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[Continued on next page]

(54) Title: ESTABLISHING CACHES THAT PROVIDE DYNAMIC, AUTHORITATIVE DNS RESPONSES

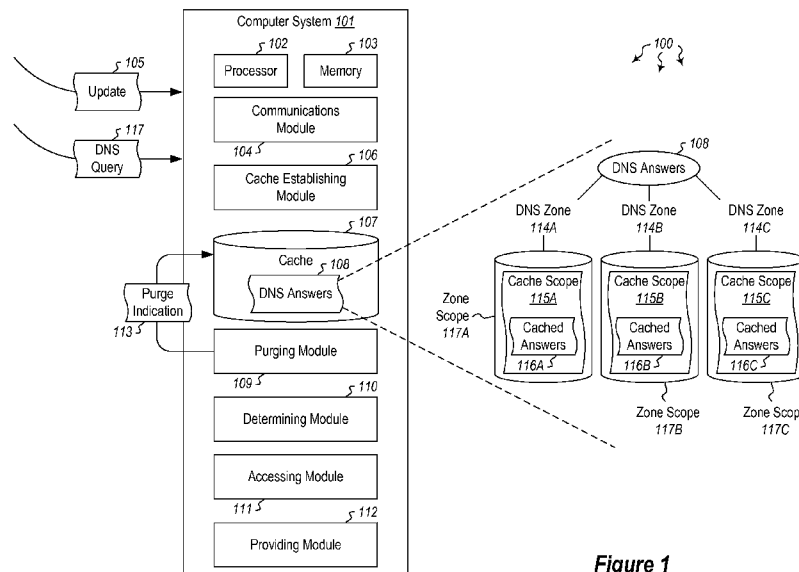
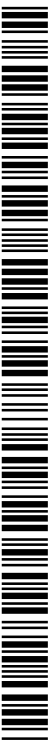


Figure 1

(57) Abstract: Embodiments are directed to establishing caches that provide authoritative domain name system (DNS) answers to DNS requests. In one scenario, a computer system establishes a cache that stores authoritative DNS answers to DNS queries. The cache corresponds to a specified DNS zone that includes authoritative DNS answers for a subset of DNS queries. The cache is configured to store the authoritative DNS answers for at least a specified period of time during which the authoritative DNS answers are updatable. The cache then receives an update indicating that at least one cached DNS answer is out-of-date and the computer system purges the out-of-date DNS answer from the cache, ensuring that the cache continually provides authoritative DNS answers for DNS queries assigned to the specified DNS zone.



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GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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

**Published:**

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH,

- (88) Date of publication of the international search report:**  
17 March 2016

INTERNATIONAL SEARCH REPORT

International application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
INV. H04L29/12  
ADD.  
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)  
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 practicable, search terms used)  
EPO-Internal, PAJ, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/112176 A1 (LIU ZAIDE E [US] ET AL) 25 May 2006 (2006-05-25)	1-3
Y	paragraph [0428] - paragraph [0466] paragraph [0023] - paragraph [0024] paragraph [0353]	4
Y	US 2008/189437 A1 (HALLEY ROBERT THOMAS [US]) 7 August 2008 (2008-08-07) paragraph [0009] - paragraph [0013]	4
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search <b>8 January 2016</b>	Date of mailing of the international search report <b>15/01/2016</b>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <b>Nocentini, Ilario</b>
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2015/041050

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ABLEY ICANN W KUMARI GOOGLE J: "A Mechanism for Remote-Triggered DNS Cache Flushes (DNS FLUSH); draft-jabley-dnsop-dns-flush-00.txt", A MECHANISM FOR REMOTE-TRIGGERED DNS CACHE FLUSHES (DNS FLUSH); DRAFT-JABLEY-DNSOP-DNS-FLUSH-00.TXT, INTERNET ENGINEERING TASK FORCE, IETF; STANDARDWORKINGDRAFT, INTERNET SOCIETY (ISOC) 4, RUE DES FALAISES CH- 1205 GENEVA, SWITZERLAND, 24 June 2013 (2013-06-24), pages 1-12, XP015090421, [retrieved on 2013-06-24] Chapters 2-4	1-4
A	----- US 2013/198269 A1 (FLEISCHMAN ROBERT M [US] ET AL) 1 August 2013 (2013-08-01) paragraph [0011] - paragraph [0024]	1-4
X	----- MOCKAPETRIS ISI P: "DOMAIN NAMES - CONCEPTS AND FACILITIES; rfc1034.txt", 5. JCT-VC MEETING; 96. MPEG MEETING; 16-3-2011 - 23-3-2011; GENEVA; (JOINT COLLABORATIVE TEAM ON VIDEO CODING OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16 ); URL: HTTP://WFTP3.ITU.INT/AV-ARCH/JCTVC-SITE/, INTERNET ENGINEERING TASK FORCE, IETF, CH, 1 November 1987 (1987-11-01), XP015005973, ISSN: 0000-0003	5-7,9,10
Y	Chapter 2.	8
Y	----- WO 2013/189024 A1 (HEWLETT PACKARD DEVELOPMENT CO [US]; LIN QUNYANG [CN]; XIE JUNQING [CN] 27 December 2013 (2013-12-27) page 6, line 18 - page 9, line 12	8

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2015/041050

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4

Assigning subset of DNS answers to different caches.

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2. claims: 5-10

Selecting a specific DNS cache.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2015/041050

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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