

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAP SE,
Petitioner,

v.

TERADATA US INC.,
Patent Owner.

IPR2021-00861
Patent 9,851,923 B2

Before LYNNE E. PETTIGREW, BART A. GERSTENBLITH, and
RUSSELL E. CASS, *Administrative Patent Judges*.

CASS, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background

SAP SE (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–16 (the “challenged claims”) of U.S. Patent No. 9,851,923 B2 (Ex. 1001, “the ’923 patent”). Paper 2 (“Pet.”). Teradata US, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review, under 35 U.S.C. § 314 and 37 C.F.R. § 42.4. An *inter partes* review may not be instituted unless it is determined that “the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4(a) (2020) (“The Board institutes the trial on behalf of the Director.”). The reasonable likelihood standard is “a higher standard than mere notice pleading,” but “lower than the ‘preponderance’ standard to prevail in a final written decision.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

For the reasons provided below and based on the record before us, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one of the challenged claims. Accordingly, we institute an *inter partes* review on all grounds set forth in the Petition.

B. Real Parties in Interest

Petitioner states that “SAP SE, SAP AMERICA, INC., and SAP LABS, LLC” are the real parties in interest. Pet. ix. Patent Owner states that “[t]he real parties-in-interest are Patent Owner Teradata US, Inc. as well as Teradata Operations, Inc.; and Teradata Corporation.” Paper 4, 1.

C. Related Proceedings

The parties identify the following district court case involving the ’923 patent: *Teradata US, Inc. v. SAP SE et al.*, Case No. 3:20-cv-06127 (N.D. Cal.), filed August 31, 2020 (the “parallel proceeding”). Pet. ix; Paper 4, 1.

D. The ’923 Patent (Ex. 1001)

The ’923 patent relates to techniques for management of data in multi-storage systems, which can include non-volatile storage (such as one or more hard disk drives) and volatile storage (such as a cache memory for improving performance by storing data that is likely to be used frequently). Ex. 1001, 3:28–53. More specifically, the ’923 patent discloses a multi-storage system in which information associated with “data temperature” in a non-volatile storage can be used to manage storage of data in the volatile storage. *Id.* at 3:54–58. “Data temperature,” the ’923 patent explains, can “reflect how frequently data is likely to be accessed and/or assigned based on its perceived importance[,] which may also . . . dictate that it should be stored in [a] storage device that offers a relatively faster data access rate.” *Id.* at 7:42–57.

According to the ’923 patent, “by allowing persistent temperature measurements to be used in managing cache memory, instead of solely relying on conventional techniques for caching data which typically do not

take into account persistent temperatures associated with a non-volatile storage environment,” “overall performance of a system can be further enhanced.” *Id.* at 3:47–53. The ’923 patent gives the least-recently used (LRU) caching technique, in which items that are least recently used are removed from the cache, as an example of a conventional storage management technique. *Id.* at 14:39–41.

In one embodiment, the ’923 patent describes a volatile storage with two distinct portions. Ex. 1001, 14:52–53. The first portion is used to implement a conventional storage management technique, such as the LRU technique, while the second portion is used to implement a temperature-based technique. *Id.* at 14:53–58. In this embodiment, the ’923 patent explains, “data need only be stored in one [of] the first or second portions” so that “only one copy of data needs to be stored in the volatile storage.” *Id.* at 14:63–67. Data portions can be identified and accessed by a unique identifier, such as assigned storage unit, cylinder identifier, and section identifier. *Id.* at 14:64–15:4. “[B]oth conventional and temperature-based storage management techniques can be consolidated together but effectively work independently to maintain and update data in their own respective assigned portions.” *Id.* at 15:6–10.

E. Illustrative Claims

Of challenged claims 1–16, claims 1, 10, and 16 are independent. For purposes of the issues raised at this stage of the proceeding, claims 1, 5, and 16 are illustrative and are reproduced below.

1. [1.1] A method of managing data in a volatile storage, wherein the method is implemented at least partly by a device, and wherein the method comprises:

- [1.2] using a combination of a data temperature-based storage management technique and a non-temperature-based storage management technique together to manage the storage of data in the volatile storage,
- [1.3] wherein a first portion of the volatile memory is used to provide the temperature-based storage management technique and a second portion of the volatile memory is used to provide non-temperature-based storage management technique.

5. The method of claim 1, wherein a copy of the data is stored only in one of two portions of the volatile storage, wherein the first portion of the two portions is used to provide the temperature-based storage management technique and the second portion of the two portions is used to provide non-temperature-based storage management technique.

16. [16.1] A device that includes one or more processors configured to manage data in a volatile storage

[16.2] by at least using a combination of a data temperature-based storage management technique and one or more non-temperature-based storage management techniques together to manage the storage of data in the volatile storage,

[16.3] wherein a first portion of the volatile memory is used to provide the temperature-based storage management technique, a second portion of the volatile memory is used to provide a first non-temperature-based storage management technique,

[16.4] and a third portion of the volatile memory is used to provide a second non-temperature-based storage management technique, different than the first non-temperature-based storage management technique.

Ex. 1001, 22:2–14, 22:33–39, 23:17–30 (bracketed paragraph identifiers added).

F. Applied References

Petitioner relies upon the following references:

Lee et al., US 2014/0095802 A1, published Apr. 3, 2014
(Ex. 1004, “Lee”);

Ho et al., US 6,370,619 B1, issued Apr. 9, 2002 (Ex. 1005,
“Ho”); and

Morris et al., US 2007/0067575 A1, published Mar. 22, 2007
(Ex. 1006, “Morris”).

Pet. viii, 2.

Petitioner submits the Declaration of Darrell Long (Ex. 1003).

G. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–16 of the
'923 patent based on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–15	102 ¹	Lee
1–16	103	Lee
1–16	103	Lee, Ho
1–16	103	Ho, Morris

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included revisions to 35 U.S.C. §§ 102 and 103 that became effective before the filing of the application that led to the '923 patent. Therefore, we apply the current, post-AIA versions of 35 U.S.C. §§ 102 and 103.

II. DISCUSSION

A. Claim Construction

A claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2020). The parties raise several claim construction issues, which are discussed below.

1. “Data Temperature”-Based Elements

Petitioner proposes constructions for three claim terms relating to “data temperature”: “data temperature,” “persistent data temperature,” and “temperature-based storage management technique.” Pet. 15–17.

a) “data temperature”

Petitioner argues that the term “data temperature” “*includes* any value representing the number or frequency of accesses of particular data in storage, either in absolute or relative terms.” Pet. 15–16 (citing Ex. 1001, 8:44–47, 18:24–27; Ex. 1003 ¶ 36).

Patent Owner does not dispute Petitioner’s construction in its Preliminary Response. Prelim. Resp. 15.

At this stage of the proceeding, and based on the present record, we adopt Petitioner’s proposed construction of this term.

b) “persistent data temperature”

Petitioner argues that the term “persistent data temperature” “has at least three different reasonable interpretations depending on whether ‘persistent’ is understood to modify ‘data’ or ‘data temperature’ or both: (1) data temperature value stored in non-volatile memory; (2) temperature of persistent data, i.e., data stored in non-volatile memory; or (3) data temperature value stored in non-volatile memory, where the data also is

stored in non-volatile memory.” Pet. 16 (citing Ex. 1003 ¶ 37). According to Petitioner, the ’923 patent “does not clarify” whether the data itself and data temperature value must both be stored in non-volatile memory, but either way “the claim element is still met because the prior art discloses examples of ‘persistent data temperatures’ under each above-identified construction.” *Id.* (citing Ex. 1001, 4:8–12, 7:9–12; Pet. 30–35, 59–60).

Patent Owner does not dispute Petitioner’s construction in its Preliminary Response. Prelim. Resp. 15.

At this stage of the proceeding, and based on the present record, we determine that Petitioner’s three proposed constructions are reasonable and, as discussed further below, that Petitioner has established a reasonable likelihood that “persistent data temperature” is disclosed or suggested by the prior art under any of the three constructions. For purposes of institution, we need not determine which of these three proposed constructions is correct; however, the parties may address this issue further if appropriate during the trial.

c) “temperature-based storage management technique”

Petitioner argues that this term “includes a storage management technique that uses temperature (e.g., how frequently data is accessed) associated with data to manage storage of that data, as that is one example expressly described by the ’923 patent.” Pet. 16 (citing Ex. 1001, 7:53–54, 8:38–57). Petitioner further contends that the term “non-temperature-based storage management technique” includes “least recently used (‘LRU’) management techniques, as the ’923 patent also expressly provides that LRU is an example of a well-known ‘conventional’ technique.” *Id.* (citing Ex. 1001, 9:58–67).

Patent Owner does not dispute Petitioner's construction in its Preliminary Response. Prelim. Resp. 15.

At this stage of the proceeding, and based on the present record, we adopt Petitioner's proposed construction of this term, as well as of "non-temperature-based storage management technique."

2. *"manage the storage of data in the volatile storage"*

Patent Owner proposes construing this phrase to mean "coordinating placement of data into and out of the volatile storage so as to limit the number of copies of the data in the volatile storage." Prelim. Resp. 15. Petitioner does not propose a construction for this term at this stage of the proceeding. *See generally* Pet.

Patent Owner argues that its construction "is commensurate with the '923 patent's description of how its storage management system 'manage[s] the storage of data in the volatile storage.'" Prelim. Resp. 15 (alteration in original). Patent Owner relies on the following portion of the '923 patent as support:

[O]nly one copy of data needs to be stored in the volatile storage 300. More specifically, data portions can be identified and accessed, for example, by a unique identifier 306, where ***the data need only be stored in one the first or second portions (302 and 304)*** and effectively marked as such so that it can be accessed from the appropriate portion. For example, a data portion D4 can be identified by its unique identifier 306 (e.g., assigned storage unit, cylinder identifier, section identifier) and located in the second portion 304 of the volatile storage 300. The embodiment depicted in FIG. 3, exemplifies a scheme where both conventional and temperature-based storage management techniques can be consolidated together but effectively work independently to maintain and update data in their own respective assigned portions. In the example, ***a data portion need not be kept in both portions in order to avoid***

unnecessar[y] complications that can arise by having two copies of the same data in the volatile storage 300.

Prelim. Resp. 16 (citing Ex. 1001, 14:63–15:13) (emphasis added).

Patent Owner further argues that its construction is supported by the disclosure in column 15 that

a storage management component and/or system can be configured ***to ensure that only a single copy of a data portion is maintained either in first portion 302*** in accordance with a conventional storage management technique ***or in the second portion 304*** in accordance with a data-temperature-based technique that considers persistent data temperatures in determining whether to keep or discard data in its designated portion 304 in favor of storing other data.

Ex. 1001, 15:13–21 (emphasis added), *quoted in* Prelim. Resp. 17.

Additionally, Patent Owner argues that claim 5 “further clarifies the ‘manage’ limitation of claim 1” by “specifically reciting” that

a copy of the data is stored only in one of two portions of the volatile storage, wherein the first portion of the two portions is used to provide the temperature-based storage management technique and the second portion of the two portions is used to provide non-temperature-based storage management technique.

Ex. 1001, 22:33–39, *quoted in* Prelim. Resp. 16.

Based on the present record, we do not find Patent Owner’s proposed construction supported by the intrinsic evidence. The ordinary meaning of “manage the storage of data in the volatile storage” does not require limiting the number of copies of the data in the volatile storage, and Patent Owner does not argue to the contrary. Turning to the language of the other claims, we note that claim 5, which depends from claim 1, specifically includes additional language stating that the data is stored “only in one of two portions of the volatile storage,” but claim 1 does not include such language. The use of this additional limitation in dependent claim 5 suggests that the

inventors did not intend it to be included within claim 1's broader language reciting "manag[ing] the storage of data in the volatile storage." *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315–16 (Fed. Cir. 2005) (en banc) ("the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim").

Turning to the '923 patent specification, the portions of the specification Patent Owner relies on appear to discuss a preferred embodiment of the invention, rather than limiting the invention itself. The portions of columns 14 and 15 upon which Patent Owner relies discuss Figure 3 which, the specification explains, "depicts a volatile storage 300 that uses a persistent temperature-based storage management technique as well as a conventional storage management technique ***in accordance with one embodiment.***" Ex. 1001, 14:48–51 (emphasis added); *see id.* at 5:5–8 (also describing Figure 3 as being "in accordance with one embodiment" of the invention). Interpreting claim 1 to require maintaining only a single copy of a data portion in either the first portion or second portion, where that language does not exist in claim 1, would be tantamount to reading a limitation from a preferred embodiment into the claims, which would be improper. *See Philips*, 415 F.3d at 1323 ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments."). Patent Owner does not identify any portions of the specification suggesting that limiting the number of copies of the data in the volatile storage is a necessary part of the invention, or that the inventors intended to expressly or impliedly define

“manage the storage of data in the volatile storage” to include this requirement.

Consequently, at this stage of the proceeding, we do not adopt Patent Owner’s proposed construction requiring that “manag[ing] the storage of data in the volatile storage” requires “coordinating placement of data into and out of the volatile storage so as to limit the number of copies of the data in the volatile storage.” The parties may further address the meaning of this claim phrase during the trial, if appropriate.

3. Other Terms

We determine that it is not necessary to provide an express interpretation of any other claim terms at this stage of the proceeding. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 102 if a single prior art reference discloses each and every limitation of the claimed invention, either explicitly or inherently. *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952 (Fed. Cir. 2014). A single prior art reference may anticipate without disclosing a feature of the claimed invention if such feature is necessarily present, or inherent, in that reference. *Id.*

A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness.² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–17.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b) (2020). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art at the time of the alleged invention would have had “a Bachelor of Science degree in computer science and two years of industry experience or research working

² At this stage of the proceeding, Patent Owner has not presented objective evidence of non-obviousness.

with database and related storage management technologies,” and that “[a]dditional education, such as an M.S. in computer science, could substitute for the industry experience as it typically involves at least two years of additional study focused exclusively on computer science, as well as a thesis or project spanning several terms to implement a substantial project.” Pet. 12–13 (citing Ex. 1003 ¶ 31). According to Petitioner, the person of ordinary skill would have “understood the advantages of partitioning a volatile memory into multiple different sections (e.g., buffer pools) and applying multiple different storage management (e.g., cache replacement) policies to those different sections, and known how to implement such designs.” *Id.* at 13 (citing Ex. 1003 ¶ 32).

Patent Owner does not dispute Petitioner’s proposed level of ordinary skill at this stage of the proceeding. Prelim. Resp. 14.

For purposes of institution, we adopt Petitioner’s assessment of the level of ordinary skill in the art, which is consistent with the ’923 patent and the asserted prior art of record.

D. Grounds 1 and 2: Anticipation of Claims 1–15 and Obviousness of Claims 1–16 Based on Lee

Petitioner contends that claims 1–15 are anticipated by Lee, and claims 1–16 would have been obvious over Lee. Pet. 2, 17–44. Patent Owner disagrees, arguing that Lee does not teach or suggest several of the limitations of these claims. Prelim. Resp. 18–27.

1. Overview of Lee (Ex. 1004)

Lee discloses techniques for caching objects in a computer system. Ex. 1004 ¶ 2. Lee explains that a “cache algorithm, also referred to as a replacement policy, comprises instructions for managing data objects stored

within a memory cache,” and for determining which items should be removed when the cache is full. *Id.* ¶ 3. Lee discloses that one such algorithm is the Least Recently Used (LRU) cache algorithm, which evicts the data item from the cache that was least recently used, to be replaced by the incoming data. *Id.* However, Lee explains, the LRU algorithm “may perform sub-optimally when it is used for scanning large objects such as in data warehousing workloads where the working set is often larger than the size of the cache.” *Id.* ¶ 4.

Lee seeks to overcome this problem by disclosing a system in which a “temperature-based replacement policy co-exists with one or more other replacement policies, such as the LRU replacement policy.” Ex. 1004 ¶ 17. According to Lee, in a temperature-based replacement policy, “temperature values are associated with a set of data objects to track the frequency with which the data objects are accessed,” and “[t]he hottest objects are given priority to the cache space.” *Id.* ¶ 15. Lee explains that these “separate replacement policies do not interfere with each other” and “may be used to manage a cache based on the type of workload that is being processed.” *Id.* ¶ 17.

2. *Analysis of Independent Claim 1*

- a) [1.1]: “[a] method of managing data in a volatile storage, wherein the method is implemented at least partly by a device, and wherein the method comprises:”

Petitioner asserts that, to the extent the preamble of claim 1 is limiting, Lee discloses methods of managing data in a volatile storage. Pet. 21 (citing Ex. 1004 ¶¶ 33–46; Ex. 1003 ¶ 44). Petitioner argues that Lee’s Figure 1 depicts an example of temperature-based management of data in cache storage, and that one of ordinary skill would have understood Lee to

disclose implementing its cache with volatile storage, such as DRAM. *Id.* at 21–22 (citing Ex. 1004, Fig. 1, ¶¶ 44–45; Ex. 1003 ¶ 44). According to Petitioner, Lee also discloses implementing its method using one or more devices. *Id.* at 23 (citing Ex. 1004 ¶¶ 12, 71, 72, 73–76; Ex. 1003 ¶ 45).

Patent Owner does not present arguments regarding the preamble. *See* Prelim. Resp. 18–22.

We determine that, on the record before us, Petitioner’s cited evidence sufficiently supports its contentions regarding the preamble.³

b) [1.2]: “*using a combination of a data temperature-based storage management technique and a non-temperature-based storage management technique together to manage the storage of data in the volatile storage,*”

Petitioner argues that “Lee discloses techniques for storage management that combine a data-temperature-based technique with a non-temperature based technique, such as the LRU cache algorithm.” Pet. 24 (citing Ex. 1003 ¶ 48). Petitioner contends that “Lee expressly discloses using a temperature-based technique to manage data storage in volatile storage (cache memory . . .),” and relies on the following portion of Lee’s disclosure for support:

In an embodiment, temperature values are associated with a set of data objects to track the frequency with which the data objects are accessed. The hottest objects are given priority to the cache space. Accordingly, the most recently accessed object may not be cached if it is colder than all other objects in the data cache.

Pet. 25 (citing Ex. 1004 ¶ 15).

³ Because we are persuaded that Petitioner has shown that Lee teaches the subject matter recited in the preamble, we need not decide whether the preamble is limiting for purposes of this Decision.

Petitioner also contends that Lee combines “this temperature-based technique with non-temperature-based techniques as part of a storage management method,” such that both “techniques ‘co-exist’ in a cache so that the replacement policies do not interfere with each other.” *Id.* at 25–26. In support, Petitioner cites the following disclosure from Lee:

In an embodiment, *the temperature-based replacement policy co-exists with one or more other replacement policies, such as the LRU replacement policy. The separate replacement policies do not interfere with each other* and can be tuned dynamically and automatically. These policies may be used to manage a cache based on the type of workload that is being processed.

Pet. 26 (citing Ex. 1004 ¶ 17).

Patent Owner argues that Lee fails to teach this claim element because it “merely manages database workloads and is . . . unconcerned with ‘manag[ing] the storage of data in the volatile storage.’” Prelim. Resp. 19 (second alteration in original). “As a consequence,” Patent Owner contends, “the data of Lee is not ‘managed’ to limit the number of copies of the data in the volatile storage.” *Id.* Patent Owner argues that paragraph 17 of Lee, quoted above, is insufficient because this claim element “requires more than the mere co-existence of two cache portions”; it “requires managing the data across the caches in order to limit the number of copies of that data, so as to avoid ‘complications’ that arise from having multiple copies of data in the same volatile storage.” *Id.* at 19–20.

At this stage of the proceeding, Petitioner has made a sufficient showing that Lee discloses this claim element. Paragraph 17 of Lee discloses the use of a temperature-based storage management technique and a non-temperature-based storage management technique (the LRU replacement policy), and that both “may be used to manage a cache.”

Ex. 1004 ¶ 17. Based on the present record, Petitioner sufficiently shows that Lee’s disclosure of using these techniques “to manage a cache” involves “manag[ing] the storage of data in” the cache, because both techniques operate in order to control what data is stored in the cache. We do not find Patent Owner’s argument persuasive because it is based on Patent Owner’s proposed construction of “manag[ing] the storage of data in the volatile storage” to require “limit[ing] the number of copies of the data in the volatile storage,” which we do not adopt. *See* § II.A.2, *supra*.

Consequently, we determine that, on the record before us, Petitioner’s cited evidence sufficiently supports its contentions regarding this limitation.

c) [1.3]: “wherein a first portion of the volatile memory is used to provide the temperature-based storage management technique and a second portion of the volatile memory is used to provide non-temperature-based storage management technique”

Petitioner argues that Lee discloses using a first portion of the volatile memory to provide its temperature-based storage management technique and a second portion to provide its LRU (non-temperature-based) storage management technique. Pet. 27. Specifically, according to Petitioner, “Lee discloses dividing its cache storage, such that a first group of buffers within the storage are used for data warehouse (‘DW’) tasks and a second group of buffers within the storage are simultaneously used for online transaction processing (‘OLTP’) tasks.” *Id.* at 27–28 (citing Ex. 1004 ¶ 66). Petitioner further contends that Lee describes using the temperature-based (“access-based”) cache policy for the DW buffers and the LRU (non-temperature-based) cache policy for the OLTP buffers. *Id.* at 28 (citing Ex. 1004 ¶¶ 63–70). According to Petitioner, one of ordinary skill would have understood the DW buffers as a first portion of the cache used to provide a temperature-

based technique for managing cache storage, and the OLTP buffers as a second portion of the cache used to provide a non-temperature-based technique (the LRU technique) for managing cache storage. *Id.* (citing Ex. 1003 ¶ 55).

Patent Owner does not present arguments regarding this limitation. *See* Prelim. Resp. 18–22.

We determine that, on the record before us, Petitioner’s cited evidence sufficiently supports its contentions regarding this limitation.

d) Summary for Claim 1

Based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claim 1 is unpatentable over the prior art.

3. Independent Claim 10

Petitioner contends that independent claim 10 is anticipated or obvious based on Lee, relying largely on the same arguments as for claim 1. Pet. 2, 40–41. For claim element 10.1’s additional recitation of “one or more processors configured to manage data in a volatile storage,” Petitioner relies on Lee’s disclosure of “a hardware processor 504 coupled with bus 502 for processing information,” and that “[h]ardware processor 504 may be, for example, a general purpose microprocessor.” *Id.* at 40 (emphasis omitted) (citing Ex. 1004 ¶ 72, Fig. 5). Petitioner argues that one of ordinary skill would have understood Lee to disclose (or at least render obvious) that the processor 504 was configured to carry out the steps of claim 10. *Id.* (citing Ex. 1003 ¶ 85).

Patent Owner also relies on the same arguments for claim 10 as for claim 1. Prelim. Resp. 24–25.

We determine that, on the record before us and for reasons similar to those explained with respect to claim 1, Petitioner has demonstrated a reasonable likelihood that claim 10 is unpatentable over the prior art.

4. Independent Claim 16

Petitioner contends that independent claim 16 is obvious based on Lee, relying, for elements 16.1–16.3, largely on the same arguments raised for claim 1 and elements 10.1–10.3 of claim 10. Pet. 42–43. As to element 16.4, requiring that “a third portion of the volatile memory is used to provide a second non-temperature-based storage management technique” different than the first non-temperature-based technique, Petitioner argues that “Lee discloses combining a temperature-based cache replacement policy with ‘one or more’ other cache-replacement policies that work independently of each other by applying to different buffers in volatile buffer cache.” *Id.* at 43 (citing Ex. 1004 ¶¶ 17, 64, 66). Petitioner acknowledges that “Lee gives no explicit example of *three* co-existing cache replacement policies,” but argues that “Lee’s reference to ‘or more’ at least suggests and otherwise would motivate [one of ordinary skill in the art] to include two cache-replacement policies to work along with the disclosed temperature-based policy, which would satisfy this element.” *Id.* (citing Ex. 1003 ¶ 101).

Patent Owner argues that “Lee gives no explicit example of three co-existing cache replacement policies.” Prelim. Resp. 25 (citing Pet. 43). According to Patent Owner, Lee’s disclosure that “the temperature-based replacement policy co-exists with one or more other replacement policies” is “ambiguous at best.” *Id.* at 26. Patent Owner argues that this language is unclear “as to whether it is suggesting that the volatile memory of Lee includes multiple non-temperature based portions (i.e., two or more) or if the

same portion of memory is being used to implement different replacement policies at different times.” *Id.* Patent Owner further argues that Lee does not disclose “managing the data to ensure that only a single copy of a data portion is stored in the volatile storage at a given time as also required by claim 16.” *Id.* at 27.

At this stage of the proceeding, Petitioner provides sufficient evidence that one of ordinary skill would have found this limitation obvious based on Lee. Lee discloses that the temperature-based replacement policy “co-exists with one or more other replacement policies” (Ex. 1004 ¶ 17), and describes embodiments in which distinct buffer caches are used for different replacement policies (*id.* ¶¶ 66, 68, 69). Petitioner also relies on expert testimony from Dr. Long. *See* Ex. 1003 ¶ 102. Patent Owner, on the other hand, relies only on attorney argument. *See* Prelim. Resp. 25–27. Based on this record, we find sufficient evidence that one of ordinary skill would have been motivated to implement Lee with a third non-temperature-based replacement policy using a third portion of the cache memory.

As to Patent Owner’s argument that Lee does not disclose “managing the data to ensure that only a single copy of a data portion is stored in the volatile storage at a given time,” this argument is based on Patent Owner’s proposed construction of this phrase, which we do not adopt. *See supra* § II.A.2. Therefore, we do not find this argument persuasive.

Consequently, we determine that, on the record before us, Petitioner has demonstrated a reasonable likelihood that claim 16 is unpatentable over the prior art.

5. *Dependent Claim 5: “The method of claim 1, wherein a copy of the data is stored only in one of two portions of the volatile storage, wherein the first portion of the two portions is used to provide the temperature-based storage management technique and the second portion of the two portions is used to provide non-temperature-based storage management technique.”*

Petitioner argues that this claim is met because “Lee discloses that when performing a data warehousing (DW) scan the accessed data is copied into the DW buffers (temperature-based), but when performing an OLTP [(Online Transaction Processing)] scan the accessed data instead is copied into the OLTP buffers (non-temperature-based).” Pet. 36 (citing Ex. 1004 ¶ 66).

Patent Owner argues that claim 5 is not met because “the ‘workload’ management technique of Lee can allow multiple copies of the same data portion to be stored simultaneously in both the non-temperature and temperature-based portion of the volatile storage.” Prelim. Resp. 22. “Because Lee’s system manages ‘workloads’ rather than the ‘data,’” Patent Owner contends, “there is no mechanism or management system described in Lee that would ‘coordinat[e] placement of data into and out of the volatile storage so as to control the number of copies of the data in the volatile storage.’” *Id.* at 20–21 (alteration in original). Rather, according to Patent Owner, “[a]n OLTP process and a DW process can implicate the same data portion.” *Id.* at 21. “Thus,” Patent Owner contends, “if a first OLTP process implicates a particular data portion and a subsequent DW process implicates the same data portion,” then “two copies of the data portion would be stored in the volatile storage simultaneously—one in the LRU (i.e., non-temperature-based) portion and a copy in the access-based (i.e., temperature-based) portion of the volatile storage.” *Id.*

Patent Owner criticizes Petitioner's argument as based on "a myopic interpretation of claim element 5," namely that, at a particular moment in time, "the database will decide to place the copy of the data in either one of the two portions of the volatile storage, based on the type of workload requesting the data." Prelim. Resp. 22–23 (citing Pet. 36). According to Patent Owner, this interpretation is incorrect because "claim 5 is not limited to a single moment in time as the Petition seemingly alleges," but rather "the plain language of claim 5 requires a management technique in which for a particular piece of data, *only* a single copy of that data is stored in the volatile storage at any given time." *Id.* at 23. Patent Owner argues that this interpretation is consistent with the '923 patent specification's disclosure that:

It will also be appreciated that only one copy of data needs to be stored in the volatile storage 300. More specifically, data portions can be identified and accessed, for example, by a unique identifier 306, where the data need only be stored in one [of] the first or second portions (302 and 304) and effectively marked as such so that it can be accessed from the appropriate portion.

Ex. 1001, 14:63–15:2.

"Thus," Patent Owner asserts, "a system that allows multiple copies of the same data to be stored in the volatile storage simultaneously cannot satisfy claim 5." Prelim. Resp. 23–24. According to Patent Owner, Lee allows this because "it has no mechanism that would prevent two copies of the same piece of data from being stored in the volatile storage." *Id.* at 24. Thus, Patent Owner asserts, Petitioner's argument "effectively ignore[s] the 'only' requirement of claim 5." *Id.*

Based on the present record, we have questions about the sufficiency of Petitioner's showing as to this claim element. Petitioner does not set forth

a construction of claim 5's language requiring that "a copy of the data is stored *only* in one of two portions of the volatile storage," or how the proper construction of this language is taught or rendered obvious by Lee. The parties, however, may further address the claim construction of this phrase, and whether that construction is taught by Lee, during the trial.

6. Dependent Claims 2–4, 6–9, and 11–15

Petitioner contends that claims 2–4, 6–9, and 11–15, which depend from claims 1 or 10, are anticipated by or obvious over Lee. Pet. 2, 30–35, 36–39, 41–42. Patent Owner does not provide any separate argument regarding these dependent claims, at this stage of the proceeding. *See* Prelim. Resp. 18–27. Based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claims 2–4, 6–9, and 11–15 are unpatentable over the prior art.

E. Ground 3: Obviousness of Claims 1–16 Based on Lee and Ho

Petitioner contends that claims 1–16 would have been obvious over the combination of Lee and Ho. Pet. 2, 44–48. Patent Owner disagrees. Prelim. Resp. 27–30.

1. Overview of Ho (Ex. 1005)

Ho discloses a system for managing a buffer cache. Ex. 1005, code (57). Ho explains that, typically, "the buffer cache includes multiple buffers that are shared among one or more processes that are executing." *Id.* at 1:41–43. However, "[b]ecause the buffer cache contains a fixed amount of memory, a limited number of buffers are available for processing information." *Id.* at 1:49–51. "In order to manage the limited number of available buffers," Ho explains, "several replacement strategies have been developed," which "determine which of the buffers currently residing in the

buffer cache are to be overwritten with the new data (i.e., [] cached out).” *Id.* at 1:56–61. These strategies include “replacing the least recently used (LRU) data, replacing the data that has been in the buffer the longest (First-In/First-Out, or FIFO), or replacing the newest data in the buffer (Last-In/First-Out, or LIFO).” *Id.* at 1:62–67.

In Ho’s system, “a buffer cache in a computer system is managed by dividing the buffer cache into multiple buffer pools.” Ex. 1005, code (57). “Each buffer pool can contain a different number of buffers and may employ a different replacement technique for replacing its buffers.” *Id.* at 5:57–61. This “allows a different caching algorithm to be used for a particular data item not only based on the disk location of [the] data block containing the data item, but also on the reason that the data item is being accessed.” *Id.* at 5:66–6:3. Ho discloses an embodiment in which the buffer cache is partitioned into three buffer pools, each using a different replacement technique, such as LRU, FIFO, and LIFO. *Id.* at 6:24–32, Fig. 3.

2. *The Lee-Ho Combination*

Petitioner argues that one of ordinary skill “would have been motivated and found it obvious to modify Lee to incorporate the teachings of Ho regarding *three* portions of volatile memory managed by *three* different cache replacement policies.” Pet. 45 (citing Ex. 1003 ¶ 105). Petitioner asserts that “Lee and Ho are both assigned to Oracle” and “complement each other,” because “[b]oth are aimed at improved methods of managing data storage in volatile cache memory used in association with a database with a mixed workload of data accesses.” *Id.* (citing Ex. 1003 ¶ 106).

Petitioner further notes that Lee discloses that its “temperature-based replacement policy co-exists with one *or more* other replacement policies’

and that each replacement policy applies to a separate portion of volatile memory, for example[,] by dividing buffers ‘among different types of workloads.’” *Id.* at 45–46 (citing Ex. 1004 ¶¶ 17, 66). Thus, according to Petitioner, “it would have been natural to combine the teachings of Lee with Ho’s expressed disclosure of dividing cache memory into three buffer pools” and to “us[e] a different replacement policy in each of these three different areas of memory to account for the distinct types of workloads faced by a database system.” *Id.* (citing Ex. 1003 ¶ 106). To do so, Petitioner argues, one of ordinary skill “need only to repeat Lee’s techniques for creating the second (non-temperature-based) cache area to create a third area, per Ho’s (and Lee’s) suggestions.” *Id.* at 47 (citing Ex. 1003 ¶ 106). Petitioner further contends that Ho “taught the improved efficiency of expanding the number of cache areas and cache replacement policies,” and the combination of Ho with Lee thus “would have improved the performance of Lee’s storage management techniques.” *Id.* (citing Ex. 1005, 1:62–2:59; Ex. 1003 ¶ 107).

3. *Analysis of Independent Claims 1–4 and 6–15*

For these claims, Petitioner relies on its arguments based on Lee for Grounds 1 and 2. Pet. 47–48. However, Petitioner acknowledges that “Lee does not expressly recite the phrase ‘volatile storage,’” and argues that Ho “discloses that the buffer cache is ‘a section of volatile memory.’” *Id.* (citing Ex. 1005, 1:9–13, 1:28–30). Thus, Petitioner argues, “in the event the Board finds that Lee does not expressly or inherently disclose managing volatile storage, but does find that Lee discloses each of the remaining elements” of these claims, claims 1–4 and 6–15 “would be unpatentable as obvious over Lee in view of Ho.” *Id.* (citing Ex. 1003 ¶ 109).

Patent Owner argues that “Ho does not make up for the deficiencies of Lee” in Grounds 1 and 2. Prelim. Resp. 27. More specifically, Patent Owner argues that “Ho fails to teach or suggest ‘manag[ing] the data in a volatile storage’ because Ho is silent with regard to a management technique that coordinates the placement of data into the non-temperature or temperature-based cache portion to ensure that multiple copies of the same data are not stored in the volatile storage.” *Id.* at 27–28 (alteration in original).

At this stage of the proceeding, Petitioner has made a sufficient showing under this ground for claims 1–4 and 6–15. Based on the present record, we agree with Petitioner that Ho discloses managing data in a volatile storage, and that one of ordinary skill would have found it obvious to combine Lee with Ho. We do not agree with Patent Owner’s argument because it is based on Patent Owner’s construction of “manag[ing] the storage of data in the volatile storage” to require ensuring that multiple copies of the same data are not stored in the volatile storage, which we do not adopt. *See supra* § II.A.2.

Consequently, based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claims 1–4 and 6–15 are unpatentable over the prior art.

4. Analysis of Dependent Claim 5

Petitioner does not separately address claim 5 in its discussion of Ground 3. As discussed in Section II.D.5 above, we have questions about the sufficiency of Petitioner’s showing as to claim 5 based on Lee. Because Petitioner does not provide additional evidence or argument directed to

claim 5, those questions also apply to Petitioner's showing based on Lee and Ho in Ground 3.

5. Analysis of Independent Claim 16

In this ground, Petitioner relies on its arguments for Grounds 1 and 2 for elements 16.1–16.3. Pet. 48–49. As to element 16.4, Petitioner argues that Lee's statement that the temperature-based replacement policy co-exists with "one or more" other replacement policies "at least suggests and otherwise would motivate [one of ordinary skill in the art] to include a third policy along the lines taught by Ho." *Id.* at 49 (citing Ex. 1004 ¶ 17; Ex. 1003 ¶ 113; Ex. 1005, 6:24–32, 8:66–9:12).

Patent Owner argues that the addition of Ho does not teach claim element 16.4 because "[e]ven if Ho taught adding a second non-temperature based cache portion to the volatile storage of Lee," the combination "does not address how the system would coordinate placement of the data to ensure that multiple copies of the same data are not stored in the volatile storage at the same time (i.e., manage the storage of data in the volatile storage)." Prelim. Resp. 29–30.

Based on the present record, Petitioner has made a sufficient showing for purposes of institution. Patent Owner's argument is not persuasive because it is based on Patent Owner's construction of "manage the storage of data in the volatile storage," which we do not adopt. *See supra* § II.A.2.

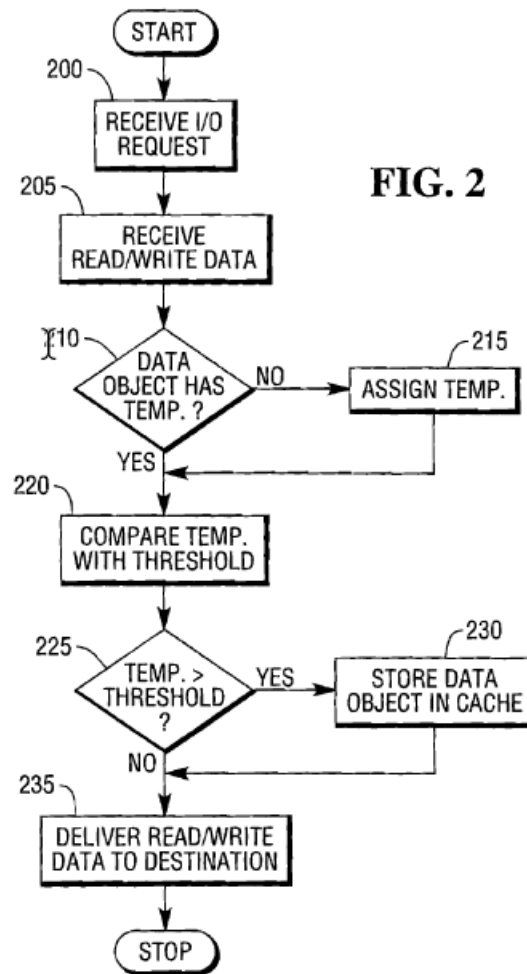
Consequently, Petitioner has demonstrated a reasonable likelihood that claim 16 is unpatentable over the prior art.

F. Ground 4: Obviousness of Claims 1–16 Based on Ho and Morris

Petitioner contends that claims 1–16 would have been obvious over Ho and Morris. Pet. 2, 51–69. Patent Owner disagrees. Prelim. Resp. 30–34.

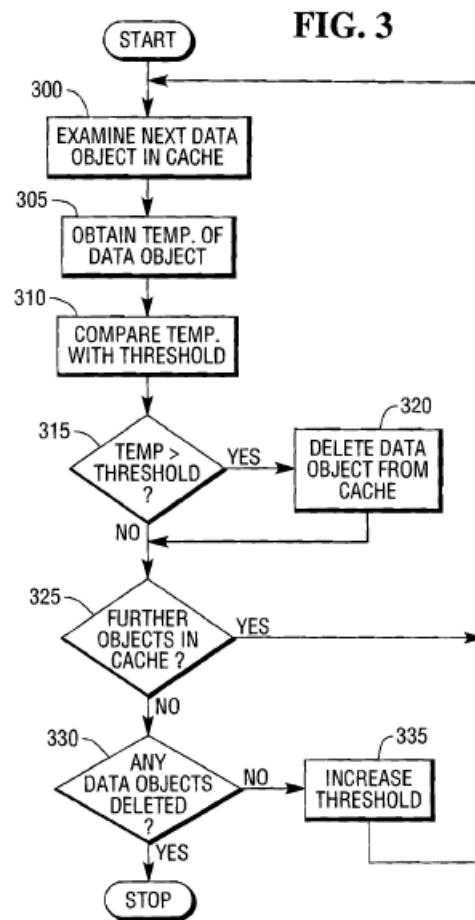
1. Overview of Morris (Ex. 1006)

Morris discloses a technique for managing a data cache memory based on data temperature. Ex. 1006, codes (54), (57). Morris’s system includes one or more persistent data storage devices, such as disk drives, and a data cache that maintains a copy of certain data objects retrieved from or written to the disk drives. *Id.* ¶¶ 16–17. Morris also discloses that data objects can be associated with a temperature value, such that data objects with a higher temperature value are likely to be accessed from a storage device, and those with a lower temperature value are less likely to be accessed. *Id.* ¶ 19. Figure 2 shows a technique for using data temperature to select data objects to be added to the cache:



Ex. 1006, Fig. 2. As shown in Figure 2, a data object that is the subject of an input/output (I/O) request is checked to determine if it has an associated temperature value (steps 200–210). *Id.* ¶ 22. If the data object does not have an associated temperature value, a temperature value is assigned (step 215). *Id.* The temperature value is then compared with a threshold value to determine whether or not the data object should be stored in the cache (step 225). *Id.* ¶ 48. If the temperature value exceeds the threshold, it is stored in the cache, otherwise, it is not (steps 230, 235). *Id.*

Figure 3 shows a technique for using data temperature to select objects to be removed from the cache.



Ex. 1006, Fig. 3. As shown in Figure 3, each object in the cache is examined to determine its temperature, and that temperature is compared to a threshold (steps 300–310). *Id.* ¶¶ 53–54. Based on whether the object has a temperature that exceeds the threshold, the data object is either retained in or deleted from the cache (steps 315, 320). *Id.* ¶ 56.

2. The Ho-Morris Combination

Petitioner argues that Ho “discloses most of the elements” of the challenged claims, but “does not expressly describe a ‘temperature’-based policy.” Pet. 52. However, Petitioner asserts, “Ho discloses that data access frequency is considered for managing storage in some buffer pools,” and “discloses using a variety of policies.” *Id.* (citing Ex. 1005, 2:24–37, 9:31–

65). Petitioner argues that “Morris expressly teaches using a temperature-based policy for cache management, and more specifically that data objects having high temperature values ‘are likely to be accessed from a storage device, whereas data objects having a relatively low temperature are unlikely to be accessed.’” *Id.* at 52–53 (citing Ex. 1006 ¶ 19).

According to Petitioner, one of ordinary skill “would have been motivated and found it obvious to modify Ho to advantageously use a temperature-based policy disclosed by Morris as one of the variety of policies taught by Ho.” *Id.* at 53 (citing Ex. 1003 ¶ 119). Petitioner argues that both Ho and Morris are “directed to techniques for managing stored data in cache memory.” *Id.* Specifically, according to Petitioner, “Ho discloses using different cache replacement policies to optimize its storage strategy, while Morris discloses a particular temperature-based policy that complements Ho’s disclosure of using a variety of policies.” *Id.* (citing Ex. 1005, 5:54–6:38). Petitioner further argues that Ho was compatible with Morris’s storage management policy, and that one of ordinary skill “knew that cache management policies are ‘plug-and-play’ since they all attempt to do the same thing—manage which data gets kept and which data gets ejected from the cache.” *Id.* at 53–54 (citing Ex. 1003 ¶ 120).

3. *Analysis of Independent Claim 1*

- a) [1.1]: “[a] method of managing data in a volatile storage, wherein the method is implemented at least partly by a device, and wherein the method comprises:”

Petitioner asserts that, to the extent the preamble of claim 1 is limiting, Ho discloses methods of managing data in a volatile storage. Pet. 54 (citing Ex. 1003 ¶ 122). Petitioner argues that Ho explains the difference between volatile and non-volatile storage, describes an improved cache

management strategy for managing data in volatile storage, and discloses a device (computer system) for implementing this method of managing data. *Id.* at 54–55 (citing Ex. 1005, 1:15–23, 1:28–40, 3:11–18, 4:17–5:51; Ex. 1003 ¶¶ 124–126).

Patent Owner does not present arguments regarding the preamble. *See* Prelim. Resp. 30–34.

We determine that, on the record before us, Petitioner’s cited evidence sufficiently supports its contentions regarding the preamble.

b) [1.2]: “*using a combination of a data temperature-based storage management technique and a non-temperature-based storage management technique together to manage the storage of data in the volatile storage,*”

Petitioner argues that “Ho discloses using a variety of storage management techniques for different portions of cache (volatile) storage.” Pet. 56 (citing Ex. 1005, 5:54–63; 1:61–2:4, 7:1–4, 8:37–41, 8:66–9:12; Ex. 1003 ¶ 128). Specifically, Petitioner relies on the following disclosure from Ho:

In certain embodiments of the present invention, a buffer cache is partitioned into multiple buffer pools. Each buffer pool can contain a different number of buffers and may employ a different replacement technique for replacing its buffers. . . . This allows a different caching algorithm to be used for a particular data item not only based on the disk location of data block containing the data item, but also on the reason that the data item is being accessed.

Ex. 1005, 5:54–6:3.

Petitioner argues that, “[a]lthough Ho does not expressly disclose using temperature-based techniques,” as claim 1 requires, “Morris does.” Pet. 56–57 (citing Ex. 1006 ¶ 6). Relying on testimony from Dr. Long, Petitioner argues that one of ordinary skill “would have found it obvious to

try Morris’[s] temperature-based technique as one of the replacement strategies disclosed by Ho’s storage management system.” *Id.* at 57–58 (citing Ex. 1003 ¶ 130).

Patent Owner argues that Petitioner “ignores the ‘management requirement’” of this claim element. Prelim. Resp. 31. Patent Owner contends that the Petition “never articulates how the combination of Ho and Morris teach or suggest using the two management techniques together ‘to manage the storage of data in the volatile storage’” because it “does not describe how the system would decide whether to place data in the non-temperature-based portion of the volatile storage or the temperature-based portion of the volatile storage.” *Id.* Patent Owner further argues that the Petition “does not describe how the combination would limit the number of copies of data in the volatile storage.” *Id.*

For purposes of institution, Petitioner has made a sufficient showing that the Ho-Morris combination discloses this claim element. Ho discloses using various techniques for managing storage of data in different portions of a cache. For example, Ho discloses that “[i]n order to manage the limited number of available buffers” in a cache, “several replacement strategies have been developed,” which “determine which of the buffers currently residing in the buffer cache are to be overwritten with the new data (i.e., [.] cached out),” including LRU, FIFO, or LIFO. Ex. 1005, 1:56–67. Petitioner also presents sufficient evidence, including testimony from its expert, that one of ordinary skill would have found it obvious based on Morris to use a temperature-based technique as one of Ho’s replacement strategies. *See* Ex. 1003 ¶ 130; Ex. 1005 ¶¶ 6, 20. Based on the present record, it appears that Ho’s disclosure of using these techniques “in order to manage the

limited number of available buffers” in a cache to “determine which of the buffers currently residing in the buffer cache are to be overwritten with the new data” involves “manag[ing] the storage of data in” the cache, because these techniques operate in order to control what data is stored in the cache. Moreover, as discussed above, we do not adopt Patent Owner’s claim construction that requires that the management of data must operate “so as to limit the number of copies of the data in the volatile storage.” *See supra* § II.A.2.

Consequently, we determine that, on the record before us, Petitioner’s cited evidence sufficiently supports its contentions regarding this limitation.

- c) [1.3]: “wherein a first portion of the volatile memory is used to provide the temperature-based storage management technique and a second portion of the volatile memory is used to provide non-temperature-based storage management technique”*

Petitioner argues that, based on “Ho’s expressed teachings of implementing different replacement policies (such as a non-temperature based LRU technique) in different portions of volatile memory,” and “Morris’[s] expressed teachings of a temperature-based technique,” one of ordinary skill in the art “would have been motivated to implement a temperature-based technique in one portion (a first of Ho’s multiple buffer pools) and a non-temperature based technique in a second portion (a second of Ho’s multiple buffer pools),” thus satisfying this claim element. Pet. 58–59 (citing Ex. 1003 ¶ 132; Ex. 1006 ¶ 53; Ex. 1005, 5:54–6:3). According to Petitioner, one of ordinary skill “would have been motivated to use caching policies that best match particular access patterns,” and that “some data access patterns are best modeled by traditional non-temperature models such

as LRU, while others, as taught by Morris[,] are better modeled with more stable temperature-based methods.” *Id.* at 59 (citing Ex. 1003 ¶ 132).

Patent Owner does not present arguments regarding this limitation. *See* Prelim. Resp. 30–34.

We determine that, on the record before us, Petitioner’s cited evidence sufficiently supports its contentions regarding this limitation.

d) Summary for Claim 1

For the foregoing reasons, and based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claim 1 is unpatentable over the prior art.

4. Independent Claims 10 and 16

Petitioner contends that independent claims 10 and 16 would have been obvious over Ho and Morris, relying on many of the same arguments as for claim 1. Pet. 2, 65–66, 68–69. For claim element 10.1’s additional recitation of “one or more processors configured to manage data in a volatile storage,” Petitioner relies on Ho’s disclosure of “processor 204,” and argues that one of ordinary skill would have understood Ho to disclose that this processor was configured to carry out the claimed process steps. Pet. 65 (citing Ex. 1005, 4:66–5:1; Ex. 1003 ¶ 153).

For claim element 16.4, Petitioner argues that “Ho discloses multiple examples having three different areas in the buffer cache [(buffer pools)] managed with three different (non-temperature-based) cache replacement policies.” Pet. 68–69 (citing Ex. 1005, 6:24–32; Ex. 1003 ¶ 173).

According to Petitioner, each of these three buffer pools corresponds to a portion of a volatile memory. *Id.* at 69 (citing Ex. 1003 ¶ 174). Therefore, Petitioner contends, Ho discloses three portions of a volatile memory, each

being managed by a different replacement technique. *Id.* For example, according to Petitioner, two of the buffer pools can be managed by non-temperature-based techniques (LRU, FIFO, or LIFO), while the third buffer pool can be managed by a temperature-based replacement technique as described in Morris. *Id.*

Patent Owner also relies on the same arguments for claims 10 and 16 as for claim 1. Prelim. Resp. 33–34.

We determine that, based on the evidence of record, Petitioner has demonstrated a reasonable likelihood that claims 10 and 16 are unpatentable over the prior art.

5. *Dependent Claim 5: “The method of claim 1, wherein a copy of the data is stored only in one of two portions of the volatile storage, wherein the first portion of the two portions is used to provide the temperature-based storage management technique and the second portion of the two portions is used to provide non-temperature-based storage management technique.”*

Petitioner argues that the combination of Ho and Morris discloses the added element of claim 5. Pet. 62. According to Petitioner, “Morris expressly discloses that when implementing the temperature-based technique, a copy of the data is stored in cache only if its temperature exceeds the threshold value.” *Id.* (citing Ex. 1006 ¶ 7; Ex. 1003 ¶ 141). Petitioner argues that one of ordinary skill would have understood that, when this disclosure is combined with “Ho’s teachings of multiple buffer pools, each using a different caching algorithm, . . . this copy of data would be stored in one buffer pool (first portion of volatile storage), and a copy of data managed by a non-temperature technique (as taught by Ho) would be stored in another buffer pool (second portion of volatile storage).” *Id.* (citing Ex. 1003 ¶ 141; Ex. 1005, 5:54–6:3).

Patent Owner contends that Petitioner’s argument “relies on the same misinterpretation of the claim that the Petition relies on for grounds 1–3.” Prelim. Resp. 32. “As described above,” Patent Owner explains, “the language of claim 5 plainly requires a management technique in which only a single copy of the data is stored in the volatile storage at any given time,” and “a system that allows multiple copies of the same data to be stored in the volatile storage simultaneously cannot satisfy claim 5.” *Id.* at 33. Patent Owner asserts that “the Petition fails to articulate a management technique in either Ho or Morris, in which only a single copy of a data portion is stored in the volatile storage,” and that “there is no disclosure in either reference that would prevent a subsequent copy of the same data from being stored in the non-temperature-based cache portion.” *Id.*

Based on the present record, we have questions about the sufficiency of Petitioner’s showing as to this claim element. As we explained in discussing the application of Grounds 1 and 2 to claim 5, Petitioner does not set forth a construction of claim 5’s language requiring that “a copy of the data is stored *only* in one of two portions of the volatile storage.” *See supra* §§ II.D.5, II.E.3. Additionally, Petitioner fails to explain how the proper construction of this language is taught or rendered obvious by the combination of Ho and Morris. The parties, however, may further address the claim construction of this phrase, and whether that construction is taught by the Ho-Morris combination, during the trial.

6. Dependent Claims 2–4, 6–9, and 11–15

Petitioner contends that claims 2–4, 6–9, and 11–15, which depend from claims 1 or 10, are anticipated by or obvious over Lee. Pet. 2, 59–61, 62–65. Patent Owner does not provide any separate argument against these

dependent claims, at this stage of the proceeding. *See* Prelim. Resp. 30–34. Based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claims 2–4, 6–9, and 11–15 are unpatentable over the prior art.

G. Discretion Under 35 U.S.C. § 314(a) Based on Related District Court Proceeding

In the Preliminary Response, Patent Owner contends that we should exercise our discretion to deny the Petition in favor of the parallel proceeding, which is scheduled for trial in January 2023. Prelim. Resp. 34–38. The Board has held that the advanced state of a parallel district court action is a factor that may weigh in favor of denying a petition under § 314(a). *See NHK Spring Co. v. Intrix-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential) (“*NHK*”); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), 58 & n.2, *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“Trial Practice Guide”). We consider the following factors to assess “whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding”:

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;

5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Apple Inc. v. Fintiv Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). In evaluating these factors, we “take[] a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* at 6.

We consider each of these factors below.

1. Factor 1 — Stay of Related Litigation Proceeding

It appears that neither party has requested a stay of the related district court proceeding. Prelim. Resp. 35. Given the particular circumstances of this case, we determine that it would be improper to speculate, at this stage, what the district court might do regarding a motion to stay, should one be requested. *See Sand Revolution II, LLC v. Cont'l Intermodal Grp. — Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) (“*Sand Revolution*”) (“In the absence of specific evidence, we will not attempt to predict how the district court in the related district court litigation will proceed because the court may determine whether or not to stay any individual case, including the related one, based on a variety of circumstances and facts beyond our control and to which the Board is not privy.”). Accordingly, we determine that this factor does not weigh either for or against exercising our discretion to deny institution in this case.

2. Factor 2 — Proximity of the Court's Trial Date

Patent Owner asserts that the trial date in the parallel proceeding is scheduled for January 2023, but acknowledges that “the Board will have until November 17, 2021 to issue its decision on whether to institute the

IPR.” Prelim. Resp. 35. “Because this is more than one year before the trial date,” Patent Owner states, “this factor weighs in favor of Petitioner.”

Any final written decision in this case will be issued no later than November 2021, which is approximately two months before the projected trial date in the parallel proceeding. Because the projected trial date is after the date for a final written decision, we agree with Patent Owner that this factor weighs against exercising our discretion to deny institution.

3. Factor 3 — Investment in the Parallel Proceeding

Patent Owner argues that the parties have invested significant resources into the parallel proceeding, including infringement and invalidity contentions, the exchange of potential claim terms for construction, and the exchange of significant volumes of documents and source code. Prelim. Resp. 35–36. “On the other hand,” Patent Owner acknowledges, “the Court is not expected to issue any orders relating to the ’923 Patent until mid or late 2022, as the Markman hearing is set for January 14, 2022 and summary judgment motions are not due until August 25, 2022.” *Id.* at 36 (citing Ex. 1014, 3).

Petitioner asserts that the parallel proceeding “is still in its early stages.” Pet. 5. Additionally, Petitioner argues that the Petition was filed just over three months after infringement contentions in the parallel proceeding, and roughly a month after service of invalidity contentions. *Id.*

The parallel proceeding is still at a relatively early stage, and we are not persuaded that the actions that have occurred so far indicate the type of significant investment that would support exercising our discretion to deny institution. *See Sand Revolution*, Paper 24 at 11 (observing that “much work remains in the district court case as it relates to invalidity: fact discovery is

still ongoing, expert reports are not yet due, and substantive motion practice is yet to come”). We also credit Petitioner’s diligence in filing its Petition approximately three months after receiving infringement contentions in the parallel proceeding. In light of these facts, we determine that this factor weighs against exercising our discretion to deny institution.

4. Factor 4 — Overlap With Issues Raised in the Parallel Proceeding

Patent Owner argues that “[s]ignificant overlap exists between the invalidity challenges raised in this petition” and the parallel proceeding. Prelim. Resp. 36. According to Patent Owner, “Petitioner has identified the same set of references as invalidating prior art references and set forth substantially the same invalidity grounds as those raised in this Petition.” *Id.* (citing Ex. 2003; Ex. 2004). Petitioner does not specifically address this factor. *See* Pet. 4–5.

Based on the present record, there appears to be significant overlap between this proceeding and the parallel proceeding. Therefore, we determine that this factor weighs in favor of exercising our discretion to deny institution.

5. Factor 5 — Commonality of Parties in the Parallel Proceedings

Patent Owner argues that Petitioner and Patent Owner are both parties to the parallel proceeding. Prelim. Resp. 37. Petitioner does not address this factor. Based on the present record, we find that this factor weighs against exercising our discretion to deny institution.

6. Factor 6 — Other Circumstances

Patent Owner does not identify any other circumstances that impact the Board’s exercise of discretion. Prelim. Resp. 37–38.

7. Conclusion

As noted in *Fintiv*, we consider the above factors as part of “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Fintiv*, Paper 11 at 6. Taken together, the scheduling of the trial date after the due date for a final written decision, the relatively early stage of the parallel proceeding, and Petitioner’s diligence in filing the Petition, indicate that this is not a case where exercising our discretion to deny institution would be appropriate. Thus, considering the *Fintiv* factors as part of a holistic analysis, we are not persuaded that the interests of the efficiency and integrity of the system would be best served by invoking our discretion under 35 U.S.C. § 314(a) to deny institution of a potentially meritorious Petition.

III. CONCLUSION

After considering the evidence and arguments presented in the current record, we determine that Petitioner has demonstrated a reasonable likelihood of success in proving that at least one of the challenged claims of the ’923 patent is unpatentable. We therefore institute trial on all challenged claims and grounds raised in the Petition. *See PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (indicating that a decision whether to institute an *inter partes* review “require[s] a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

At this stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or as to the construction of any claim term.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–16 of the '923 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '923 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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