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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KSHITIJ A. DOSHI and CHRISTOPHER J. HUGHES

Appeal 2019-001389
Application 14/697,832
Technology Center 2100

Before ST. JOHN A. COURTENAY III, LARRY J. HUME, and
PHILLIP A. BENNETT, *Administrative Patent Judges*.

HUME, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision rejecting claims 1–4, 6–17 and 20–25, which are all the claims pending in the application. Appellant has canceled claims 5, 18 and 19. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word “Appellant” to refer to “Applicant(s)” as defined in 37 C.F.R. § 1.42(a). Appellants identify the real party in interest as Intel Corp. App. Br. 2.

STATEMENT OF THE CASE²

The Invention

The claims are directed to “controlling displacement in a co-operative and adaptive multiple level memory system.” *See* Title. In particular, Appellant’s disclosed embodiments and claimed invention relate to “the field of processing logic, microprocessors, and associated instruction set architecture that, when executed by the processor or other processing logic, perform logical, mathematical, or other functional operations.” Spec. ¶ 1.

Exemplary Claim

Claim 1, reproduced below, is representative of the subject matter on appeal (*emphasis* added to contested prior-art limitations):

1. A processor comprising:

a control logic to determine whether to enable an incoming data block associated with a first priority to displace, in a cache memory coupled to the processor, a candidate victim data block associated with a second priority and stored in the cache memory, based at least in part on the first and second priorities, a first access history associated with the incoming data block and

a second access history associated with the candidate victim data block, *wherein the control logic is to perform a data block displacement decision with respect to the incoming data block and the candidate victim data block comprising a statistical probability determination according to a first bias value to randomly statistically bias displacement of the*

² Our decision relies upon Appellant’s Appeal Brief (“App. Br.,” filed May 30, 2018); Reply Brief (“Reply Br.,” filed Dec. 5, 2018); Examiner’s Answer (“Ans.,” mailed Oct. 5, 2018); Final Office Action (“Final Act.,” mailed Jan. 3, 2018); and the original Specification (“Spec.,” filed April 28, 2015).

candidate victim data block, wherein the control logic is to select one of a first bias matrix storage and a second bias matrix storage from which to obtain the first bias value based at least in part on the first priority and the second priority.

Prior Art

The Examiner relies upon the following prior art as evidence in rejecting the claims on appeal:

Hosoya et al. (“Hosoya”)	US 2002/0007440 A1	Jan. 17, 2002
Cargnoni et al. (“Cargnoni”)	US 2004/0215890 A1	Oct. 28, 2004
Fair et al. (“Fair”)	US 7,752,395 B1	July 6, 2010
Lilly et al. (“Lilly”)	US 2015/0026404 A1	Jan. 22, 2015
Evans	US 9,047,225 B1	June 2, 2015
Schwetman, Jr. et al. (“Schwetman”)	US 2016/0062894 A1	Mar. 3, 2016

Rejections on Appeal

R1. Claims 1, 6, 7, and 12 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly and Evans. Final Act. 5.

R2. Claims 2 and 8 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, and Cargnoni. Final Act. 9.

R3. Claims 3 and 4 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, Cargnoni, and Fair. Final Act. 10.

R4. Claim 9 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, and Hosoya. Final Act. 12.

R5. Claim 10 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, Hosoya, and Fair. Final Act. 13.

R6. Claim 11 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, and Schwetman. Final Act. 14.

R7. Claim 13 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, and Cargnoni. Final Act. 15.

R8. Claims 14–16 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, Cargnoni, and Fair. Final Act. 18.

R9. Claim 17 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lilly, Evans, Cargnoni, and Schwetman. Final Act. 19.

R10. Claim 20 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Evans and Schwetman. Final Act. 20.

R11. Claims 21, 23, 24, and 25 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Evans, Schwetman, and Hosoya. Final Act. 23.

R12. Claim 22 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Evans, Schwetman, Hosoya, and Fair. Final Act. 26.

ISSUES AND ANALYSIS

Based upon our review of the record, we find a preponderance of the evidence supports particular arguments advanced by Appellant with respect to claims 1–4, 6–17 and 20–25 for the specific reasons discussed below. We highlight and address specific findings and arguments for emphasis as follows.

1. § 103 Rejection R1 of Claims 1, 6, 7, and 12

Issue 1

Appellant argues (App. Br. 9–10; Reply Br. 2–3) the Examiner’s rejection of claim 1 under 35 U.S.C. § 103(a) as being obvious over the combination of Lilly and Evans is in error. These contentions present us with the following issue:

Did the Examiner err in finding the cited prior art combination teaches or suggests a processor that includes, *inter alia*, “control logic” wherein, *inter alia*,

the control logic is to perform a data block displacement decision with respect to the incoming data block and the candidate victim data block comprising a statistical probability determination according to a first bias value to randomly statistically bias displacement of the candidate victim data block, wherein the control logic is to select one of a first bias matrix storage and a second bias matrix storage from which to obtain the first bias value based at least in part on the first priority and the second priority,
as recited in claim 1?

ANALYSIS

Appellant submits “Evans does not teach or suggest . . . that this statistical probability determination is according to a first bias value.”

Appeal Br. 10. Appellant further argues:

[N]owhere in Evans is there any teaching or suggestion of a control *logic to select a bias value from one of multiple bias matrix storages*. Evans further fails to teach or suggest that this selection of bias matrix storage from which to obtain a bias value be based on priorities of both incoming data block and victim candidate data block.

Id. Additionally,

[t]he Examiner never mentions, and cannot identify anything in the art for selection of a bias value that is selected from one of multiple storages based on priorities of both incoming data block and candidate victim data block. Instead, Evans’ teaching of bias is only for weighting which of its multiple replacement protocols to use. And this biasing is taught to be based on cache hit rate. Evans, col. 3, lns. 37–50. But nothing teaches or suggests a bias value based on data block priorities.

Reply Br. 3.

The Examiner finds Lilly does not explicitly teach or suggest the limitations “a statistical probability determination according to a first bias value to randomly statistically bias displacement of the candidate victim data block” and “wherein the control logic is to select one of a first bias matrix storage and a second bias matrix storage from which to obtain the first bias value based at least in part on the first priority and the second priority.”

Final Act. 6.

Instead, the Examiner finds:

Evans Col: 1 line 42 to Col: 2 line: 21, Col: 3 lines: 28–42 and Col: 4 lines 16–41 teaches pre-fetching data from the disk and loading it into the cache. Once the cache fills, it becomes necessary to evict some of the data stored in the cache to make room for newly arriving data. For the eviction process, a probability with different weight factors with respect to data replacement protocols for evicting data is performed. The weights affects how data is evicted (LRU, FIFO, random, etc.) based on what would have a better reward than punishment for evicting.

Ans. 4. The Examiner additionally finds:

Evans Fig. 3 teaches a cache manager 130 which comprises protocol selector 132, as well as a record 310 of data replacement protocols, a current protocol 330, a hit rate detector 340 and a protocol adjuster 350. Col: 4 lines 17–33 teaches the record 310 of data replacement protocols includes entries of replacement protocols selection (whether candidate data will be evicted based on LRU, FIFO, random replacement, etc.). Each protocol having a weight. Weights for all protocols may initially be set to be the same values or to random values. Col: 4 lines: 34–41 and Col: 8 lines: 32–57 teaches that the probability of the protocol selector 132 selecting any given protocol is equal to the weight associated with that protocol divided by the sum of all the weights for all of the protocols, [t]his sum would be equivalent to the bias value.

Ans. 5.

Appellant responsively contends, “[w]hile Evans teaches that a random selection process can be used to select the replacement protocol, there is absolutely nothing in the reference that in any way teaches or suggests that any replacement decision for a given data block be by a statistical probability determination.” Reply Br. 2.

We disagree with the Examiner because, for the reasons set forth by Appellant, we do not find the cited portions of Evans teach or suggest the disputed limitation, i.e.,

wherein the control logic is to perform a data block displacement decision with respect to the incoming data block and the candidate victim data block comprising a statistical probability determination according to a first bias value to randomly statistically bias displacement of the candidate victim data block, wherein the control logic is to select one of a first bias matrix storage and a second bias matrix storage from which to obtain the first bias value based at least in part on the first priority and the second priority.

as recited in claim 1.

We disagree with the Examiner because, as argued by Appellant, “regardless of how a protocol is selected in Evans, once selected, replacement decisions are made according to the selected protocol — none of which relies on a statistical probability determination according to a bias value.” Appeal Br. 10.

Therefore, for essentially the same reasons argued by Appellant, we reverse the Examiner's rejection of independent claim 1, and grouped claims 6, 7, 12 that depend therefrom and stand therewith.³ *See Claim Grouping, supra.*

³ Because we agree with at least one of the dispositive arguments advanced by Appellant, we need not reach the merits of Appellant's other arguments. *See Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (finding an administrative agency is at liberty to reach a decision based on “a single dispositive issue”).

2. § 103 Rejections R2–R12 of Claims 2–4, 8–11, 13–17, and 20–25

Because we have reversed the Examiner's rejection of independent claim 1 under Rejection R1, we also reverse Rejection R7 of independent claim 13 and Rejection R10 of independent claim 20, which both recite the disputed limitation in commensurate form, and which all rely upon the disclosure of Evans to teach or suggest the disputed limitation.

Accordingly, in light of our reversal of Rejections R1, R7, and R10 of independent claims 1, 13 and 20, *supra*, we also reverse obviousness Rejections R2–R6, R8, R9, R11, and R12 under § 103 of dependent claims 2–4, 8–11, 14–17, and 21–25, which variously and ultimately depend from independent claims 1, 13, and 20. On this record, the Examiner has not shown how the additionally cited references overcome the aforementioned deficiencies with Evans, as discussed above regarding claim 1.

CONCLUSION

The Examiner erred with respect to obviousness Rejections R1–R12 of claims 1–4, 6–17, and 20–25 under 35 U.S.C. § 103(a) over the cited prior art combinations of record, and we do not sustain the rejections.

DECISION

We reverse the Examiner's decision rejecting claims 1–4, 6–17 and 20–25.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Basis/ References	Affirmed	Reversed
1, 6, 7, 12	103	Lilly, Evans		1, 6, 7, 12
2, 8	103	Lilly, Evans, Cargnoni		2, 8
3, 4	103	Lilly, Evans, Cargnoni, Fair		3, 4
9	103	Lilly, Evans, Hosoya		9
10	103	Lilly, Evans, Hosoya, Fair		10
11	103	Lilly, Evans, Schwetman		11
13	103	Lilly, Evans, Cargnoni		13
14–16	103	Lilly, Evans, Cargnoni, Fair		14–16
17	103	Lilly, Evans, Cargnoni, Schwetman		17
20	103	Evans, Schwetman		20
21, 23, 24, 25	103	Evans, Schwetman, Hosoya		21, 23, 24, 25
22	103	Evans, Schwetman, Hosoya, Fair		22
Overall Result				1–4, 6–17, 20–25

REVERSED