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**Datasheet for the decision
of 13 November 2023**

Case Number: T 1273/20 - 3.5.07

Application Number: 10819153.7

Publication Number: 2480971

IPC: G06F11/00, G06F13/00, G06F3/06

Language of the proceedings: EN

Title of invention:

Snapshotting a performance storage system in a system for performance improvement of a capacity optimized storage system

Applicant:

EMC Corporation

Headword:

Performance storage system/EMC

Relevant legal provisions:

EPC Art. 56

Keyword:

Disputed common general knowledge
Inventive step - main request (no) - first and second auxiliary requests (no)

Decisions cited:

G 0004/92, T 0939/92, T 0190/03, T 1242/04, T 2467/09



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Case Number: T 1273/20 - 3.5.07

D E C I S I O N
of Technical Board of Appeal 3.5.07
of 13 November 2023

Appellant: EMC Corporation
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Representative: Gill, David Alan
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 16 January 2020
refusing European patent application
No. 10819153.7 pursuant to Article 97(2) EPC**

Composition of the Board:

Chairman J. Geschwind
Members: P. San-Bento Furtado
R. de Man

Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division to refuse European patent application No. 10819153.7.

The following document was cited in the decision under appeal:

D3: US 7 567 188 B1, 28 July 2009.

- II. The examining division decided that claims 1, 3 and 6 of the sole request considered in the decision under appeal did not fulfil the requirements of Article 84 EPC and that all the claims infringed Article 56 EPC for lack of an inventive step over document D3.
- III. With the grounds of appeal, the appellant submitted claims according to a main request and first and second auxiliary requests. The claims of the main request differed from those of the refused request in that claim 3 had been deleted.
- IV. In a communication accompanying a summons to oral proceedings, the board expressed the view that the main request seemed admissible and that claim 1 of the main request was not clear and that its subject-matter was not inventive over the common general knowledge of the skilled person in the areas of storage deduplication and memory hierarchies. The common general knowledge in storage deduplication was illustrated by document D3 and acknowledged in the application. The board indicated that it intended not to admit the first and second auxiliary requests into the appeal proceedings. Claim 1 of the first auxiliary request did not *prima*

facie fulfil the requirements of Articles 123(2) and 56 EPC.

- V. With a letter of reply, the appellant amended the main request and submitted arguments in support of the patentability of the main request.
- VI. In a further letter, the appellant informed the board that it would not attend the oral proceedings and requested a written decision. The board then cancelled the oral proceedings.
- VII. The appellant's final request was that the contested decision be set aside and that a patent be granted on the basis of the main request, the first auxiliary request or the second auxiliary request.
- VIII. Claim 1 of the main request reads as follows:
"A system for storing data, comprising:
 a performance storage system (104, 154) for storing one or more data items, wherein a data item of the one or more data items comprises a data file or a data block, wherein the performance storage system (104) comprises a data storage system that is able to respond to request for data to be stored and to be retrieved;
and
 a segment storage system (106, 162, 212) for storing a stored data item of the one or more data items, wherein the stored data item is processed to break data items into segments and deduplicate the segments by the segment storage system;
 a performance storage transfer manager (310) for transferring a stored data item of the one or more data items from the performance storage system (104, 154) to the segment storage system and removing the stored data item from the performance storage system (104, 154) subsequent to the transfer, and in the event multiple

requests for the stored data item is determined to be likely, transferring the data item back to the performance storage system in a capacity optimized manner as deduplicated segments, wherein the performance storage system (104, 154) enables faster access to the data item than the segment storage system (106, 162, 212); and

a determiner for determining whether a requested data is stored in the performance storage system (104, 154) and in the event that the requested data is not stored in the performance storage system (104, 154), determining whether the requested data is stored in the segment storage system (106, 162, 212)."

IX. Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the text "and removing the stored data item from the performance storage system (104, 154) ... transferring the data item back to the performance storage system in a capacity optimized manner as deduplicated segments," has been replaced with the following text:

", in the event that access activity for the performance storage system (104, 154) is below a threshold, removing the stored data item from the performance storage system (104, 154) subsequent to the transfer, and in the event the stored data item is removed and a threshold of requests for the stored data item is received subsequent to the removal, transferring the one or more data items back to the performance storage system in a capacity optimized manner as deduplicated segments,".

X. Claim 1 of the second auxiliary request differs from claim 1 of the first auxiliary request in that the following text has been added at the end of the claim:

", wherein the performance storage transfer manager (310) further transfers the stored data item to the segment storage system (106, 162, 212) by means for taking a snapshot of the one or more data items stored in performance storage system (104, 154) based on a snapshot protocol, wherein the snapshot protocol sets criteria for inclusion of the one or more data items in the snapshot based on at least one of the remaining storage capacity of the performance storage unit, whether the data has been accessed within a predetermined time period, the available processing bandwidth, and the receipt of an external signal."

Reasons for the Decision

The application

1. As background of the invention, the application explains that in a "segment deduplication storage system" a data block is broken into segments. If a data segment has been previously stored, a reference is stored to the prior stored segment. According to the application, a segment deduplication storage system is efficient in terms of storage capacity but sometimes too slow in terms of storing and retrieving (see paragraph [0002] of the published application).
2. The data deduplication storage system of the invention addresses this problem by combining a segment storage system with a "performance storage system", which is able to respond efficiently to data storage and retrieval requests (see e.g. paragraphs [0019]). Requested data items are retrieved from the performance storage system if present there. Otherwise, they are retrieved from the segment storage system. If there are many requests for a data item that is stored in the

segment storage system and not in the performance storage system, the data item may be transferred to the performance storage system so that response performance is improved (paragraphs [0034] and [0042]).

Main request

3. *Admittance*

The main request introduces a minor amendment to address a new clarity objection raised by the board in its communication. The previous main request filed with the grounds of appeal introduced minor amendments to address the examining division's lack of clarity objection against dependent claim 3. Therefore, the board admits the main request into the proceedings (Articles 12(4) and 13(2) RPBA 2020).

4. *Claim interpretation - claim 1*

4.1 For the purpose of assessing inventive step, claim 1 is interpreted as follows.

4.2 Claim 1 concerns a system for storing data comprising a "performance storage system", a "segment storage system", a "performance storage transfer manager" and a "determiner".

4.3 The "performance storage system" and the "segment storage system" store data items, e.g. data files. The performance storage system enables faster access to the data items than the segment storage system.

The performance storage system may also store the data as segments. It provides faster access to stored data independently of whether the stored data is

deduplicated or not, for instance by using a faster storage medium.

- 4.4 The "determiner" of the claimed system determines whether requested data is stored in the performance storage system. If the data is not stored there, it determines whether the requested data is stored in the segment storage system.

Although the claim does not specify how the "determiner" is used by the other components of the system, the skilled reader of the claim understands that the requested data is not only located but also retrieved.

- 4.5 The data item stored in the segment storage system "is processed to break data items into segments and deduplicate the segments by the segment storage system". This corresponds to the known functionality of a segment deduplication storage system (see point 1. above).

- 4.6 The "performance storage transfer manager" transfers a stored data item from the performance storage system to the segment storage system and, subsequent to the transfer, removes the stored data item from the performance storage system. If it is determined that multiple requests for the stored data item are likely, the performance storage transfer manager transfers the data item back to the performance storage system, where it is stored "in a capacity optimized manner as deduplicated segments".

5. *Inventive step - claim 1*

5.1 As explained in document D3, column 1, lines 15 to 55, data deduplication is a well-known technique for storing data in a "capacity optimized way". This is also acknowledged in the background section of the present application. In particular, paragraph [0002] explains that a prior-art deduplication storage system comprises a segment storage system for storing data items, where a data item may be a data file. The segment storage system processes the data items to break them into segments and deduplicate the segments and is able to respond to requests for data to be stored and to be retrieved.

5.2 The subject-matter of claim 1 differs from this prior-art deduplication storage system in that it further comprises

(a) a performance storage system which enables faster access to a data item than the segment storage system;

(b) a performance storage transfer manager for

(b.1) moving a stored data item from the performance storage system to the segment storage system, and

(b.2) if multiple requests for the stored data item are determined to be likely, transferring the data item back to the performance storage system as deduplicated segments,

(c) a determiner for determining whether requested data is stored in the performance storage system and if the requested data is not stored in the performance storage system, determining whether the requested data is stored in the segment storage system.

5.3 The appellant argued that the invention solved the objective technical problem of "providing a superior storage system; namely one which is able to store and

retrieve larger amounts of data (i.e. improved capacity) more efficiently".

The board notes, however, that the data items are stored in the same deduplicated manner in the prior-art system and in the segment and performance storage systems of claim 1. Therefore, no capability in terms of being able to store and retrieve "larger amounts of data" is achieved.

- 5.4 The board considers instead that the distinguishing features solve the objective technical problem of improving the data retrieval time of the prior-art deduplication storage system.
- 5.5 The board notes that a well-known technique for improving data access times is the use of memory hierarchies. A memory hierarchy consists of different levels of memories, where memories at a higher level are typically smaller and faster (and more expensive per unit of data storage) than memories at a lower level of the hierarchy. When a data retrieval request is processed, faster memories in the hierarchy are accessed before slower memories. By storing frequently accessed data in a faster memory, a higher overall data retrieval performance is achieved.
- 5.6 The appellant indirectly contested that memory hierarchies were well-known in the art by arguing that no evidence had been presented to suggest that a "two-tiered storage system", i.e. a memory hierarchy with two levels, was known. Any teaching was lacking as to when to transfer data items between the two tiers, much less the format of the data when it was transferred back to the performance storage system. Without hindsight, it was not apparent how the skilled person

would have derived such interactions between the two storage systems.

- 5.7 If the common general knowledge relevant for the outcome of a case is disputed by a party, normally it has to be proved like any other fact under contention, for instance by documentary or oral evidence (T 939/92, OJ EPO 1996, 309, Reasons 2.3; Case Law of the Boards of Appeal, 10th edition, 2022, I.C.2.8.5). However, exceptionally it suffices to give cogent reasons based on readily verifiable facts. This applies, for example, to knowledge that is "notorious" or indisputably forms part of the common general knowledge (see decisions T 1242/04, OJ EPO 2007, 421, Reasons 9.2 and T 2467/09, Reasons 4 and 8). Likewise, no specific documentary evidence may be needed to prove knowledge which belongs to the "mental furniture" of the skilled person, such as routine design skills and general principles of system design which are often necessary just to understand the prior art in the relevant field (T 190/03, Reasons 16).
- 5.8 In the present case, the board considers that memory hierarchies and their associated design principles indeed belong to the mental furniture of the skilled person in the field of computing. Processors for laptops and desktop computers produced in the last two or three decades include multiple levels of memory caches to hide the access latency of RAM (random access memory), and modern operating systems are well known to use RAM to hide the access latency of hard drives or SSDs (solid state drives). Memory hierarchies are so pervasive in the computing field that the board considers that no documentary evidence of them is needed.

5.9 Nevertheless, the board notes that evidence that memory hierarchies were common general knowledge can in fact be found in document D3, column 9, lines 36 to 44, which reads: "The memory elements can include local memory employed during actual execution of the program code, bulk storage, and cache memories which provide temporary storage of at least some program code in order to reduce the number of times code must be retrieved from bulk storage during execution." The cache memories are a more efficient higher-level memory than the "bulk storage" and are used for reducing the number of times that code must be retrieved from the slower bulk storage. Since this passage is part of the description of a generic data processing system, it relates to common general knowledge.

The board notes that the citation of this new passage does not infringe the appellant's right to be heard since the passage merely supports an assertion made by the board in its communication, and the appellant chose not to attend the oral proceedings before the board (cf. G 4/92, OJ EPO 1994, 149, Reasons 9).

5.10 In view of their common general knowledge of memory hierarchies, it would have been obvious for the skilled person facing the above stated problem to add a more efficient storage to the prior-art deduplication storage system, as specified in features (a) and (b.2). Such a more efficient storage corresponds to the "performance storage system" of claim 1. It would have been straightforward, based on the design principles of memory hierarchies, to store in this more efficient storage those data items likely to be accessed more often and to search first for requested data in the more efficient storage, thereby arriving at feature (c).

When implementing this solution, the skilled person would have considered storing new data items, which are likely to be accessed more frequently, in the more efficient storage, and then demote data items which are not likely to be used frequently to the prior-art segment storage system as in feature (b.1), and to transfer back to the more efficient storage the data items of the segment storage system determined to be frequently requested as in feature (b.2). The system component performing these operations corresponds to feature (b). The skilled person would thus have arrived at the claimed invention.

- 5.11 Therefore, claim 1 of the main request does not fulfil the requirements of Article 56 EPC for lack of an inventive step.

First auxiliary request

6. Claim 1 of the first auxiliary request differs from claim 1 of the main request essentially in that it specifies that
- "removing the stored data item from the performance storage system" is performed "in the event that access activity for the performance storage system (104, 154) is below a threshold";
 - the condition for transferring back the data item(s) to the performance storage system is that "the stored data item is removed and a threshold of requests for the stored data item is received subsequent to the removal" (instead of "multiple requests for the stored data item is determined to be likely").

7. *Admittance*

7.1 The first auxiliary request, which was submitted with the grounds of appeal, is an amendment within the meaning of Article 12(4) RPBA 2020 and may thus be admitted only at the discretion of the board.

7.2 With its grounds of appeal, the appellant did not reason specifically why the board should admit the first auxiliary request into the appeal proceedings. It argued that the features added to claim 1 of the first auxiliary request were disclosed in paragraphs [0026] and [0049] along with Figure 6 of the application as filed. The amendments solved the clarity objection that the examining division had raised against the feature "in the event multiple requests for the stored data item is determined to be likely", thereby invalidating the examining division's argument that the feature could not contribute to inventive step because it was unclear.

7.3 In its communication, the board expressed the preliminary opinion that the passages cited by the appellant did not disclose the amended features. The first auxiliary request was *prima facie* not allowable under Articles 123(2) and 56 EPC. The board informed the appellant that it intended not to admit the first auxiliary request.

With its letter of reply, the appellant did not provide any arguments concerning the question of admittance. The board sees no reason for deviating from its preliminary opinion.

8. Consequently, the board does not admit the first auxiliary request into the appeal proceedings (Article 12(4) RPBA 2020).

Second auxiliary request

9. *Admittance*

9.1 The second auxiliary request, which was filed with the grounds of appeal, is an amendment within the meaning of Article 12(4) RPBA 2020 which may be admitted only at the discretion of the board.

9.2 The appellant did not provide any reason why the board should exercise its discretion under Article 12(4) RPBA 2020 to admit the second auxiliary request into the appeal proceedings, and the board cannot recognise any such reason either.

9.3 In addition, the board notes that claim 1 reintroduces features related to taking snapshots of the data items which were specified in original claim 1, but later deleted from subsequent claim requests.

The reintroduction of requests which were no longer maintained in the proceedings leading to the decision under appeal is not admissible under Article 12(6) RPBA 2020, second paragraph, unless the circumstances of the appeal case justify their admittance. In the board's opinion, the same applies to the reintroduction of subject-matter which was no longer maintained in the proceedings leading to the decision under appeal. The board cannot identify any circumstances justifying admittance of the second auxiliary request.

9.4 In view of the above, the board does not admit the second auxiliary request into the proceedings (Article 12(4) RPBA 2020).

Conclusion

10. Since the only request admitted into the proceedings is not allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. Brückner

J. Geschwind

Decision electronically authenticated