

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAP SE,
Petitioner,

v.

TERADATA US INC.,
Patent Owner.

IPR2021-00863
Patent 9,720,623 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 1–3, 5–9, 11–13, 15, and 17–19 (the “challenged claims”) of U.S. Patent No. 9,720,623 B2 (Ex. 1001, “the ’623 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. viii. 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 ’623 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. viii; Paper 4, 1.

D. The ’623 Patent (Ex. 1001)

The ’623 patent describes a multi-storage system that manages the storage of data in storage devices having different characteristics, such as different volatility or persistence. Ex. 1001, 6:47–65. More specifically, the system can manage the storage of data in one of the multiple storages based on information associated with another one of the multiple storages. *Id.* at 7:3–8. The ’623 patent explains that one of the storages can be a volatile and/or non-persistent memory device, such as a cache memory, and other storages can include non-volatile and persistent memory devices, such as hard disk or flash memory drives. *Id.* at 8:7–13.

The ’623 patent explains that the system can store and manage data in one of the multiple storages (such as a volatile storage) based on the “temperature” of the data. Ex. 1001, 7:35–41. The “data temperature” 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 ’623 patent, the system can apply data temperatures associated with one storage environment to manage data in another storage environment. Ex. 1001, 8:58–60. For example, where a first storage is a non-volatile storage device and a second storage is a volatile storage, the ’623 patent explains, it may not conventionally be possible or feasible to persistently store data temperatures in the volatile storage due to its non-persistent nature. *Id.* at 8:65–9:5, 9:10–13. However, storage of data in or for the volatile device can be managed using a data temperature associated with the non-volatile storage. *Id.* at 9:6–10. Alternatively, according to the ’623 patent, the system can use information associated with a volatile storage environment to more efficiently manage the storage of data in a non-volatile environment. *Id.* at 9:14–18.

E. Illustrative Claims

Of the challenged claims, claims 1, 7, 11, and 17–19 are independent. For purposes of the issues raised at this stage of the proceeding, claims 1, 3, and 19 are illustrative and are reproduced below.

1. [1.1] A method of managing data in a multi-storage system that includes multiple storages for storage of the data, wherein the method is implemented at least partly by a device, and wherein the method comprises:
 - [1.2] using storage information associated with storage of data in a first one of the multiple storages to manage storage of data in another one of the multiple storages of the multi-storage system; and
 - [1.3] providing the storage information associated with storage of data in the first one of the multiple storage devices to the second one of the multiple storages, thereby

allowing the second one of the multiple storage devices to manage storage of data in the second one of the multiple storage devices, based on the information associated with storage of data in the first one of the multiple storage devices.

3. The method of claim 1, wherein the storage information includes data access information indicative of access of data in a volatile storage, and wherein the method further comprises: using the data access information indicative of access of data in a volatile storage to determine a persistent data temperature for the data.

19. [19.1] A computer-implemented method of managing data in a multi-storage system that includes a volatile storage and a non-volatile storage for storage of the data,

[19.2] wherein the computer-implemented method is implemented at least partly by one or more processors executing computer code stored in a non-transitory computer readable storage medium, and wherein the computer-implemented method comprises:

[19.3] providing information associated with storage of data in the volatile storage to a storage manager of the non-volatile storage; and

[19.4] using by the storage manager of the non-volatile storage, the information associated with the storage of data in the volatile storage, to manage the storage of data in the non-volatile storage.

Ex. 1001, 22:2–17, 22:24–29, 24:36–50 (bracketed paragraph identifiers added).

F. Applied References

Petitioner relies upon the following references:

Morris et al., US 2007/0067575 A1 (Ex. 1004, “Morris”);

Ghandeharizadeh et al., *Placement of Data in Multi-Zone Disk Drives*, Proceedings of BalticDB’96, 1996, pp. 1–14 (Ex. 1015, “Ghandeharizadeh”); and

Burke et al., U.S. Patent No. 8,566,549 B1 (Ex. 1005, “Burke”).

Pet. vii, 4.

Petitioner submits the Declaration of Darrell D. E. Long, Ph.D.
(Ex. 1003).

G. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–3, 5–9, 11–13, 15,
and 17–19 of the ’623 patent based on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5–9, 11–13, 15, 17–19	102 ¹	Morris
1–3, 5–9, 11–13, 15, 17–19	103	Morris
19	103	Morris, Ghandeharizadeh
1–3, 5–9, 11–13, 15, 17–19	102	Burke
1–3, 5–9, 11–13, 15, 17–19	103	Burke

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

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 ’623 patent. Therefore, we apply the current, post-AIA versions of 35 U.S.C. §§ 102 and 103.

U.S.C. § 282(b).” 37 C.F.R. § 42.100(b) (2020). Petitioner proposes constructions for two claim terms: “data temperature” and “persistent data temperature.” Pet. 10–12.

1. *“Data Temperature”*

Petitioner argues that the term “data temperature” in claims 2–3, 8–9, and 12–13 “includes any value representing the number or frequency of accesses of particular data in storage, either in absolute or relative terms.” Pet. 11–12 (citing Ex. 1001, 8:44–47, 15:37–42, 18:24–27; Ex. 1003 ¶ 34).

Patent Owner does not dispute Petitioner’s construction in its Preliminary Response. Prelim. Resp. 17.

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

2. *“Persistent Data Temperature”*

Petitioner argues that the term “persistent data temperature” in claims 2–3, 8–9, and 12–13 “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 is also stored in non-volatile memory.” Pet. 12 (citing Ex. 1003 ¶ 35). According to Petitioner, the ’623 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, code (57), 4:8–12, 7:9–12; Pet. 25–27, 57–61).

Patent Owner does not dispute Petitioner's construction in its Preliminary Response. Prelim. Resp. 17.

At this stage of the proceeding, and based on the present record, we determine that Petitioner's three proposed constructions of "persistent data temperature" 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.

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 416–417.

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.

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

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 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.” Pet. 9 (citing Ex. 1003 ¶ 30). According to Petitioner, the person of ordinary skill would have been familiar with “DRAM cache, flash or other solid-state storage device[s], tape, optical media, and other well-known storage types,” “[c]oncepts of data ‘temperature,’” “[m]ulti-level storage tiers and managing data storage between volatile devices (e.g., cache) and non-volatile devices (e.g., disk) based on temperature,” and “[w]ell-known concepts such as volatile storage, non-volatile storage, and data persistency.” *Id.* at 9–10 (citing Ex. 1005, 2:23–38, 5:65–6:3, 21:33–43, 25:21–62; Ex. 1010 ¶¶ 3–4; Ex. 1004 ¶¶ 18–52; Ex. 1001, 8:7–13).

Patent Owner does not dispute Petitioner’s proposed level of ordinary skill at this stage of the proceeding. Prelim. Resp. 17.

At this stage of the proceeding, we adopt Petitioner’s assessment of the level of ordinary skill in the art, which is consistent with the ’623 patent and the asserted prior art of record.

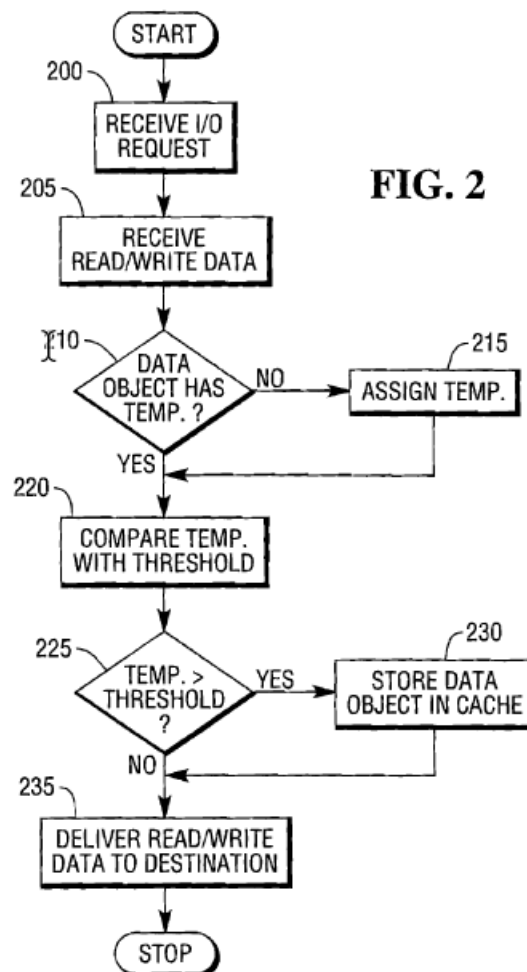
D. Grounds 1 and 2: Anticipation and Obviousness of Claims 1–3, 5–9, 11–13, 15, and 17–19 Based on Morris

Petitioner contends that claims 1–3, 5–9, 11–13, 15, and 17–19 are anticipated by or would have been obvious over Morris. Pet. 4, 12–40. Patent Owner disagrees, arguing that Morris does not teach or suggest several of the limitations of these claims. Prelim. Resp. 17–31.

1. Overview of Morris (Ex. 1004)

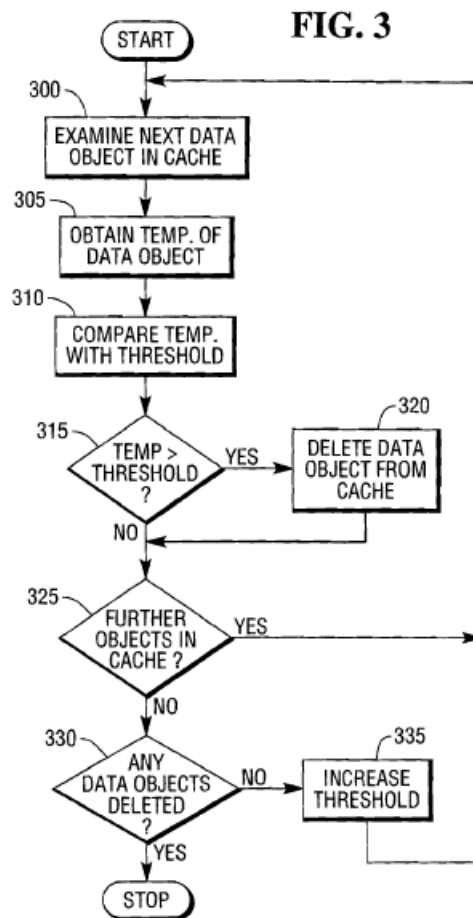
Morris discloses a technique for managing a data cache memory based on data temperature. Ex. 1004, codes (54), (57). Morris's system includes one or more persistent data storage devices, such as disk drives, and a data cache that maintains a copy of certain data objects retrieved from or written to the 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. 1004, 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 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. 1004, 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. *Analysis of Independent Claim 1*

- a) [1.1]: “A method of managing data in a multi-storage system that includes multiple storages for storage of the data, 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, Morris discloses it. Pet. 16. Petitioner argues that Morris discloses a method of managing data in a system that includes multiple storages such as disk drives, cache, and memory. *Id.* (citing Ex. 1004, Fig. 1, ¶¶ 2, 16–17, 61–63).

Patent Owner does not present arguments regarding the preamble. *See* Prelim. Resp. 17–31.

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

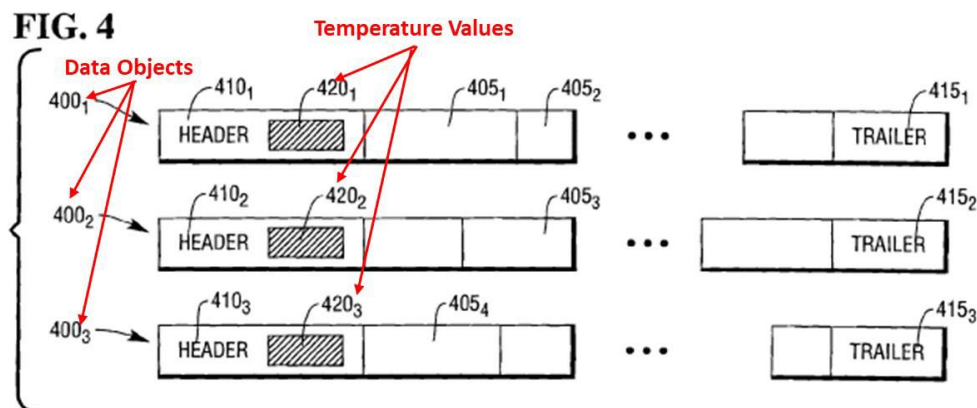
³ Because we are persuaded that Petitioner has shown that Morris teaches the subject matter recited in the preamble, we need not decide whether the preamble is limiting for purposes of this Decision.

b) [1.2]: “using storage information associated with storage of data in a first one of the multiple storages to manage storage of data in another one of the multiple storages of the multi-storage system;”

[1.3]: “providing the storage information associated with storage of data in the first one of the multiple storage devices to the second one of the multiple storages, thereby allowing the second one of the multiple storage devices to manage storage of data in the second one of the multiple storage devices, based on the information associated with storage of data in the first one of the multiple storage devices.”

Petitioner argues that Morris teaches or renders obvious these claim elements. Pet. 18–25. For example, Petitioner asserts, Morris “discloses using a temperature value (‘storage information’) associated with storage of data in a disk drive (first one of the multiple storages) in order to manage storage of data in a cache (another one of the multiple storages).” *Id.* (citing Ex. 1004, Figs. 2–3; Ex. 1003 ¶¶ 43–44). According to Petitioner, one of ordinary skill “would have understood that a given data object’s temperature in Morris was ‘information associated with storage of data in a first one of the multiple storages,’ e.g., in a disk drive.” *Id.* (citing Ex. 1003 ¶ 45).

Petitioner contends that “Morris discloses including a temperature with each data object ‘stored on a disk drive 125,’” as shown in Petitioner’s annotated version of Morris’s Figure 4, reproduced below:



Pet. 18–19 (citing Ex. 1004, Fig. 4 with annotations). As shown in Petitioner’s annotated Figure 4, multiple data objects (400_{1–3}), each including a header (410_{1–3}) and temperature value (420_{1–3}), are stored on the disk. *Id.*

Petitioner argues that Morris discloses using this temperature in arranging storage of data in the cache in at least two different ways. Pet. 19 (citing Ex. 1003 ¶¶ 48–54). In the first way, according to Petitioner, Morris discloses using data temperature to determine whether data should be stored in the cache. *Id.* at 19–20 (citing Ex. 1004, Fig. 2). In this method, Petitioner asserts, Morris’s system, as shown in Figure 2, “retrieves one or more data objects from storage” (the disk), determines whether that data object has an associated temperature value, and if so, compares the temperature value with a threshold value to “determine whether or not the data object should be stored in the cache.” *Id.* at 20 (citing Ex. 1004 ¶¶ 18, 22, 48, Fig. 2; Ex. 1003 ¶¶ 49–50). Thus, Petitioner contends, “information associated with storage of data (temperature) in a first storage (the disk) is provided and used to manage the storage of data in a second storage (the cache).” *Id.* at 21 (citing Ex. 1003 ¶¶ 49–50).

Petitioner further contends that one of ordinary skill would have understood that this process of using temperature to determine whether to store data objects in the cache necessarily involved checking the “HEADER” (410 in Fig. 4) to see if it contained a “temperature value” (420 in Fig. 4), and then using this temperature value as part of the Figure 2 steps. Pet. 21. Petitioner also argues that, even if this use of HEADER 410 was not inherent, it would have been obvious because one of ordinary skill would have recognized the expressly disclosed “temperature value” variable as the

best measure of a given data object's temperature, and the first place to check for whether a data object stored on the disk had an associated temperature. *Id.* According to Petitioner, the express disclosure of this "temperature value" variable made it a natural choice, and one of ordinary skill would have had a reasonable expectation of success in using this pre-existing variable when evaluating whether to cache data being read from the disk. *Id.* (citing Ex. 1003 ¶ 51).

In the second way of using this temperature in arranging storage of data in the cache, Petitioner argues, Morris discloses using the data temperature in deciding whether to delete a data object from the cache, as reflected in Morris's Figure 3. Pet. 21–22 (citing Ex. 1004, Fig. 3, ¶¶ 53–58). In this technique, Petitioner contends, Morris discloses that "[t]he data temperature is stored with the data object in the cache 150 or alternatively is stored in any other suitable structure." *Id.* at 23 (quoting Ex. 1004 ¶ 53). Relying on the testimony of Dr. Long, Petitioner argues that one of ordinary skill "would have understood that this data temperature in the cache originated from the 'temperature value' retrieved from the disk when originally storing data in the cache." *Id.* (citing Ex. 1003 ¶ 54). Alternatively, Petitioner argues, "it would have been obvious to implement the Morris system in this way because the temperature value maintained on the disk was the most natural source when copying the data over to the cache." *Id.*

Patent Owner argues that Petitioner fails to demonstrate that Morris anticipates or renders obvious claim element 1.3. Prelim. Resp. 18–22. Petitioner, Patent Owner contends, fails to support its inherency argument that Morris's process for determining whether to store data in the cache

“necessarily involved checking the data ‘HEADER’ (410 in FIG. 4) to see if it contained a ‘temperature value’ (420 in FIG. 4), and then using this temperature value as part of the FIG. 2 steps” with sufficient disclosure from Morris or expert testimony. *Id.* at 20. Patent Owner also argues that Petitioner’s obviousness argument is merely based on a paragraph in Dr. Long’s declaration that “repeats the same conclusory statements as the Petition.” *Id.* at 20–21 (citing Ex. 1003 ¶ 51). Patent Owner further argues that Petitioner “fails to address how Morris’[s] disclosure of *deleting* a data object from the cache would motivate or teach a POSITA about how that data object was *stored* in the cache in the first place.” *Id.* at 21.

Patent Owner does not appear to dispute at this stage that element 1.2 is disclosed or rendered obvious by Morris. Based on the present record, we determine that Petitioner has made a sufficient showing for this claim element.

As for claim element 1.3, we question whether Petitioner has sufficiently established that Morris inherently discloses this element based on the evidence of record. Petitioner does not point to specific portions of Morris that expressly state that storage information associated with storage of data in the disk drive (such as temperature values 420 in Figure 4) are provided to the cache, or that indicate that this step is necessarily present in Morris’s system. For example, it appears that there might be other places for storing temperature information or other ways of providing that information to the cache. Additionally, Dr. Long does not explain why one of ordinary skill would have “necessarily” understood that Morris’s process would have checked data HEADER 410 in Figure 4 to see if it contained a temperature

value, and then used this temperature value as part of the Figure 2 steps, rather than obtaining the temperature value from another source.

However, we determine that, for purposes of institution, Petitioner has sufficiently shown that element 1.3 would have been obvious over Morris. Petitioner's obvious argument is supported by Dr. Long's testimony that, when using data temperature to determine whether data should be stored in the cache (as reflected in Figure 2), it would have been obvious to "check[] the data 'HEADER' (410 in FIG. 4) to see if it contained a 'temperature value' (420 in FIG. 4), and then us[e] this temperature value as part of the FIG. 2 steps." Ex. 1003 ¶ 51. As Dr. Long explains, data objects 400 with headers 410 and temperature values 420 in Figure 4 are "stored on a disk drive." *Id.* ¶ 46. Dr. Long further testifies that one of ordinary skill "would have recognized the expressly disclosed 'temperature value' variable" 420 stored on the disk "as the best measure of a given data object's temperature and the first place to check for whether a disk-stored data object had an associated temperature." *Id.* "Given the express disclosure of this [temperature value] variable" 420, Dr. Long continues, it "would have been a natural choice" for the person of ordinary skill in the art to use it "when evaluating whether to cache data being read from the disk," and one of ordinary skill would have had a reasonable expectation of success in doing so. *Id.* Contrary to Patent Owner's argument, this testimony provides logical reasons why one of ordinary skill would have provided the temperature value from the disk to the cache, and is not merely "conclusory."

We reach a similar determination as to Petitioner's obviousness argument based on the process for determining whether data should be

deleted from the cache in Morris's Figure 3. Petitioner's argument is supported by Morris's statement that "[t]he data temperature is stored with the data object in the cache," and Dr. Long's testimony that it would have been obvious to have "this data temperature in the cache originate[] from the 'temperature value' retrieved from the disk when originally storing the data in the cache." Ex. 1004 ¶ 53; Ex. 1003 ¶ 54. Dr. Long further explains that "it would have been obvious to implement the Morris system in this way because the temperature maintained on the disk was the most natural source for the value of the data temperature stored in the cache," and one of ordinary skill "would have used that approach with a reasonable expectation of success." Ex. 1003 ¶ 54. "In fact," according to Dr. Long, "given that the temperature value was persistently stored with the data on the disk," the disk "was the only logical source for a reliable temperature value when deciding whether to load the data into the cache," because "[a]ny other source would have risked being inaccurate or out of date and would have needlessly and redundantly stored the temperature in another location." *Id.* This testimony provides logical reasons why one of ordinary skill would have provided the temperature value on the disk to the cache.

Consequently, we determine that, on the record before us, Petitioner's cited evidence sufficiently supports its contentions regarding these limitations.

c) 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.

3. *Dependent Claim 3: “The method of claim 1, wherein the storage information includes data access information indicative of access of data in a volatile storage, and wherein the method further comprises: using the data access information indicative of access of data in a volatile storage to determine a persistent data temperature for the data.”*

Petitioner argues that Morris’s temperature value “includes information indicative of access of data in both volatile and non-volatile storage.” Pet. 26. Petitioner points to Morris’s disclosure that “the temperature of the data object is either raised or lowered depending on the access rate of the data object.” *Id.* (citing Ex. 1004 ¶ 47). Relying on Dr. Long, Petitioner argues that one of ordinary skill “would have understood that these temperature changes occur based on both access of the data from the cache as well as access from the disk drive(s),” because “the purpose of the cache is to avoid disk accesses and thus access of a given data is either from the disk or, when available, cache.” *Id.* (citing Ex. 1004 ¶ 17; Ex. 1003 ¶ 60). According to Petitioner, “the access rate of data while stored in the cache (volatile storage) thus impacts the temperature, making the temperature indicative of access of data in volatile storage.” *Id.* at 26–27 (citing Ex. 1003 ¶ 60). “Given that the temperature is stored with the data,” Petitioner contends, “when the data moves in and out of [the] cache, so too does its temperature, and thus the temperature is indicative of access of that data in both volatile and non-volatile storage.” *Id.* at 27 (citing Ex. 1003 ¶ 60).

Petitioner argues that one of ordinary skill “also would have understood that any data objects stored in cache would eventually be reconciled—or stored—at the corresponding data location on the disk, e.g., upon deletion of the data object from the cache.” Pet. 28 (citing Ex. 1003

¶ 62; Ex. 1012, 2:4–24). Additionally, according to Petitioner, “[t]o the extent not inherent this would have been obvious, as the whole purpose of a cache was to create copies of disk data in faster, smaller, and more volatile memory.” *Id.* (citing Ex. 1004 ¶ 17). Relying on testimony from Dr. Long, Petitioner argues that, “[i]f the cache data were modified, including temperature modifications, then [one of ordinary skill in the art] would have been motivated to make sure those changes were reflected in the corresponding disk-saved data so that any future disk access would retrieve accurate data.” *Id.* (citing Ex. 1003 ¶ 62; Ex. 1012, 2:4–24). Petitioner further cites testimony from Dr. Long that “[t]his concept of cache consistency was well-known as the proper way to implement a cache.” *Id.* (citing Ex. 1003 ¶ 62).

Patent Owner argues that “Morris does not disclose determining the temperature of data in its cache based on access of that data from the cache (i.e., **volatile storage**), as required by the claim.” Prelim. Resp. 22. Rather, Patent Owner asserts, “the data temperature in Morris is, at most, based on access of data from the disk (i.e. **non-volatile storage**).” *Id.* To support its argument, Patent Owner points to Morris’s disclosure that its technique assigns a higher or lower temperature value to a data object based on how recently it has been retrieved from or written to “the disk drives.” *Id.* at 23 (citing Ex. 1004 ¶¶ 46, 59). Patent Owner asserts that the Petition “never explains or demonstrates why the data temperature in Morris would necessarily be calculated or updated using the access rate of data while stored in the cache,” and characterizes Dr. Long’s testimony as “conclusory.” *Id.* at 25–26 (citing Ex. 1003 ¶ 60).

Based on the evidence of record, Petitioner has established a reasonable likelihood that Morris would have taught or rendered obvious this limitation to one of ordinary skill. Petitioner's argument is supported by Dr. Long, who provides logical reasons why one of ordinary skill in the art would have understood Morris's data temperature to travel with the data object and take into account the access of the data object when it is stored in the cache, as well as when it is stored on the disk drive.

Consequently, based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claim 3 is unpatentable over the prior art.

4. Claims 2, 5–9, 11–13, 15, and 17–18

Petitioner contends that claims 2, 5–9, 11–13, 15, and 17–18 are anticipated by or would have been obvious over Morris. Pet. 4, 25–27, 29–37. Patent Owner does not provide any separate argument regarding these dependent claims, at this stage of the proceeding. *See* Prelim. Resp. 26–29. Based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claims 2, 5–9, 11–13, 15, and 17–18 are unpatentable over the prior art.

5. *Independent Claim 19*

a) [19.1]: “A computer-implemented method of managing data in a multi-storage system that includes a volatile storage and a non-volatile storage for storage of the data, ”

[19.2]: “wherein the computer-implemented method is implemented at least partly by one or more processors executing computer code stored in a non-transitory computer readable storage medium, and wherein the computer-implemented method comprises:”

For these elements, Petitioner relies on its earlier discussions for claims 1, 7, and 11. Pet. 37. Patent Owner does not present arguments regarding these limitations at this stage of the proceeding. Prelim. Resp. 17–31.

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

b) [19.3]: “providing information associated with storage of data in the volatile storage to a storage manager of the non-volatile storage; and”

[19.4]: “using by the storage manager of the non-volatile storage, the information associated with the storage of data in the volatile storage, to manage the storage of data in the non-volatile storage.”

Petitioner argues that Morris meets these elements “because its system manages access of a given data object from disk (non-volatile storage) based on information relating to whether the data object is stored in cache (information associated with storage of data in volatile storage).” Pet. 37–38. According to Petitioner, one of ordinary skill would have understood that, in response to a data access request, “the Morris processor would first receive and process information indicating whether the data was available in cache (information associated with storage of data in volatile storage).”

Pet. 38 (citing Ex. 1003 ¶ 90; Ex. 1012, 1:32–40). Thus, Petitioner contends, “[d]ata indicated as ‘in cache’ will be retrieved from the cache, whereas if the data is not in cache, the processor will retrieve it from disk (manage the storage of data in the non-volatile storage).” *Id.* Petitioner further argues that the ’623 patent provides no meaningful details concerning what is meant by “managing” non-volatile storage based on volatile storage information, and one of ordinary skill “would have understood that this element is met by using information indicating whether data is stored in volatile storage in order to decide whether to access the data from a non-volatile storage.” *Id.* at 38–39 (citing Ex. 1003 ¶ 90).

Petitioner further argues that it would have been obvious “to use the temperature values stored on the disk(s) to manage the data on those disks.” Pet. 39 (citing Ex. 1003 ¶ 91). Because “the Morris disks already stored temperature values associated with storage of data in the cache,” Petitioner argues, one of ordinary skill “would have been motivated to implement the disks in a tiered fashion and use the already-available temperatures to manage data storage among those disk tiers, i.e., hotter data in faster tiers and colder data in slower tiers.” *Id.*

Patent Owner argues that “Morris at most manages data in a cache, i.e., a volatile storage, and does not teach or suggest managing data in disk, i.e., non-volatile storage.” Prelim. Resp. 29. In response to Petitioner’s argument that one of ordinary skill would have been motivated to implement the disks in a tiered fashion and use the already-available temperatures to manage data storage among the tiers, Patent Owner argues that “Morris contains no reference or disclosure of ‘disk tiers.’” *Id.* at 31.

Based on the evidence of record, we determine that Petitioner has presented sufficient evidence for claim elements [19.3] and [19.4] at this stage of the proceeding. Petitioner presents evidence, including testimony from Dr. Long, that one of ordinary skill would have understood “managing” non-volatile storage based on volatile storage information to include using information indicating whether data is stored in volatile storage in order to decide whether to access the data from non-volatile storage. Pet. 38–39 (citing Ex. 1003 ¶ 90). Petitioner also presents evidence, including testimony from Dr. Long, that one of ordinary skill would have understood from Morris that the system, in response to a data access request, would first receive and process information indicating whether the data was available in cache, retrieve the data from the cache if it was there, and retrieve it from a disk if not. *Id.* at 38 (citing Ex. 1003 ¶ 90; Ex. 1012, 1:32–40). At this stage of the proceeding, Patent Owner does not present a contrary construction of “managing” non-volatile storage based on volatile storage information, or challenge how one of ordinary skill in the art would have understood Morris to operate in response to a data access request.

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

c) Summary for Claim 19

For the foregoing reasons, and based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claim 19 is unpatentable over the prior art.

E. Ground 3: Obviousness of Claim 19 Based on Morris and Ghandeharizadeh

Petitioner contends that claim 19 would have been obvious over the combination of Morris and Ghandeharizadeh. Pet. 4, 40–43. Patent Owner disagrees. Prelim. Resp. 29–30.

1. Overview of Ghandeharizadeh (Ex. 1015)

Ghandeharizadeh is a paper that discusses “software techniques that improve the performance of multi-zone disks by controlling the placement of data across the zones.” Ex. 1015, 1–2. Ghandeharizadeh explains that “zoning” is a “technique employed by modern magnetic disk drives to improve their storage density” by dividing the disk into “regions that provide different transfer rates.” *Id.* at 1. According to Ghandeharizadeh, “one can enhance the performance of a multi-zone disk by assigning the frequently accessed files to the zone with the highest transfer rate.” *Id.* at 2. Ghandeharizadeh explains that the term “heat” can be used to “denote the frequency of access to a file.” *Id.*

2. Analysis of Independent Claim 19

Petitioner argues that one of ordinary skill in the art “would have been motivated to increase disk drive access times by using the heat-based data management techniques taught by Ghandeharizadeh.” Pet. 40 (citing Ex. 1003 ¶¶ 92–93). “As modified in view of Ghandeharizadeh,” Petitioner explains, “the Morris system memory controller (storage manager) would have used the Morris temperature values to reorganize (manage) the storage of data on the non-volatile disk drives.” *Id.* at 43 (citing Ex. 1003 ¶ 97).

Patent Owner argues (among other things) that “the Petition does not provide any analysis or [explanation] as to how the combined system would function, and in particular, whether the most frequently used data would be

stored in the cache memory of Morris or in the fast zones of Ghandeharizadeh.” Prelim. Resp. 34. Patent Owner also asserts that Petitioner does not explain “how the combined system would meet the requirements of claim [element] 19.3 of ‘providing information associated with storage of data in the volatile storage to a storage manager of the non-volatile storage.’” *Id.*

As noted above, we determine that Petitioner has sufficiently demonstrated a reasonable likelihood that claim 19 would have been obvious over Morris at this stage of the proceeding. *See supra* § II.D.5. For Ground 3, however, we agree with Patent Owner that the Petition lacks a detailed explanation of how the combined Morris and Ghandeharizadeh system would function and how the operation of the combined system would meet the limitations of claim 19. Based on this lack of detail, we have questions about the sufficiency of Petitioner’s showing as to claim 19 based on this Ground.

F. Grounds 4–5: Obviousness of Claims 1–3, 5–9, 11–13, 15, and 17–19 Based on Burke

Petitioner contends that claims 1–3, 5–9, 11–13, 15, and 17–19 would have been obvious over Burke. Pet. 4, 44–77. Patent Owner disagrees. Prelim. Resp. 34–39.

1. Overview of Burke (Ex. 1005)

Burke discloses a system for managing data stored on computer storage devices. Ex. 1005, 1:7–9. Burke explains that it may be desirable to copy data written to a first storage device to a second storage device in a different location so that, “if a disaster occurs that renders the first storage device inoperable, the host (or another host) may resume operation using the

data of the second storage device.” *Id.* at 1:46–51. Burke explains that such capability is provided by a Remote Data Facility (RDF) product provided by EMC Corporation, which uses a first storage device, referred to as the “primary storage device,” or “R1,” and one or more other storage devices called “secondary storage devices, or “R2,” for receiving copies of the data that is written to the primary storage device. *Id.* at 1:51–59. The host interacts directly with the primary storage device, but any data changes made to the primary storage device are automatically provided to the one or more secondary storage devices. *Id.* at 1:59–62.

Burke discloses a system that includes storage device 30 (*see* Fig. 1) with “a plurality of disk drives.” Ex. 1005, 5:62–65. These “disk drives,” Burke explains, “should be understood as representing any appropriate type of storage media, including, without limitation, DRAM cache, flash or other solid-state storage device, tape, optical media, and/or any combination of permanent, semi-permanent and temporally-limited storage media.” *Id.* at 5:65–6:3. Storage device 30 may “include multiple tiers of storage in which each tier of storage” may “be ordered according to different characteristics or classes, such as speed, technology and/or cost.” *Id.* at 13:34–38. Burke further describes an embodiment including a primary storage device (R1) and a secondary storage device (R2), which may “each be similar to the storage device 30, having similar components therein.” *Id.* at 20:38–45, 21:7–11. R1 and R2 may operate to “provid[e] backup and/or mirrored copies of data.” *Id.* at 20:46–48.

Burke states that its system provides “a more practical and efficient approach to providing the R2 device with sufficient information to characterize the tiering of data stored thereon in a similar manner to the data

tiering on the R1 device,” so that, “in the event of failover, the R2 device may adequately assume the workload that was being supported by the primary R1 device.” Ex. 1005, 21:51–58. In order to do this, Burke explains, “[r]aw data access information about the workload of the primary R1 device is collected at the R1 device,” including “data access and/or usage information about the data stored on the R1 device.” *Id.* at 21:59–67. This “raw” data access information “may be characterized” to create “characterized data access information,” which “may include statistical information concerning access rates of data, frequency of use of data,” and other information.” *Id.* at 22:3–11. This characterized data access information for R1 “may be sent periodically to the secondary R2 device, but less frequently, and with less total information, than for every block-relocation decision made at the primary R1 device.” *Id.* at 22:11–15.

Burke further discloses that this transmission of characterized data access information from the R1 device to the R2 device “allows the R2 device to operate according to a fully-automated storage tiering system that is independent from the storage tiering system of the R1 device,” but is “sufficient to handle the workload of the primary site in the event of failover.” Ex. 1005, 23:15–20. “[E]ach remote storage device,” Burke explains, “may make its own independent decisions on how best to utilize the available resources to match the performance requirements currently being supported by the primary site.” *Id.* at 23:20–23.

2. *Analysis of Independent Claim 1*

- a) [1.1]: “A method of managing data in a multi-storage system that includes multiple storages for storage of the data, 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, Burke discloses it. Pet. 47. Petitioner argues that Burke discloses a multi-storage system having multiple storages for storage of data, including a “primary” storage R1 and a “secondary” storage R2. *Id.* at 47–48 (citing Ex. 1005, 20:38–40, Fig. 17). According to Petitioner, Burke discloses that R1 and R2 include a “plurality of disk drives,” each of which may be “any appropriate type of storage media, including, without limitation, DRAM cache, flash or other solid-state storage device, tape, optical media, and/or any combination of permanent, semi-permanent and temporally-limited storage media.” *Id.* at 48 (citing Ex. 1005, 5:62–6:3). Burke also contemplates, according to Petitioner, that R1 and R2 “may be configured differently,” and that each storage device may “make independent decisions on how best to manage storage of data in its available resources.” *Id.* at 49 (citing Ex. 1005, 21:49–51, 23:14–23). Based on these disclosures, Petitioner asserts, one of ordinary skill “would have understood, or at least found it obvious, to implement the multi-storage systems in Burke such that the primary and secondary ‘storage devices’ each included combinations of ‘permanent, semi-permanent and temporally-limited’ (i.e., volatile) memories.” *Id.* (citing Ex. 1003 ¶ 106).

Petitioner also argues that Burke discloses that the method for managing data is implemented at least partly by a device. Pet. 49 (citing Ex. 1005, 2:41–3:4, 3:16–18, 7:4–20, Figs. 1–23; Ex. 1003 ¶ 107). Examples of data management, according to Petitioner, include replicating

and moving data from one storage to another based on data access frequency information, handling read/write operations, and sending data access information from one device to another. *Id.* at 49–50.

Patent Owner does not present arguments regarding the preamble.
See Prelim. Resp. 34–39.

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

b) [1.2]: “*using storage information associated with storage of data in a first one of the multiple storages to manage storage of data in another one of the multiple storages of the multi-storage system;*”

[1.3] “*providing the storage information associated with storage of data in the first one of the multiple storage devices to the second one of the multiple storages, thereby allowing the second one of the multiple storage devices to manage storage of data in the second one of the multiple storage devices, based on the information associated with storage of data in the first one of the multiple storage devices.*”

Petitioner argues that Burke’s multi-storage system uses characterized data access information associated with storage of data in a first storage device (R1) to manage storage of data in a second storage device (R2), thus satisfying element 1.2. Pet. 50–51. For example, Petitioner contends, Burke discloses that the secondary R2 device manages its data by using an “Information Lifecycle Management” (ILM) algorithm based on the characterized access information from R1, and that this ILM algorithm causes data to be stored on faster or slower storage systems depending on how frequently the data is accessed. *Id.* (citing Ex. 1005, Fig. 20, 25:54–59, 1:31–44, 2:23–43).

Thus, according to Petitioner, one of ordinary skill “would understand Burke to disclose, or at the very least teach, using characterized data access information from primary device R1 to manage storage of data in ‘fast’ and ‘slower’ storage devices on secondary device R2.” Pet. 51 (citing Ex. 1003 ¶ 111). Or, in other words, Burke discloses “a second storage device R2 managing its data storage (e.g., determining which tier, or type of memory, in which to store particular data) using characterized data access information from first storage device R1.” *Id.* at 53 (citing Ex. 1003 ¶ 113). From this disclosure, Petitioner further asserts that one of ordinary skill would understand that the characterized data access information from R1 is provided to R2, as required by claim element 1.3. *Id.* at 56.

Patent Owner does not present arguments regarding these limitations. *See* Prelim. Resp. 34–39.

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

c) 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.

3. *Dependent Claim 3: “The method of claim 1, wherein the storage information includes data access information indicative of access of data in a volatile storage, and wherein the method further comprises: using the data access information indicative of access of data in a volatile storage to determine a persistent data temperature for the data.”*

Petitioner argues that Burke discloses the claimed “data access information” in the form of “characterized data access information,” which includes “statistical information concerning access rates of data [and]

frequency of use of data . . . over a period of time.” Pet. 57 (citing Ex. 1005, 22:1–11; Ex. 1003 ¶¶ 119–120). Thus, Petitioner argues, one of ordinary skill would understand that Burke’s “characterized data access information” includes values representing the number or frequency of accesses of data, i.e., “data temperature.” *Id.* (citing Ex. 1003 ¶ 122).

Petitioner argues that Burke discloses or teaches storing data in both non-volatile and volatile memory on each of R1 and R2. Pet. 62 (citing Ex. 1005, 6:1–3, 20:49–55, 5:65–61). Relying on Dr. Long, Petitioner asserts that one of ordinary skill “would have understood that any given storage device in Burke, such as R1 or R2, stored data on both a volatile memory device (e.g., DRAM) and a non-volatile memory device (e.g., flash).” *Id.* (citing Ex. 1003 ¶ 131).

Again relying on Dr. Long, Petitioner argues that, because Burke teaches implementing R1 and R2 with different memory devices, and R1 and R2 each manage data independently, one of ordinary skill “would have envisioned an obvious usage scenario in which R1 stored data in volatile memory whereas R2 stored the data in non-volatile memory.” Pet. 63–64 (citing Ex. 1003 ¶ 134). “Thus,” according to Petitioner and Dr. Long, “it would have been at least obvious that on R2 the characterized data access information, i.e., data temperature, corresponded to data stored in non-volatile memory.” *Id.* at 64 (citing Ex. 1003 ¶ 134).

Patent Owner argues that “Burke does not specify whether a particular storage is a volatile or non-volatile storage,” and that “the only reference to the type of storages used in Burke is a generic statement that the storages can be ‘any appropriate type of storage media.’” Prelim. Resp. 35 (citing Ex. 1005, 5:65–6:3). Patent Owner contends that “[t]he Petition never

explains or establishes ‘using the data access information indicative of access of data in a volatile storage to determine a persistent data temperature for the data.’” *Id.* “In fact,” Patent Owner asserts, “there is no discussion whatsoever of calculating a data temperature for data in a volatile storage, as required by claim 3.” *Id.* at 35–36.

Based on the evidence of record, Petitioner has established a reasonable likelihood that Burke would have taught or rendered obvious this limitation to one of ordinary skill. Petitioner’s argument is supported by Dr. Long, who provides logical reasons why one of ordinary skill in the art would understand Burke’s R1 and R2 to include both volatile and non-volatile memory devices, and would expect that data access information for data stored in R1’s volatile storage would sometimes be stored in R2’s non-volatile storage due to the independent management of data in R1 and R2. Ex. 1003 ¶¶ 131–134. At this stage of the proceeding, Patent Owner does not sufficiently explain how one of ordinary skill would have understood these disclosures of Burke or why Petitioner’s arguments on this point are incorrect.

Consequently, based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claim 3 is unpatentable over the prior art.

4. Claims 2, 5–9, 11–13, 15, and 17–18

Petitioner contends that claims 2, 5–9, 11–13, 15, and 17–18 are anticipated by or obvious over Burke. Pet. 4, 56–63, 64–74. Patent Owner does not provide any separate argument regarding these dependent claims, at this stage of the proceeding. *See* Prelim. Resp. 34–39. Based on the evidence of record, we determine that Petitioner has demonstrated a

reasonable likelihood that claims 2, 5–9, 11–13, 15, and 17–18 are unpatentable over the prior art.

5. *Independent Claim 19*

a) [19.1]: “*A computer-implemented method of managing data in a multi-storage system that includes a volatile storage and a non-volatile storage for storage of the data,*”

[19.2]: “*wherein the computer-implemented method is implemented at least partly by one or more processors executing computer code stored in a non-transitory computer readable storage medium, and wherein the computer-implemented method comprises:*”

For these elements, Petitioner relies on its earlier discussions of claims 1, 7, 11, and 17–18. Pet. 74–75. Patent Owner does not present arguments regarding these limitations at this stage of the proceeding. Prelim. Resp. 34–39.

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

b) [19.3]: “*providing information associated with storage of data in the volatile storage to a storage manager of the non-volatile storage; and*”

[19.4]: “*using by the storage manager of the non-volatile storage, the information associated with the storage of data in the volatile storage, to manage the storage of data in the non-volatile storage.*”

Petitioner argues that Burke’s secondary device R2 “includes a receiver/controller (storage manager), which receives (i.e., is provided with) the characterized data access information,” and “uses that information to manage the storage of data on the secondary storage device (R2).” Pet. 75 (citing Ex. 1003 ¶ 172). Petitioner also contends that it would have been obvious “to implement the Burke system such that the characterized data

access information included information relating to storage of data (e.g., access information) in volatile storage on the primary device R1,” and “to use that information to manage storage of data in the non-volatile memory on secondary storage R2.” *Id.* at 75–76 (citing Ex. 1003 ¶ 172).

“For example,” Petitioner asserts, one of ordinary skill “would have understood that when data on R1 became more frequently accessed and thus stored on a higher tier volatile memory,” then “access information associated with storage of that data on the R1 volatile memory would be provided to R2.” Pet. 76 (citing Ex. 1005, 17:48–59, 18:17–40, 21:65–22:15, 22:47–52, Fig. 15; Ex. 1003 ¶ 173). “Secondary device R2, and its receiver/controller (storage manager),” according to Petitioner, would then “receive and use this information to manage the storage of data on R2.” *Id.* (citing Ex. 1005, 21:53–58, 25:9–20).

Additionally, Petitioner argues, because “Burke contemplates tiering storage of data onto volatile and non-volatile memories on R2,” one of ordinary skill “would have envisioned the scenario in which characterized data access information was used by R2 to move data from a non-volatile memory tier to another memory tier, either volatile or faster-access non-volatile.” Pet. 76. “In fact,” Petitioner contends, “the primary purpose of Burke’s characterized data access information was to make sure that storage access data tiering decisions on R1 (e.g., moving data to or from higher-speed volatile memory based on data access patterns) could be accounted for in making similar tiering decisions on R2.” *Id.* at 76–77 (citing Ex. 1003 ¶ 173). “Thus,” according to Petitioner, “characterized data access information relating to movements from / to volatile storage on R1 would

regularly lead to R2 managing its own data between volatile and non-volatile storage.” *Id.* at 77 (citing Ex. 1003 ¶¶ 173–177).

Patent Owner argues that “Burke does not specify whether its first and second storages are volatile or non-volatile storage,” and fails to disclose “how a **non-volatile** storage is managed using information associated with a **volatile** storage.” Prelim. Resp. 38. Patent Owner argues that the Petition never establishes why one of ordinary skill would be motivated “to implement the Burke system such that the characterized data access information included information relating to storage of data (e.g., access information) in volatile storage on the primary device R1,” or to “use information associated with storage of data specifically in a **volatile** storage to manage the storage of data specifically in a **non-volatile** storage.” *Id.* (citing Pet. 75–76).

Based on the evidence of record, Petitioner has established a reasonable likelihood that Burke would have taught or rendered obvious this limitation to one of ordinary skill. Petitioner’s argument is supported by Dr. Long, who provides logical reasons why one of ordinary skill in the art would have implemented Burke to provide information concerning storage of data in R1’s volatile (and non-volatile) storage to R2’s storage manager, and to have R2’s storage manager to use this information to manage data storage in R2’s non-volatile (and volatile) storage. Ex. 1003 ¶¶ 172–176. At this stage of the proceeding, Patent Owner does not sufficiently explain how one of ordinary skill would have understood these disclosures of Burke or why Petitioner’s arguments on this point are incorrect.

Consequently, we determine that, on the record before us, Petitioner's cited evidence sufficiently supports its contentions regarding these limitations.

c) Summary for Claim 19

For the foregoing reasons, and based on the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood that claim 19 is 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. 39–42. 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. Intri-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. 39. 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. 40. “Because this is more than one year before the trial date,” Patent Owner states, “this factor weighs in favor of Petitioner.” *Id.*

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. 40–41. “On the other hand,” Patent Owner acknowledges, “the Court is not expected to issue any orders relating to the ’623 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 41 (citing Ex. 1017, 2).

Petitioner asserts that the parallel proceeding “is still in its early stages.” Pet. 6. 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. 41. According to Patent Owner, “Petitioner has identified the same Burke reference as one of its prior art grounds and set forth substantially the same invalidity grounds as those raised in this Petition.” *Id.* (citing Ex. 2003). Petitioner does not specifically address this factor. *See* Pet. 5–6.

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. 41–42. 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. 42.

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 '623 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 1–3, 5–9, 11–13, 15, and 17–19 of the ’623 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 ’623 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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