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**Datasheet for the decision  
of 19 November 2024**

**Case Number:** T 1031/23 - 3.5.07

**Application Number:** 17854995.2

**Publication Number:** 3518116

**IPC:** G06F16/188

**Language of the proceedings:** EN

**Title of invention:**

Method and apparatus for layered access of file in  
virtualization instance

**Applicant:**

Huawei Technologies Co., Ltd.

**Headword:**

Layered file access/HUAWEI

**Relevant legal provisions:**

EPC Art. 84, 111(1)  
RPBA 2020 Art. 11, 13(2)

**Keyword:**

Remittal to the department of first instance - (no)  
Clarity - main request and second to twenty-fourth auxiliary  
requests (no)  
Late-filed request - first auxiliary request (not admitted)

**Decisions cited:**

G 0010/93, T 0131/18, T 0911/20, T 0975/20, T 0860/21,  
T 1006/21, T 0850/22, T 1220/22



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Case Number: T 1031/23 - 3.5.07

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.07**  
**of 19 November 2024**

**Appellant:**  
(Applicant)

Huawei Technologies Co., Ltd.  
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Bantian  
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**Representative:**

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**Decision under appeal:**

**Decision of the Examining Division of the  
European Patent Office posted on 26 October 2022  
refusing European patent application  
No. 17854995.2 pursuant to Article 97(2) EPC**

**Composition of the Board:**

**Chairman** J. Geschwind  
**Members:** R. de Man  
M. Jaedicke

## Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application No. 17854995.2, which was filed in Chinese as international application PCT/CN2017/104409.

II. The examining division decided, *inter alia*, that claim 1 of the main request and of auxiliary requests 1, 2, 3 and 4 was not clear, that auxiliary request 1a did not comply with Article 123(2) EPC, and that the subject-matter of claim 1 of the main request and of auxiliary requests 1a, 1 and 2 lacked an inventive step over the following document:

D2: T. Vasily et al., "Virtual Machine Workloads: The Case for New Benchmarks for NAS", Proceedings of the 11th USENIX Conference on File and Storage Technologies (FAST'13), 12 February 2013, pp. 307-320, retrieved from <https://www.usenix.org/system/files/conference/fast13/fast13-final84.pdf>.

III. With its statement of grounds of appeal, the appellant filed sets of claims according to a main request and auxiliary requests 1 to 17, the main request and auxiliary requests 3, 6 and 12 being identical to the main request and auxiliary requests 2, 3 and 4 considered in the decision under appeal.

IV. In a communication accompanying the summons, the board introduced the following document:

D4: M. Schmidt et al., "Efficient Distribution of Virtual Machines for Cloud Computing", Proceedings of the 2010 18th Euromicro Conference on Parallel, Distributed and Network-based Processing (PDP'10), February 2010, pp. 567-574.

It raised objections under Articles 56, 84 and 123(2) EPC and indicated that it was not inclined to admit auxiliary requests 1, 2 and 4 to 17 into the appeal proceedings under Article 12(3), (4) and (5) RPBA.

- V. With a letter dated 17 October 2024 filed in preparation for the oral proceedings, the appellant filed a new main request and new first to sixth auxiliary requests. It refiled the main request and auxiliary requests 1 to 17 filed with the statement of grounds of appeal as seventh to twenty-fourth auxiliary requests.
- VI. During oral proceedings held on 19 November 2024, the appellant filed sets of claims replacing the first and seventh auxiliary requests. At the end of the oral proceedings, the board announced its decision.
- VII. The appellant's final requests were that the decision under appeal be set aside and that the case be remitted to the examining division for further prosecution or that a patent be granted on the basis of the claims of one of:
- the main request filed with the letter of 17 October 2024;
  - the first auxiliary request filed during the oral proceedings;
  - the second to sixth auxiliary requests filed with the letter of 17 October 2024;

- the seventh auxiliary requests filed during the oral proceedings;
- the eighth to twenty-fourth auxiliary requests refiled with the letter of 17 October 2024.

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

"A file access method of a virtualization instance, used for accessing a file in a host operating system, wherein a hypervisor and a library operating system engine run on the host operating system, and the host operating system, the hypervisor, and the library operating system engine run in a host mode, wherein the method comprises:

obtaining, by the library operating system engine, an image file of a library operating system instance based on a library operating system, wherein the image file comprises a plurality of image subfiles, and the plurality of image subfiles are specified as one or more image layers; obtaining the plurality of image subfiles from the image file; and storing, according to the one or more image layers, the plurality of image subfiles to a plurality of image subfile directories that are in the host operating system and that are in a one-to-one correspondence to the one or more image layers;

performing first union on all the image subfile directories and mounting a united directory to a first union directory, by using a union file system, wherein the first union directory comprises at least one union directory file, and the plurality of image subfiles in the at least one union directory file are in a one-to-one correspondence to the one or more image layers;

running, in a guest mode based on one or more of the plurality of image subfiles, by the library operating system engine, the library operating system

instance, wherein programs running in the guest mode have lower permission than programs running in the host mode, and programs running in the guest mode cannot directly access a resource running in the host mode, while programs running in the host mode can directly access a resource running in the guest mode; and

when the library operating system receives, from an application in the library operating system instance, a first access request that is used for accessing the union directory file, making a central processing unit generate an exit event of switching from the guest mode to the host mode, so that the hypervisor captures the exit event, performs processing to convert the first access request into a second access request that can be used to access, in the host mode based on a host operating system call, an image subfile corresponding to the union directory file, and accesses, based on the second access request, the image subfile corresponding to the union directory file."

IX. Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the text ", and the plurality of image subfiles in the at least one union directory file are in a one-to-one correspondence to the one or more image layers" has been deleted.

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

"wherein the first union directory is in the host operating system, and the performing first union on all the image subfile directories and mounting a united directory to a first union directory, by using a union file system, comprises:

performing, by the library operating system engine, the first union on all the image subfile directories and mounting the united directory to the first union directory, by invoking a union file system in the host operating system."

- XI. Claim 1 of the fourth auxiliary request differs from claim 1 of the main request in that the following text has been inserted at the end of the claim:

"wherein the first union directory is in the host operating system, and the performing first union on all the image subfile directories and mounting a united directory to a first union directory, by using a union file system comprises:

performing, by the library operating system engine, the first union on the plurality of image subfile directories and at least one readable/writable directory in the host operating system and mounting a united directory to the first union directory, by using a union file system in the host operating system, wherein a property of the at least one readable/writable directory is readable/writable during the first union; and

the method further comprises:

mounting, by the library operating system engine, the first union directory to a mount directory in the library operating system; and

correspondingly, when the application in the library operating system instance needs to access the union directory file, accessing the union directory file through the mount directory."

- XII. Claim 1 of the third and fifth auxiliary requests differs from claim 1 of the second and fourth auxiliary requests, respectively, in that the following text has



been inserted after "performing first union ... image layers":

", wherein, after the union file system is used, each of a plurality of library operating system instances can see all files in the first union directory".

XIII. Claim 1 of the sixth auxiliary request differs from claim 1 of the main request in that:

- the text "running a plurality of library operating systems" has been inserted after "used for accessing a file in a host operating system"; and
- the text ", such that each instance of the plurality of instances can access the image subfiles in the host operating system and wherein the image subfiles in the host operating system are configured to be shared by each instance" has been inserted after "performing first union .. image layers".

XIV. Claim 1 of the seventh auxiliary requests reads as follows:

"A file access method of a virtualization instance, used for accessing a file in a host operating system, wherein a hypervisor and a library operating system engine run on the host operating system, and the host operating system, the hypervisor, and the library operating system engine run in a host mode, wherein the method comprises:

obtaining, by the library operating system engine, an image file of a library operating system instance based on a library operating system, wherein the image file comprises a plurality of image subfiles, and the plurality of image subfiles are specified as one or more image layers; obtaining the plurality of image

subfiles from the image file; and storing, according to the one or more image layers specified by the plurality of image subfiles, the plurality of image subfiles to a plurality of image subfile directories that are in the host operating system and that are in a one-to-one correspondence to the one or more image layers;

performing first union on all the image subfile directories and mounting a united directory to a first union directory, by using a union file system, wherein the first union directory comprises at least one union directory file, and one or more union layers formed by the at least one union directory file based on the first union are in a one-to-one correspondence to the one or more image layers;

running, in a guest mode based on one or more of the plurality of image subfiles, by the library operating system engine, the library operating system instance, wherein programs running in the guest mode have lower permission than programs running in the host mode, and programs running in the guest mode cannot directly access a resource running in the host mode, while programs running in the host mode can directly access a resource running in the guest mode; and

when the library operating system receives, from an application in the library operating system instance, a first access request that is used for accessing the union directory file, making a central processing unit generate an exit event of switching from the guest mode to the host mode, so that the hypervisor captures the exit event, performs processing to convert the first access request into a second access request that can be used to access, in the host mode based on a host operating system call, an image subfile corresponding to the union directory file, and accesses, based on the second access request, the image subfile corresponding to the union directory file."

XV. Claim 1 of the tenth auxiliary request differs from claim 1 of the seventh auxiliary request in that the text ", wherein, after the union file system is used, each of a plurality of library operating system instances can see all files in the first union directory" has been inserted after "performing first union ... image layers".

XVI. Claim 1 of the thirteenth and sixteenth auxiliary requests differs from claim 1 of the seventh and tenth auxiliary requests, respectively, in that the following text has been added at the end of the claim:

"wherein the first union directory is in the host operating system, and the performing first union on all the image subfile directories and mounting a united directory to a first union directory, by using a union file system, comprises:

performing, by the library operating system engine, the first union on all the image subfile directories and mounting the united directory to the first union directory, by invoking a union file system in the host operating system."

XVII. Claim 1 of the nineteenth and twenty-second auxiliary requests differs from claim 1 of the seventh and tenth auxiliary requests, respectively, in that the following text has been added at the end of the claim:

"wherein the first union directory is in the host operating system, and the performing first union on all the image subfile directories and mounting a united directory to a first union directory, by using a union file system comprises:

performing, by the library operating system engine, the first union on the plurality of image subfile directories and at least one readable/writable directory in the host operating system and mounting a united directory to the first union directory, by using a union file system in the host operating system, wherein a property of the at least one readable/writable directory is readable/writable during the first union; and

the method further comprises:

mounting, by the library operating system engine, the first union directory to a mount directory in the library operating system; and

correspondingly, when the application in the library operating system instance needs to access the union directory file, accessing the union directory file through the mount directory."

Moreover, in claim 1 of the twenty-second auxiliary request, the text ", wherein, after the union file system is used, each of a plurality of library operating system instances can see all files in the first union directory" has been moved from the end of the third paragraph of the claim to the end of the second paragraph.

XVIII. Claim 1 of the eighth, eleventh, fourteenth, seventeenth, twentieth and twenty-third auxiliary requests differs from claim 1 of the seventh, tenth, thirteenth, sixteenth, nineteenth and twenty-second auxiliary requests, respectively, in that the text ", wherein each image layer is a file system" has been inserted after "the plurality of image subfiles are specified as one or more image layers".

Moreover, in claim 1 of the twenty-third auxiliary request, the text ", wherein, after the union file system is used, each of a plurality of library operating system instances can see all files in the first union directory" has been moved from the end of the second paragraph of the claim to the end of the third paragraph.

- XIX. Claim 1 of the ninth, twelfth, fifteenth, eighteenth, twenty-first and twenty-fourth auxiliary requests differs from claim 1 of the seventh, tenth, thirteenth, sixteenth, nineteenth and twenty-second auxiliary requests, respectively, in that the text ", wherein each image layer is a union file system" has been inserted after "the plurality of image subfiles are specified as one or more image layers".

Moreover, in claim 1 of the twenty-fourth auxiliary request, the text ", wherein, after the union file system is used, each of a plurality of library operating system instances can see all files in the first union directory" has been moved from the end of the second paragraph of the claim to the end of the third paragraph.

## **Reasons for the Decision**

1. *The application*
- 1.1 The application relates to "layer-based file access" by a virtualisation instance.
- 1.2 Central to the application is the prior-art concept of a "union file system".

The translated description filed with the entry into the European phase, in paragraphs [0070] to [0076], explains that a union file system is a file system which allows directories in other file system to be "union-overlaid by layer", resulting in a file system in which the content (including (sub)directories and files) in the directories of the other file system appears in one and the same directory, i.e. the directories are "layered" on top of each other.

As an example, performing a union mount on a "fruits" directory containing files "apple" and "tomato" and a "vegetable" directory containing files "carrots" and "tomato" and mounting this union file system to a directory named "./mnt" results in the files "apple", "carrots" and "tomato" appearing as files in the "./mnt" directory.

*Main request*

2. The main request was filed in response to the board's communication. It is based on the main request considered in the decision under appeal and maintained in the statement of grounds of appeal with amendments intended to address clarity objections raised in the board's communication.
3. *Request for remittal for further prosecution*
  - 3.1 At the start of the oral proceedings, the appellant requested that the case be remitted to the examining division for further prosecution on the basis of the main request.

It argued that the primary purpose of the appeal proceedings was to review the decision under appeal.

The board's communication, which had raised new objections and had introduced a new prior-art document, had necessitated the filing of new requests. To ensure fairness and procedural correctness, the appellant had to be given the opportunity to respond to the new objections and arguments in two instances.

3.2 According to decision G 10/93 (OJ EPO 1995, 172), Reasons 5, if a board of appeal raises new objections, it must decide after due assessment of the particular circumstances whether it will rule on the case itself or whether it will remit the matter for further prosecution to the examining division (Article 111(1), second sentence, EPC). The relevant circumstances of the case must be taken into account and consideration must be given in particular as to whether further investigations should be carried out, whether a procedural violation has taken place which would preclude a decision on the merits, whether there has been any significant change in the facts with respect to the contested decision, what stance the applicant is taking with regard to the "loss of instance", whether a decision by the board would speed up the proceedings significantly and whether there are any other grounds for or against remittal. The weight accorded to individual factors depends on the circumstances of the particular case.

3.3 In its communication, the board raised two new clarity objections to claim 1 of the then main request, and it maintained the examining division's objection that the subject-matter of claim 1 of the then main request lacked an inventive step over document D2 combined with common general knowledge of union file systems. The board's inventive-step reasoning in some respects deviated from that of the examining division, but it

did not rely on the newly introduced document D4 (which the board, in point 8.10 of its communication, referred to only "for the sake of completeness").

Although the differences between the board's preliminary opinion set out in its communication and the objections raised in the contested decision may indeed have necessitated the filing of amended requests, in the board's view its communication did not present the appellant with a significantly different case. In examination appeal cases, an appellant has to expect the board to analyse the wording of the independent claims for the purpose of assessing inventive step and, if necessary, to identify new issues of clarity and interpretation *ex officio*. The board considers that the admissibility and allowability of amendments made in response to such developments should in principle be examined by the board. This is in line with Article 11 RPBA, which provides that a case is not to be remitted for further prosecution, unless special reasons present themselves for doing so.

- 3.4 The appellant initially responded to the board's new objections by filing amended requests and not by requesting a remittal of the case for further prosecution by the examining division. Only at the oral proceedings before the board did the appellant make its request for remittal.

The appellant argued that a request for remittal could be made at any time, and the board is aware of decision T 1006/21, which holds that procedural requests, including requests for remittal under Article 111(1) EPC, are not subject to the provisions of Articles 12 and 13 RPBA, can therefore be made at any time during the appeal proceedings, and have to be considered by



the board, regardless of when they are made. The board also notes that the EPC does not provide a comprehensive legal basis for not admitting a request for remittal.

Nevertheless, allowing a request for remittal of a case for further prosecution under Article 111(1) EPC is at the board's discretion, and the timing of a request for remittal made by a party may well be a factor relevant to the exercise of that discretion (see e.g. decisions T 975/20, Reasons 12.3; T 860/21, Reasons 8; T 850/22, Reasons 1.6; T 1220/22, Reasons 4).

In the present case, the appellant apparently did not consider it necessary to request a remittal for further prosecution when preparing its reply to the board's communication. Moreover, when it did request a remittal at the oral proceedings, the board had already completed its preparation for those oral proceedings, including forming a preliminary opinion on the amendments made in the newly filed main request.

3.5 In view of these circumstances, the board sees no special reasons for allowing the appellant's request to remit the case to the examining division for further prosecution on the basis of the main request. It therefore rejects the appellant's request and proceeds with the examination of the main request.

4. *Admission into the appeal proceedings*

Since the main request was filed in response to clarity objections raised for the first time in the board's communication, the board has no objection to its admission under Article 13(2) RPBA.

5. *Clarity*

5.1 The amendments made to claim 1 introduced the following feature:

(F) "the plurality of image subfiles in the at least one union directory file based on the first union are in a one-to-one correspondence to the one or more image layers".

According to feature (F):

- the at least one union directory file contains a plurality of image subfiles; and
- the one or more "image layers" are in a one-to-one correspondence to the plurality of "image subfiles".

5.2 However, claim 1 also specifies that image subfiles obtained from an image file are stored "to a plurality of image subfile directories that are in the host operating system and that are in a one-to-one correspondence to the one or more image layers".

Hence, the one or more "image layers" are in a one-to-one correspondence to a plurality of "image subfile directories", not to "image subfiles" as specified in feature (F). This is a first contradiction in the wording of claim 1.

5.3 Claim 1 further specifies that the "image subfile directories" are union mounted to "a first union directory" by using a union file system, and that the first union directory comprises "at least one union directory file".

This means that image subfiles in the image subfile directories appear as files in the "first union directory", not in the "at least one union directory file" as specified in feature (F). This is a second contradiction in the wording of claim 1.

- 5.4 In view of these contradictions, claim 1 of the main request is unclear (Article 84 EPC).

*First auxiliary request*

6. *Admission into the appeal proceedings*

- 6.1 The first auxiliary request was filed during the oral proceedings before the board. It is based on the main request but deletes feature (F) from claim 1.
- 6.2 The appellant argued that the admission of the first auxiliary request into the appeal proceedings was justified by exceptional circumstances within the meaning of Article 13(2) RPBA because the request represented an easy fix to a typographical error in the main request and was *prima facie* allowable with respect to Article 84 EPC.
- 6.3 Obvious corrections of mistakes in application documents within the meaning of Rule 139, second sentence, EPC, are generally admissible under Article 13(2) RPBA (see decisions T 131/18, Reasons 3.3.3, and T 911/20, Reasons 1). The deletion of feature (F), however, does not qualify as such a correction, as it cannot be said to be immediately evident that the feature had not been intended to be part of claim 1 of the main request. On the contrary, it is evident that, in the main request, this feature was deliberately introduced by amendment.

6.4 Nevertheless, a straightforward amendment which is not an obvious correction within the meaning of Rule 139, second sentence, EPC but which only serves to remove a mere typographical error and does not otherwise influence the examination of the case may still be admissible under Article 13(2) RPBA.

6.5 However, the board does not agree with the appellant that the lack of clarity of claim 1 of the main request identified in point 5. above is the result of mere typographical mistakes in feature (F).

Even if it were accepted that "the plurality of image subfiles" and "the at least one union directory file" both included typographical errors and should have read "the plurality of image subfile directories" and "the union directory", the resulting feature would have read "the plurality of image subfile directories in the union directory ...", which is not correct because the "image subfile directories" are not (sub)directories of the union directory but, as already noted in point 5.3 above, are union mounted to "a first union directory" by using a union file system.

6.6 Moreover, under the headings "CLARITY" and "INVENTIVE STEP", the appellant's letter of 17 October 2024 refers several times to the "one-to-one correspondence" between "image subfiles" and "image layers" specified in feature (F). This is inconsistent with this part of the feature being a mere typographical mistake or some other kind of excusable mere oversight.

6.7 Since the board is not convinced by the appellant's justification for the late filing of the first auxiliary request and no other relevant exceptional

circumstances are evident to the board, it does not admit the first auxiliary request into the appeal proceedings (Article 13(2) RPBA).

*Second to sixth auxiliary requests*

7. *Admission into the appeal proceedings and clarity*

7.1 Feature (F) and the features which with it conflicts (see point 5. above) are also present in claim 1 of the second to sixth auxiliary requests. The appellant had no further arguments with respect to the clarity of claim 1 of these requests.

7.2 In view of this, it is not in the interest of procedural efficiency to consider whether one or more of the second to sixth auxiliary requests should not be admitted.

7.3 Hence, the board admits the second to sixth auxiliary requests into the appeal proceedings but concludes that, for the reasons given in point 5. above, claim 1 of each of these requests is not clear (Article 84 EPC).

*Seventh to twenty-fourth auxiliary requests*

8. *Admission into the appeal proceedings*

8.1 The seventh auxiliary request was filed during the oral proceedings and consists of a single claim 1, which is identical to claim 1 of the main request considered in the decision under appeal.

8.2 The eighth to twenty-fourth auxiliary requests correspond to auxiliary requests 1 to 17 filed with the

statement of grounds of appeal. In its communication, the board expressed doubts in respect of the admissibility of auxiliary requests 1, 2 and 4 to 17, which correspond to the current eighth, ninth and eleventh to twenty-fourth auxiliary requests.

- 8.3 At the oral proceedings, the board heard the appellant on the seventh auxiliary request in respect to both admissibility and clarity. In view of the board's opinion on the issue of clarity and its relevance to the remaining auxiliary requests, it is not in the interest of procedural efficiency to consider whether one or more of the seventh to twenty-fourth auxiliary requests should not be admitted. Consequently, the board admits these requests into the appeal proceedings.

9. *Clarity*

- 9.1 Claim 1 of the seventh auxiliary request refers to "the one or more image layers" which are "specified by the plurality of image subfiles".

According to paragraph [0085] of the translated description, the files in an image file, which are referred to as "image subfiles", are logically divided into one or more (image) layers. However, it is unclear how this logical division of image subfiles into layers can be "specified by the plurality of image subfiles" (Article 84 EPC).

For example, in the example given in paragraph [0089] of the description, the files are "a.bin", two files named "b.so", and "c.txt". These four files are divided into two layers, apparently by their being placed in a directory "/sys", corresponding to one layer, and a

directory "/doc", corresponding to another layer. It cannot be seen in what sense these two layers are "specified by" the four files.

9.2 In claim 1 of the seventh auxiliary request, it is also unclear what is meant by "one or more union layers formed by the at least one union directory file based on the first union" (Article 84 EPC). A file cannot form "one or more union layers".

9.3 At the oral proceedings, the appellant argued that, according to general principles of interpretation, the claims should be read with a mind willing to understand. The skilled reader would try to interpret the claim with synthetic propensity, i.e. building up rather than tearing down. The appellant further referred to paragraphs [0007], [0085] and [0106] of the translated description.

However, assessing the compliance of a claim with Article 84 EPC is not the same as trying to interpret the claim. The board's objection is not that the meaning of claim 1 cannot be established by a skilled reader with the help of the description, but that some of the wording of claim 1 does not make (technical) sense and therefore does not comply with the clarity requirement of Article 84 EPC.

It may further be mentioned that the appellant's attempt to clarify the expression objected to in point 9.2 by means of the amendments made in the current main request was unsuccessful (see point 5. above), whereas it deleted the expression objected to in point 9.1.

- 9.4 The same objections apply to claim 1 of the eighth to twenty-fourth auxiliary requests. The appellant made no further submissions on these requests with respect to clarity.
- 9.5 Hence, the seventh to twenty-fourth auxiliary requests do not meet the requirements of Article 84 EPC.
10. Since none of the requests admitted into the appeal proceedings is allowable, the appeal is to be dismissed.

## Order

### **For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



M. Schalow

J. Geschwind

Decision electronically authenticated