

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
19 February 2004 (19.02.2004)

PCT

(10) International Publication Number
WO 2004/015596 A3

(51) International Patent Classification⁷: G06F 17/50

(21) International Application Number:
PCT/US2003/024601

(22) International Filing Date: 5 August 2003 (05.08.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/215,869 9 August 2002 (09.08.2002) US

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(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, VN, YU, ZA, ZM, ZW.

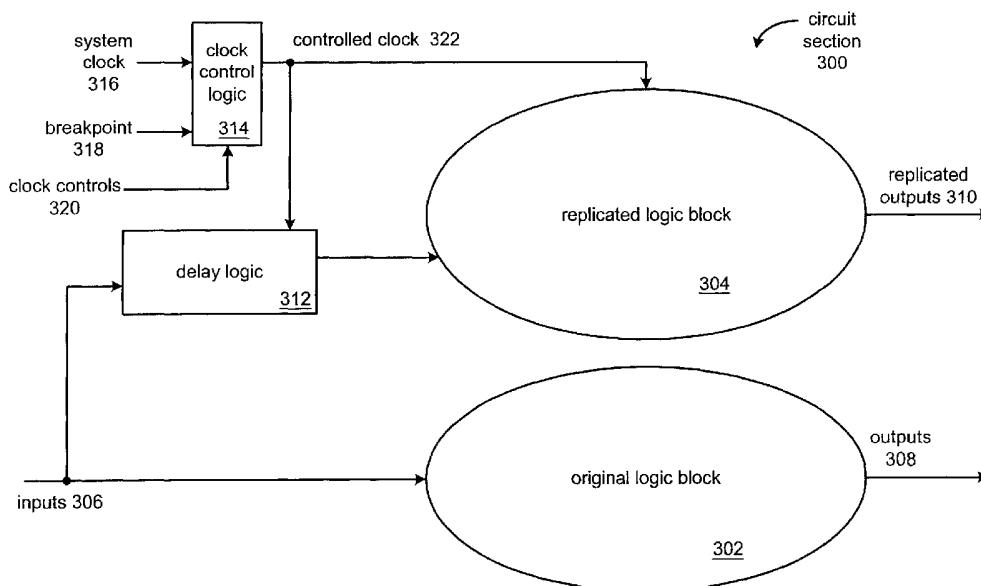
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, 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:
3 June 2004

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR DEBUGGING USING REPLICATED LOGIC



(57) Abstract: A method and apparatus is provided to debug using replicated logic. A text representation of a circuit is compiled to generate a first register transfer level (RTL) netlist. The netlist may be mapped to a target architecture, such as a field programmable gate array (FPGA). The netlist may be used to program an FPGA to create a prototype board for debugging. After debug, a portion of the circuit that a designer would like to analyze is selected. The selected portion of the circuit is replicated. Delay logic is inserted to delay the inputs into the replicated portion of the circuit. The text representation of the circuit is recompiled to generate a second RTL netlist. The second RTL netlist may be mapped to a target architecture, such as a FPGA or application specific integrated circuit (ASIC).

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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

Application No
PCT/US 03/24601

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/50

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, WPI Data, PAJ, INSPEC, IBM-TDB, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 269 467 B1 (LENNARD CHRISTOPHER K ET AL) 31 July 2001 (2001-07-31) abstract column 22, lines 2-4,17-26 column 32, lines 10-58; figure 30	1-27
X	EP 1 168 206 A (KURATORIUM OFFIS E V) 2 January 2002 (2002-01-02) paragraphs '0001!, '0010!, '0013! - '0018!	1-27

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

5 April 2004

Date of mailing of the international search report

16/04/2004

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INTERNATIONAL SEARCH REPORT

Application No
PCT/US 03/24601

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 2001/025369 A1 (LENNARD CHRISTOPHER K ET AL) 27 September 2001 (2001-09-27) abstract paragraph '0243! paragraphs '0351! - '0353!, '0370! - '0386!, '0416! paragraph '0527! claims 41,42	1-27
A	US 5 706 473 A (O'NEIL JANET LYNN ET AL) 6 January 1998 (1998-01-06) abstract column 1, lines 8-12 column 4, line 60 - column 5, line 13 column 6, lines 28-33; figure 4	1-27

INTERNATIONAL SEARCH REPORT

 Application No
 3/24601

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6269467	B1	31-07-2001	US 2001042237 A1 15-11-2001
			US 6567957 B1 20-05-2003
			US 2002016952 A1 07-02-2002
			US 2001039641 A1 08-11-2001
			US 2003115564 A1 19-06-2003
			US 2001018756 A1 30-08-2001
			US 2002166098 A1 07-11-2002
			US 2001025369 A1 27-09-2001
			US 2001016933 A1 23-08-2001
			US 2002073380 A1 13-06-2002
			AU 1100500 A 17-04-2000
			BR 9914200 A 22-01-2002
			CA 2345648 A1 06-04-2000
			CN 1376283 T 23-10-2002
			EE 200100189 A 15-08-2002
			EP 1145159 A2 17-10-2001
			HU 0301274 A2 28-08-2003
			JP 2002526908 T 20-08-2002
			PL 350155 A1 18-11-2002
			WO 0019343 A2 06-04-2000
EP 1168206	A	02-01-2002	DE 10030349 A1 10-01-2002
			EP 1168206 A2 02-01-2002
US 2001025369	A1	27-09-2001	US 6269467 B1 31-07-2001
			US 2001042237 A1 15-11-2001
			US 6567957 B1 20-05-2003
			US 2002016952 A1 07-02-2002
			US 2001039641 A1 08-11-2001
			US 2003115564 A1 19-06-2003
			US 2001018756 A1 30-08-2001
			US 2002166098 A1 07-11-2002
			US 2001016933 A1 23-08-2001
			US 2002073380 A1 13-06-2002
			AU 1100500 A 17-04-2000
			BR 9914200 A 22-01-2002
			CA 2345648 A1 06-04-2000
			CN 1376283 T 23-10-2002
			EE 200100189 A 15-08-2002
			EP 1145159 A2 17-10-2001
			HU 0301274 A2 28-08-2003
			JP 2002526908 T 20-08-2002
			PL 350155 A1 18-11-2002
			WO 0019343 A2 06-04-2000
US 5706473	A	06-01-1998	NONE