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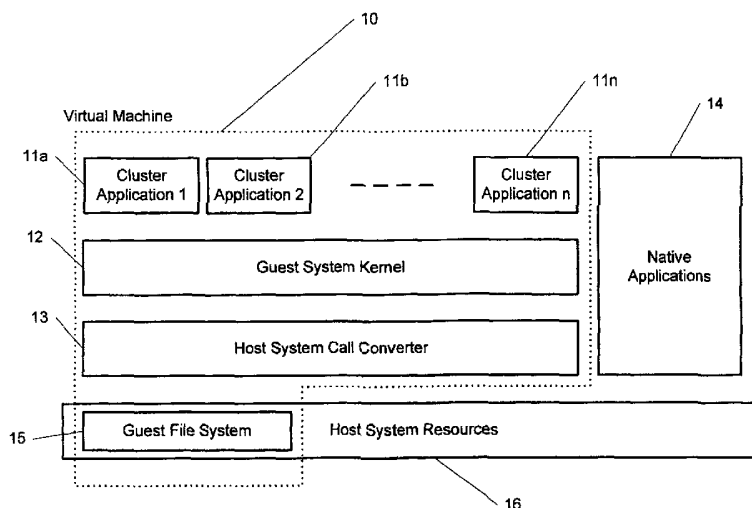
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**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: CONCURRENT CLUSTER ENVIRONMENT WITH EMULATORS FOR RUNNING NON-NATIVE APPLICATIONS



(57) Abstract: The invention relates to method and apparatus for running a plurality of interrelated computational tasks (11a...11n) on a plurality of host computers. The host computers run a primary operating system. The method includes the steps of: establishing a virtual machine running on a host computer where the virtual machine is configured to run as a native application emulating a secondary operating system (12) including storage and I/O functionality. The virtual machine may be configured to provide the host computer's primary operating system with access to the virtual machine's secondary operating system and the virtual machine with access to the host computers system resources. The virtual machine may also emulate a file system by providing a guest file system (15) and provide access to the host computers system resources via a host system call converter (13). Virtual machine system calls are converted to the host systems system calls by a host system call converter and controls the access to the users system resources. The host system call converter also provides access to the guest file system.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**INTERNATIONAL SEARCH REPORT**

International Application No

PCT/IB2004/001547

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 G06F9/455 G06F9/46

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)

IPC 7 G06F

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 770 958 A (SUN MICROSYSTEMS INC) 2 May 1997 (1997-05-02) page 2, line 44 - line 53 page 3, line 54 - page 4, line 20	1-7, 13-15
Y	-----	1,8-15
X	EP 1 040 414 B (FUJITSU SIEMENS COMPUTERS GMBH) 4 October 2000 (2000-10-04) paragraph '0001! paragraph '0009! - paragraph '0010! paragraph '0018! - paragraph '0022!; figure 1 paragraph '0062! - paragraph '0066! ----- -/--	1-7, 13-15

Further documents are listed in the continuation of box C.

Patent family members are listed in 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 document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(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 priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* 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 with one or more other such documents, such combination being obvious to a person skilled in the art.
- \* & \* document member of the same patent family

Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2004/001547

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 96/10224 A (BULL HN INFORMATION SYST)            4 April 1996 (1996-04-04)            page 2, line 1 - line 3            page 5, paragraph 1 - paragraph 2            page 12, line 15, paragraph 2 - page 13,            line 21, paragraph 2; figure 1            page 14, line 11, paragraph 2 - paragraph            3</p> <p style="text-align: center;">-----</p>	1-7, 13-15
A	<p>FRANZ M: "EMULATING AN OPERATING SYSTEM            ON TOP OF ANOTHER"            SOFTWARE PRACTICE &amp; EXPERIENCE, JOHN WILEY            &amp; SONS LTD. CHICHESTER, GB,            vol. 23, no. 6, 1 June 1993 (1993-06-01),            pages 677-692, XP000655851            ISSN: 0038-0644            abstract</p> <p style="text-align: center;">-----</p>	1-7, 13-15
Y	<p>US 6 463 457 B1 (ARMENTROUT STEVEN L ET            AL) 8 October 2002 (2002-10-08)            column 4, line 40 - line 65; figure 1            column 5, line 40 - column 6, line 6            column 6, line 24 - line 28            column 7, line 55 - column 8, line 50            column 9, line 25 - column 10, line 2</p> <p style="text-align: center;">-----</p>	1,8-15
Y	<p>US 6 112 225 A (LU QI ET AL)            29 August 2000 (2000-08-29)            column 2, line 1 - column 3, line 9            column 4, line 63 - column 6, line 3            column 7, line 9 - column 8, line 67            column 10, line 28 - line 32</p> <p style="text-align: center;">-----</p>	1,8-15
A	<p>TAKAGI H ET AL: "Ninplet: a migratable            parallel objects framework using Java"            CONCURRENCY: PRACTICE AND EXPERIENCE, JOHN            WILEY AND SONS, GB,            vol. 10, no. 11-13,            February 1998 (1998-02), pages 1063-1078,            XP002209552            ISSN: 1040-3108            abstract            From line 16:            page 1064            page 1067, line 6 - page 1069, line 2</p> <p style="text-align: center;">-----</p>	1,8-15

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB2004/001547

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7,13-15 (group 1)

Emulating an operating system (OS') on a computer running another OS (OS'') by translating system calls. Emulator converting the system calls runs as native application on OS''. Thus applications for OS' require no recompilation to run on the computer with OS''.

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2. claims: 8-12 (group 2)

Performing CPU intensive portionable tasks on under-utilized machines offering their surplus processing power. Tasks performed only when hosting computer is idle, for example when no user input is registered.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No <b>PCT/IB2004/001547</b>
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Patent document cited in search report	Classification	Publication date	Patent family member(s)	Publication date
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EP 1040414	B	04-10-2000	DE 59804749 D1	14-08-2002
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			EP 1145109 A2	17-10-2001
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