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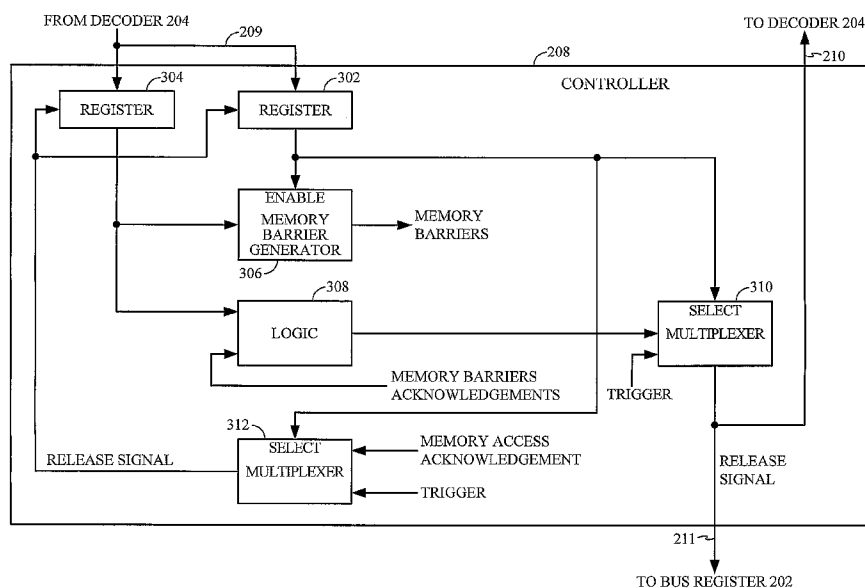
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: ENFORCING STRONGLY-ORDERED REQUESTS IN A WEAKLY-ORDERED PROCESSING SYSTEM



(57) Abstract: The disclosure is directed to a weakly-ordered processing system and method for enforcing strongly-ordered memory access requests in a weakly-ordered processing system. The processing system includes a plurality of memory devices and a plurality of processors. Each of the processors are configured to generate memory access requests to one or more of the memory devices, with each of the memory access requests having an attribute that can be asserted to indicate a strongly-ordered request. The processing system further includes a bus interconnect configured to interface the processors to the memory devices, the bus interconnect being further configured to enforce ordering constraints on the memory access requests based on the attributes.

WO 2006/102667 A3



— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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

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Minimum documentation searched (classification system followed by classification symbols)

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 6 385 705 B1 (KELLER ET AL) 7 May 2002 (2002-05-07) column 2, line 1 - column 3, line 2 column 3, line 53 - column 5, line 23 column 11, line 29 - line 56 figure 1	1,4,9, 15,18 2,3,5-8, 10-14, 16,17, 19,20
Y	US 6 038 646 A (SPROULL) 14 March 2000 (2000-03-14) column 4, line 50 - column 6, line 20 column 7, line 51 - column 8, line 64 ----- -/--	2,3,5-8, 16,17, 19,20



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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 088 771 A (STEELY ET AL) 11 July 2000 (2000-07-11) column 2, line 10 - column 4, line 33 figures 1,2	10-14
X	----- PATENT ABSTRACTS OF JAPAN vol. 016, no. 516 (P-1443), 23 October 1992 (1992-10-23) & JP 04 190435 A (HITACHI LTD), 8 July 1992 (1992-07-08) abstract	1,4,9, 15,18
X	----- US 2003/131175 A1 (HEYNE MANN ET AL) 10 July 2003 (2003-07-10) paragraph [0035] - paragraph [0040]	1,9,15
A	----- US 6 609 192 B1 (GUTHRIE ET AL) 19 August 2003 (2003-08-19) column 3, line 40 - column 4, line 35 -----	3,7,12, 17

INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/US2006/011174

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6385705	B1	07-05-2002	US 6167492 A 26-12-2000
US 6038646	A	14-03-2000	AU 2336199 A 09-08-1999
			EP 1047996 A1 02-11-2000
			JP 2002510079 T 02-04-2002
			WO 9938085 A1 29-07-1999
US 6088771	A	11-07-2000	NONE
JP 04190435	A	08-07-1992	NONE
US 2003131175	A1	10-07-2003	NONE
US 6609192	B1	19-08-2003	NONE