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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* MAURICIO BRETERNITZ JR., JAMES M. O’CONNOR,  
SRILATHA MANNE, and YASUKO ECKERT

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Appeal 2017-004432  
Application 13/708,090  
Technology Center 2100

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Before ROBERT E. NAPPI, KALYAN K. DESHPANDE, and  
DAVID M. KOHUT, *Administrative Patent Judges*.

KOHUT, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE<sup>1</sup>

Appellants<sup>2</sup> seek review under 35 U.S.C. § 134(a) of the Examiner’s rejection of claims 1–9 and 14–25.<sup>3</sup> We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM-IN-PART and enter a NEW GROUND OF REJECTION under 37 C.F.R. § 41.50(b).

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<sup>1</sup> Our Decision makes reference to Appellants’ Reply Brief (“Reply Br.,” filed January 17, 2017) and Appeal Brief (“App. Br.,” filed July 21, 2016), and the Examiner’s Answer (“Ans.,” mailed November 17, 2016) and the Non-Final Office Action (“Non-Final Act.,” mailed December 22, 2015).

<sup>2</sup> According to Appellants, the Real Party in Interest is Advanced Micro Devices, Inc. App. Br. 1.

<sup>3</sup> Claims 10–13 were withdrawn previously.

## INVENTION

Appellants’ invention is directed to reducing the impact of spill data on processor efficiency and power consumption by removing spill data from the memory hierarchy after it is no longer needed. Spec. ¶ 11.

Claims 1, 14, and 22 are the independent claims on appeal. An understanding of the invention can be derived from illustrative claim 1.

1. A method, comprising:

in response to a field of an instruction indicating a final access to first data stored at a memory hierarchy of a processor, discarding the first data from the memory hierarchy.

## REFERENCES

Scales	US 2002/0016887 A1	Feb. 7, 2002
Bennett et al. (hereinafter “Bennett”)	US 2007/0113029 A1	May 17, 2007
Rahman et al. (hereinafter “Rahman”)	US 2009/0037666 A1	Feb. 5, 2009
Ono et al.	US 2009/0172332 A1	July 2, 2009

## REJECTIONS

Claims 1–4, 6, 14, 18, and 22 stand rejected under 35 U.S.C. § 103(a) as obvious over the combination of Applicant Admitted Prior Art (“AAPA”) and Bennett. Non-Final Act. 2–4.

Claims 5, 7, 17, 19, and 25 stand rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Ono. *Id.* at 4–5.

Claims 8, 9, 20, and 21 stand rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Rahman. *Id.* at 5–6.

Claims 15, 16, 23, and 24 stand rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Scales. *Id.* at 6–8.

## ISSUES

Did the Examiner err in finding the combination of AAPA and Bennett teaches or suggests “a field of an instruction indicating a final access to first data stored at a memory hierarchy of a processor, discarding the first data from the memory [of] hierarchy,” as recited in independent claim 1, and similarly required in independent claims 14 and 22?

Did the Examiner err in finding the combination of AAPA and Bennett teaches or suggests “a load instruction that results in a load access to the first data,” as recited in dependent claim 2?

Did the Examiner err in finding the combination of AAPA, Bennett, and Ono teaches or suggests “determining the final access to the first data further based upon a modification of a stack pointer that results in the first data being removed from the stack,” as recited in dependent claim 5?

Did the Examiner err in finding the combination of AAPA and Bennett teaches or suggests “discarding a plurality of data including the first data and a second data in response to the final access to the first data,” as recited in dependent claim 6?

## ANALYSIS

*Claims 1, 14, 18, and 22 rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA and Bennett*

Independent claim 1 recites “in response to a field of an instruction indicating a final access to first data stored at a memory hierarchy of a processor, discarding the first data from the memory hierarchy.”

The Examiner finds that AAPA indicates that it was known in the art, at the time of the invention, to “spill” data that is accessed less frequently. Non-Final Act. 2–3; Ans. 2–3. Thus, the Examiner finds that when the data is “spilled,” it has been finally accessed. Non-Final Act. 2; Ans. 8. As a result, the Examiner interprets the spill data as the final access data. Ans. 8. Further, the Examiner finds that the spill code (instruction) to spill the less frequently accessed data is the claimed field of instruction. *Id.*; see Spec. ¶¶ 2.

Appellants contend that AAPA teaches a spill code to spill less frequently accessed data to a memory hierarchy, which is not the same as final access to data because the spill data may be accessed again in the future. App. Br. 4; Reply Br. 2. Additionally, Appellants argue that the portion of Appellants’ Specification cited by the Examiner does not teach or suggest a field of an instruction indicating a final access to data. App. Br. 4; Reply Br. 2. We disagree with Appellants.

Appellants do not provide a specific definition for the claim term “final access” either in the claims or Appellants’ Specification. As a result, the Examiner interprets the term broadly to include data that is “spilled” because it is infrequently used. We find this to be a reasonable interpretation of the limitation that is consistent with Appellants’

Specification because spill data is data that has been finally accessed, for at least that specific moment in time.

Because we agree with the Examiner that spill data is considered data that is finally accessed, we also agree with the Examiner that the spill instruction is the claimed “field of instruction” indicating the final access. We agree with the Examiner (Ans. 8) because the spill instruction indicates to the system that the data is to be moved from the processor’s registers to a specific memory because it is data that has been finally accessed for a particular process.<sup>4</sup>

Thus, for all of the reasons indicated above, we sustain the Examiner’s rejection of independent claim 1. Appellants make the same arguments with respect to independent claims 14 and 22 and do not argue dependent claim 18 separately. Therefore, we sustain the rejection of independent claims 14 and 22 and dependent claim 18 for the same reasons indicated above with respect to claim 1.

*Claims 2, 3, and 4 rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA and Bennett.*

Dependent claim 2 recites “wherein the instruction comprises a load instruction that results in a load access to the first data and the field stores a

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<sup>4</sup> Furthermore, although not used by the Examiner, we find that Bennett also teaches the disputed limitation. Bennett specifically indicates that when data is obsolete (i.e., no longer needed, has served its purpose, or has been finally accessed) a flag (field of instruction) is set to have the data erased. *See* Bennett, col. 2, ¶ 13.

value identifying the load access as the final access.” Claims 3 and 4 depend from claim 2.

Appellants argue that even if the spill data was loaded into the memory hierarchy by a load instruction, there is no teaching or suggestion that the load instruction includes a “field [that] stores a value identifying the load access as the final access,” as required by claim 2. *Id.* We agree with Appellants.

Although the Examiner’s findings that the combination of references teaches a load instruction, the Examiner has failed to provide or identify sufficient evidence or reasoning to support the finding that the load instruction includes a “field [that] stores a value.” Non-Final Act. 3; Ans. 3, 8; *see* Spec. ¶ 2. Accordingly, we reverse the Examiner’s rejection claims 2, 3, and 4.

We, however, find that Bennett teaches setting a flag to indicate that the data should be erased. *See* Non-Final Act. 3 (citing Bennet ¶ 14). We find that the flag is a value identifying final access because the data is no longer needed and will be erased. As our analysis deviates from the Examiner’s rejection, we designate our analysis to be a new ground of rejection of claim 2 under 35 U.S.C. § 103(a) over AAPA and Bennett. Because claim 3 was not argued separately with particularity, we also designate a new ground of rejection of claim 3 for the same reasons as claim 2.

Claim 4 recites “automatically generating the load instruction at a compiler in response to determining a source code instruction indicates the final access to the first data.” Appellants argue that AAPA does not teach that the spill code instruction is inserted in response to determining a source

code instruction indicates a final access to data. App. Br. 6; Reply Br. 4. Appellants further argue that “spill code can mark data as less frequently accessed without including in any particular instruction an indication of final access to the data.” App. Br. 6; Reply Br. 4. However, as noted above in the analysis for claim 1, we agree with the Examiner that less frequently accessed spill data is considered data that is finally accessed. Thus, we also agree with the Examiner (Non-Final Act. 3; Ans. 9) that the spill instruction is the claimed source code instruction indicating the final access because the spill instruction causes the less frequently access data to be spilled, as indicated above with respect to claim 1.

Claim 4 is dependent upon claim 2. Therefore, we incorporate the new rejection of claim 2 with the rejection of claim 4 and we designate claim 4 as a new ground of rejection under 35 U.S.C. § 103(a) over AAPA and Bennett.

*Claim 5 rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Ono.*

Dependent claim 5 recites “determining the final access to the first data further based upon a modification of a stack pointer that results in the first data being removed from the stack.”

The Examiner finds that the combination of AAPA and Bennett teaches determining final access to first data and removing that data, as discussed above regarding claim 1. Non-Final Act. 4–5; Ans. 4, 9–10. Further, the Examiner finds that Ono, teaches a stack pointer and a stack pointer update system. Non-Final Act. 4–5; Ans. 4, 9–10.

Appellants contend that Ono teaches that a stack pointer can be updated to add data to a stack, and fails to teach or suggest modification of a



stack pointer that results in data being removed from a stack, as provided by claim 5. App. Br. 6; Reply Br. 4. Further, Appellants argue that Ono fails to teach or suggest determining a final access to data based upon a modification of a stack pointer. App. Br. 6; Reply Br. 4.

We do not find Appellants’ arguments persuasive. As the Examiner finds, Ono teaches stack modification. Ans. 10; *see* Ono, Figs. 8A, 8B. Appellants argue that Ono teaches adding to a stack (pushing onto a stack) and does not teach removing data from a stack (popping off of a stack), as required by the claim. App. Br. 6; Reply Br. 4. While, Appellant is correct that Ono Figures 8A and 8B disclose pushing data onto a stack, Ono generally teaches operations for stack modification including popping data off of a stack. *See* Ono ¶7. Appellants have not presented any arguments that explain why the Examiner’s findings regarding stack modification as taught by Ono are in error. Accordingly, we sustain the Examiner’s rejection of dependent claim 5.

*Claim 6 rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA and Bennett.*

Dependent claim 6 recites “discarding a plurality of data including the first data and a second data in response to the final access to the first data.”

The Examiner finds that AAPA, discloses spilling less frequently accessed data, interpreting the spill data as the final access data. Non-Final Act. 4; Ans. 3, 10. Further, the Examiner finds that Bennett teaches

discarding a plurality of data. Non-Final Act. 4; Ans. 3, 10; *see* Bennett, Fig.10, ¶¶ 136–139.

Appellants contend that AAPA teaches a spill code and does not teach or suggest discarding first data and a second data in response to the final access to the first data. App. Br. 6; Reply Br. 4–5. Further, Appellants argue that Bennett fails to remedy the alleged deficiencies of the AAPA and alone fails to teach or suggest discarding first data and a second data in response to the final access to the first data. App. Br. 6; Reply Br. 4–5.

We do not find Appellants’ arguments persuasive as they attack the references individually, and further because the arguments are conclusory. As discussed above, the Examiner finds that AAPA discloses a spill code to spill less frequently accessed data, interpreted as final access data, to the memory hierarchy. Non-Final Act. 2–3; Ans. 2–3; *see* Spec. ¶ 2. Appellants argue that AAPA does not teach discarding a plurality of data (App. Br. 6), even though the Examiner relies on Bennett for that teaching. Ans. 10; *see also* Bennett, Fig. 10, ¶ 14. However, nonobviousness cannot be shown by attacking references individually when the rejection is based on a combination of references. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Further, Appellants summarily argue that the AAPA and Bennett, each do not teach or suggest the limitations as recited in claim 6, without specifically addressing the merits of the Examiner’s rejection and pointing out the supposed error. App. Br. 6; Reply Br. 5; *see* 37 C.F.R. § 41.37(c)(1)(vii) (noting that an argument that merely points out what a claim recites is unpersuasive). Thus, we do not find Appellants’ argument persuasive. Accordingly, we sustain the Examiner’s rejection of dependent claim 6.

*Claims 7, 17, 19, and 25 rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Ono.*

Regarding claims 7, 17, 19, and 25, Appellants’ arguments present the same issues discussed above with respect to independent claims 1, 14, and 22. App. Br. 7. Therefore, we sustain the Examiner’s rejection of these claims for the reasons discussed *supra* with respect to claims 1, 14, and 22.

*Claims 8, 9, 20, and 21 rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Rahman.*

Regarding claims 8, 9, 20, and 21, Appellants’ arguments present the same issues discussed above with respect to independent claims 1, 14, and 22. App. Br. 7. Therefore, we sustain the Examiner’s rejection of these claims for the reasons discussed *supra* with respect to claims 1, 14, and 22.

*Claims 15, 16, 23, and 24 stand rejected under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Scales.*

Regarding claims 15, 16, 23, and 24, Appellants’ arguments present the same issues discussed above with respect to independent claims 1, 14, and 22. App. Br. 7. Therefore, we sustain the Examiner’s rejection of these claims for the reasons discussed *supra* with respect to claims 1, 14, and 22.

*New Ground of Rejection: Claims 22–25*

Claims 22–25 are directed to a “computer readable medium.” Appellants’ Specification, paragraph 39, states that

[a] computer readable storage medium may include any storage medium, or combination of storage media, accessible by a computer system during use to provide instructions and/or data to the computer system. Such storage media can include, but is not limited to, optical media (e.g., compact disc (CD), digital versatile disc (DVD), BluRay disc), magnetic media (e.g., floppy disc, magnetic tape, or magnetic hard drive), volatile memory (e.g., random access memory (RAM) or cache), non-volatile memory (e.g., read-only memory (ROM) or Flash memory), or microelectromechanical systems (MEMS)-based storage media.

Thus, the term “computer readable medium” encompasses transitory signals. Accordingly, claims 22–25 are directed to non-statutory subject matter and are rejected under 35 U.S.C. § 101. *See In re Nuijten*, 500 F.3d 1346 (Fed. Cir. 2007); *see also Ex parte Mewherter*, 107 USPQ2d 1857, 1862 (PTAB 2013) (precedential) (“The broadest reasonable interpretation of a claim drawn to a computer readable medium (also called machine readable medium and other such variations) typically covers forms of nontransitory tangible media and transitory propagating signals *per se* in view of the ordinary and customary meaning of computer readable media, particularly when the specification is silent.”)). We designate our analysis to be a new ground of rejection.

## CONCLUSION

The Examiner did not err in finding the Applicant Admitted Prior Art teaches or suggests “a field of an instruction indicating a final access to first data stored at a memory hierarchy of a processor,” as recited in independent claim 1, and similarly required in independent claims 14 and 22.

The Examiner erred in finding the combination of Applicant Admitted Prior Art (AAPA) and Bennett teaches or suggests “a load instruction that results in a load access to the first data,” as recited in dependent claim 2.

The Examiner did not err in finding the combination of AAPA, Bennett, and Ono teaches or suggests “determining the final access to the first data further based upon a modification of a stack pointer that results in the first data being removed from the stack,” as recited in dependent claim 5.

The Examiner did not err in finding the combination of AAPA and Bennett teaches or suggests “discarding a plurality of data including the first data and a second data in response to the final access to the first data,” as recited in dependent claim 6.

#### DECISION

The Examiner’s decision to reject claims 1, 6, 14, 18, and 22 under 35 U.S.C. § 103(a) as obvious over the combination of AAPA and Bennett is affirmed.

The Examiner’s decision to reject claims 2, 3, and 4 under 35 U.S.C. § 103(a) as obvious over the combination of AAPA and Bennett is reversed.

The Examiner’s decision to reject claims 5, 7, 17, 19, and 25 under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Ono is affirmed.

The Examiner’s decision to reject claims 8, 9, 20, and 21 under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Rahman is affirmed.

The Examiner's decision to reject claims 15, 16, 23, and 24 under 35 U.S.C. § 103(a) as obvious over the combination of AAPA, Bennett, and Scales is affirmed.

We enter a New Ground of Rejection for claims 2–4 under 35 U.S.C. § 103(a) as obvious over the combination of AAPA and Bennett and claims 22–25 under 35 U.S.C. § 101 as containing non-statutory subject matter.

#### TIME PERIOD

This decision contains new grounds of rejection pursuant to 37 C.F.R. § 41.50(b). 37 C.F.R. § 41.50(b) provides "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review." 37 CFR § 41.50(b) also provides that the appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) Reopen prosecution. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .

(2) Request rehearing. Request that the proceeding be reheard under § 41.52 by the Board upon the same record . . . .

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)(iv).

AFFIRMED-IN-PART; 37 C.F.R. § 41.50(b)