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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SATYAM B. VAGHANI, YUEN-LIN TAN, and ABHISHEK RAI

Appeal 2018-008484
Application 11/707,724
Technology Center 2100

Before ST. JOHN COURTENAY III, DAVID M. KOHUT, and MONICA S. ULLAGADDI, *Administrative Patent Judges*.

COURTENAY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. § 134(a) from a final rejection of claims 3–19, which are all the claims pending in this application. Claims 1, 2, and 20–36 are canceled. We have jurisdiction over the pending claims under 35 U.S.C. § 6(b).

We reverse.

[1] We use the word "Appellant" to refer to Applicant as defined in 37 C.F.R. § 1.42(a). The real party in interest is VMware, Inc. Appeal Br. 3.

STATEMENT OF THE CASE [2]

Introduction

Appellant's claimed invention "relates to a distributed transaction system within a computer system, or, more specifically, to providing multiple computers or other computing entities with concurrent access to a file system or other structured data system while maintaining a crash recovery journal." Spec. ¶ 3.

Exemplary Independent Claim 3

3. A distributed transaction system comprising:

a first computing entity;

a second computing entity; and

a data storage unit, coupled with said first computing entity and said second computing entity, *said data storage unit storing* **a file system**, a first transaction journal for said first computing entity, *and* **within the file system** a second transaction journal for said second computing entity, a plurality of data entities including file descriptors, files, and a block bitmap, *and* **a lock for each of the data entities** comprising an owner field and a version field,

wherein the first transaction journal is updated with entries that describe transactions executed by the first computing entity on the data entities during periods in which the first computing entity gained exclusive access to the data entities by having acquired the locks associated with the data entities, and the second transaction journal is updated with entries that describe transactions executed by the second

[2] We herein refer to the Final Office Action, mailed May 4, 2017 ("Final Act."); Appeal Brief, filed March 5, 2018 ("App. Br."); the Examiner's Answer, mailed June 28, 2018 ("Ans."), and the Reply Brief, filed Aug. 28, 2018 ("Reply Br.").

> computing entity on the data entities during periods in which the second computing entity gained exclusive access to the data entities by having acquired the locks associated with the data entities, and
>
> at least one of the entries include a log action that indicates updates made to a data entity during the transaction described by the entry, and a lock action that indicates an address of a lock that was exclusively acquired during the transaction described by the entry and a version number written into the version field of the lock during the transaction described by the entry.

Appeal Br. 15, "CLAIMS APPENDIX." (Emphasis added regarding the contested dispositive limitations under 35 U.S.C. § 103).

Rejection

Claims 3–19 are rejected under pre-AIA 35 U.S.C. § 103(a) as being obvious over the combined teachings and suggestions of Kingsbury et al. (US 2003/0065672 A1; pub. Apr. 3, 2003) ("Kingsbury"), Georgiev (US 7,552,122 B1; iss. Jun. 23, 2009), and Sandri et al. (US 2003/0105796 A1; pub. Jun. 5, 2003) ("Sandri").

Prior PTAB Decision

Appeal No. 2014-007868, corresponding to instant Application No. 11/707,724, decided May 26, 2016 (Examiner Affirmed-In-Part, New Ground of Rejection by Board under 37 C.F.R. § 41.50(b)).

ANALYSIS

We have considered all of Appellant's arguments and any evidence presented. Based upon our review, and for the reasons discussed below, Appellant provides sufficient argument and evidence to persuade us the

Examiner erred with respect to the single rejection under 35 U.S.C. § 103(a) over the cited combination of Kingsbury, Georgiev, and Sandri.

Rejection of Independent Claim 3 under 35 U.S.C. § 103(a)

Issue: Under 35 U.S.C. § 103(a), did the Examiner err by finding Kingsbury, Georgiev, and Sandri collectively teach or suggest the contested dispositive limitations: "a data storage unit storing a file system . . . . and **within the file system** . . . **a lock for each of the data entities**," within the meaning of independent claim 3?[3] (Emphases added).

We note the disputed limitations of independent claim 3 are recited in similar form having commensurate scope in remaining independent claim 10. We note a locking mechanism (such as a semaphore) is essentially, for example, a counter variable that keeps track of when a shared resource is claimed (e.g., by a process). When the lock is released, the shared resource becomes available to another waiting process, as is known in the art. [4]

[3] We give the contested claim limitations the broadest reasonable interpretation ("BRI") consistent with the Specification. *See In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

[4] *See* Spec. ¶ 46: "The acquisition of a lock may be achieved in a number of ways, including as described in U.S. Patent Application No. 10/773,613, which is incorporated by reference herein." *See* corresponding US Pat. 7,849,098 B1 (filed Feb. 6, 2004; issued Dec. 7, 2010): "If multiple computers are given concurrent, unrestricted access to a typical file system the data in the file system will likely become corrupted." Col. 1, ll. 18–20. *See also* Col. 1, ll. 37–42: "Thus, to provide multiple computers with concurrent access to a common file system on a shared data store, without corrupting the data and the file system, one or more locking and/or coherence mechanisms must generally be implemented."

The dispositive issue presented here is not whether a lock is taught by the cited references, but rather whether the cited combination of Kingsbury, Georgiev, and Sandri teaches or suggests a lock for each of the data entities that is actually *stored within the file system*, as claimed, and as depicted below in Appellant's Figure 5. Lock 36 is stored *within* file system 64, which is further stored within the data storage unit, as illustrated below:

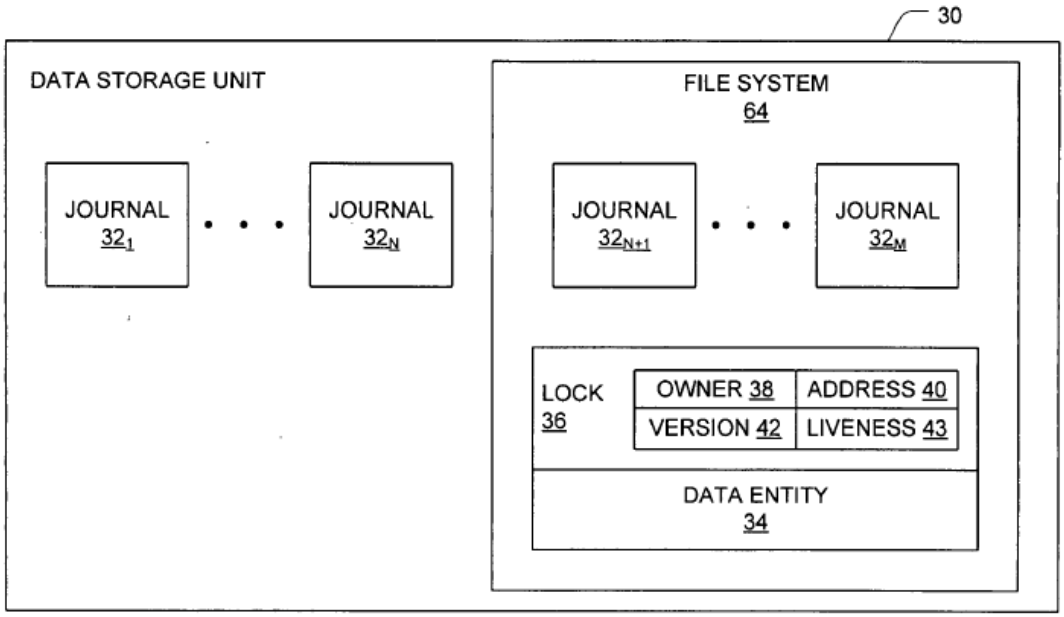

FIG. 5

Appellant's Figure 5 is shown above depicting file system 64. Associated with data entity 34 is **lock 36, stored within file system 64,** within the data storage unit. To gain access to a particular data entity 34, server 12 must gain control of the respective lock 36.

Claim Construction

We begin our analysis with claim construction regarding the broadest reasonable interpretation of the claim term "file system." [5] We turn to the Specification for *context* regarding the claimed "file system." Appellant provides non-limiting, exemplary descriptions of the claim term "file system," as being consistent with conventional file systems, as follows:

> In various embodiments of the present invention, physical file systems, including the New Technology File System (NTFS), the Unix File System (UFS), the VMware Virtual Machine File System (VMFS), and the Linux third extended file system (ext3FS), may be used as the file system layer 64.

Spec. ¶ 41.

See also:

> FIG. 5 illustrates a data storage unit (DSU) 30, in accordance with various embodiments of the present invention. As shown, the DSU 30 includes a file system 64. It should be appreciated that any other structured data system, such as a database, may be substituted for file system 64. The file system 64 may comprise a conventional file system, including a plurality of files of

[5] Claim construction is an important step in a patentability determination. A legal conclusion that a claim is obvious involves two analytical steps, assuming the references have been properly combined under § 103. *See Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003) ("Both anticipation under § 102 and obviousness under § 103 are two-step inquiries. The first step in both analyses is a proper construction of the claims. . . . The second step in the analyses requires a comparison of the properly construed claim to the prior art." (Internal citations omitted)). Under the second step, the Board must compare the construed claim to one or more prior art references and make factual findings regarding the limitations contested by Appellant. *See In re Crish*, 393 F.3d 1253, 1256 (Fed. Cir. 2004). Because the PTO is entitled to give claims their broadest reasonable interpretation, a court's review of the Board's claim construction is limited to determining whether it was reasonable. *See Morris*, 127 F.3d at 1055.

> various types, typically organized into one or more directories. The file system 64 may include metadata that specifies information about the file system 64, such as some data structure that indicates which data blocks in the file system remain available for use, along with other metadata indicating the directories and files in the file system, along with their location. . . . Many existing file systems are amply documented so that they can be used and modified as described herein by a person of skill in the art, and any such file system may be used in implementing the invention.

Spec. ¶ 45.

Regarding the claim term "data storage unit" that stores the "file system" (claim 1), we again turn to the Specification for context:

> The different potential locations of logical storage managers are generally not significant to the operation of the SAN 14 [(Storage Area Network 14)] and, in particular, the underlying data storage systems 16. While the SAN 14 provides routeable multipath access, the data storage systems 16 present a relatively large collection of externally visible LUNs, also referred to in the context of the present invention as data storage units (DSUs), accessible by the computing entities 12, subject to conventional access controls. Individually, the data storage systems 16 are relatively conventional computer platforms 20, though specialized to support typically high-bandwidth fibre channel network interfaces and to host large parallel arrays of *typically SCSI-based disk drive storage units* 22_1-22_N. Aggregate network bandwidth at the SAN 14 interface typically in excess of 200 Megabytes per second and online storage capacity in excess of 10 terabytes on a single system 16 is presently not uncommon. Collectively, the data storage systems 16 are *often geographically distributed* to reduce access latency, distribute load, and ensure that power and network disruptions do not compromise the entire function of the system 10.

Spec. ¶ 39 (emphases added).

Therefore, consistent with the Specification, we broadly but reasonably interpret the claimed "file system" as being persistently stored in "data storage units" that encompass secondary storage, such as hard disk drives, which may be geographically distributed. *See Id.* *See supra* Fig. 5.

Appellant's Contentions

Appellant contends the cited combination of Kingsbury, Georgiev, and Sandri fails to teach or suggest the limitations: "a data storage unit storing **a file system** . . . . and **within the file system** . . . **a lock for each of the data entities**," as recited in independent claim 3. Appeal Br. 8 (emphasis added).

The Examiner's Findings

We agree with the Examiner that Kingsbury teaches a file system in paragraph 27. We also agree with the Examiner that Kingsbury teaches "a method for lock and journal management" in paragraph 41. *See* Final Act. 7. However, in reviewing the Examiner's rejection of independent claim 3, the Examiner makes no specific findings that map the bolded terms of the claim 3 limitation ("a data storage unit storing **a file system** . . . . and **within the file system** . . . **a lock for each of the data entities**") to a particular section of Kingsbury, Georgiev, or Sandri. *See* Final Act. 6–13. Even if the two cited features or embodiments were used in combination in Kingsbury, we still do not see a specific teaching or suggestion of "a data storage unit storing a file system . . . . and **within the file system** . . . **a lock** for each of the data entities," as required by the express language of independent claim 3. (Emphasis added).

Therefore, for the reasons discussed *infra*, we find the evidence and record supports Appellant's statement in the Appeal Brief:

> In the Final Office Action, the [E]xaminer's rejection against claim 3 was silent with respect to the above limitation, which requires a lock for a data entity to be stored within a file system. Instead, the examiner applied Kingsbury against a different limitation, i.e., "said file system comprising: a plurality of data entities ... , each of the data entities . . . having an associated lock." See page 7, lines 8-12 of Final Office Action. The claim language being considered in that passage corresponds to the claim language of claim 3 which *was deleted by amendment,* and not the amended limitation of "a data storage unit storing **a file system** ... and **within the file system** ... **a lock for each of the data entities**."

Appeal Br. 8 (emphasis added).

We have also reviewed the Examiner's responses in the Answer and the additional and/or cumulative citations to "Kingsbury: paragraphs [0041]-[0042]; also, Fig. 4: #400: exclusive lock. Fig. 4 #400: wherein the 'mode' refers to the lock state; also, paragraph [0041]: lock states are exclusive, shared, and/or not held; also, Fig. 3: the 'field' being located in the 'Transactional data structure.'" Ans. 3.

Even if a field pertaining to the state of a lock is located in Kingsbury's transactional data structure (Fig. 3A), we find this is insufficient to establish by a preponderance of the evidence that Kingsbury teaches "a data storage unit storing **a file system** . . . . and **within the file system** . . . **a lock for each of the data entities**," as required by the disputed language of independent claim 3. Moreover, we find that to affirm the

Examiner on this point would require some degree of speculation on our part. We decline to engage in speculation. [6]

Therefore, on this record, we find a preponderance of the evidence supports Appellant's rebuttal in the Reply Brief: "in *Kingsbury*, the locking mechanism relates only to writing blocks to the journal to make the writes to the journal atomic. The locking mechanism governing writes to the journal still does not teach a data storage unit **storing a lock within the file system**." Reply Br. 2 (emphasis added).

Further regarding claim 3, the Examiner contradicts any finding that Kingsbury and/or Georgiev teach the contested limitations by making a new finding in support of the rejection of independent claim 10 that relies upon the tertiary Sandri reference to teach what is found missing in Kingsbury and Georgiev:

> However neither Kingsbury nor Georgiev explicitly facilitate from a data storage unit that stores **within the file system** a plurality of data entities including file descriptors, files, and a block bitmap, and **a lock for each of the data entities** comprising an owner field and a version field; by writing an owner ID thereof into the owner field of the lock.

Final Act. 19.

Regarding independent claim 10, the Examiner now finds:

> Sandri discloses, from a data storage unit that stores **within the file system** a plurality of data entities including file descriptors, files, and a block bitmap, and **a lock for each of**

[6] "A rejection . . . must rest on a factual basis . . . ." *In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967). "The Patent Office has the initial duty of supplying the factual basis for its rejection. It may not . . . resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis." *Id.*

> **the data entities** comprising an owner field and a version field; by writing an owner ID thereof into the owner field of the lock.

Id.

Thus, to support the rejection of independent claim 10, the Examiner turns to the tertiary Sandri reference and now finds Sandri's resource descriptor 106 (Fig. 1) teaches or suggests **a lock within the file system**. In particular, the Examiner reproduces and relies upon paragraph 48 of Sandri:

> Resource descriptor 106 could be a register formatted into a plurality of fields each associating a resource with a logical processor identifier (LPID) and a status identifier such as a lock bit. Each field associating a resource with a LPID and a status identifier could identify the corresponding resource based on the field's position, i.e., order, within the register. Each field could be N+l bits long, with the low-order bit acting as the lock bit and the higher-order bits holding the LPID. Each resource's LPID field would identify which, if any, logical processor had reserved the resource, and the status identifier would indicate whether the reservation was currently active.

Final Act. 20 (quoting Sandri ¶ 48).

Thus, the Examiner finds: "If logical processor 101 successfully obtains a lock, it has exclusive access to resource descriptor 106 (i.e., logical processor 102 is not permitted to change the contents of resource descriptor 106 while logical processor 101 has the lock)." Final Act. 20.

In rebuttal, Appellant argues:

> This semaphore lock [in Sandri] does not meet the limitations of the claimed "lock for each of the data entities" *because it is stored in hardware (i.e., a register) and not in any file system*. Claim 10 expressly requires a data storage unit "storing ... within the file system ... a lock for each of the data entities." (Emphasis added.) Therefore, the [E]xaminer clearly erred in

> concluding that the combination of Kingsbury, Georgiev, and Sandri teaches "a data storage unit storing a file system ... and **within the file system ... a lock for each of the data entities**."

Appeal Br. 11 (emphasis added).

We find a preponderance of the evidence supports the Appellant's contentions, because we do not see how a register internal to Sandri's logic device 100 (either resource descriptor 106 or semaphore 105 — Fig. 1) teaches or suggests **a lock within the file system**, because any such file system (in persistent secondary storage) would be external to logic device 100, and processors 101 and 102. *See* Sandri Fig. 1, logical device 100, including logical processors 101 and 102. *See also* Sandri ¶ 31: "Semaphore 105 and resource descriptor 106 may both be registers."

We note Sandri describes locks as follows: "a particular logical processor of a plurality of logical processors has exclusive use of a shared resource. A logical processor with exclusive use of a resource may be said to have a 'lock' on the resource." Sandri ¶ 9. Sandri depicts the shared resources as element 103, shown *within* logic device 100. *See* Fig. 1.

Thus, Sandri is not concerned with any file system as a shared resource, but rather with "a control mechanism for controlling access by multiple logical processors to **shared resources on a common microchip**." Abstract (emphasis added). Sandri describes the shared resources: "A plurality of processor cores as shown in FIG. 7 typically share certain chip resources. For example, cores 0-N share cache 706, front side bus 707, and control logic 708 via multiplexer 705." Sandri ¶ 3.

Accordingly, even if *arguendo* Sandri's resource descriptor 106 were to store an address pointer to a file system, Sandri's semaphore 105 (i.e., a "lock" contained within logical device 100 — Fig. 1) would exist **outside**

the file system, and *not within it*, as required by the express language of independent claims 3 and 10.

In the Reply Brief (and Appeal Brief 12–13), Appellant additionally argues the references have not been properly combined:

> In the Final Office Action, the Examiner [found] that the reason to combine Sandri with Kingsbury and Gorgiev [(sic)] is the "need to manage locks to make sure logical processors can function properly". Final Office Action, page 13, 1st full paragraph, page 21, 1st full paragraph. In the Examiner's Answer, the Examiner now [finds] that the reason to make the combination is the "need to manage shared resources; need for efficient logical process for controlling access to shared resources in an environment with multiple logical processors". Examiner's Answer, page 8.

Reply Br. 3.

We find a preponderance of the evidence supports Appellant's responsive rebuttal in the Reply Brief:

> However, neither reason offered by the Examiner in the Examiner's Answer articulates sufficient grounds for combining Sandri with Kingsbury and Gorgiev [(sic)]. The journal lock in Kingsbury already controls access by multiple servers to the blocks in the journal and Kingsbury provides no reason to seek out other locks to control access to any other shared resources. The access trees in Gorgiev already control access by multiple computers to shared resources and Gorgiev provides no reason to seek out another locking mechanism to control access to shared resources.
>
> Moreover, no person of skill in the art cognizant of Kingsbury and Gorgiev would turn to Sandri because neither Kingsbury nor Gorgiev has any need to reserve resources prior to their use, as taught in Sandri.

Id. Note: "Gorgiev" should be "Georgiev."

Further, based upon our review of the record, we find the Examiner's mapping of the disputed limitations is generally unclear (particularly regarding claim 3), because the Examiner does not provide a clear mapping of the individual disputed claim terms to the corresponding *specific* feature(s) found in Kingsbury, Georgiev, or Sandri, considered alone or in combination. *See* Final Act. 6–21. We emphasize that a list of many possible citations is not specific.

Although Georgiev also teaches an "object-based opportunistic locking file system application" (col. 4, ll. 38–39), the Examiner did not rely on this portion of Georgiev in support of the rejection. Upon closer review, we find that there is insufficient evidence to determine whether Georgiev (col. 4, ll. 38–39) teaches "**a lock that is stored within the file system for each of the data entities**," as required by the disputed language of independent claims 3 and 10.

We note the Board is a reviewing body that does not perform initial examination. To show obviousness (or anticipation), the Examiner must provide a clear mapping of each claim limitation to the *corresponding specific feature* found in the reference, which the Examiner must identify with particularity.[7]

The prima facie burden has not been met, and the rejection does not adhere to the minimal requirements of 35 U.S.C. § 132(a), "when a rejection is so uninformative that it prevents the applicant from recognizing and

[7] *See* 37 C.F.R. § 1.104(c)(2) ("When a reference is complex or shows or describes inventions other than that claimed by the applicant, *the particular part relied on must be designated as nearly as practicable*. The pertinence of each reference, if not apparent, *must be clearly explained* and each rejected claim specified." (Emphasis added)).

seeking to counter the grounds for rejection." *Chester v. Miller*, 906 F.2d 1574, 1578 (Fed. Cir. 1990).

On this record, and based upon a preponderance of the evidence, we are persuaded of error regarding the Examiner's underlying factual findings and ultimate legal conclusion of obviousness for independent claims 3 and 10.

Therefore, given the absence of clear mappings and explanations by the Examiner, and for essentially the same reasons argued by Appellant in the Briefs, as further discussed above, we are constrained on this record to reverse the Examiner's § 103(a) rejection of independent claims 3 and 10.

Because we have reversed the rejection of each independent claim on appeal, we also reverse the Examiner's obviousness rejection for each dependent claim on appeal.

Accordingly, we reverse the Examiner's obviousness rejection of all claims 3–19 on appeal.

CONCLUSION

The Examiner erred in rejecting claims 3–19, as being obvious under 35 U.S.C. § 103(a), over the cited combination of Kingsbury, Georgiev, and Sandri.

DECISION SUMMARY

Claims Rejected	**Pre-AIA 35 U.S.C. §**	**Reference(s)/Basis**	**Affirmed**	**Reversed**
3–19	103(a)	Kingsbury, Georgiev, Sandri		3–19
Overall Outcome				3–19

REVERSED