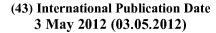
(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization

International Bureau







(10) International Publication Number WO 2012/056494 A3

- (51) International Patent Classification: *G06F 17/30* (2006.01)
- (21) International Application Number:

PCT/JP2010/006323

(22) International Filing Date:

26 October 2010 (26.10.2010)

(25) Filing Language:

English

(26) Publication Language:

English

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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, 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, RO, RS, RU, 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.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Published:

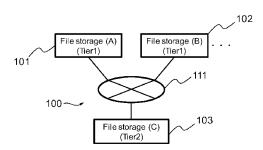
with international search report (Art. 21(3))

[Continued on next page]

(54) Title: STORAGE SYSTEM AND ITS OPERATION METHOD

[Fig. 1]

FIG.1



(57) Abstract: Predicting whether a file migration will be executed successfully or not. A file storage apparatus in a high-order tier generates a migration task list that records scheduled time periods of migration execution and a total file size of files which are targets to be migrated, and transfers the generated migration task list to a file storage apparatus in a low-order tier; and the file storage apparatus in the low-order tier generates, based on the migration task list, a migration overlap table that records, for each unit time, whether the execution of a migration is scheduled or not, and a remaining file size table that records a predicted value of a data transfer amount for each unit time and a predicted value of a remaining file size for each unit time; and if the predicted value in the last scheduled time period, from among the predicted value of the remaining file size for each unit time which is recorded in the remaining file size table, is equal to or less than 0, it is predicted that the migration will be executed successfully; and if the predicted value in the last scheduled time period is more than 0, it is predicted that the execution of the migration will fail.





 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)) (88) Date of publication of the international search report: 18 October 2012

INTERNATIONAL SEARCH REPORT

International application No PCT/JP2010/006323

Relevant to claim No.

a. classification of subject matter INV. G06F17/30

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) 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 practicable, search terms used)

Citation of document, with indication, where appropriate, of the relevant passages

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Х	US 2009/043822 A1 (SARKAR PRASEN ET AL) 12 February 2009 (2009-02 the whole document	JIT [US] -12)	1-15			
А	US 2008/201542 A1 (MARUYAMA TETS ET AL) 21 August 2008 (2008-08-2 abstract; figures 1-4,9,14-23 paragraph [0107] - paragraph [01 paragraph [0172] - paragraph [02	1)	1-15			
Α	US 2008/222218 A1 (RICHARDS ELIZ [US] ET AL) 11 September 2008 (20 the whole document		1-15			
A	US 2009/150639 A1 (OHATA HIDEO [11 June 2009 (2009-06-11) abstract; figure 12 paragraph [0204] - paragraph [02		1-15			
X Further documents are listed in the continuation of Box C. X See patent family annex.						
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Date of the actual completion of the international search		Date of mailing of the international search report				
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INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2010/006323

tion). DOCUMENTS CONSIDERED TO BE RELEVANT	
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	Citation of document, with indication, where appropriate, of the relevant passages

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/JP2010/006323

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009043822 A1	12-02-2009	NONE	
US 2008201542 A1	21-08-2008	JP 4814119 B2 JP 2008203937 A US 2008201542 A1 US 2010325378 A1 US 2012179887 A1	16-11-2011 04-09-2008 21-08-2008 23-12-2010 12-07-2012
US 2008222218 A1	11-09-2008	US 2008222218 A1 US 2008222644 A1	11-09-2008 11-09-2008
US 2009150639 A1	11-06-2009	JP 2009140356 A US 2009150639 A1 US 2011276772 A1	25-06-2009 11-06-2009 10-11-2011
US 2004260862 A1	23-12-2004	NONE	