

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 March 2002 (21.03.2002)

PCT

(10) International Publication Number
WO 2002/023331 A3

(51) International Patent Classification⁷: G06F 9/445,
9/44, 9/45

(21) International Application Number:
PCT/US2001/028579

(22) International Filing Date:
12 September 2001 (12.09.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/661,684 14 September 2000 (14.09.2000) US

(71) Applicant: SUN MICROSYSTEMS, INC. [US/US]; 910
San Antonio Road, Palo Alto, CA 94303 (US).

(72) Inventor: SCHWABE, Judith, E.; 901 San Antonio
Road, Palo Alto, CA 94303 (US).

(74) Agents: RITCHIE, David, B. et al.; Thelen Reid & Priest
LLP, P.O. Box 640640, San Jose, CA 95164-0640 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,

CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK,
SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

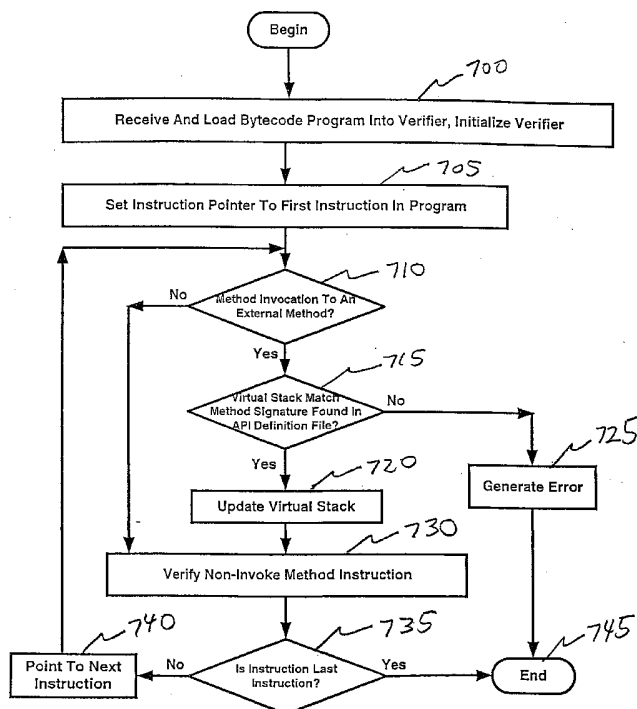
(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,
CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,
TG).

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

(88) Date of publication of the international search report:
26 February 2004

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.

(54) Title: REMOTE INCREMENTAL PROGRAM BINARY COMPATIBILITY VERIFICATION USING API DEFINITIONS



(57) Abstract: A method of operating a computer system includes providing a first version of a program in memory and verifying the program prior to program execution. The first version of a program includes at least one program unit. Each program unit includes an Application Programming Interface (API) definition file and an implementation, each API definition file defines items in its associated program unit that are made accessible to one or more other program units and each implementation includes executable code corresponding to the API definition file. The executable code includes type specific instructions and data. Program verification includes indicating a verification error when a first version of a first program unit implementation is not internally consistent, indicating a verification error when the first version of the first program unit implementation is inconsistent with the version of the program unit API definition file associated with the first version of the first program unit implementation, receiving a second version of the first program unit implementation and a second version of the first program unit API definition file, verifying the second version of the first program unit implementation and verifying that the second version of the first program unit implementation is binary compatible with the first version of the first program unit implementation by comparing the first version of the first program unit API definition file and the second version of

WO 2002/023331 A3

the first program unit API definition file.

INTERNATIONAL SEARCH REPORT

Intern. Application No
PCT/US 01/28579

| | | | | |
|--|---|---|---|---|
| A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06F9/445 G06F9/44 G06F9/45 | | | | |
| 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 | | | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | | | |
| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | | |
| X | SURESH SUBRAMANIAN ED - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: "CRUISE: USING INTERFACE HIERARCHIES TO SUPPORT SOFTWARE EVOLUTION" PROCEEDINGS OF THE CONFERENCE ON SOFTWARE MAINTENANCE. PHOENIX, OCT. 24 - 27, 1988, PROCEEDINGS OF THE CONFERENCE ON SOFTWARE MAINTENANCE. FROM 1994 INTERNATIONAL CONFERENCE ON SOFTWARE MAINTENANCE, WASHINGTON, IEEE COMP. SOC. PRESS, US, 24 October 1988 (1988-10-24), pages 132-142, XP000010770 the whole document | 1-18 | | |
| A | US 5 613 101 A (LILICH ALAN W) 18 March 1997 (1997-03-18) column 3, line 64 - page 1, column 5, line 12 | 1-18 | | |
| ----- -/-- ----- | | | | |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. | | | | |
| <input checked="" type="checkbox"/> Patent family members are listed in annex. | | | | |
| ° Special categories of cited documents : | | | | |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <ul style="list-style-type: none"> *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 </td> <td style="width: 50%; border: none; vertical-align: top;"> <ul style="list-style-type: none"> *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. *Z* document member of the same patent family </td> </tr> </table> | | | <ul style="list-style-type: none"> *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 | <ul style="list-style-type: none"> *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. *Z* document member of the same patent family |
| <ul style="list-style-type: none"> *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 | <ul style="list-style-type: none"> *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. *Z* document member of the same patent family | | | |
| Date of the actual completion of the international search <p style="text-align: center; font-size: 1.2em;">9 December 2003</p> | | Date of mailing of the international search report <p style="text-align: center; font-size: 1.2em;">05/01/2004</p> | | |
| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016 | | Authorized officer <p style="text-align: center; font-size: 1.2em;">Bijn, K</p> | | |

INTERNATIONAL SEARCH REPORT

Intern: Application No

PCT/US 01/28579

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| A | EP 0 498 130 A (IBM) 12 August 1992 (1992-08-12) column 5, line 25 - column 7, line 30 ----- | 1-18 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

| | |
|---------|-----------------|
| Intern: | Application No |
| | PCT/US 01/28579 |

| Patent document cited in search report | A | Publication date | Patent family member(s) | Publication date |
|--|---|------------------|-------------------------|------------------|
| US 5613101 | A | 18-03-1997 | AT 160032 T | 15-11-1997 |
| | | | AU 6783394 A | 21-11-1994 |
| | | | CA 2162033 A1 | 10-11-1994 |
| | | | DE 69406660 D1 | 11-12-1997 |
| | | | EP 0698238 A1 | 28-02-1996 |
| | | | JP 3343354 B2 | 11-11-2002 |
| | | | JP 8509830 T | 15-10-1996 |
| | | | WO 9425918 A1 | 10-11-1994 |
| | | | | |
| EP 0498130 | A | 12-08-1992 | US 5579509 A | 26-11-1996 |
| | | | EP 0498130 A2 | 12-08-1992 |
| | | | JP 5088859 A | 09-04-1993 |
| | | | | |