtual machine, the configuration of the virtual machine is marked as final 216 and the server is activated for the client 217.

[0032] Now referring to Figure 3, a virtualization layer and the related subcomponents are shown within a physical computer 300. A client physical computer comprises at least one virtual machine 301 and at least one virtualization layer 302. A virtualization layer 302 allows the deployment of a plurality of dedicated servers such as network configuration 304, resources monitoring 306 and security parameters, such as the configuration of a firewall 305. The virtualization layer allows the direct configuration of the network, the security parameters and the different resources. Thus, the virtualization layer eliminates the need to configure such parameters through a virtual machine. The virtualization layer may comprise a self update reprogramming software tool 307 allowing the automatic deployment of different version of a virtualization layer without stopping the at least one virtual machine.

[0033] In order to save storage space on the physical computer, the virtualization layer may be hosted or stored on external storage such as removable memory device such as a USB flash drive, ROM device such as DVD or Blu-ray™ discs or such as programmable unit such as a dedicated chip. The device may facilitate the restoration of the systems after a major power outage or faulty equipment.

[0034] Now referring to Figure 4, an architecture diagram shows a virtualization layer within a hosting services environment. The hosting services environment allows a new customer 401 or returning customer 402 to create, manage, modify or suppress a host server configuration from a graphical user interface, such as a web site 403 or a secure website 404. The hosting services environment comprises a business logic layer 405 and a services layer 406. The services layer 406 comprises a plurality of controllers such as the network configuration controller 408, the power management controller 409, the operating system installation controller 410 and the virtualization layer controller 411 (referred to as SmartLayer™ controller). The virtualization layer controller 411 acts as a server to receive a plurality of requests from the services layer 406 controllers to configure the virtualization layer of a specific physical computer or to execute different commands on a specific physical computer. The virtualization layer controller 411 processes the request from a controller and use the translator to transform the request as a command compatible with the targeted physical computer. An orchestrator 413 may be present within the architecture to synchronize the plurality of events from or to a physical computer of a client of the hosting services provider. The synchronization allows the business logic layer 405 processes to access live information related to the plurality of physical computers.

[0035] In another embodiment, within at least one step executing at least one software programs used for automatically configuring or updating a virtual server, human intervention may replace the execution of the at least one software program. A human intervention may be required in order to execute non-repetitive tasks or to provide customized configuration.

[0036] While illustrative and presently preferred embodiments of the invention have been described in detail hereinabove, it is to be understood that the inventive concepts may be otherwise variously embodied and employed and that the appended claims are intended to be construed to include such variations except insofar as limited by the prior art.

Claims

1) A system for automatically configuring a virtual machine on a computer, the virtual machine comprising network parameters, security parameters and resource parameters, the system comprising a virtuahzation layer hosted on the computer, the virtuahzation layer being in communication with the virtual machine and comprising:
    a) a network management module for automatically configuring the network parameters of the virtual machine with external network parameters;
    b) a security management module for automatically configuring the security parameters of the virtual machine with external security parameters;
    c) a resource management module for automatically configuring the resource parameters of the virtual machine with external resource parameters.

2) A system as claimed in claim 1, wherein the computer is a hosting server.

3) A computer hosting a virtuahzation layer and at least one virtual machine, the at least one virtual machine comprising network parameters, security parameters and resource parameters, the virtuahzation layer being in communication with the at least one virtual machine for automatically configuring the network parameters of the at least one virtual machine with external network parameters, for automatically configuring the security parameters of the at least one virtual machine with external security parameters, and for automatically configuring the resource parameters of the virtual machine with external resource parameters.

4) A computer as claimed in claim 3, wherein the computer is a hosting server.

5) A method for automatically configuring a virtual machine on a computer, the method comprising:
    a) installing a virtuahzation layer on the computer;
    b) the virtuahzation layer receiving external network parameters, external security parameters, and external resource parameters;
    c) installing at least one virtual machine on the computer, the at least one virtual machine being in communication with the virtuahzation layer;

d) the virtualization layer automatically configuring network parameters, security parameters and resource parameters of the at least one virtual machine with the received external network parameters, external security parameters, and external resource parameters.

6) A method as claimed in claim 5, wherein the computer is a hosting server.

* * *

Figure 1

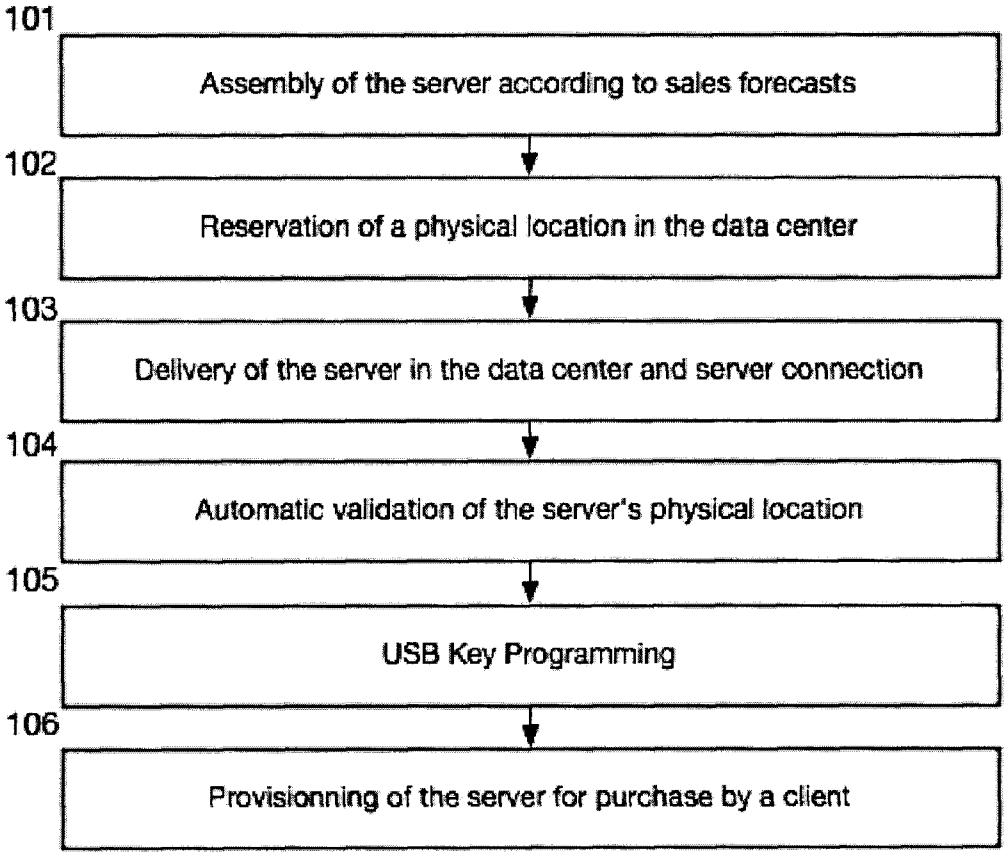

101
Assembly of the server according to sales forecasts
102
Reservation of a physical location in the data center
103
Delivery of the server in the data center and server connection
104
Automatic validation of the server's physical location
105
USB Key Programming
106
Provisionning of the server for purchase by a client

Figure 2A

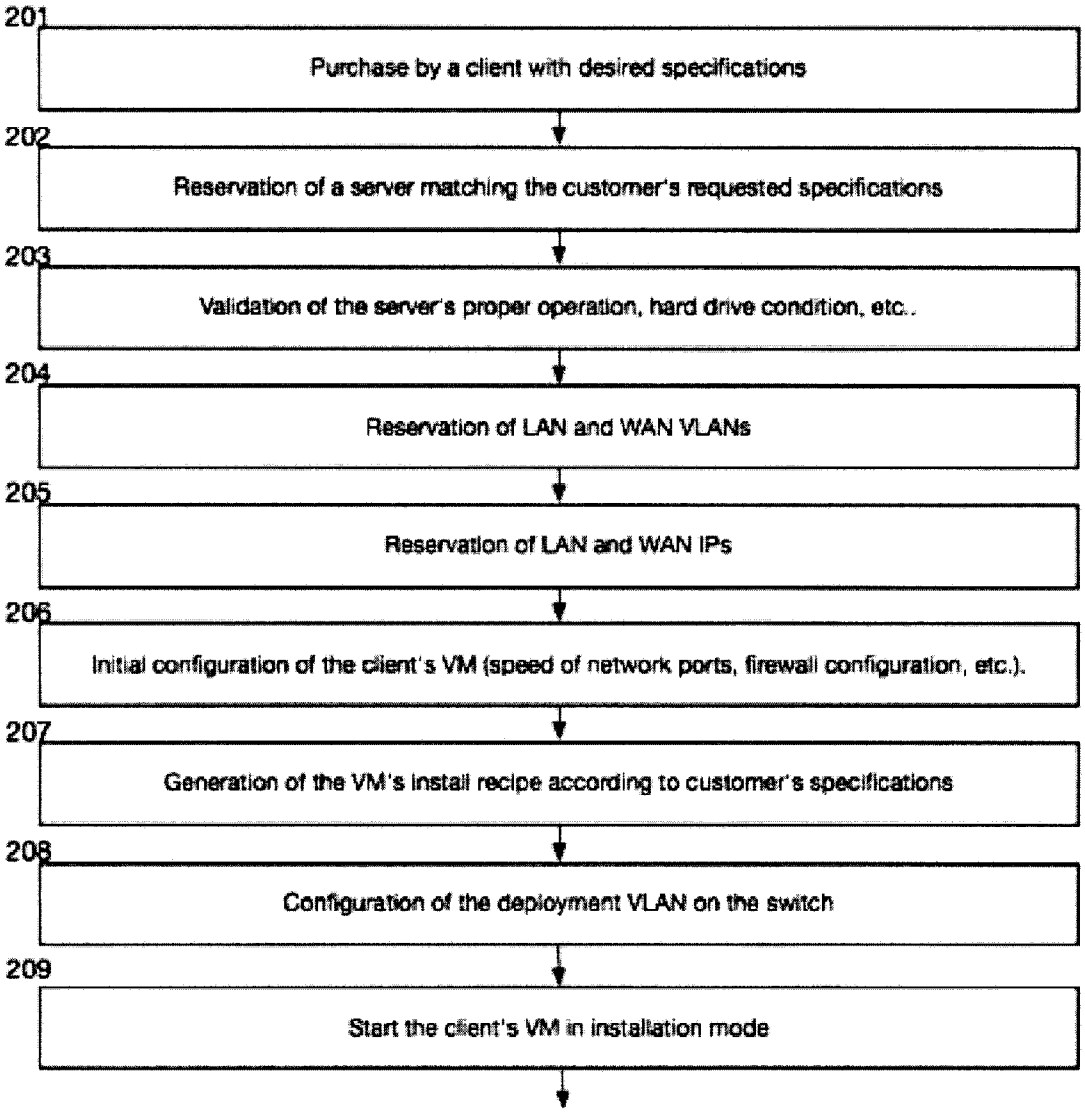

201
Purchase by a client with desired specifications
202
Reservation of a server matching the customer's requested specifications
203
Validation of the server's proper operation, hard drive condition, etc..
204
Reservation of LAN and WAN VLANs
205
Reservation of LAN and WAN IPs
206
Initial configuration of the client's VM (speed of network ports, firewall configuration, etc.).
207
Generation of the VM's install recipe according to customer's specifications
208
Configuration of the deployment VLAN on the switch
209
Start the client's VM in installation mode

Figure 2B

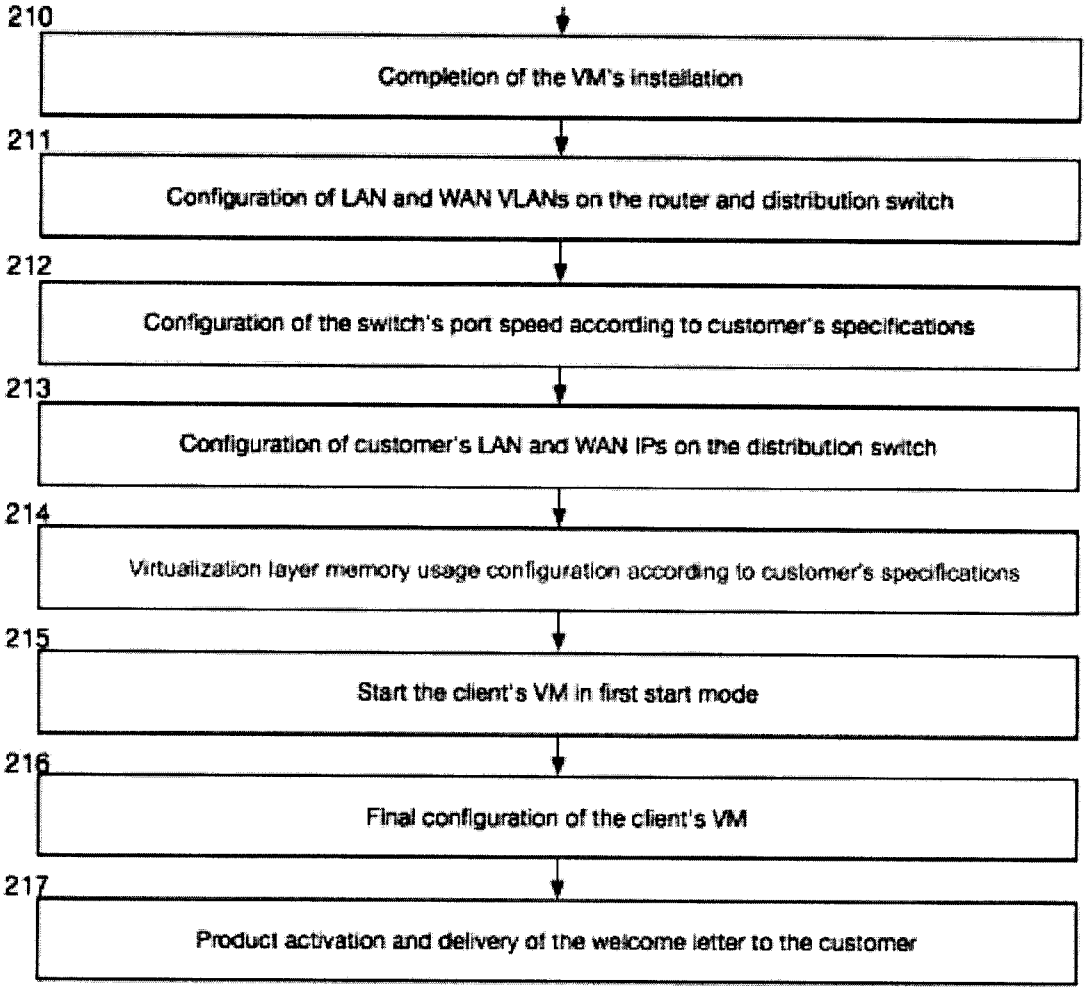
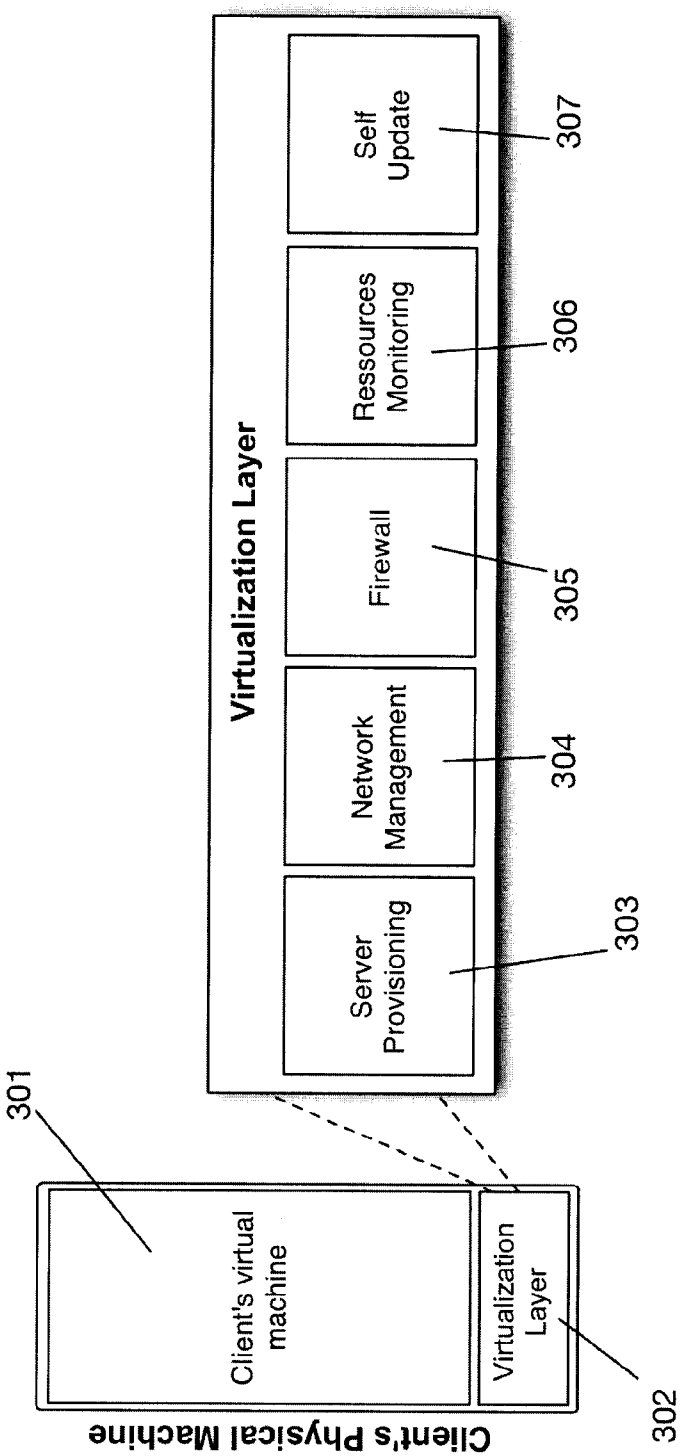

210
Completion of the VM's installation
211
Configuration of LAN and WAN VLANs on the router and distribution switch
212
Configuration of the switch's port speed according to customer's specifications
213
Configuration of customer's LAN and WAN IPs on the distribution switch
214
Virtualization layer memory usage configuration according to customer's specifications
215
Start the client's VM in first start mode
216
Final configuration of the client's VM
217
Product activation and delivery of the welcome letter to the customer

Figure 3


Client's Physical Machine
Client's virtual machine
Virtualization Layer
Virtualization Layer
Server Provisioning
Network Management
Firewall
Ressources Monitoring
Self Update
301
302
303
304
305
306
307

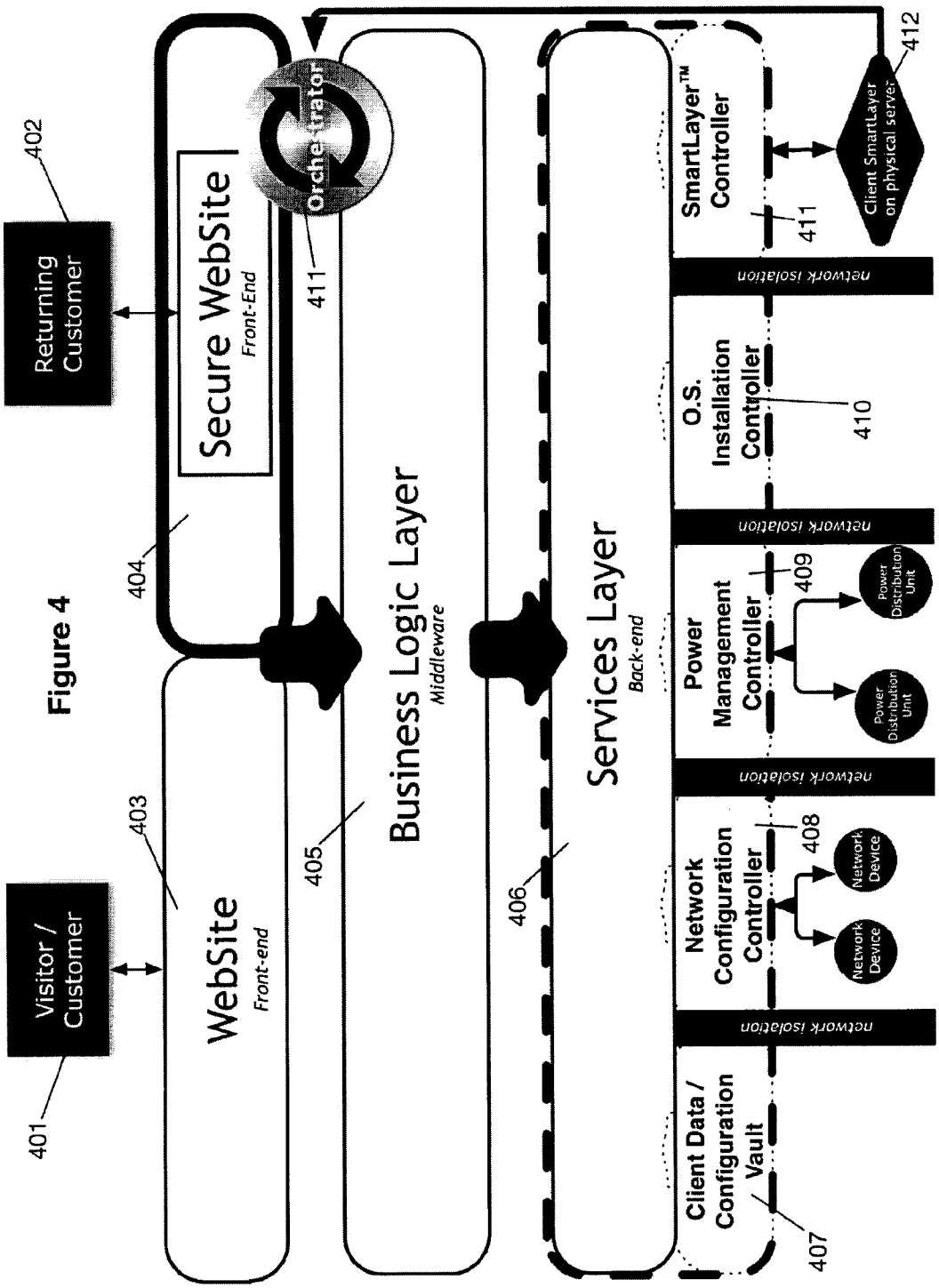

Visitor / Customer
Returning Customer
WebSite
Front-end
Secure WebSite
Front-End
Orchestrator
Business Logic Layer
Middleware
Services Layer
Back-end
Client Data / Configuration Vault
Network Configuration Controller
Power Management Controller
O.S. Installation Controller
SmartLayer™ Controller
Client SmartLayer on physical server
Network Device
Network Device
Power Distribution Unit
Power Distribution Unit
network isolation
network isolation
network isolation
network isolation
401
402
403
404
405
406
407
408
409
410
411
411
412

Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2012/001 106

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***H04L 12/24*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation seaixhed (classification system followed by classification symbols)
IPC: ***H04L 12/24*** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
TotalPatent, Espiffcenet, Canadian Patent Database, USPTO Database, ΓEEE Xplore.
Keywords: automatic, configure, virtual, machine, desktop, host, server, network, security, resource, external, parameter, virtualrzation,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO201 1/069784 A1 (CIANO ET AL.) 16 June 201 1 -see abstract: -see page 2, line 29-32: -see page 4, line 3 - page 6, line 32: -see page 7, line 2 1 - page 8, line 3: -see page 9, line 9 - page 14, line 7: -see figures 1 and 6.	1-6
A	US20070180448 A1 (LOW ET AL.) 02 August 2007 -see abstract: -see paragraphs [0()16]-[0019]: -see figure 95-97.	1-6

[ ] Further documents are listed in the continuation of Box C. [X] 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
"L" document which may throw- doubts on priority clami(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or prionty date and not m conflict with the application but citecTto understand the principle or theorv underlying the invention
"χ" document of particular relevance ; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance ; the claimed invention cannot be considered to involve an inventive step when the document is combined rath one or more other such documents, such combination being obvious to a person skilled m the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 March 2013 (13-03-2013)	20 March 2013 (20-03-2013)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C I 14 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Hassan Bayaa (8 19) 997-78 10

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA20 12/00 1106

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO201 1069784A1	16 June 201 1 (16-06-201 1)	TW201 137751A	0 1 November 201 1 (01-1 1-201 1)
		US2012246647A1	27 September 2012 (27-09-2012)
US2007180448A1	02 August 2007 (02-08-2007)	AU2007208093A1	02 August 2007 (02-08-2007)
		BRPI0707220A2	26 April 201 1 (26-04-201 1)
		CA2637980A1	02 August 2007 (02-08-2007)
		CN101410803A	15 April 2009 (15-04-2009)
		EP1977317A1	08 October 2008 (08-10-2008)
		EP2369479A2	28 September 201 1 (28-09-201 1)
		EP2369479A3	2 1 December 201 1 (21-12-201 1)
		EP2375328A2	12 October 201 1 (12-10-201 1)
		EP2375328A3	2 1 December 201 1 (21-12-201 1)
		IL192910D0	11 February 2009 (1 1-02-2009)
		IL192910A	3 1 December 2012 (31-12-2012)
		US2007192329A1	16 August 2007 (16-08-2007)
		US7870153B2	11 January 201 1 (1 1-01-201 1)
		US2007179955A1	02 August 2007 (02-08-2007)
		US7949677B2	24 May 201 1 (24-05-201 1)
		US2007180493A1	02 August 2007 (02-08-2007)
		US7954150B2	3 1 May 201 1 (31-05-201 1)
		US8010679B2	30 August 201 1 (30-08-201 1)
		US2007198656A1	23 August 2007 (23-08-2007)
		US8051 180B2	0 1 November 201 1 (01-1 1-201 1)
		US2007180449A1	02 August 2007 (02-08-2007)
		US81 17314B2	14 February 2012 (14-02-2012)
		US2007186212A1	09 August 2007 (09-08-2007)
		US8341270B2	25 December 2012 (25-12-2012)
		US2007180450A1	02 August 2007 (02-08-2007)
		US8341732B2	25 December 2012 (25-12-2012)
		US2007171921A1	26 July 2007 (26-07-2007)
		US8355407B2	15 January 2013 (15-01-2013)
		US2007174410A1	26 July 2007 (26-07-2007)
		US2007174429A1	26 July 2007 (26-07-2007)
		US2007180447A1	02 August 2007 (02-08-2007)
		WO2007087558A2	02 August 2007 (02-08-2007)
		WO2007100942A2	07 September 2007 (07-09-2007)
		WO2007100942A9	0 1 November 2007 (01-1 1-2007)
		WO2007100942A8	2 1 December 2007 (21-12-2007)