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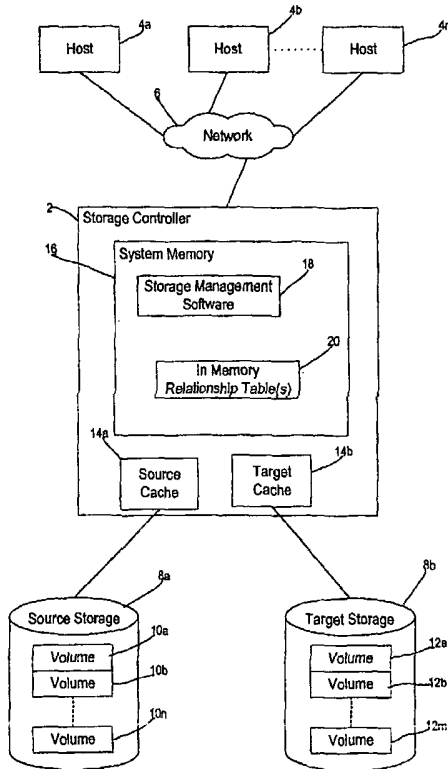
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(54) Title: MANAGING A RELATIONSHIP BETWEEN ONE TARGET VOLUME AND ONE SOURCE VOLUME



(57) Abstract: Provided are a method, system, and program for managing a relationship between one target volume and one source volume. For each of the source volume and target volume, the memory includes: (i) at least one element, wherein each element represents a range of sequential data units in the volume; (ii) at least one relationship entry, wherein each relationship entry represents one relationship; (iii) at least one element pointer associating one element with one relationship entry, wherein the data units represented by the element are part of the relationship represented by the relationship entry that the pointer associates with the element; and (iv) one relationship pointer for each relationship entry associating the relationship entry with volume metadata, wherein the volume metadata provides information on the relationship represented by the relationship entry.

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 189 079 B1 (MICKA WILLIAM FRANK ET AL) 13 February 2001 (2001-02-13) column 1, line 50 - line 65 column 2, line 14 - line 55 column 4, line 65 - column 6, line 54	1-24
A	EP 0 671 686 A (INTERNATIONAL BUSINESS MACHINES CORPORATION) 13 September 1995 (1995-09-13) column 1, line 21 - line 43 column 2, line 49 - column 3, line 38 column 15, line 38 - column 16, line 50	1-24
A	US 6 338 114 B1 (PAULSEN MICHAEL ALOYSIUS ET AL) 8 January 2002 (2002-01-08) the whole document	1-24
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<input checked="" type="checkbox"/> Patent family members are listed in annex.		
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INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6189079	B1	13-02-2001	NONE
<hr style="border-top: 1px dashed black;"/>			
EP 0671686	A	13-09-1995	DE 69502125 D1 28-05-1998
			DE 69502125 T2 19-11-1998
			JP 7239799 A 12-09-1995
			US 5615329 A 25-03-1997
<hr style="border-top: 1px dashed black;"/>			
US 6338114	B1	08-01-2002	NONE
<hr style="border-top: 1px dashed black;"/>			