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**Datasheet for the decision
of 10 January 2018**

Case Number: T 1861/13 - 3.5.05

Application Number: 08726953.6

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IPC: G06F3/06

Language of the proceedings: EN

Title of invention:

Automated information life-cycle management with thin provisioning

Applicant:

EMC IP Holding Company LLC

Headword:

Thin provisioning/EMC

Relevant legal provisions:

EPC Art. 56

RPBA Art. 13(1)

Keyword:

Inventive step - main, first and second auxiliary requests (no)
Admission of request filed during oral proceedings - (no)



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1861/13 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 10 January 2018

Appellant: EMC IP Holding Company LLC
(Applicant) 176 South Street
Hopkinton, MA 01748 (US)

Representative: Kuhnen & Wacker Patent- und Rechtsanwaltsbüro
PartG mbB Patent- und Rechtsanwaltsbüro Prinz-
Ludwig-Straße 40A 85354 Freising (DE)

Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 13 March 2013
refusing European patent application
No. 08726953.6 pursuant to Article 97(2) EPC**

Composition of the Board:

Chair A. Ritzka
Members: K. Bengi-Akyuerek
F. Blumer

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division to refuse the present European patent application for lack of novelty (Article 54 EPC) or lack of inventive step (Article 56 EPC) with respect to the claims of a main request and three auxiliary requests, having regard to the disclosures of

D1: US-A-2006/0224844;

D3: EP-A-1 657 630.

II. With the statement setting out the grounds of appeal, the appellant maintained the claims according to the main request and the former second and third auxiliary requests (as first and second auxiliary requests) underlying the appealed decision. It requested that the examining division's decision be set aside and that a patent be granted on the basis of one of the above claim requests.

III. In a communication under Rule 100(2) EPC, the board gave its preliminary opinion on the appeal. In particular, it raised objections under Article 123(2) EPC and indicated that the subject-matter of claim 1 of each claim request was considered to be novel but to lack inventive step (Article 56 EPC), mainly having regard to prior-art document D1.

IV. With a letter of reply, the appellant submitted amended claims according to a new main request and new first and second auxiliary requests, replacing the claim requests on file.

V. In a communication annexed to the summons to oral proceedings pursuant to Article 15(1) RPBA, the board

indicated that it maintained its objections under Articles 123(2) and 56 EPC as regards the amended claim requests, and gave its reasons therefor.

- VI. With a letter of reply, the appellant again filed amended claims according to a main request and two auxiliary requests, replacing the former main and auxiliary requests on file.
- VII. Oral proceedings were held on 10 January 2018, during which the appellant filed amended claims according to a new main request and three auxiliary requests, replacing the former claim requests on file. The admissibility and allowability of all the pending claim requests were discussed.

The appellant's final request was that the decision under appeal be set aside and that a patent be granted on the basis of the main request ("New Main request") or, subsidiarily, on the basis of any of a first auxiliary request ("New Claims Auxiliary request I"), a second auxiliary request ("New Claims Auxiliary request II") and a third auxiliary request ("Auxialinary [sic] request III"), all requests as filed during the oral proceedings before the board.

At the end of the oral proceedings, the board's decision was announced.

- VIII. Claim 1 of the **main request** reads as follows:

"A method for managing data, comprising:

- a) providing at least one logical data device (61-67) having a data device table of information (122) that maps sections of the logical data

device (61-67) to physical storage space of at least two storage areas (42-44),

- b) providing at least one logical thin device (71-74) presenting a logical storage space and having a thin device table of information (112) that maps portions of the logical thin device (71-74) for which physical storage space exists to the logical data device (61-67) but not directly to physical storage space of the one or more physical storage areas (42-44), wherein the at least one logical thin device (71-74) indicates upon access of the logical storage space whether the corresponding physical storage space of the at least two storage areas (42-44) has yet been allocated or not;
- c) evaluating characteristics of data associated with at least one of the sections of the logical data device (61-67);
- d) moving the data associated with the at least one of the sections of the logical data device (61-67) between the physical storage space of the at least two storage areas (42-44) according to a policy and based on the characteristics of the data; and
- e) updating the thin device table of information (112) according to the movement of the data between the physical storage space of the at least two storage areas (42-44)."

Claim 1 of the **first auxiliary request** comprises all the features of claim 1 of the main request, and further adds the following phrase at the end of its step b):

"wherein, upon a user inquiry, the thin device indicates its maximum amount of physical storage space that could be allocated even though corresponding physical storage space has not yet been allocated".

Claim 1 of the **second auxiliary request** comprises all the features of claim 1 of the first auxiliary request, and further adds the following phrase at the end of step d):

"wherein each of the at least two storage areas have different characteristics, and wherein the policy and the characteristics of the data determine between which of the at least two storage areas having the different characteristics of the data is moved".

Lastly, claim 1 of the **third auxiliary request** reads as follows (amendments to claim 1 of the main request underlined by the board):

"A method for managing data, comprising:

- a) providing at least one logical data device (61-67) having a data device table of information (122) that maps sections of the logical data device (61-67) to physical storage space of at least two storage areas (42-44);
- b) providing at least one logical thin device (71-74) presenting a logical storage space and having a thin device table of information (112) that maps portions of the logical thin device (71-74) for which physical storage space exists to the logical data device (61-67) but not directly to physical

storage space of the one or more physical storage areas (42-44), wherein the at least one logical thin device (71-74) indicates upon access of the logical storage space whether the corresponding physical storage space of the at least two storage areas (42-44) has yet been allocated or not; by returning either a null pointer or returning a reference to the logical data device which in turn references a portion of the physical storage space;

- c) evaluating characteristics of data associated with at least one of the sections of the logical data device (61-67);
- d) moving the data associated with the at least one of the sections of the logical data device (61-67) between the physical storage space of the at least two storage areas (42-44) according to a policy and based on the characteristics of the data; wherein each of the at least two storage areas have different characteristics, wherein the policy and the characteristics of the data determine between which of the at least two storage areas having the different characteristics of the data is moved; and
- e) updating the thin device table of information (112) according to the movement of the data between the physical storage space of the at least two storage areas (42-44)."

Reasons for the Decision

1. MAIN REQUEST

1.1 *Novelty and inventive step (Articles 54 and 56 EPC)*

The board judges that the subject-matter of present claim 1 is novel but does not involve an inventive step (Article 56 EPC), for the reasons set out below.

1.1.1 It is apparent to the board that closest prior art **D1** discloses the following limiting features of present claim 1 (as labelled by the board):

A method for managing data, comprising the steps of:

- a) providing a logical data device ("logical device LDEV") associated with a data device table of information ("LDEV Config table 29") that maps sections ("Logical Block Addresses, LBAs") of the logical data device to physical storage spaces ("Discs 32"; "physical storage devices 32"; see Fig. 1; [0044]) of storage areas (see e.g. paragraphs [0049] and [0050] in conjunction with Fig. 3);
- b) providing a logical thin device ("virtual device VDEV") presenting a logical storage space (see e.g. paragraph [0056]), wherein the logical thin device
 - b1) is associated with a thin device table of information ("allocation table 27-0"; "free segment pool 27-1"; see Figs. 5 and 6) that maps portions ("storage segments") of the logical thin device for which physical

storage space exists to the logical data device (see e.g. Fig. 6: "LDEV field 147" of "free segment pool 27-1") but not directly to

physical storage spaces of the physical storage areas (see e.g. paragraphs [0056] to [0058]),

- b2) indicates upon accessing the logical storage space whether the corresponding physical storage space of the storage areas has yet been allocated or not (see e.g. paragraph [0063]: *"... a determination is made whether storage segment that corresponds to the target LBA ... has been allocated or not ..."* and paragraph [0064]: *"The determination ... is made by consulting the allocation table 27-0 ..."* and Fig. 9, step 101);

- c) evaluating characteristics of data ("production data"; "non-production data") associated with a section of the logical data device (see e.g. claim 5: *"... accessing information which identifies for each of the data blocks whether the data block contains production data or not in order to determine if the logical block address designates an area on the source volume that contains production data"*);

- d) moving the data ("source/target volume") associated with the section of the logical data device between the physical storage space of the storage areas according to a policy (*"if the logical block address designates an area on the source volume that contains production data"*) and

based on the characteristics of the data (see e.g. claim 1: *"... for each logical block address in the source volume, if the logical block address designates an area on the source volume that contains production data, then copying the production data to the target volume ..."*);

e) updating the thin device table of information ("allocation table 27-0"; "free segment pool 27-1") according to the movement of the data between the physical storage space of the storage areas (inherently performed when segments are allocated according e.g. to paragraph [0057]).

1.1.2 As regards the question whether D1 is a suitable starting point for the assessment of novelty and inventive step, the appellant argued that D1 was not concerned with information or data life-cycle management in thin provisioned storage systems and that it did not disclose an automated system, requiring no user intervention, as claimed. In that regard, however, the board notes that D1 clearly relates to moving or migrating data in thin provisioned storage systems (see e.g. abstract or claim 1) and that it in fact does not necessarily rely on user intervention (see e.g. paragraph [0061]: *"An important aspect of this thin provisioning ... is that the thin provisioned volume is dynamically expanded as storage is needed, and that the expansion occurs automatically without user involvement"*).

1.1.3 As to feature a) of present claim 1, the appellant submitted that D1 did not disclose or suggest a data device table providing a mapping to *physical* storage spaces of physical storage areas, since the "LBA" field merely indicated a *logical* address. However, it is

evident to the board that D1 relies on a data device table, i.e. "LDEV Config table 29" (see in particular paragraph [0050] in conjunction with Fig. 3), wherein the logical block address LBA "designates an area on the source volume that contains production data" (see e.g. claims 1 and 5 of D1). This in turn implies the indication of a physical storage space of the source volume which corresponds to a physical storage area (see e.g. claim 4 of D1: "... data blocks comprising a storage area identified by the logical block address ..."). In addition, disc identifications such as "1,2,3,4" and "10,11,12,13" in D1 likewise correspond to *physical* storage areas identified in "LDEV Config table 29" (see e.g. Fig. 3, column 54, "Disk#").

1.1.4 As to feature b1), the appellant contended that the logical thin device "VDEV" of D1 did not map storage segments to the *logical* data device "LDEV" but directly to the *physical* storage devices. The board notes in this regard that D1 plainly demonstrates that "VDEV" does indeed map storage segments for which physical storage space exists (e.g. "LBA field 148" greater than zero) to "LDEV" (see paragraphs [0056] to [0058] and Fig 6: "LDEV field 147" in "free segment pool 27-1") and thus not directly to physical disc devices 32.

1.1.5 As to feature c), the appellant submitted, referring to paragraph [0052] of D1, that "production data" and "non-production data" in D1 did not correspond to different data characteristics but only to blocks which were allocated or not allocated to stored data for applications on the host. However, the board finds that the cited paragraph likewise indicates that "production data" and "non-production data" may be defined as data being used or not used by a host's operating system and

thus as usage information which *characterises* certain data (see paragraph [0052]: "... *blocks ... which are used by the operating system on the host to manage a file system are referred to as production data. Data contained in blocks which are ... not used by the operating system can be referred to as non-production data ...*" or paragraph [0102], last sentence: "... *production data ... used by applications such as a database ...*").

1.1.6 As to feature d), the board agrees with the appellant that paragraphs [0077] and [0083] of D1, as cited by the examining division in the impugned decision, relate merely to data migration between LDEVs and VDEVs, i.e. between *logical* devices, and not to moving data between *physical* storage devices. However, it is apparent to the board that at least claim 1 of D1 discloses that source data is indeed copied, i.e. moved, from the "source volume" of one physical disc device to the "target volume" of another physical disc device, and thus anticipates the movement of a source volume to a target volume based on whether the source volume contains "production data", in full accordance with feature d) of present claim 1.

1.1.7 In sum, the sole difference between the subject-matter of claim 1 and the disclosure of D1 is seen as being that the logical data devices and thin devices *themselves* comprise the corresponding "data device table" and "thin device table" respectively (rather than the "VDEV manager 22" and "LDEV manager 23" as in D1; see paragraph [0056]). Accordingly, the subject-matter of present claim 1 is considered to be novel over D1 (Article 54 EPC).

1.1.8 However, the board holds that providing for a *centralised* instead of a *distributed* implementation of the underlying thin device table constitutes a straightforward, alternative implementation measure which the skilled person, without exercising inventive skills, would readily choose, depending on practical criteria such as complexity, choice of technology or cost. This issue was, moreover, not contested by the appellant. Thus, present claim 1 lacks an inventive step having regard to document D1 combined with the skilled person's common general knowledge.

1.2 In view of the above, the main request is not allowable under Article 56 EPC.

2. FIRST AND SECOND AUXILIARY REQUESTS

Claim 1 of the first and second auxiliary requests differs from claim 1 of the main request basically in that it further specifies that

f) upon a user inquiry, the thin device indicates its maximum amount of physical storage space that could be allocated even though corresponding physical storage space has not yet been allocated (*first and second auxiliary requests*);

g) each of the at least two storage areas has different characteristics, and that the policy and the characteristics of the data determine between which of the at least two storage areas the data is moved (*second auxiliary request*).

2.1 *Inventive step (Article 56 EPC)*

2.1.1 Concerning added feature f), D1 discloses that a graphical user interface (GUI) presents the user with

the storage space usage as a percentage of the corresponding total available physical storage space (see e.g. paragraph [0085] in conjunction with Fig. 20, "usage field 225"). The board holds that, in order to enhance user-friendliness, the skilled person would, without using any inventive skills, readily adapt this GUI such that - along with the relative usage information - it also showed the user the absolute amount of total available storage space. This is all the more so since a "host visible size field 142" is already included in allocation table 27-0 (see paragraph [0057] and Fig. 5, column 142, "Size").

2.1.2 As to feature g), D1 discloses that the respective disc drives may comprise production data, e.g. data used by the host's operating system, and non-production data, i.e. data not used by the host's operating system (see point 1.1.5 above), and thus two separate characteristics, and that data blocks of production data are in principle to be copied from a segment in the thin-provisioned volume ("source volume") to a free segment list ("target volume") (see e.g. paragraphs [0006] and [0052] in conjunction with claims 1 and 5 of D1). Furthermore, it is also known from D1 that discs may have different access rates, i.e. distinct characteristics, and that they may be used according to those characteristics (see in particular paragraph [0005], last two sentences). Thus, the board concludes that added feature g) is also anticipated by D1.

2.2 In view of the above, the first and second auxiliary requests likewise lack an inventive step over D1 and the skilled person's common general knowledge, and are thus not allowable under Article 56 EPC.

3. THIRD AUXILIARY REQUEST

Claim 1 of this auxiliary request differs from claim 1 of the second auxiliary request essentially in that it no longer includes feature f), and further specifies that

h) the indication whether or not physical storage space has yet been allocated is given by returning either a null pointer or a reference to the logical data device, which in turn references a portion of the physical storage space.

3.1 *Admission into the proceedings (Article 13(1) RPBA)*

3.1.1 The claims of the third auxiliary request were filed during the oral proceedings before the board. The appellant argued that they were submitted in reaction to the objections raised by the board under Articles 123(2) and 56 EPC.

3.1.2 In appeal proceedings, the admissibility of claim requests filed after a party has submitted its statement setting out the grounds of appeal, which "shall contain a party's complete case" (Article 12(2) RPBA), is mainly governed by Article 13(1) and (3) RPBA. By virtue of Article 13(1) RPBA, a board's discretion in admitting any amendment to a party's case "shall be exercised in view of inter alia the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy".

3.1.3 In the present case, the board notes that the claims of the third auxiliary request, including a new feature h) taken from the application's description as filed (cf.

page 10, lines 7-11), were submitted for the very first time at the oral proceedings before the board, after a total of twelve claim requests had been filed during the appeal proceedings. They were thus submitted at a very late stage of the overall proceedings, during which the appellant had had ample opportunity to file a potentially allowable set of claims.

Furthermore, as regards the appellant's argument set out in point 3.1.1 above, the board notes that it is apparent from the file that the former objections under Article 123(2) EPC (cf. the board's communication under Article 15(1) RPBA, point 2.1) were already overcome by amending features b1) and b2).

- 3.2 Overall, in view of the very late stage of the proceedings, the board decided not to admit the third auxiliary request into the appeal proceedings under Article 13(1) RPBA.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



G. Nachtigall

A. Ritzka

Decision electronically authenticated