



[54] TRANSACTION SYNCHRONIZATION IN A DISCONNECTABLE COMPUTER AND NETWORK

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[56] References Cited

U.S. PATENT DOCUMENTS

4,575,793	3/1986	Morel et al.	364/200
4,622,631	11/1986	Frank et al.	364/200
4,774,655	9/1988	Kollin et al.	364/200
4,774,661	9/1988	Kumpati	364/300
4,827,399	5/1989	Shibayama	364/200
4,878,167	10/1989	Kapulka et al.	364/200
4,941,845	7/1990	Eppley et al.	439/505
5,001,628	3/1991	Johnson et al.	364/200
5,008,814	4/1991	Mathur	364/200
5,019,963	5/1991	Alderson et al.	364/200
5,043,876	8/1991	Terry	364/200

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

87107475	1/1988	European Pat. Off.	G06F 11/14
92308720	8/1993	European Pat. Off.	G06F 15/16
9508809	3/1995	European Pat. Off.	G05F 17/30
95100255	7/1995	European Pat. Off.	G06F 17/30

OTHER PUBLICATIONS

Advance Program—Second Workshop on the Management of Replicated Data (WMRD-II), Nov. 12–13, 1992, pp. 1–2. "Application-Aware Adaptation for Mobile Computing", M. Satyanarayanan et al., *ACM SIGOS Operating Systems Review* 29.1, 1995, pp. 52–55.

"Architecture of the Ficus Scalable Replicated File System", T. Page, Jr., *Computer Science Department Technical Report University Of California At Los Angeles*, Mar. 1991, pp. 1–18.

"Coda: A Highly Available file System for a Distributed Workstation Environment", M. Satyanarayanan et al., *IEEE Transactions On Computers*, vol. 39 No. 4 Apr. 1990, pp. 447–459.

"Coding for Compression in Full-Text Retrieval Systems", A. Moffat et al., *IEEE DCC Data Compression Conference*, 1992, pp. 72–81.

(List continued on next page.)

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[57] ABSTRACT

A method and apparatus are disclosed for synchronizing transactions in a disconnectable network. Each transaction includes operations that were performed on a database replica on one computer while that computer was disconnected from another computer and hence from that other computer's replica. Transaction synchronization, which occurs after the computers are reconnected, transfers information from each computer to the other computer and applies updates to both replicas as appropriate. Transaction logs and clash handling tools may be used with the invention.

34 Claims, 4 Drawing Sheets

