(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
17 June 2004 (17.06.2004)

PCT

(10) International Publication Number
WO 2004/051473 A2

(51) International Patent Classification[7]: G06F 9/46

(21) International Application Number:
PCT/GB2003/003567

(22) International Filing Date: 14 August 2003 (14.08.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0227825.7 29 November 2002 (29.11.2002) GB

(71) Applicant *(for all designated States except US)*: **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; New Orchard Road, Armonk, NY 10504 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **FUENTE, Carlos,** **Francisco** [GB/GB]; 43 White Hart Road, Portsmouth, Hampshire PO1 2TY (GB). **SCALES, William, James** [GB/GB]; 5 Portchester Road, Portchester, Fareham, Hampshire PO16 8AD (GB).

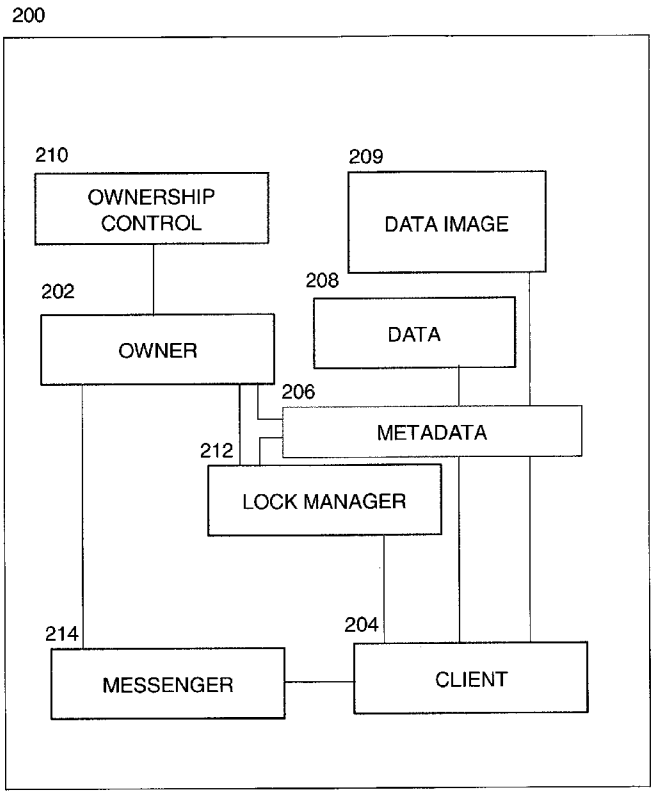
(74) Agent: **BURT, Roger, James**; IBM United Kingdom Limited, Intellectual Property Law, Hursley Park, Winchester, Hampshire SO21 2JN (GB).

(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, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, 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: HIGH-PERFORMANCE LOCK MANAGEMENT FOR FLASH COPY IN N-WAY SHARED STORAGE SYSTEMS



(57) Abstract: Storage control apparatus is operable in a network of storage controller nodes having an owner node operable to control locking of a region of data during I/O activity, a messaging component operable to request locks, grant locks, request release of locks and signal lock release. The apparatus comprises an I/O performing component to perform I/O on data owned by any owner node, subject to compliance with lock protocols controlled by the owner node. Any Flash Copy image of the region of data is maintained in a coherency relation with the region of data, and the I/O performing component is operable to cache a previous positive confirmation that the region of data has been left in a coherency relation with any said Flash Copy image, and to perform I/O activity on the basis of said previous positive confirmation.

WO 2004/051473 A2

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:

— *without international search report and to be republished upon receipt of that 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.