

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
3 July 2003 (03.07.2003)

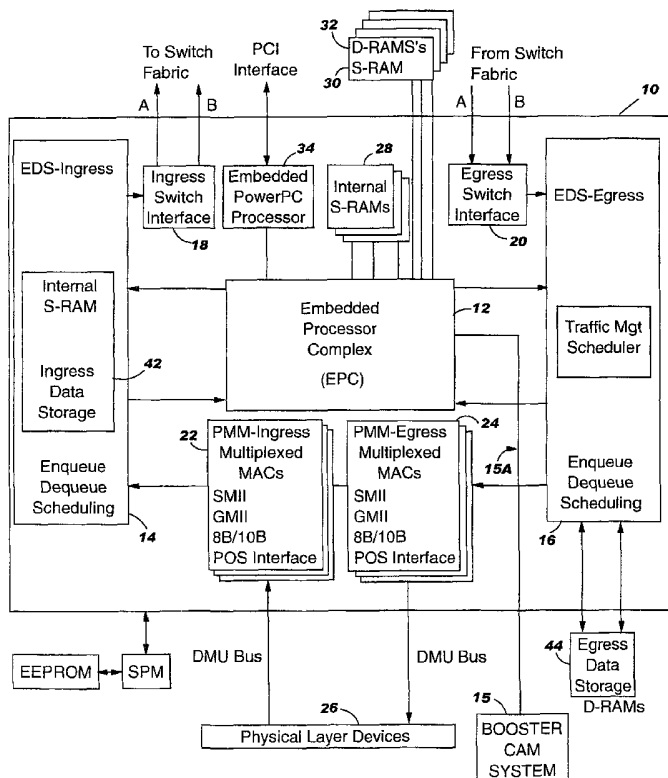
PCT

(10) International Publication Number  
WO 2003/054739 A3

- (51) International Patent Classification<sup>7</sup>: G06F 17/30, H04L 12/46
- (21) International Application Number: PCT/GB2002/005562
- (22) International Filing Date: 9 December 2002 (09.12.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 10/015,165 11 December 2001 (11.12.2001) US
- (71) Applicant: INTERNATIONAL BUSINESS MACHINES CORPORATION [US/US]; New Orchard Road, Armonk, NY 10504 (US).
- (71) Applicant (for MG only): IBM UNITED KINGDOM LIMITED [GB/GB]; PO Box 41, North Harbour, Portsmouth, Hampshire PO6 3AU (GB).
- (72) Inventors: CALVIGNAC, Jean, Louis; 112 Spring Hollow Lane, Cary, NC 27511 (US). VERPLANKEN, Fabrice, Jean; 9152 Route de Cagnes, F-06610 La Gaude (FR).
- (74) Agent: BURT, Roger, James; IBM United Kingdom Limited, Intellectual Property Law, Hursley Park, Winchester, Hampshire SO21 2JN (GB).
- (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, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: HYBRID SEARCH MEMORY FOR NETWORK PROCESSOR AND COMPUTER SYSTEMS



(57) Abstract: A data structure, system and method of searching the data structure are disclosed. The system includes a data structure having a Direct Table (DT), Patricia-Trees, Pointers and high speed storage systems such as Contents Address Memory (CAM). The DT has a plurality of entries with each one coupled to a Patricia Tree having multiple nodes coupled to leaves. The number of Nodes, termed a threshold, that can be traversed to obtain information in the leaves is limited to a predetermined value. Once the threshold is reached a pointer indicates the address of the CAM and the address of the leaves is stored in the CAM. By using the disclosed structure and method the latency associated with tree search is significantly reduced.

WO 2003/054739 A3



ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK,  
TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
GW, ML, MR, NE, SN, TD, TG).

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

**Published:**

— *with international search report*

*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/GB 02/05562

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 G06F17/30 H04L12/46		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 H04L		
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, WPI Data, PAJ, COMPENDEX, IBM-TDB		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 01 16763 A (IBM) 8 March 2001 (2001-03-08) the whole document ---	1-10
Y	US 5 414 704 A (SPINNEY BARRY A) 9 May 1995 (1995-05-09) the whole document ---	1-10
Y	EP 0 594 196 A (DIGITAL EQUIPMENT CORP) 27 April 1994 (1994-04-27) the whole document ---	1-10
Y	EP 0 522 743 A (DIGITAL EQUIPMENT CORP) 13 January 1993 (1993-01-13) the whole document ---	1-10
	-/--	
<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 :		
*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  28 October 2003		Date of mailing of the international search report  06/11/2003
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  Korkuzas, V

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 02/05562

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 136 580 A (VIDELOCK GARY B ET AL) 4 August 1992 (1992-08-04) the whole document ---	1-10
A	GIBBS D S ET AL: "A CONTENT ADDRESSABLE MEMORY FOR DATA COMMUNICATIONS", MICROPROCESSORS AND MICROSYSTEMS, IPC BUSINESS PRESS LTD. LONDON, GB, VOL. 16, NR. 2, PAGE(S) 59-66 XP000277788 ISSN: 0141-9331 the whole document -----	1-10

## INTERNATIONAL SEARCH REPORT

 Internatic application No  
 PCT/GB 02/05562

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0116763	A	08-03-2001	CN 1399738 T	26-02-2003
			EP 1226501 A1	31-07-2002
			JP 2003508954 T	04-03-2003
			WO 0116763 A1	08-03-2001
US 5414704	A	09-05-1995	DE 69324204 D1	06-05-1999
			DE 69324204 T2	23-12-1999
			EP 0594196 A1	27-04-1994
EP 0594196	A	27-04-1994	DE 69324204 D1	06-05-1999
			DE 69324204 T2	23-12-1999
			EP 0594196 A1	27-04-1994
			US 5414704 A	09-05-1995
EP 0522743	A	13-01-1993	DE 69223553 D1	29-01-1998
			DE 69223553 T2	10-06-1998
			EP 0522743 A1	13-01-1993
			JP 6205025 A	22-07-1994
US 5136580	A	04-08-1992	NONE	