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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LI LI, JU WEI SHI, RUI XIONG TIAN, and YI XIN ZHAO

Appeal 2015-005036
Application 13/106,751
Technology Center 2100

Before BRUCE R. WINSOR, KEVIN C. TROCK, and
NABEEL U. KHAN, *Administrative Patent Judges*.

WINSOR, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants¹ appeal under 35 U.S.C. § 134(a) from the final rejection² of claims 1, 2, and 5–20, which constitute all the claims pending in this application. App. Br. 4. We have jurisdiction under 35 U.S.C. § 6(b). Claims 3 and 4 are cancelled. *Id.*

¹ The real party in interest identified by Appellants is International Business Machines Corporation. App. Br. 2.

² The Final Office Action (mailed July 29, 2014), states both that it is final (Final Act. 1) and non-final (Final Act. 2). In view of the Amendment after Final (filed Sept. 30, 2014) and Advisory Action (mailed Nov. 5, 2014), we conclude both the Examiner and Appellants understood the claims to be finally rejected, and we treat the claims accordingly.

We affirm.

STATEMENT OF THE CASE

Appellants' disclosed invention "relate[s] to garbage collection in computer programming [i]n particular, . . . to providing garbage collection in an in-memory replication system." Spec. ¶ 2. Claim 10, which is illustrative, reads as follows (with emphasis added):

10. A system for garbage collection in a first node server of an in-memory replication system, said system comprising:

a processor; and

at least one memory communicatively coupled to said processor, said memory comprising executable code that, when executed by said processor, causes said processor to:

determine whether any external node server has indicated that a replicated data object stored by said at least one memory is eligible for garbage collection; and

in response to determining that an external node server has indicated that the replicated data object stored by said at least one memory is eligible for garbage collection, *perform garbage collection on said replicated data object without performing a mark operation of garbage collection.*

Claims 10–16, 1–7, 19, and 20 stand rejected under 35 U.S.C.

§ 103(a)³ as being unpatentable over Barsness et al. (US 2009/0112953 A1; Apr. 30, 2009) ("Barsness") and Holt (US 2008/0250213 A1; Oct. 9, 2008). *See* Final Act. 2–5, 7; Adv. Act. 2.

³ In an apparent typographical or clerical error, in the rejection summary the Examiner refers to the rejection of claims 10–16 as being for anticipation under 35 U.S.C. § 102(b). *See* Final Act 2. However, both the preceding heading (Final Act 2) and the overall thrust of the detailed rejection (Final Act 2–5, 7) indicates it is for unpatentability under 35 U.S.C. § 103(a).

Claims 17, 18, 8, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Barsness, Holt, and Oh et al. (US 2009/0119353 A1; May 7, 2009) (“Oh”). *See* Final Act. 6–7.

Rather than repeat the arguments here, we refer to the Briefs (“App. Br.” filed Nov. 24, 2014; “Reply Br.” filed Apr. 2, 2015) and the Specification (“Spec.” filed May 12, 2011) for the positions of Appellants and the Final Office Action (“Final Act.” mailed July 29, 2014), Advisory Action (“Adv. Act.” mailed Nov. 5, 2014), and Answer (“Ans.” mailed Feb. 3, 2015) for the reasoning, findings, and conclusions of the Examiner. Only those arguments actually made by Appellants have been considered in this decision. Arguments that Appellants did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2014).

ISSUES

The issues presented by Appellants’ arguments are as follows:

Whether the Examiner errs in finding the combination of Barsness and Holt teaches or suggests “in response to determining that an external node server has indicated that [a] replicated data object stored by said at least one memory is eligible for garbage collection, *perform[ing] garbage collection on said replicated data object without performing a mark operation of garbage collection*” (emphasis added), as recited in claim 10.

Whether the Examiner errs in finding the combination of Barsness and Holt teaches or suggests “acquiring identification information for said data object identified with said first node server and transmitting said

identification information to at least one other node server in said in-memory replication system that stores said data object,” as recited in claim 1.

ANALYSIS

Claim 10

The Examiner relies on Barsness to teach “in response to determining that an external node server has indicated that [a] replicated data object stored by said at least one memory is eligible for garbage collection, perform[ing] garbage collection on said replicated data object,” as recited in claim 10, but finds Barsness does not teach doing so “without performing a mark operation of garbage collection.” Final Act. 3 (citing Barsness ¶ 38).

The Examiner finds as follows:

Holt teaches, identification information for replicated data, where the data is identified without performing mark operation (Paragraphs [0497]–[0498], Fig 55 and 56: Element 195 — based on if a data object is marked for deletion on machines (N-1) (*external nodes*), making a determination to perform deletion of the object on the machine without performing mark operation on the machine, Holt).

Final Act. 3. The Examiner further finds it would have been obvious to the person of ordinary skill in the art at the time of the invention to combine Barsness and Holt in the manner recited in the claim. Final Act. 3–4 (citing Holt ¶ 41). The Examiner explains as follows:

[Barsness] explicitly teaches that even thou[gh] a mark step [is] performed in Machine X, the actual garbage collection does not take place unless specified by other Machines that garbage collection can be performed based on identification of the object that is marked for deletion, i.e. the actual decision to garbage collection is NOT based on the performing a mark operation but rather based on census of other Machines.

Ans. 3.

Appellants contend the Examiner errs for the following reason:

Holt states that “[i]n step 181 the proposing machine sends an enquiry message to machine X to request the clean-up or finalisation status of the object (or class or other asset) to be cleaned-up” wherein “finalisation or clean up status is determined as seen in step 192 which determines if the object (or class or other asset) corresponding to the clean-up status request of global name, as received at step 191 (191A), is **marked for deletion.**” (Holt, paras. 497–498) (emphasis added). Clearly, Holt describes marking objects for deletion. Consequently, Holt not only fails to describe “perform[ing] garbage collection on said replicated data object **without performing a mark operation of garbage collection,**” but instead **teaches away** from this subject matter claimed in claim 10. (Claim 10) (emphasis added).

App. Br. 11; *see also* Reply Br. 4–7.

We are unpersuaded of error because Appellants’ contention is not commensurate with the scope of the claim. Contrary to Appellants’ argument, claim 10 does not recite that garbage collection occurs without marking data objects for collection. Rather, it recites “perform[ing] garbage collection on said replicated data object **without performing a mark operation of garbage collection**” (emphases added). According to Appellants’ Specification “[t]he task of the mark operation is to traverse all the data objects in a heap from a root node and to mark all the data objects found to be alive until all the data objects are traversed, wherein unmarked data objects are garbage.” Spec. ¶ 24. In light of Appellants’ Specification, “a mark operation of garbage collection” is a mark operation performed on all the data objects in a heap during a garbage collection operation, e.g., a Mark-Copy or Mark-Sweep operation. *See* Spec. ¶¶ 23–25. That Holt teaches deleting objects, i.e., garbage collection, that have been marked for

deletion does not mean that Holt teaches performing a mark operation as a part of the garbage collection process. Indeed, Holt's teaching of data objects marked for deletion teaches, cumulatively with Barsness, that "[an] external node server has indicated that a replicated data object stored by said at least one memory is eligible for garbage collection," as recited in claim 10.

We find the Examiner's findings, conclusions, and reasoning to be reasonable and consistent with the scope of claim 10. Accordingly, we sustain the rejections over various combinations of Barsness, Holt, and Oh of claim 10, independent claim 19,⁴ which is argued on substantially the same bases as claim 10 (App. Br. 16), and claims 11–18 and 20, which respectively depend, directly or indirectly, from claims 10 and 19 and were not separately argued with particularity.

Claim 1

Appellants argue claim 1 on substantially the same bases as claim 10. App. Br. 14. We are unpersuaded of error for the reasons discussed *supra*.

The Examiner finds Barsness teaches "acquiring identification information for said data object identified with said first node server and transmitting said identification information to at least one other node server in said in-memory replication system that stores said data object" (the

⁴ In the event of further prosecution of claims 19 and 20, or claims in similar form, the Examiner may wish to review such claims for compliance under 35 U.S.C. § 101 in light of MPEP § 2106(I) (9th ed. 2014). See *In re Nuijten*, 500 F.3d 1346, 1357 (Fed. Cir. 2007); *Ex parte Mewherter*, 107 USPQ2d 1857, 1862 (PTAB 2013) (precedential); David J. Kappos, *Subject Matter Eligibility of Computer Readable Media*, 1351 Off. Gaz. Pat. Office 212 (Feb. 23, 2010).

“acquiring and transmitting steps”⁵), as recited in claim 1. *See* Final Act. 4–5 (citing Barsness ¶ 7) (discussing claim 13), 7; *see also* Ans. 4 (additionally citing Barsness ¶¶ 38–39, 42, 45).

Appellants contend as follows:

Barsness states that the method described therein may further include “determining a set of garbage collection *statistics* associated with at least one evaluated object in the object space and transmitting the set of *garbage collection statistics* to a master garbage collector running on a second compute node of the parallel computing system.” (Barsness, para. 7) (emphasis added). Appellant asserts that statistics are not the same as “*identification information* for [a] data object.” (Claim 1)

App. Br. 15; *see also* Reply Br. 7–8. We are unpersuaded of error.

First of all, we note that the first occurrence of “identification information” recited in the acquiring and transmitting step of claim 1 is not preceded by a definite article and is, therefore, not necessarily the same “identification information” recited in the determining, identifying, and performing steps of claim 1. Barsness teaches transmitting statistical information to other nodes, including information regarding specific data objects, e.g., “average life time of *an object*” (emphasis added) (Barsness ¶ 38), for the purpose of identifying objects that may be eligible for deletion (*see id.* ¶ 42). We conclude that this information regarding the average life time of specific objects falls within the broadest reasonable interpretation of “identification information for said data object [eligible for deletion] identified with said first node server,” as recited in claim 1. We further note

⁵ We refer to the steps of claim 1 by the gerunds used in the claim to describe the steps.

that nothing in claim 1 precludes acquiring and transmitting information regarding objects *not* eligible for deletion.

We find the Examiner's findings, conclusions, and reasoning to be reasonable and consistent with the scope of claim 1. Accordingly, we sustain the rejections over various combinations of Barsness, Holt, and Oh of claim 1 and claims 2 and 5–9 which depend, directly or indirectly, from claim 1 and were not separately argued with particularity.

DECISION

The decision of the Examiner to reject claims 1, 2, and 5–20 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1). *See* 37 C.F.R. §§ 41.50(f), 41.52(b).

AFFIRMED