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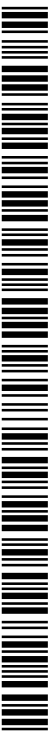
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: UNROLLING QUANTIFICATIONS TO CONTROL IN-DEGREE AND/OR OUT DEGREE OF AUTOMATON

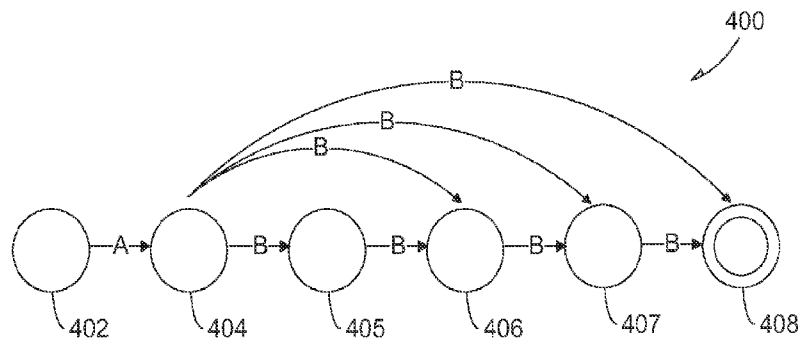


FIG. 4A

(57) Abstract: Apparatus, systems, and methods for a compiler are disclosed. One such compiler parses a human readable expression into a syntax tree and converts the syntax tree into an automaton having in-transitions and out-transitions. Converting can include unrolling the quantification as a function of in-degree limitations wherein in-degree limitations includes a limit on the number of transitions into a state of the automaton. The compiler can also convert the automaton into an image for programming a parallel machine, and publishes the image. Additional apparatus, systems, and methods are disclosed.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/022441**A. CLASSIFICATION OF SUBJECT MATTER****G06F 9/45(2006.01)i**

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)

G06F 9/45; G06F 17/30; G06N 5/02

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: compiler, regular expression(quantification), automaton, image(machine code)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GIORGOS VASILIAKIS et al., 'Regular expression matching on graphics hardware for intrusion detection', '09 Proceedings of the 12th International Symposium on Recent Advances in Intrusion Detection, pp. 265-283, 2009. See pages 267-270, 272-274; and figure 5.	1-48
A	ABHISHEK MITRA et al., 'Compiling PCRE to FPGA for Accelerating SNORT IDS', ACM/IEEE Symposium on Architectures for Networking and Communications Systems, December 2007. See pages 3, 4; and figure 2.	1-48
A	US 2010-0131935 A1 (HAO WANG) 27 May 2010 See paragraphs [0034]-[0039]; claims 1-4; and figure 2.	1-48
A	US 2008-0140600 A1 (ASHISH A. PANDYA) 12 June 2008 See paragraphs [0073]-[0074], [0077]-[0092]; claim 6; and figures 9 and 10.	1-48

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0131935 A1	27.05.2010	CN 101360088 A	04.02.2009
		CN 101360088 B	14.09.2011
		EP 2184687 A1	12.05.2010
		EP 2184687 A4	12.01.2011
		WO 2009-015603 A1	05.02.2009
US 2008-0140600 A1	12.06.2008	CA 2696636 A1	14.05.2009
		CN 101784651 A	21.07.2010
		EP 2179022 A2	28.04.2010
		JP 2010-536978 A	02.12.2010
		KR 10-2010-0039392 A	15.04.2010
		US 2008-0140631 A1	12.06.2008
		US 2008-0140632 A1	12.06.2008
		US 2008-0140661 A1	12.06.2008
		US 2008-0140662 A1	12.06.2008
		US 2008-0140911 A1	12.06.2008
		US 2008-0140912 A1	12.06.2008
		US 2008-0140917 A1	12.06.2008
		US 2008-0140991 A1	12.06.2008
		US 2009-0049230 A1	19.02.2009
		US 2011-0029549 A1	03.02.2011
		US 2011-0029550 A1	03.02.2011
		US 2011-0029556 A1	03.02.2011
		US 2011-0113191 A1	12.05.2011
		US 2011-0119440 A1	19.05.2011
		US 2011-0131196 A1	02.06.2011
		US 2011-0145181 A1	16.06.2011
		US 2011-0153657 A1	23.06.2011
		US 7827190 B2	02.11.2010
		US 7831606 B2	09.11.2010
		US 7831607 B2	09.11.2010
		US 7890692 B2	15.02.2011
		US 7899976 B2	01.03.2011
		US 7899977 B2	01.03.2011
		US 7899978 B2	01.03.2011
		US 7912808 B2	22.03.2011
		US 7996348 B2	09.08.2011
		US 8051022 B2	01.11.2011
		US 8055601 B2	08.11.2011
WO 2008-073824 A1	19.06.2008		
WO 2009-060312 A2	14.05.2009		
WO 2009-060312 A3	14.05.2009		
WO 2009-060312 A8	14.05.2009		