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**Datasheet for the decision
of 16 October 2023**

Case Number: T 1922/21 - 3.5.05

Application Number: 17881495.0

Publication Number: 3543838

IPC: G06F3/06

Language of the proceedings: EN

Title of invention:

MAGNETIC DISK ACCESS METHOD AND HOST

Applicant:

Huawei Technologies Co., Ltd.

Headword:

MAGNETIC DISK ACCESS METHOD / Huawei

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 13(1), 13(2)

Keyword:

Inventive step - (no) - obvious modification

Amendment after summons - taken into account (no) - amendment

overcomes issues raised (no)



Beschwerdekammern

Boards of Appeal

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Case Number: T 1922/21 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 16 October 2023

Appellant:
(Applicant)

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted on 28 May 2021
refusing European patent application No.
17881495.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman E. Mille
Members: N. H. Uhlmann
P. Tabery

Summary of Facts and Submissions

- I. The appellant appealed against the examining division's decision refusing the European patent application in suit.
- II. The examining division decided that the sole request on file did not meet the requirements of Article 56 EPC.
- III. The examining division made reference, *inter alia*, to the following documents:
 - D1 US 2010/125857
 - D2 US 2007/233700
 - D3 US 2010/153612
- IV. With the statement setting out the grounds of appeal the appellant re-submitted the application documents underlying the contested decision.
- V. The board summoned the appellant to oral proceedings.
In a communication under Article 15(1) RPBA, the board set out its provisional opinion on the case.
- VI. By letter dated 15 September 2023, the appellant submitted further arguments.
- VII. At the oral proceedings, the allowability of the request on file was discussed and the appellant filed an auxiliary request.
- VIII. The appellant's final requests were that the decision under appeal be set aside and a patent be granted based on the main request filed with the statement of grounds

of appeal or the auxiliary request filed during the oral proceedings.

IX. Claim 1 of the main request reads as follows:

"A disk access method, wherein

the method is applied to a host (110),
the host (110) is connected to a plurality of
controllers (140 to 143) in a storage system, said
storage system including a disk group (150), said disk
group including a plurality of disks, each disk
belonging to a controller, wherein only the controller
to which the disk belongs can access the disk,
at least one logical unit, LU is mounted to the host,
each LU comprises at least one virtual address space,
each virtual address space is corresponding to an
access path,

a controller to which the access path points, of the
plurality of controllers (140 to 143), can directly
access data corresponding to each virtual address
space, and

the method comprises:

generating (S210) an input/output, IO request, wherein
the IO request carries a logical unit number, LUN and a
virtual address of to-be-accessed data;

finding (S220), based on the LUN, an LU to be accessed
by using the IO request, and determining, based on the
virtual address, a virtual address space into which the
virtual address falls;

determining (S230), based on the determined virtual
address space, an access path corresponding to the
virtual address space; and

delivering (S240), along the access path, the IO
request to a controller (140 to 143) to which the
access path points, so that the controller accesses,
based on the LUN and the virtual address in the IO

request, a disk belonging to the controller, to obtain the data requested by using the IO request."

- X. Claim 1 of the auxiliary request is based on claim 1 of the main request 1. The wording

"can directly access data corresponding to each virtual address space"

has been replaced with

"directly accesses data corresponding to a respective virtual address space".

Claim 1 has been further amended by adding the following clause between "based on the virtual address" and "a virtual address space into which the virtual address falls":

"and a correspondence between each virtual address space included in each LU in the host and an access path that points to a controller corresponding to the respective virtual address space, such that a correspondence between each virtual address space and a corresponding disk space is established,".

Reasons for the Decision

1. The present application pertains to a disk access method and system. A host is connected to a plurality of controllers. Disks are foreseen, wherein each disk belongs to a controller and only this controller can access the respective disk. A logical unit, comprising a virtual address space, is mounted to the host. Each virtual address space is corresponding to an access path, which points to a controller.

Data access is performed as follows:

- An input/output request is generated, comprising an identification of a logical unit and a virtual address
- The virtual address space is determined, based on the virtual address
- Based on the virtual address space, the access path is determined
- The request is delivered to the corresponding controller, which accesses a disk and obtains the requested data.

2. Document D3 relates to a method for accessing data in a system including a host, target devices, data segments and virtual volumes spreading over the data segments.

Main request

3. Inventive step
 - 3.1 Document D3 forms a suitable starting point for the inventive-step assessment.
 - 3.2 According to the decision under appeal, the subject-matter of independent claim 5 did not involve an inventive step in view of document D3 and the common general knowledge of the skilled person. Similar arguments applied to the subject-matter of claim 1.
 - 3.3 The appellant argued with regard to distinguishing features that
 - 3.3.1 D3 did not disclose that "the host is connected to a plurality of controllers, and each disk can only be accessed by one of the controllers" (statement of

grounds, page 3, second paragraph of the "Novelty" section)and

- 3.3.2 the "inventive step analysis should be performed based on the greater distinguishing feature that is the use of a plurality of controllers providing indirect access to the disks" (first paragraph on page 4).
- 3.3.3 At the oral proceedings, the appellant stated that D3 did not disclose also that **the host** determines a virtual address space and an access path.
- 3.4 The board holds that document D3 discloses the features referred to in points 3.3.1 and 3.3.2 above.

The targets 506 to 512 anticipate the claimed plurality of controllers, see Figure 5. They are connected to the initiator 502, which anticipates the claimed host, see paragraph 49. The data segments 514 to 520 are each connected to a corresponding target and anticipate the claimed disks. According to paragraph 50, penultimate sentence, a target 506 may initiate data transfer for data held locally, i.e. on data segment 514. Thus, each disk can only be accessed by one of the controllers.

The appellant argued that "the data segments of D3 are segments of a virtual volume 522 and thus are not storage media". This argument is not convincing. According to paragraph 48, a portion of a virtual volume is a data segment and may be composed of a physical disk, a virtual disk, or any other segment of data available on the target. Hence, data segments may be composed of physical disks, which are in fact storage media.

The further argument of the appellant that "the target devices 506, 508, 510 and 512 are explicitly described as physical storage media (paragraph 48), i.e. the endpoints of the data access" is not convincing alike.

According to the same paragraph 48, data segments may be composed of physical disks, i.e. D3 discloses that the data segments are the "endpoints" of the data access. The targets in D3 may include the physical disks (see paragraph 48: "any other segment of data available on the target"). This does not contradict the teaching of claim 1.

Furthermore, D3 discloses that the initiator 502 accesses data segments 514 to 520 via one or more ports of the targets (paragraph 49, penultimate sentence), i.e. it discloses indirect access.

3.5 Regarding the distinguishing feature referred to in point 3.3.3 above, the following is observed.

According to the decision under appeal (cf. sections 11.3 to 11.5 and 13.1), this feature does not contribute towards inventive step. The board agrees and notes that the "determining" on the host is claimed in very general terms. Furthermore, D3, paragraph 57, discloses that "the initiator 502 may selectively determine via which port to access each data segment". Consequently, D3 discloses that the initiator (which anticipates the claimed host) determines a part of the access path, i.e. the port used to access the data segments. Thus, D3 provides a motivation to the skilled person to implement the determination of the access path and the virtual address space on the initiator, to reduce and simplify the control traffic between the initiator and the targets.

3.6 The appellant argued that a disk group was a physical feature which was not disclosed in D3.

The board disagrees.

Claim 1 **only** states that a disk group is included in the storage system and includes a plurality of disks. In particular, claim 1 does not specify any physical attributes of the group, i.e. if the disks in a group are accessible by one and the same controller, or each disk is accessible by a different controller, or the group is encompassed in a single enclosure.

As the appellant himself stated with regard to D3 "each of the targets has physical storage" and "virtual volume 522 is stored within the physical memory of the targets". Furthermore, according to paragraph 36 of D3 each target system 106, 108 is "communicatively coupled with/including physical storage devices".

Claim 1 does not exclude that each of the disks forming the group is "individually provided within each of the targets". Thus, the physical storage within a target (or coupled to a target) anticipates the claimed "disks" and the plurality of these physical storages in D3 anticipates the "disk group"

D3 discloses in paragraph 36 that a "target" (106, 108, 506 to 512, 1108, 1110) may be a "storage system". Furthermore, according to paragraph 48 a "target device" may be "disks... or any other type of storage device". Additionally, the target performs functions like dealing with SCSI I/O referral lists (cf. paragraph 50), hence the target is not a dumb disk drive but includes controller functions. Hence, the target disclosed in D3 anticipates the claimed "controller".

Finally, it is noted that a target in D3 includes physical storage (or is connected to physical storage) and performs controller functions (for the latter see also blocks 118, 122, 132 and 134 of the target 106 in Figure 1). In particular in the embodiment "connected to physical storage" it is self-evident that indirect access takes place. In the case "includes physical storage" indirect access takes place, too: initiator - target - physical storage.

- 3.7 Finally, the appellant argued that the claimed method did have the advantages described in paragraph 93 of the description as translated.

The board disagrees. Paragraph 93 refers to synchronisation between controllers and locks. Yet, the independent claims do not recite such aspects and define only one host. Consequently, the alleged problem "increasing the reliability of data storage and reading in the storage system" is not addressed by the claimed subject-matter.

- 3.8 For these reasons, the board confirms the impugned decision that the subject-matter of the independent claims does not involve an inventive step.

Auxiliary request

4. Admittance

- 4.1 The auxiliary request was submitted in the course of the oral proceedings before the board. Thus, this request is late-filed and the provisions of Article 13 paragraphs (1) and (2) RPBA are applicable.

- 4.2 The appellant argued that claim 1 addressed, and resolved, the clarity objection raised in the board's communication under Article 15(1) RPBA. Additionally, the feature referred to in point 3.3.3 above was set out in more details.
- 4.3 The board observes that the amendment to claim 1 does not change in substance the subject-matter. In fact, the wording inserted into the first "determining" clause (lines 17 to 21) does not introduce any additional limitations. In this regard, it is noted that the "disk space" referred to in the amendment does not play any role in claim 1.

For these reasons, the amendment introduced in claim 1 does not, *prima facie*, overcome the inventive-step objection raised in the impugned decision and confirmed by the board.

Consequently, the board decided to not admit the auxiliary request into the appeal proceedings (Article 13(1) and (2) RPBA).

Conclusion

Because none of the request on file is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. Brückner

E. Mille

Decision electronically authenticated