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Paper 48
Entered: July 29, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VEEAM SOFTWARE CORPORATION,
Petitioner,

v.

SYMANTEC CORPORATION,
Patent Owner.

Case IPR2013-00143
Patent 7,191,299 B1

Before FRANCISCO C. PRATS, THOMAS L. GIANNETTI, and TRENTON A. WARD, *Administrative Patent Judges.*

PRATS, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a); 37 C.F.R. § 42.73

I. INTRODUCTION

A. Statement of the Case

Petitioner, Veeam Software Corporation, filed a corrected Petition to institute an *inter partes* review of claims 1, 2, 4, 5, 12, 14, and 15 ("the challenged claims") of U.S. Patent 7,191,299 B1 (Ex. 1001, "the '299 patent"). Paper 6 ("Pet."). Patent Owner, Symantec Corporation, filed a Preliminary Response. Paper 10 ("Prelim. Resp."). The Board instituted trial as to the challenged claims on the following grounds of unpatentability asserted by Petitioner:

Reference[s]	**Basis**	**Claims challenged**
Ohran[1]	§ 102(b)	1, 2, 4, 5, 12, 14, and 15
Kleiman[2]	§ 102(b)	1, 2, 4, 5, 12, 14, and 15
DeKoning[3] and Linde[4]	§ 103	1, 2, 4, 5, 12, 14, and 15

Decision to Institute 21 (Paper 11, "Dec.").

After the Board instituted trial, Patent Owner filed a corrected Response to the Petition. Paper 23 ("PO Resp."). Patent Owner also filed a corrected Motion to Amend. Paper 24 ("Mot. to Amend").

Petitioner filed a Reply to the corrected Patent Owner Response (Paper 28, "Reply"), as well as an Opposition to the corrected Motion to

[1] US 5,835,953 (issued Nov. 10, 1998) (Ex. 1003).
[2] US 2002/0049718 A1 (published Apr. 25, 2002) (Ex. 1004).
[3] US 6,691,245 B1 (issued Feb. 10, 2004) (Ex. 1005).
[4] US 6,799,258 B1 (issued Sept. 28, 2004) (Ex. 1006).

Amend (Paper 29, "Opp."). Patent Owner filed a Reply to the Opposition. Paper 31 ("Amend Reply").

Petitioner relies on two declarations by Dr. Prashant Shenoy in support of its position. Ex. 1002 ("Shenoy Decl."); Ex. 1008 ("Supplemental Shenoy Decl."). Petitioner relies also on depositions of Dr. John V. Levy. Ex. 1013; Ex. 1014.

Patent Owner relies on three declarations by Dr. Levy in support of its position. Ex. 2003 ("Levy Motion Decl."); Ex. 2010, ("Levy Resp. Decl."); Ex. 2011, ("Levy Reply Decl."). Patent Owner relies also on depositions of Dr. Shenoy. Ex. 2005; Ex. 2012.

Oral argument was conducted on May 5, 2014. A transcript is entered as Paper 47.

The Board has jurisdiction under 35 U.S.C. § 6(c). This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

"In an inter partes review instituted under this chapter, the petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence." 35 U.S.C. § 316(e).

Petitioner has shown, by a preponderance of the evidence, that claims 1, 2, 4, 5, 12, 14, and 15 of the '299 patent are unpatentable, based on each of the challenges for which trial was instituted.

Patent Owner's Motion to Amend is denied.

B. Related Proceedings

In addition to this Petition, we instituted *inter partes* review on August 7, 2013 based on Petitioner's challenges to the patentability of certain claims of Patent Owner's U.S. Patents 6,931,558 B1 (IPR2013-00141, IPR2013-00142) and 7,093,086 B1 (IPR2013-00150). Our final

decisions in those proceedings are being entered concurrently with this decision.

C. The '299 Patent (Ex. 1001)

The '299 patent "relates to data storage and retrieval generally and more particularly to a method and system of providing periodic replication." Ex. 1001, 1:7–9. Figure 2 of the '299 patent is reproduced below:

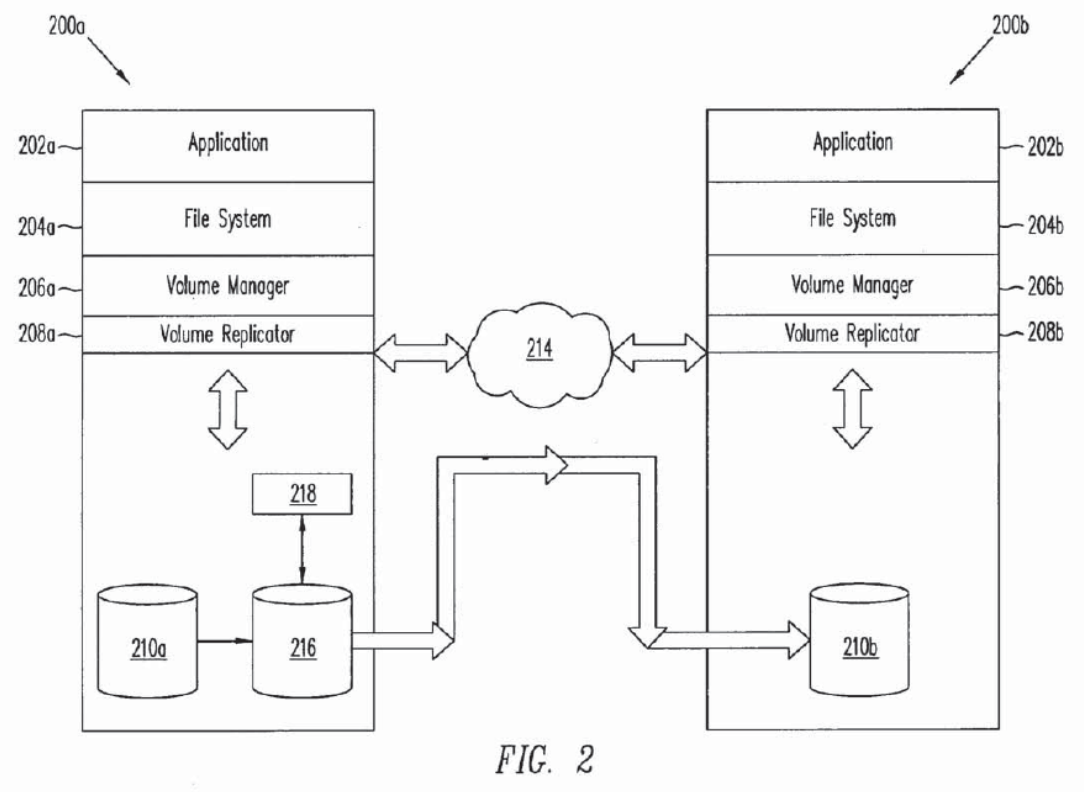

FIG. 2

Figure 2 "illustrates an initial synchronization operation within a replication system environment according to an embodiment of the present invention." Ex. 1001, 4:16–18. As shown in Figure 2, the "contents of a primary data volume (Vol) within primary node 200*a* are transferred to a replicated secondary data volume (R_Vol) within a secondary node 200*b* during initial synchronization." *Id.* at 4:22–25.

To perform the transfer, primary node 200*a* shown in Figure 2

includes "a primary data volume 210*a*, and a 'snappoint' storage object including a point-in-time copy 216 or 'snapshot' of said primary data volume 210*a* and a data volume map 218 (current)." *Id.* at 4:34–39. The '299 patent describes the transfer procedure as follows:

> After the creation of the storage object including point-in-time copy 216, a subsequent write operation results in the copying of existing data impacted by the write from primary data volume 210*a* to point-in-time copy 216 and the modification of data volume map 218 to indicate the occurrence of the write and the modified regions of primary data volume 210*a*. Consequently, point-in-time copy 216 provides a consistent, stable volume[,] which may be synchronized with secondary data volume 210*b* (e.g., by copying all the data from point-in-time copy 216 to secondary data volume 210*b*). The data volume map 218 indicating write operations as described may then be subsequently used to perform periodic replication.

Ex. 1001, 5:28–41.

The '299 patent explains that a "snapshot volume is a point-in-time copy of another volume (e.g., a primary data volume). A snapshot may be a virtual point-in-time copy or 'instant snapshot' as more fully described in U.S. patent application Ser. No. 10/143,059." *Id.* at 4:40–46.[5] "Such instant snapshots may be space-optimized, such that only data modified in the base (e.g., primary) data volume or the snapshot itself is stored in the snapshot, or full-image, such that all data from a corresponding base volume is copied into the snapshot, potentially using a background process." *Id.* at 4:48–53.

[5] U.S. Application Serial No. 10/143,059 issued as U.S. Patent No. 6,785,789 B1, on Aug. 31, 2004 (Ex. 2006). This application was incorporated by reference into the '299 patent. Ex. 1001, 4:40-46.

Alternatively, the '299 patent explains, a snapshot "may be a complete (sometimes also referred to as 'real' or 'actual') point-in-time copy." *Id.* at 4:46–48.

"Once the initial synchronization is completed as described with respect to [Figure] 2, periodic replication may be performed." Ex. 1001, 6:5–7. Figure 3 of the '299 patent, reproduced below, "illustrates a periodic replication operation within a replication system environment according to an embodiment of the present invention" (*id.* at 5:50–52):

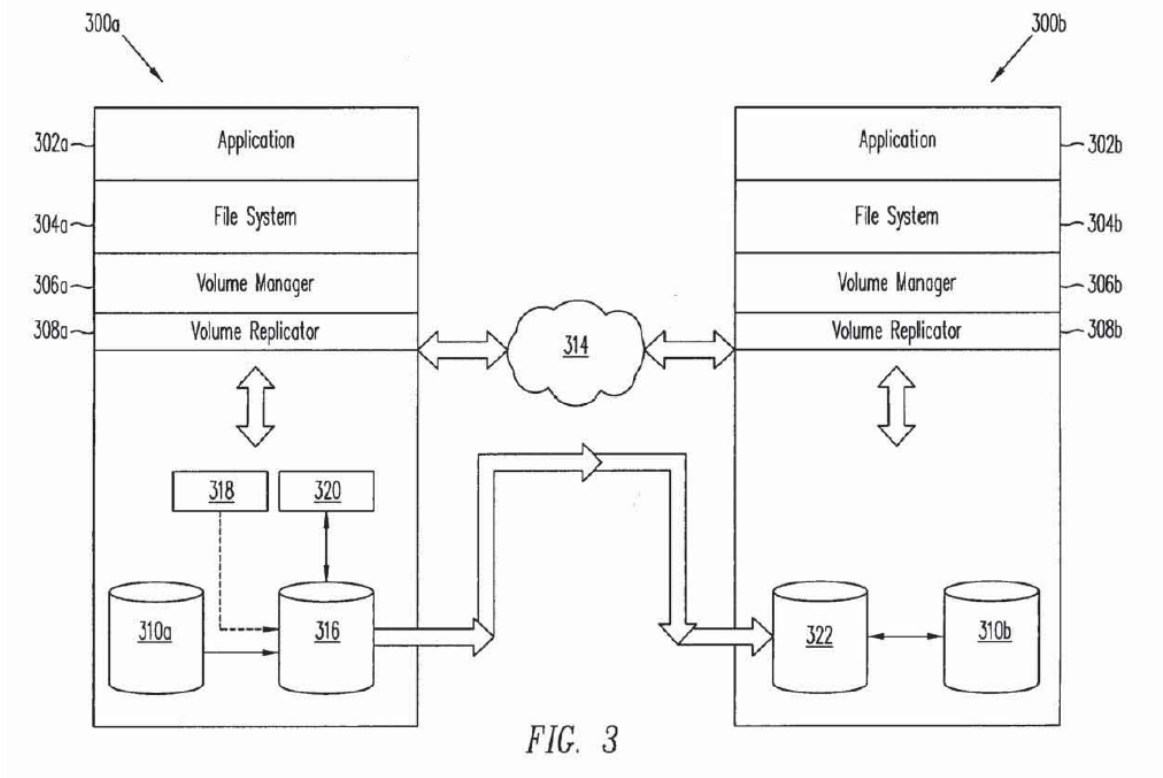

FIG. 3

As shown in Figure 3, "copies of incrementally modified or changed data of a primary data volume (Vol) within primary node 300*a* are transferred to a replicated secondary data volume (R_Vol) within a secondary node 300*b* periodically." *Id.* at 5:53–56. In addition to the point-in-time copy 316 of primary data volume 310*a*, the periodic replication

operation illustrated in Figure 3 includes point-in-time copy 322 or snapshot volume in secondary node 300*b*. *Id.* at 6:37–38. Thus,

> data associated with incremental changes (e.g., data of primary data volume 310a which was modified during initial synchronization) may be copied from point-in-time copy 316 using the first data volume map 318 (current) to a point-in-time copy 322 or "snapshot" volume on secondary node 300*b* and used to restore secondary data volume 310*b*.

Id. at 6:33–39.

D. Illustrative Claims

Claims 1 and 12 illustrate the subject matter of the challenged claims and read as follows:

> 1. A method comprising:
>
> creating a storage object corresponding to a storage volume, wherein said storage object comprises a point-in-time copy of said storage volume and a storage volume map; and
>
> replicating said storage volume utilizing said storage object, wherein
>
> said creating a storage object comprises creating a first storage object corresponding to a first storage volume,
>
> said first storage object comprises a first point-in-time copy of said first storage volume and a first storage volume map,
>
> said replicating said storage volume comprises copying data from said first point-in-time copy of said first storage volume to a second storage volume, and

said copying data from said first point-in-time copy comprises, synchronizing said first point-in-time copy of said first storage volume and said second storage volume.

12. A method comprising:

creating a storage object corresponding to a storage volume, wherein said storage object comprises a point-in-time copy of said storage volume and a storage volume map; and

replicating said storage volume utilizing said storage object, wherein

said creating a storage object comprises creating a first storage object corresponding to a first storage volume,

said first storage object comprises a first point-in-time copy of said first storage volume and a first storage volume map,

said replicating said storage volume comprises copying data from said first point-in-time copy of said first storage volume to a second storage volume, and

said copying data from said first point-in-time copy comprises,

copying data from said first point-in-time copy of said storage volume to a point-in-time copy of said second storage volume, and

restoring said second storage volume using said point-in-time copy of said second storage volume.

II. ANALYSIS

A. Claim Construction

The Board interprets claims using the "broadest reasonable construction in light of the specification of the patent in which [they] appear[]." 37 C.F.R. § 42.100(b). Under that standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

When applying that standard, "while 'the specification [should be used] to interpret the meaning of a claim,' courts must not 'import[ ] limitations from the specification into the claim.' . . . [I]t is improper to 'confin[e] the claims to th[e] embodiments' found in the specification . . . ." *In re Trans Texas Holdings Corp.*, 498 F.3d 1290, 1299 (Fed. Cir. 2007) (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed Cir. 2005)) (citations omitted, bracketed text in internal quotes in original).

1. "replicating said storage volume"

In the Decision to Institute, we stated that, "consistent with the claims and the specification, we construe 'replicating said storage volume' to mean 'copying data from said first point-in-time copy of said first storage volume to a second storage volume.'" Dec. 6.

Patent Owner contends that our initial construction is too broad, and argues, for a number of reasons, that "the proper construction for 'replicating said storage volume' is 'creating a duplicate copy of the storage volume.'" PO Resp. 28; *see id.* at 23–28; Paper 39 ¶¶ 1–4 ("PO Observations"). In particular, Patent Owner concludes that, "with respect to claims 1 and 14, this 'replication' should be further interpreted to include the 'copying' and

'synchronizing' steps recited in these claims (*i.e.*, an initial synchronization process)." PO Resp. 28–29; *see also* PO Observations ¶¶ 5–9. As to claims 12 and 15, Patent Owner concludes that "this 'replication' should be further interpreted to include the 'copying' and 'restoring' steps recited in these claims (*i.e.*, an periodic replication sub-process)." PO Resp. 29.

We are not persuaded that we should construe the "replicating" step in a manner that limits claims 1 and 14 to the initial synchronization process described in the '299 patent. Nor are we persuaded that claims 12 and 15 should be limited to the periodic replication process described in the '299 patent, even if those claims encompass such a process. To the contrary, under the claim construction standard governing this proceeding, it is improper to the limit the claims to any particular embodiment described in the specification. *See In re Trans Texas Holdings Corp.*, 498 F.3d at 1299.

It may be true, as Patent Owner argues, that replicating a storage volume creates a duplicate copy of the storage volume. *See* PO Resp. 24–25 (citing Ex. 1002 ¶ 21 (Shenoy Decl.)). As explained in the '299 patent, however, a duplicate copy of the primary storage volume may be created in the secondary storage volume using a point-in-time copy that contains only modified data from the primary storage volume. *See, e.g.*, Ex. 1001, 6:33–39 ("[D]ata associated with incremental changes (e.g., data of primary data volume 310*a* which was modified during initial synchronization) may be copied from point-in-time copy 316 using the first data volume map 318 (current) to a point-in-time copy 322 or 'snapshot'' volume on secondary node 300*b and used to restore secondary data volume 310b.*" (emphasis added)). Moreover, the claims expressly define the replicating step by stating "said replicating said storage volume comprises copying data from

said first point-in-time copy of said first storage volume to a second storage volume." *Id.* at 11:21–23 (claim 1), 12:27–29 (claim 12).

We acknowledge, as Patent Owner argues (*see* PO Resp. 25–26), that claim 1 of the '299 patent additionally states "said copying data from said first point-in-time copy comprises, synchronizing said first point-in-time copy of said first storage volume and said second storage volume." Ex. 1001, 11:21–27. We also acknowledge that claim 14 contains similar language. *See id.* at 13:20–22. We are not persuaded, however, that this language limits those claims to performing an *initial* synchronization. Rather, when viewed in light of the '299 patent specification, the claimed synchronizing step encompasses simply copying all the data from the point-in-time copy to the secondary data volume. *See id.* at 5:35–38 ("[P]oint-in-time copy 216 provides a consistent, stable volume which may be synchronized with secondary data volume 210*b* (*e.g., by copying all the data from point-in-time copy 216 to secondary data volume 210b*)." (emphasis added)).

We acknowledge, as Patent Owner argues (*see* PO Resp. 26), that claim 12 states that the copying data step comprises "copying data from said first point-in-time copy of said storage volume to a point-in-time copy of said second storage volume, and restoring said second storage volume using said point-in-time copy of said second storage volume." Ex. 1001, 12:32–36. We acknowledge that claim 15 contains similar language. *See id.* at 13:25–29.

We also acknowledge that this language further limits the "copying data" portion of the replicating step in those claims. By its terms, however, the replicating step "comprises copying data from said first point-in-time

copy of said first storage volume to a second storage volume," *id.* at 12:27–29 (claim 12), as we concluded in the Decision to Institute. Dec. 6. Moreover, we note again that neither claim 12 nor claim 15 contains any specific language limiting those claims to performing a periodic replication.

In sum, consistent with the claims, the specification, and the Decision to Institute, we construe "replicating said storage volume" in claims 1 and 12 to mean "copying data from said first point-in-time copy of said first storage volume to a second storage volume," in the manner required by those claims.

2. "*point-in-time copy*"

In the Decision to Institute, we stated, "on the record presented, we conclude that the term 'point-in-time copy' is a 'partial or complete copy of another data volume as it existed at a particular point in time.'" Dec. 8.

Patent Owner contends that this construction is "inconsistent with the '299 [p]atent specification, which consistently and repeatedly discloses the creation and use of snapshot volumes as point-in-time copies of the entire underlying storage volume." PO Resp. 30. Patent Owner argues that "there is no mention in the '299 [p]atent of any point-in-time copies that are used to capture only a portion or part of the underlying storage volume." *Id.*

Moreover, Patent Owner contends, the space-optimized snapshot volume described in the '299 patent is not a partial copy of the underlying data volume because it "still has a block or location (albeit, often an empty one) corresponding to each data block on the storage volume." *Id.* at 33; *see also id.* at 32 (citing Ex. 2010 ¶¶ 72–79 (Levy Resp. Decl.) and Ex. 2005, 30:25–31:14, 37:20–44:14, 75:12–76:15 (First Shenoy Dep.)); *see also* PO Observations ¶ 15.

As we noted in the Decision to Institute, however, the '299 patent expressly states the "instant snapshot" type of point-in-time copy "may be space-optimized, *such that only data modified in the base* (e.g., primary) data volume or the snapshot itself *is stored in the snapshot*." Ex. 1001, 4:48–50 (emphasis added); *see also* Dec. 7–8. Moreover, the '299 patent expressly contrasts the space-optimized instant snapshot with a "full-image" instant snapshot, in which "all data from a corresponding base volume is copied into the snapshot." *Id.* at 4:51–52. The '299 patent further distinguishes these instant snapshot type of point-in-time copies from a snapshot which is "a complete (sometimes also referred to as 'real' or 'actual') point-in-time copy." *Id.* at 4:46–48.

Thus, because the '299 patent specification distinguishes expressly between point-in-time copies that store only data that has been modified in the primary volume, and point-in-time copies that contain all of the data from the primary volume, and because the claims do not contain specific language requiring the point-in-time copy to include all the data from the primary storage volume, we are not persuaded that the claimed point-in-time copy must be a copy of the entire underlying storage volume.

In sum, for the reasons discussed, consistent with our conclusion in the Decision to Institute, we construe "point-in-time copy" to mean a "partial or complete copy of another data volume as it existed at a particular point in time."

B. Anticipation of Claims 1, 2, 4, 5, 12, 14, and 15 by Ohran

1. Claims 1 and 14

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a finding that Ohran anticipates claims 1 and 14 of the '299 patent.

The first step in the process recited in claim 1 of the '299 patent requires the practitioner to create "a storage object corresponding to a storage volume" by creating a "first point-in-time copy" of a first storage volume, and a first storage volume map. Ex. 1001, 11:9–10, 11:18–20. As discussed above, the '299 patent explains that a point-in-time copy of a data volume need only include data that has been modified in the primary volume. *See id.* at 4:48–50 ("[I]nstant snapshots may be space-optimized, such that only data modified in the base (e.g., primary) data volume or the snapshot itself is stored in the snapshot . . . .").

Ohran describes a "backup system having a backup storage device and one or more primary systems having mass storage devices that are to be backed up on the backup storage device." Ex. 1003, Abstract. Ohran's system functions such that, once the primary systems identify changes that are going to be made to the primary mass storage device, the "identified changes are then captured in a static snapshot when the mass storage device is in a logically consistent state." *Id.*; *see also id.* at 10:67–11:3 ("[T]he system identifies [a] logically consistent state of the mass storage device and takes a static snapshot of at least those storage locations that have been changed since time T_0. In FIG. 2, the logically consistent state is identified as time T_1 and a snapshot is taken.").

Thus, Ohran describes its snapshot of its primary mass storage device in the same manner as the '299 patent describes its space-optimized snapshot. Therefore, we are persuaded that claim 1's step of creating a point-in-time copy of a data volume encompasses Ohran's snapshot capture step. As also required by claim 1, Ohran describes "keeping a map which identifies those storage locations that have new data written in them starting with time T_0." *Id.* at 10:61–62. Accordingly, we are persuaded that a preponderance of the evidence supports a finding that Ohran describes creating both elements of the storage object required by claim 1 of the '299 patent.

The second step in the process recited in claim 1 of the '299 patent requires the practitioner to "replicat[e] said storage volume utilizing said storage object." Ex. 1001, 11:13–14. As noted above, claim 1 specifies that this replicating step "comprises copying data from said first point-in-time copy of said first storage volume to a second storage volume." *Id.* at 11:21–23. As also noted above, claim 1 further specifies that the copying data portion of the replicating step "comprises, synchronizing said first point-in-time copy of said first storage volume and said second storage volume." *Id.* at 11:25–27.

Ohran discloses that, once its snapshot captures data from the primary storage device, "[a]t time T_1, the changes identified between time T_0 and time T_1 are backed up by sending them to the backup storage device." Ex. 1003, 11:21–23; *see also id.* at Fig. 2. Ohran explains that the "map or other mechanism that was used to track which storage locations had data written therein between time T_0 and time T_1 is used to identify the data that should be transferred to the backup storage device." *Id.* at 11:30–33.

Ultimately, "[o]nce all the data has been transferred, then the changes may be applied to the backup storage device in order to bring the backup storage device current to time T_1." *Id.* at 11:40–43.

Thus, as required by claim 1's replicating step, Ohran describes copying data from its snapshot, or point-in-time copy, to a second storage volume, in this case the backup storage. Moreover, because Ohran describes copying all of the data from the snapshot to the backup storage volume, we are persuaded that Ohran describes "synchronizing" the point-in-time copy with the backup volume, as that term is used in the '299 patent. *See* Ex. 1001, 5:35–38 (point-in-time copy described as being "synchronized with secondary data volume 210*b* (e.g., by copying all the data from point-in-time copy 216 to secondary data volume 210*b*)").

Accordingly, given Ohran's description of its backup process, we are persuaded that a preponderance of the evidence supports Petitioner's contention that Ohran anticipates claim 1 of the '299 patent. Because claim 14 recites, essentially, a computer program product that executes the process recited in claim 1, we are persuaded also that a preponderance of the evidence supports Petitioner's contention that Ohran anticipates claim 14 of the '299 patent. *See* Ex. 1003, 7:49–51 ("Embodiments within the scope of the present invention also include computer-readable media having encoded therein computer-executable instructions.")

Patent Owner's arguments and supporting evidence do not convince us to the contrary. Patent Owner argues initially that Ohran does not anticipate claims 1 and 14 because those claims clearly track the initial synchronization process described in the '299 patent, "in which all of the data of a first storage volume is initially replicated and synchronized with a

second storage volume using a point-in-time copy of the first storage volume." PO Resp. 35. In contrast, Patent Owner contends, Ohran's process begins with two storage devices that have identical data already, and Ohran's static snapshots preserve only data blocks that have been modified since the last backup. *Id.* at 35–37 (citing Ex. 2010 ¶¶ 121, 133 (Levy Resp. Decl.)); *see also* PO Observations ¶¶ 11, 16. Moreover, Patent Owner argues, in stating on page 11 that Ohran included an embodiment in which the entire primary storage was replicated, our Decision to Institute did not interpret Ohran reasonably, because replicating the entire primary storage volume would have required additional mechanisms not described in Ohran. PO Resp. 37–38 (citing Ex. 2010 ¶ 124).

We acknowledge Ohran's disclosure that its processes assume that the primary and backup storage devices contain identical data initially. *See, e.g.*, Ex. 1003, 5:39–42. As discussed above, however, we are not persuaded that the proper construction of claims 1 and 14 limits those claims to the initial synchronization processes described in the '299 patent. Thus, the fact that Ohran might not use a point-in-time copy to perform its initial synchronization process does not demonstrate that claims 1 and 14 do not encompass the processes described in Ohran. Moreover, contrary to Patent Owner's argument that Ohran's snapshot does not, and cannot, replicate the entire primary storage volume, Ohran states expressly that "embodiments within the scope of this invention use a static snapshot *of all* or part of the mass storage device during the backup process." *Id.* at 8:51–53 (emphasis added).

Patent Owner argues that the synchronizing sub-step of the replicating step in claims 1 and 14 requires the first point-in-time copy of the first

storage volume to have "the exact same data" as the second storage volume. PO Resp. 39 (citing Pet. 16; Ex. 1002 ¶ 49 (Shenoy Decl.)). Ohran does not meet this requirement, Patent Owner argues, because Ohran's snapshots contain only a portion data from the primary storage volume, whereas Ohran's backup volume contains a full copy of the data stored on the primary volume. *Id.* (citing Pet. 10–12; Ex. 2010 ¶¶ 130, 133 (Levy Resp. Decl.)).

As noted above, however, the '299 patent states that "point-in-time copy 216 . . . may be synchronized with secondary data volume 210b (e.g., by copying all the data from point-in-time copy 216 to secondary data volume 210b)." Ex. 1001, 5:35–38. Accordingly, because Ohran describes copying all of the data from the snapshot of its primary storage volume to the backup storage device (*see* Ex. 1003, 11:40–43), we are persuaded that Ohran describes the synchronizing sub-step of the replicating step of claims 1 and 14 (e.g., claim 1 recites "synchronizing said first point-in-time copy of said first storage volume and said second storage volume"). Moreover, as discussed above, as well as in our Decision to Institute, Ohran describes copying and transferring the entire primary storage volume. *See id.* at 8:52–53 (describing a "static snapshot of all or part of the mass storage device"); *see also* Dec. 11 (noting that Ohran describes, at column 11, lines 35–36, transferring entire file when entire file changes).

Patent Owner contends that it is unclear whether Petitioner asserts that Ohran's static snapshot, snapshot storage, or some other element, corresponds to the point-in-time copy of a first storage volume recited in claims 1 and 14. PO Resp. 41 (citing Pet. 11–13; Ex. 1002 ¶¶ 39, 42, 45, 47 (Shenoy Decl.); Ex. 2005, 89:13–90:21, 101:14–103:8 (First Shenoy Dep.)).

The Petition states expressly, however, that "Ohran's static snapshot is equivalent to the 'point-in-time copy of the [first] storage volume.'" Pet. 12; *see also id.* at 13 ("The static snapshot of Ohran is therefore equivalent to the 'point in time copy of said storage volume' recited in claims 1 and 12 of the '299 patent."); *id.* at 21 (asserting that functional limitations in claims 14 and 15 correspond to process limitations in claims 1, 2, and 12). The depiction shown in Ohran's Figure 3 of using a "snapshot storage" instead of a static snapshot in its backup process does not persuade us that claims 1 and 14 fail to encompass the process described in Ohran, given the teachings in Ohran discussed above.

Patent Owner argues that Ohran does not describe creating a point-in-time copy of a first storage volume as required by claims 1 and 14 because the '299 patent requires its snapshot, which corresponds to the point-in-time copy recited in claims 1 and 14, to be "a copy of the entire storage volume (not a portion thereof)." PO Resp. 41. In contrast, Patent Owner argues, Ohran's snapshots, are "at best, only a copy of a portion of the storage device at a point in time." *Id.* (citing Ex. 2010 ¶¶ 130, 133 (Levy Resp. Decl.)). Thus, Patent Owner argues, the point-in-time copies required by claims 1 and 14 all include blocks or locations corresponding to each data block on the storage volume, contrasting with Ohran's snapshot storage, which "is merely an unstructured area of memory that may be used to store certain blocks between snapshots." *Id.* at 42.

Neither claim 1 nor claim 14, however, contains any specific language requiring any particular set or structure of data blocks in the claimed point-in-time copy. Moreover, as discussed above, the '299 patent expressly distinguishes "space-optimized" snapshots, and "full-image" snapshots, in

which "all data from a corresponding base volume is copied into the snapshot." Ex. 1001, 4:48–52. We, therefore, are not persuaded that the point-in-time copy of claims 1 and 14 fails to encompass the snapshots described in Ohran.

In sum, having considered the evidence advanced by Petitioner in light of the arguments and supporting evidence advanced by Patent Owner, we find, for the reasons discussed, that a preponderance of the evidence supports Petitioner's position that Ohran describes a process having all of the features of claim 1, and a computer program product having all of the features of claim 14. We, therefore, find also that a preponderance of the evidence supports a finding that Ohran anticipates claims 1 and 14.

2. Claims 2, 4, and 5

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a finding that Ohran anticipates claims 2, 4, and 5 of the '299 patent.

Petitioner identifies disclosures in Ohran urged as describing the periodic replication recited in claim 2, the identification of changes in the first storage volume using the first storage volume map as recited in claim 4, and the further step of creating a second storage object as recited in claim 5. Pet. 18–20. Patent Owner does not allege error in Petitioner's characterization of the cited portions of Ohran, nor does Patent Owner dispute specifically Petitioner's contentions regarding claims 2, 4, and 5. Having reviewed the disclosures in Ohran identified by Petitioner in light of Petitioner's contentions, we find that a preponderance of the evidence supports a finding that Ohran anticipates claims 2, 4, and 5 of the '299 patent.

3. Claims 12 and 15

We are persuaded that a preponderance of the evidence supports Petitioner's contention that Ohran anticipates claims 12 and 15 of the '299 patent.

Claim 12 recites a process that includes the creating and replicating steps recited in claim 1, discussed above, except that claim 12 additionally requires the copying data sub-step of the replication step to include "copying data from said first point-in-time copy of said storage volume to a point-in-time copy of said second storage volume, and restoring said second storage volume using said point-in-time copy of said second storage volume." Ex. 1001, 12:32–36. Claim 15 depends from claim 14 and recites, essentially, a computer program product that executes the process recited in claim 12. *See id.* at 13:23–29.

For the reasons discussed above as to claims 1 and 14, we are persuaded that Ohran's disclosure of creating a snapshot of the primary storage volume, as well as a map which identifies storage locations that have new data written in them, meets claim 12's step of creating a storage object. As to the replicating step of claim 12, Ohran discloses that, rather than receiving transferred data directly, its process can include a "backup capture buffer" in addition to the backup storage device. Ex. 1003, 25:3–6; *see also id.* at Fig. 3 (showing backup capture buffer 26). Ohran explains that this "allows all data blocks to be received before they are applied to backup storage device 24 or before they are saved as an incremental backup." *Id.* at 25:6–9 (bolding omitted).

Thus, as required in claim 12's replicating step, Ohran describes copying data from a first point-in-time copy of a first storage volume

(Ohran's snapshot of primary storage), to a point-in-time copy of the second storage volume (Ohran's backup capture buffer of its backup storage device). Moreover, because the copied data in Ohran's backup capture buffer is applied ultimately to the backup storage device, Ohran describes restoring the second storage volume (Ohran's backup storage device), using the point-in-time copy of the second storage device (Ohran's backup capture buffer), as also required by claim 12's replicating step.

Accordingly, given Ohran's description of its backup process, we are persuaded, for the reasons discussed, that a preponderance of the evidence supports Petitioner's contention that Ohran anticipates claims 12 and 15 of the '299 patent.

Patent Owner's arguments and supporting evidence do not convince us to the contrary. Patent Owner contends that the '299 patent describes both the first and second point-in-time copies as including complete or virtual copies of all of the data blocks on the underlying storage volumes, whereas the Ohran's backup capture buffer is "simply an unstructured area in storage that is used to 'buffer' the data as it is received from the mass storage device (*i.e.*, to make sure that all of the changes are received before storing them in the backup storage device)." PO Resp. 43–44 (citing Ex. 2010 ¶ 130, 133, 134, 138) (Levy Resp. Decl.)); *see also* Paper 39 ¶¶ 5–8, 12–15 (PO Observations). Therefore, Patent Owner argues, "*Ohran's* backup-capture buffer fails to disclose a point-in-time copy of the second storage volume." PO Resp. 44; *see also id.* at 45.

Claims 12 and 15 do not contain, however, any specific language requiring the second point-in-time copy to contain all of the data of the underlying storage volume, nor do those claims require the copied data to be

structured in any particular manner. Moreover, as discussed above, rather than requiring a point-in-time copy to be a complete copy of all of the data of the underlying volume, the '299 patent discloses that point-in-time copies may be either complete or partial copies. *See* Ex. 1001, 4:4–53. We, therefore, are not persuaded that the second point-in-time copy of claims 12 and 15 fails to encompass the backup capture buffer described in Ohran.

In sum, having considered the evidence advanced by Petitioner in light of the arguments and supporting evidence advanced by Patent Owner, we find, for the reasons discussed, that a preponderance of the evidence supports Petitioner's position that Ohran describes a process, and computer program product, having all of the features of claims 12 and 15, respectively. We, therefore, find also that a preponderance of the evidence supports a finding that Ohran anticipates claims 12 and 15.

C. Anticipation of Claims 1, 2, 4, 5, 12, 14, and 15 by Kleiman

1. Claims 1, 12, 14, and 15

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a finding that Kleiman anticipates claims 1, 12, 14, and 15 of the '299 patent.

Kleiman describes a process "for duplicating all or part of a file system while maintaining consistent copies of the file system. The file server maintains a set of snapshots, each indicating a set of storage blocks making up a consistent copy of the file system as it was at a known time." Ex. 1004 ¶ 8. Kleiman describes its snapshots as "compris[ing] a collection of selected storage blocks 115 from the file system 114 that formed all or part of the (consistent) file system 114 at some point in time." *Id.* at ¶ 49. Kleiman states that its snapshots "represent copies of the file system 114 that

are read-only." *Id.* at ¶ 51. Because Kleiman describes its snapshots as copies of a file system that include data blocks forming the file system at a particular point in time, we are persuaded that Kleiman's snapshots are encompassed by the point-in-time copies recited in claims 1 and 12 of the '299 patent. Accordingly, we are persuaded also that Kleiman describes creating a first point-in-time copy of a storage volume, as those claims require.

As to the requirement in claims 1 and 12 of creating a first storage volume map, the '299 patent explains that the claimed maps determine which data is to be transferred to the secondary storage volume. *See* Ex. 1001, 5:2–4 ("The changes to the base volume with respect to each snapshot are tracked in the form of data volume maps . . . ."). Kleiman, similarly, explains that when performing the "Volume Mirroring" embodiment of its backup process (Ex. 1004 ¶ 116), "a first mark-on-allocate storage image 230 is used to determine which storage blocks 115 to include in the storage image 230 for transfer." *Id.* at ¶ 122.

Thus, because Kleiman's mark-on-allocate storage image determines which snapshot data is to be transferred to the secondary storage volume, in the same manner as the storage volume map of the '299 patent, we are persuaded that the storage volume map recited in claims 1 and 12 of the '299 patent encompasses Kleiman's mark-on-allocate storage image. Accordingly, we are persuaded also that Kleiman describes a process that includes the creating step required by claims 1 and 12 of the '299 patent.

As to the claimed replicating step, Kleiman's volume mirroring process provides a mirror copy of the primary file system at a destination file system coupled to a second file server. *Id.* at ¶ 116. Kleiman explains that,

when performing volume mirroring, its system "first transfers an image stream 230 representing a complete file system 114 from the file server 110 to the destination file system 120. The system 100 then periodically transfers image streams 230 representing incremental changes to that file system 114 from the file server 110 to the destination file system 120." *Id.* at ¶ 118. Ultimately, the "destination file system 120 is able to reconstruct a most recent form of the consistent file system 114 from the initial full image stream 230 and the sequence of incremental image streams 230." *Id.* Kleiman explains that its image streams, similar to its snapshots, "include a sequence of storage blocks from a storage image." *Id.* at ¶ 57.

Thus, because Kleiman describes copying data from a first point-in-time copy of the first storage volume (storage blocks contained in a snapshot or image stream) to a second storage volume (destination file system) we are persuaded that Kleiman describes the copying data portion of the replication step required by claim 1 of the '299 patent. Because Kleiman describes reconstructing the primary file system at the destination file system using its point-in-time copies, we are persuaded also that Kleiman's process meets claim 1's synchronizing step.

Accordingly, we are persuaded that Kleiman describes a process that includes all of the steps required by claim 1 of the '299 patent. We are persuaded also, therefore, that a preponderance of the evidence supports a finding that Kleiman anticipates claim 1. Moreover, because claim 14 of the '299 patent recites, essentially, a computer program product that executes the process recited in claim 1, we are persuaded further that Kleiman anticipates claim 14. *See id.* at ¶ 12 ("[E]mbodiments of the invention may be implemented using one or more general purpose processors (or special

purpose processors adapted to the particular process steps and data structures) operating under program control . . . .")

As to claim 12's requirement that the replicating step also includes copying data from the first point-in-time copy of the first storage volume to a point-in-time copy of the second storage volume, Kleiman describes its volume mirroring as including an incremental mirroring process in which storage images are created and received at the secondary, or destination, file system, and stored in an "incremental mirror data structure" maintained at the destination file system. *See id.* at ¶ 131–132. Thus, because Kleiman describes copying its storage blocks to a data structure (the incremental mirror data structure) which contains copies of data blocks for ultimate copying to the secondary file system, we are persuaded that Kleiman's process meets the copying and restoring steps required by claim 12 of the '299 patent.

Accordingly, because we are persuaded that Kleiman describes a process that includes all of the steps of claim 12 of the '299 patent, we are persuaded also that Kleiman anticipates claim 12. Moreover, because claim 15 of the '299 patent recites, essentially, a computer program product that executes the process recited in claim 12, we are persuaded further that Kleiman anticipates claim 15. *See id.* at ¶ 12.

Patent Owner's arguments and supporting evidence do not convince us to the contrary. Patent Owner contends that, rather than being directed to copying data at the storage volume level as required by the '299 patent's claims, Kleiman is directed instead to snapshot and backup mechanisms for use with the unusual "WAFL" file systems described in three patents incorporated by reference into Kleiman. PO Resp. 45–47 (citing Ex. 2010

¶¶ 89–92, 96–102, 104–114 (Levy Resp. Decl.); Ex. 1002 ¶ 69–81 (Shenoy Decl.)). Patent Owner contends that significant differences exist between backing up a file system as described in Kleiman, and replicating a storage volume as claimed in the '299 patent, because a storage volume as claimed "is a collection of fixed-size data blocks or regions (*e.g.*, a physical hard disk drive), [whereas] a file system is a software layer that sits on top of the storage volume and manages the storage and access of files that are stored in a particular portion of these blocks." PO Resp. 48 (citing Ex. 2010 ¶¶ 104-114 (Levy Resp. Decl.). Moreover, Patent Owner notes, neither the Petition nor the Shenoy Declaration mentions the WAFL file system described in Kleiman, and Dr. Shenoy conceded that he had not reviewed any of the WAFL patents incorporated by reference into Kleiman. *Id.* at 47–48 (citing Ex. 2005, 104:15–105:1 (First Shenoy Dep.)).

Patent Owner argues also that Kleiman fails to describe a point-in-time copy of the first storage volume. PO Resp. 49–50. In particular, Patent Owner argues, because Kleiman's WAFL system never overwrites any data blocks, "no data blocks are ever copied at all in Kleiman until the moment they are transferred to the backup system." *Id.* at 49 (citing Ex. 2010 ¶¶ 115–119 (Levy Resp. Decl.)). Rather, Patent Owner argues, Kleiman's snapshots "are merely blockmaps (*i.e.*, one bit for each block that indicate whether or not each block is in the snapshot (*i.e.*, that version of the file system) or not. In other words, these 'snapshots' do not (nor can they) include any of the actual underlying data." *Id.* at 49–50.

We are not persuaded that Kleiman's disclosure supports Patent Owner's contentions. As to the contention that Kleiman's processes never overwrite data blocks when new data is written to them, Kleiman states

expressly that, in its incremental mirroring, "[a]s each new incremental storage image 230 is copied, copied storage blocks 115 overwrite the equivalent storage blocks 115 from earlier incremental storage images 230." Ex. 1004 ¶ 131. Moreover, as to the contention that Kleiman does not create a point-in-time copy of the storage blocks, Patent Owner concedes that the blocks are in fact copied at "the moment they are transferred to the backup system." PO Resp. 49.

Further, Kleiman expressly describes its "snapshot" as "a set of *storage blocks*, the member storage blocks forming a consistent file system" Ex. 1004 ¶ 41 (emphasis added). Kleiman explains that, as used therein, "the term 'consistent,' referring to a file system (*or to storage blocks in a file system*), means a set of storage blocks for that file system that includes all blocks required *for the data* and file structure of that file system." *Id.* at ¶ 37 (emphases added). Kleiman also states expressly that its snapshots "*represent copies* of the file system 114 that are read-only." *Id.* at ¶ 51 (emphasis added). Accordingly, because Kleiman expressly describes its snapshots as including storage blocks, and because Kleiman describes the snapshots as copies of the primary file system, including all blocks required for the data and file structure of that system, we are persuaded that Kleiman's snapshots correspond to a storage or data volume, and are point-in-time copies, as the claims of the '299 patent require.

In sum, having considered the evidence advanced by Petitioner in light of the arguments and supporting evidence advanced by Patent Owner, we find, for the reasons discussed, that a preponderance of the evidence of record supports Petitioner's position that Kleiman describes processes, and computer program products, having all of the features of claims 1, 12, 14,

and 15. We, therefore, find also that a preponderance of the evidence supports a finding that Kleiman anticipates claims 1, 12, 14, and 15.

2. Claims 2, 4, and 5

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a finding that Kleiman anticipates claims 2, 4, and 5 of the '299 patent.

Petitioner identifies disclosures in Kleiman urged as describing the periodic replication recited in claim 2, the identification of changes in the first storage volume using the first storage volume map as recited in claim 4, and the further step of creating a second storage object as recited in claim 5. Pet. 27–29. Patent Owner does not allege error in Petitioner's characterization of the cited portions of Kleiman, nor does Patent Owner dispute specifically Petitioner's contentions regarding claims 2, 4, and 5. Having reviewed the disclosures in Kleiman identified by Petitioner in light of Petitioner's contentions, we find that a preponderance of the evidence supports a finding that Kleiman anticipates claims 2, 4, and 5 of the '299 patent.

D. Obviousness of Claims 1, 2, 4, 5, 12, 14, and 15 over DeKoning and Linde

1. Claims 1, 12, 14, and 15

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a conclusion that claims 1, 12, 14, and 15 of the '299 patent would have been obvious to an ordinarily skilled artisan in view of DeKoning and Linde.

Petitioner cites DeKoning as describing storage volume mirroring processes in which data stored on a local storage device is synchronized with

a remote fail-over storage device. Pet. 31. Specifically, Petitioner contends that DeKoning describes periodically synchronizing the local storage device and remote storage device using copy-on-write techniques to generate "checkpoint information" that describes a known coherent state of the data file or system. *Id.* at 32. Petitioner concedes, however, that "because DeKoning does not disclose the format of the checkpoint information," DeKoning does not describe creating a first storage object comprised of a first point-in-time copy of a first storage volume, and a storage volume map, as claims 1 and 12 of the '299 patent require. *Id.* at 32–33.

To remedy that deficiency, Petitioner cites Linde as describing "the creation of a point-in-time copy of the source volume and associated data maps that are used for 'copy-on-write.'" *Id.* at 33. Petitioner contends that "a person of ordinary skill in the art would have replaced the checkpoint information of DeKoning with the point-in-time copy and associated data maps of Linde." *Id.* Specifically, Petitioner contends, because Linde's point-in-time copying techniques provide advantages in data replication processes, an ordinarily skilled artisan would have been prompted to use Linde's techniques in DeKoning's data volume mirroring processes. *Id.* at 46–47. In particular, Petitioner contends that an ordinarily skilled artisan would have recognized Linde's techniques as providing more functionality than DeKoning's checkpoint information, as well as allowing "restoration or rollback to a previous time, us[ing] a general-purpose storage volume (that can be read or written) or in forced migration mode where the point-in-time volume is used for disaster recovery." *Id.* (citing Ex. 1002 ¶ 134 (Shenoy Decl.)).

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a conclusion that DeKoning and Linde would have rendered claims 1 and 12 of the '299 patent obvious to an artisan of ordinary skill. As Petitioner points out, DeKoning describes a process in which data stored on a host's local storage device is "mirrored to [a] remote storage device, and a synchronization procedure enables the host and remote storage device easily and quickly to 'roll back' to, and continue operations from, a stable, coherent state in the event of a failure of the local storage device." Ex. 1005, 1:13–17.

DeKoning describes its synchronization procedure as generating "checkpoint information [which] describes the known coherent state of the data or file system." *Id.* at 6:12–13. Figure 1 of DeKoning is reproduced below:

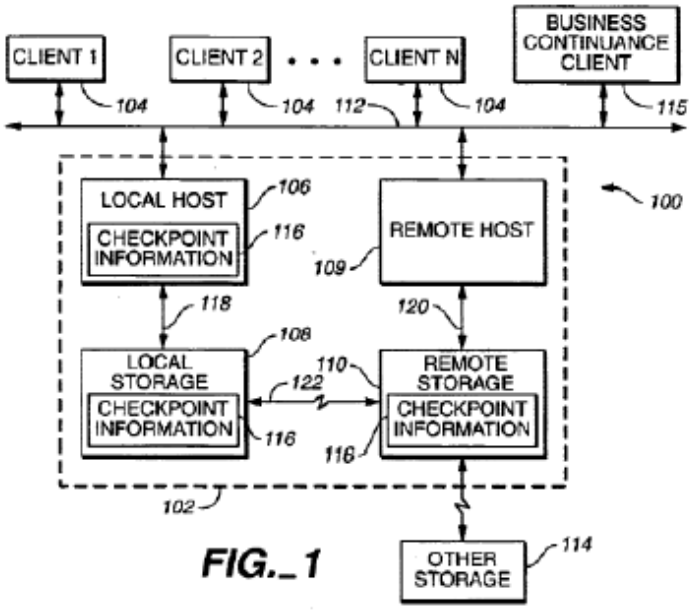

FIG._1

As seen in Figure 1, DeKoning's "checkpoint procedure" (*id.* at 9:63) involves sending the checkpoint information 116 stored in local storage device 108 to remote storage device 110. *Id.* at 9:62–10:25.

Given these teachings, we are persuaded that DeKoning's process includes the step of replicating a first storage volume by copying data from the first storage volume to a second storage volume, as recited in claims 1 and 12 of the '299 patent. As to claim 12's additional requirement of a second point-in-time copy of the second storage volume, and restoring the second storage volume using the second point-in-time copy, DeKoning describes its remote storage device as including a snapshot repository, which tracks updates to the remote storage device (*id.* at 8:30–38), and is used in a fail-over procedure to assemble an image, of any affected data volumes, that is consistent with the volumes' last checkpoint information (*id.* at 9:32–37).

While DeKoning might not expressly describe creating point-in-time copies and storage maps to perform its replication and volume restoring, as claims 1 and 12 also require, Linde describes the use of point-in-time volumes and related data maps in data replication, as Petitioner contends. *See* Ex. 1006, Abstr.; *see also* Pet. 33–35.

Specifically, Linde describes a process of creating a "point-in-time volume [which] represents the contents of a source volume in a particular past state." Ex. 1006, 2:31–33. Linde discloses that, in one embodiment, "the point-in-time volume is used to restore the source volume to its prior state." *Id.* at 2:40–41. In other embodiments, "a forced migration process can replicate a source volume to a point-in-time volume. In the event of a failure of the source volume, a point-in-time volume can be used for disaster recovery." *Id.* at 2:47–50. Linde also describes the use of "data maps" to determine which data chunks have been copied from the source volume to the point-in-time volume, and to track which data chunks of a source volume or point-in-time volume have been modified. *Id.* at 7:40–54.

Linde, thus, teaches that its point-in-time volumes and related data maps, like the checkpoint information of DeKoning, are useful for copying data for later use in the event of failures in primary storage systems, precisely the objective described in DeKoning. We are persuaded, therefore, that an artisan of ordinary skill, copying data from a local storage device to a remote device as taught by DeKoning, would have been prompted to substitute Linde's point-in-time volumes and data maps for DeKoning's checkpoint information. Accordingly, we are persuaded also that DeKoning and Linde suggest not only replicating data as required by claims 1 and 12, but also using a point-in-time copy and storage volume to accomplish that replication, as claims 1 and 12 also require.

Thus, given the teachings in DeKoning and Linde, we are persuaded that a preponderance of the evidence supports concluding that an ordinarily skilled artisan would have considered the processes recited in claims 1 and 12 obvious in view of those references. Moreover, because claims 14 and 15 of the '299 patent recite, essentially, computer program products that execute the processes recited in claims 1 and 12, respectively, we are persuaded that an ordinarily skilled artisan would have considered the computer program products of claims 14 and 15 obvious as well.

Patent Owner's arguments and supporting evidence do not convince us to the contrary. Patent Owner contends that, rather than creating a point-in-time copy and then using the point-in-time copy to replicate all of the data to a second storage volume, Linde uses the point-in-time copies themselves as the backup or replicated volume. PO Resp. 51–52 (citing Ex. 2010 ¶¶ 158–160 (Levy Resp. Decl.)). Thus, Patent Owner argues, even if DeKoning and Linde were combined in the manner posited by the Petitioner,

"*Linde* does not teach copying any data to a second storage volume from its point-in-time volume." *Id.* at 51.

Petitioner, nonetheless, does not rely on Linde as teaching the step of copying data from the first point-in-time copy to the second storage volume. Instead, Petitioner relies on Linde as evidence that it was known in the art to use point-in-time techniques and associated volume maps to replicate data volumes when backing up data, and that, therefore, an ordinarily skilled artisan would have considered it obvious to use those replicating techniques when copying data from a primary volume to a remote volume, as described in DeKoning. *See* Pet. 33 ("[A] person of ordinary skill in the art would have replaced the checkpoint information of DeKoning with the point-in-time copy and associated data maps of Linde.").

Accordingly, the fact that Linde might not describe copying data from its point-in-time volume to a second storage volume does not persuade us that the combination of references advanced by Petitioner fails to teach or suggest all of the steps in the claims. *Compare In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) ("Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references. . . . [The reference] must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole.").

Patent Owner contends that, because DeKoning performs its mirroring function by sending both checkpoint information and new data from write operations to the local and remote storage devices, "[u]nder Petitioner's proposed combination, therefore, the hypothetical system would send both the new data, as well as a point-in-time copy of the local system and the data

maps to both the local and remote storage systems at each checkpoint." PO Resp. 56 (citing Ex. 2010 ¶¶ 161–162 (Levy Resp. Decl.)); *see also id.* at 53–55 (citing Ex. 2010 ¶¶ 139–153) (summarizing DeKoning). Thus, Patent Owner argues, "it would make no sense to send the point-in-time copy itself (as well as the data maps) to both storage systems in addition to sending the actual data that needs to be stored at each system." PO Resp. 56. Moreover, Patent Owner argues, "because the remote storage in DeKoning is designed to simply receive and apply write operations, it would not have been possible to use point-in-time copy and maps received from the local host without substantial modifications." *Id.* (citing Ex. 2010 ¶¶ 161–162).

We are not persuaded, however, that Patent Owner has adequately explained why simply substituting one technique of replicating the state of a source volume (creation of a point-in-time volume and associated volume map as taught by Linde) for another (creation of checkpoint information as taught by DeKoning) would entail substantial modifications to DeKoning's system, or render DeKoning unsuitable for its intended purpose. Moreover, the fact that Patent Owner and its witness might disagree with the logic underlying the steps used in DeKoning's mirroring procedure does not demonstrate that an ordinarily skilled artisan would have failed to combine DeKoning with Linde in the fashion posited by Petitioner.

Patent Owner argues that DeKoning teaches away from replacing its copy-on-write checkpoints with copy-on-write snapshots, because DeKoning uses its copy-on-write snapshots only at the remote storage system, and emphasizes conventional mirroring techniques when mirroring the local and remote storage systems. PO Resp. 57 (citing Ex. 2010 ¶¶ 141, 148, 152–153). Moreover, Patent Owner argues, because snapshot techniques would

increase substantially the inconsistency in DeKoning's replication process, as compared to the consistency provided by the mirroring techniques DeKoning describes, an ordinarily skilled artisan would not have been motivated to replace DeKoning's true mirroring techniques with the snapshot technique using the point-in-time volume of Linde. *Id.* at 58-59 (citing Ex. 2010 ¶¶ 148–149, 152, 161–162).

Patent Owner, however, does not direct us to any clear or specific teaching in DeKoning disparaging the use of point-in-time volumes such that an ordinarily skilled artisan would have been taught away from using that technique when replicating its primary storage volume. *See DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) ("A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not 'criticize, discredit, or otherwise discourage' investigation into the invention claimed.") (citing *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)).

Moreover, rather than suggesting that its point-in-time volumes would generate inconsistency between the primary and secondary storage volumes, Linde states expressly that its point-in-time volumes are "used to restore the source volume to its prior state" and "can be used for disaster recovery." Ex. 1006, 2:40–50. We are not persuaded, therefore, that an ordinarily skilled artisan would have failed to recognize that creating a point-in-time volume and related storage map as taught in Linde would have been a suitable alternative to DeKoning's checkpoint information when replicating a primary storage volume, as Petitioner posits.

In sum, having considered the evidence advanced by Petitioner in light of the arguments and supporting evidence advanced by Patent Owner,

we conclude, for the reasons discussed, that a preponderance of the evidence supports Petitioner's position that processes and computer program products, having all of the features of claims 1, 12, 14, and 15, would have been obvious to an ordinarily skilled artisan in view of DeKoning and Linde.

2. Claims 2, 4, and 5

We are persuaded that Petitioner has shown that a preponderance of the evidence supports a conclusion the processes recited in claims 2, 4, and 5 of the '299 patent would have been obvious to an ordinarily skilled artisan in view of DeKoning and Linde.

Petitioner identifies disclosures in DeKoning urged as describing the periodic replication recited in claim 2, the identification of changes in the first storage volume using the first storage volume map as recited in claim 4, and the further step of creating a second storage object as recited in claim 5. Pet. 41–42. Patent Owner does not allege error in Petitioner's characterization of the cited portions of DeKoning, nor does Patent Owner dispute specifically Petitioner's contentions regarding claims 2, 4, and 5.

Having reviewed the disclosures in DeKoning identified by Petitioner in light of Petitioner's contentions, we conclude that a preponderance of the evidence supports a finding that DeKoning's process includes the features recited claims 2, 4, and 5 of the '299 patent, and that, therefore, the combination of DeKoning and Linde would have rendered the processes recited in those claims obvious to an ordinarily skilled artisan.

E. Patent Owner's Motion to Amend Claims

Because we determine that all of the challenged claims are unpatentable, we turn to Patent Owner's contingent request to enter proposed amended claims. Patent Owner proposes claims 18–21 as

substitutes for claims 1, 12, 14, and 15, respectively. Mot. to Amend 1–5.[6,7] As the moving party, Patent Owner bears the burden of establishing that it is entitled to the relief requested in its Motion to Amend. 37 C.F.R. § 42.20(c).

1. Support for Amended Claims in Original Disclosure

Proposed substitute claims may not introduce new matter. 35 U.S.C. § 316(d)(3). Thus, Patent Owner must set forth "[t]he support in the original disclosure of the patent for each claim that is added or amended." 37 C.F.R. § 121(b)(1).

In alleging support for the proposed substitute claims in the Motion to Amend, Patent Owner cites to the specification of the '299 patent as issued, rather than the original disclosure of the application which matured into the '299 patent, U.S. Application Serial No. 10/436,354 ("the '354 application," Ex. 2022). *See* Mot. to Amend 5–7. Petitioner argues that Patent Owner has failed to explain adequately where support for the proposed substitute claims as a whole, rather than the merely the proposed new elements, is to be found. Opp. 2. In response, Patent Owner provides, with its Reply to the

[6] Patent Owner requests the Board to "update the dependencies of any corresponding dependent claims," in the event that any of the proposed independent claims are substituted. Mot. to Amend 1. Patent Owner does not direct us, however, to any authority allowing the Board to amend claims in this manner. Rather, the governing statute expressly limits motions to amend, in this instance, to cancellation of claims, or proposal of a reasonable number of substitute claims. *See* 35 U.S.C. § 316(d)(1).

[7] The Motion to Amend states that claim 21 is a proposed substitute for claim 15, "if claim 11 is found unpatentable." Mot. to Amend 5. Claim 11 is not under challenge, however. We presume, therefore, that proposed claim 21 is a proposed substitute for claim 15, if claim 15 is found unpatentable.

Opposition, the Levy Reply Declaration (Ex. 2011) as well as a claim chart (Ex. 2013) purporting to explain where the features of the proposed substitute claims find support in the '354 application. Having reviewed the materials submitted by Patent Owner, we are persuaded that a preponderance of the evidence supports Patent Owner's contention that proposed claims 18–21 find support in the original disclosure of the '299 patent.

2. Patentability over the Prior Art — Claim 18

A proposed amendment is not subject to an examination by the Office and, therefore, is not entered automatically. *Idle Free Sys. Inc. v. Bergstrom, Inc.*, IPR2012-00027, slip. op. at 33 (PTAB Jan. 7, 2014) (Paper 66). Instead, Patent Owner must show, by a preponderance of the evidence, that the proposed claims comply with all sections of the patent statutes. 37 C.F.R. § 42.1(d) (noting that the "default evidentiary standard [in proceedings before the Board] is a preponderance of the evidence.").

We agree with our colleagues' reasoning in *Idle Free*, that Patent Owner's burden is not met by merely showing that the proposed claims are distinguished over the prior art references applied to the original patent claims. *Idle Free*, Paper 66 at 33. Instead, because there is no examination of the proposed claims, Patent Owner must explain why the subject matter recited is not taught or suggested by the prior art in general, to allow the Board to determine whether the proposed claims comply with the novelty and nonobviousness requirements of 35 U.S.C. §§ 102 and 103, in addition to the other patent statutes. *Id.*

Patent Owner contends that, whereas substitute claim 18 requires creating an initial synchronized copy of a storage volume using the storage object, "[n]one of Ohran, DeKoning or Linde disclose[s] using a storage

object to perform an initial synchronization. . . . Rather, Ohran and DeKoning both disclose using conventional techniques, such as mirroring, to mirror the data of one device at a second location." Mot. to Amend 8 (citing Ex. 2003 ¶¶ 111–14, 171–192 (Levy Amendment Decl.), Ex. 2005, 91:14–94:17, 120:12–121:1 (First Shenoy Dep.)); *see also* Amend Reply 2. Moreover, Patent Owner argues, "Linde only describes creating a point-in-time copy volume of a first volume and does not disclose copying any data from the point-in-time copy to create a replicated, second volume." Mot. to Amend 8. Further, Patent Owner contends, claim 18 additionally requires the initial synchronization to include data copied from at least one modified and one unmodified region of the first storage volume, whereas Ohran, Kleiman, and DeKoning describe only copying modified data to secondary storage volumes, and Linde does not describe copying any data from its point-in-time volume. *Id.* at 9–10.

As to patentability over the prior art in general, Patent Owner states that it "is not aware of any prior art that is closer to the claims of the '299 [p]atent than these four references [Ohran, Kleiman, DeKoning, and Linde]." *Id.* at 7; *see also* Amend Reply 1. Moreover, Patent Owner contends, "[n]o combination of the prior art references cited in the Petition, nor any other prior art references of which Patent Owner is aware, disclose, teach or suggest each and every limitation as recited in the substitute claims." Mot. to Amend 7-8; *see also* Amend Reply 1–2.

We are not persuaded that Patent Owner has explained convincingly why claim 18 would have been unobvious over the prior art of record. Like claim 18, Ohran describes a process in which an initial synchronization is performed by copying all of the data from a primary storage volume to a

secondary storage volume, followed by a replication step, which uses a point-in-time copy and a storage map. *See, e.g.*, Ex. 1003, 5:39–49 (describing initial step of "making a complete copy of the primary mass storage device to the backup device using either traditional backup techniques or traditional disk mirroring techniques"); *see also id.* at 10:55–11:43 (using static snapshot to copy data regarding consistent state of primary mass storage device to backup storage device).

While Ohran might differ from claim 18 in not using a point-in-time copy to perform its initial synchronization step, we are not persuaded that Patent Owner has explained convincingly why it would have been unobvious to perform Ohran's initial synchronization using a point-in-time copy, or to have copied all data, modified and unmodified, when performing that initial synchronization. Specifically, as noted above, Ohran itself states expressly that snapshots can be used to copy the entire storage volume. *Id.* at 8:51–53 ("[E]mbodiments within the scope of this invention use a static snapshot *of all* or part of the mass storage device during the backup process." (emphasis added)).

Moreover, as Petitioner points out (Opp. 3–4), Ohran describes using an archival tape backup as a suitable way of ensuring that its primary and backup storage devices contain identical data (Ex. 1003:10:35–39). Ohran II,[8] which Ohran incorporates by reference (*id.* at 1:8–13), in turn describes using a point-in-time copy, in the form of a virtual storage device, to copy a storage volume to a tape backup on a client computer. *See* Ex. 1012, 6:56–61 ("File server computer 312, with mass storage system 314 . . . exports the

[8] US 5,649,152, (issued July 15, 1991) (Ex. 1012).

virtual device (and probably mass storage system 314) to client computer 302, communicating over network 300. Computer 302 can run a tape backup program that copies the information from the exported virtual storage to tape drive 304.").

Thus, based on this teaching in Ohran II, an artisan of ordinary skill would have known that a point-in-time copy was a useful device for replicating data when backing up the entire content of an original volume, in the precisely the fashion taught in Ohran. We are not persuaded, therefore, that the conventional backup techniques described in Ohran are at odds with point-in-time copying, as Patent Owner argues. *See* Amend Reply 3–4. Further, Linde would have advised an ordinarily skilled artisan that point-in-time volumes were advantageous as compared to conventional backup techniques, because they offered the advantage of keeping the primary storage volume available. *See* Ex. 1006, 1:62–67 ("Unlike conventional data backup processes, a typical point-in-time process can complete without making the source volume unavailable to production applications.").

Thus, an ordinarily skilled artisan would have recognized that using a point-in-time copy and an associated volume map, as taught at least in Ohran, Ohran II, Kleiman, and Linde, was a suitable technique for copying data from a primary storage volume when backing up that volume. Such an artisan would have recognized also that using that technique afforded the advantage of data volume availability during the backup process, as taught by Linde. We are not persuaded, therefore, that Patent Owner has explained convincingly why it would have been unobvious to use a point-in-time copy and associated volume map to perform Ohran's initial synchronization step, so as to copy all data, modified and unmodified, from the primary storage

volume to the backup storage volume. Accordingly, we are not persuaded that Patent Owner has explained convincingly why the process recited in claim 18 would have been unobvious.

Patent Owner contends that using point-in-time techniques to perform the initial synchronization as recited in claim 18 "represents a significant advancement over the prior art. For example, performing initial synchronization using the storage object allows write operations to continue at the storage volume, which allows for reduced system downtime during this relatively lengthy process." Mot. to Amend 8–9 (citing Ex. 2003 ¶¶ 203–11; Ex. 2005, 27:13–28:13). Additionally, Patent Owner contends, using point-in-time techniques "avoids the need for conventional mirror techniques, which often require having both storage volumes initially located at the same computer system." *Id.* at 9 (citing Ex. 2003 ¶ 30).

Further, Patent Owner contends, "performing initial synchronization by transferring 'data copied from at least one unmodified data region' is also an advancement from the known prior art. This technique allows for reduced space requirements for transferring the initial copy." Mot. to Amend 10 (citing Ex. 2003 ¶¶ 207–08). Additionally, Patent Owner argues, "this technique avoids the need for specialized filesystems and is in fact filesystem agnostic." *Id.* (citing Ex. 2003 ¶¶ 152, 162).

Given the teachings in at least Ohran, Ohran II, Kleiman, and Linde, discussed above, that point-in-time technology was a recognized alternative to conventional data backup techniques, we are not persuaded that Patent Owner has explained convincingly why the stated benefits of using point-in-time technology would have been unexpected or unobvious, even when performing an initial synchronization. Indeed, Linde's express teaching that

primary data storage volume accessibility during backup was an advantage of point-in-time techniques as compared to conventional techniques (*see* Ex. 1006, 1:62–65), would have provided an incentive for using those point-in-time techniques in Ohran's initial synchronization, instead of the conventional backup techniques Ohran describes expressly.

As to the reduced space requirements Patent Owner alleges, we are not persuaded that Patent Owner has explained convincingly how space would be saved when copying all of the data, modified and unmodified, from the first storage volume, as claim 18 requires. Indeed, rather than suggesting that space may be saved when using claim 18's full-image snapshot, the '299 patent expressly states that "[i]nstant snapshots may also afford a user a savings in storage space *where space-optimized snapshots are used*." Ex. 1001, 4:66–67 (emphasis added).

In sum, having reviewed Patent Owner's contentions and supporting evidence, we are not persuaded, for the reasons discussed, that Patent Owner has shown, by a preponderance of the evidence, that an ordinary artisan would have considered the process recited in claim 18 unobvious over the prior art. Accordingly, we deny entry of claim 18.

3. Patentability over the Prior Art — Claim 19

Patent Owner contends that the language in claim 19 requiring both the first and second point-in-time copies and storage maps to have "a location corresponding to each data region on said first storage volume" makes it clear that "the point-in-time copies and storage volume maps each have the same number of locations, with each such location corresponding to a particular data region on the first storage volume (*e.g.*, a block or set of blocks)." Mot. to Amend 10–11. In contrast, Patent Owner contends, Ohran

at best "merely discloses unstructured buffers for holding data (*e.g.*, snapshot storage, backup capture buffer)." *Id.* at 11 (citing Figs. 3, 7A, and 7B of Ohran). Thus, Patent Owner argues, "Ohran does not teach any correspondence of the number of locations in its unstructured buffers, the snapshot, backup maps, and the data regions of any storage volume." *Id.* (citing Ex. 2003 ¶¶ 128–33 (Levy Amendment Decl.); Ex. 2005, 95:6–101:3 (First Shenoy Dep.)).

We are not persuaded that Patent Owner has shown that a preponderance of the evidence supports a conclusion that claim 19 is patentable over the prior art. In particular, we are not persuaded that Patent Owner has explained convincingly why Ohran fails to teach or suggest a process having all of the features of claim 19.

As discussed above, we find that Ohran describes a process having all of the steps and features of claim 12, which claim 19 replaces. As to the added feature in claim 19 requiring the first point-in-time copy and first storage volume map to have a location corresponding to each data region on the first storage volume, as noted above, Ohran states expressly that "embodiments within the scope of this invention use a static snapshot *of all* or part of the mass storage device during the backup process." Ex. 1003, 8:51–53 (emphasis added). As also noted above, Ohran teaches further that a full copy of the first storage volume can be transferred in the instance in which the entire first storage volume has been changed. *See id.* at 11:35–36. Thus, given Ohran's description of using its snapshot to copy the entire mass storage device, we are not persuaded that Ohran fails to teach or suggest a point-in-time copy, and associated storage volume map, which include a

location corresponding to each data region on the primary storage volume, as claim 19 requires.

Claim 19 also requires the point-in-time copy of the second storage volume to contain a location corresponding to each data region on the first storage volume. As discussed above, we agree with Petitioner that Ohran's backup capture buffer, which receives and stores data blocks received from the snapshots, corresponds to the claimed point-in-time copy of the second storage volume. *See id.* at 25:4–9 ("[I]t may be desirable to store the data blocks as they are received in a backup capture buffer . . . . This allows all data blocks to be received before they are applied to backup storage device 24 or before they are saved as an incremental backup.").

We do not agree with Petitioner (*see* Opp. 6), however, that Ohran fails to teach or suggest that its backup capture buffer contains a location corresponding to each data region on the first storage volume. Rather, because Ohran teaches that its entire primary storage volume can be copied to the backup storage, and because the backup capture buffer would then receive all the data blocks from the primary storage volume, we find that an ordinary artisan would have understood that the backup capture buffer would, in that instance, contain a location corresponding to each data region on the primary volume, as claim 19 requires. Thus, we conclude that Ohran teaches or suggests a process having all of the steps and features recited in claim 19.

Patent Owner contends that the term "location" in claim 19 should be construed as meaning "a position in a data structure." Amend Reply 4 (citing Ex. 2011 ¶¶ 38–45 (Levy Reply Decl.)). In support, Dr. Levy testifies that the "claimed locations in the point-in-time copy snapshot

volumes and maps described and claimed in the '299 Patent can be positions or entries within any suitable data structure, wherein each such location represents one of the data regions or blocks on the primary storage volume." Ex. 2011 ¶ 45. We, thus, conclude that construing "location" in claim 19 as meaning "a position or entry in a data structure which represents a data region or block on the primary storage volume" is reasonable and consistent with the specification of the '299 patent.

Applying this construction to Ohran, when Ohran uses a snapshot to copy its entire primary storage volume to the backup capture buffer, each of the snapshot, associated snapshot map, and backup capture buffer, will contain an entry that represents a data region or block on the primary storage volume. Accordingly, we are not persuaded that the claim construction advanced by Patent Owner demonstrates that Ohran fails to teach or suggest a process having all of the steps and features of claim 19.

Patent Owner contends that requiring the point-in-time copies and storage volume maps to include locations corresponding to each data region on said first storage volume "has significant advantages. More specifically, the use of such corresponding locations enables much simpler replication processes by avoiding the need to search through unstructured data buffers to determine if a particular data region was transferred." Mot. to Amend 12–13 (citing Ex. 2003 ¶¶ 213–14). Thus, Patent Owner argues, "the same index can be used to determine whether a block is present in the storage map and to retrieve the data in the point-in-time copy or the storage volume," which is "especially beneficial when the second point-in-time copy is virtual and being used to provide read access to the second storage volume." *Id.* at 13 (citing Ex. 2001 ¶¶ 213, 214).

Patent Owner does not state positively, however, or explain with specificity, whether or why an ordinarily skilled artisan would have considered these advantages unexpected or unobvious in light of Ohran's disclosure. Rather, because Ohran describes embodiments in which each of the snapshot, associated snapshot map, and backup capture buffer, contains a location that corresponds to a data region or block on the primary storage volume, we are not persuaded that Patent Owner has explained persuasively why an ordinary artisan would have considered the enumerated advantages to be unexpected or otherwise unobvious in light of Ohran.

In sum, having reviewed Patent Owner's contentions and supporting evidence, we are not persuaded, for the reasons discussed, that Patent Owner has shown, by a preponderance of the evidence, that an ordinary artisan would have considered the process recited in claim 19 unobvious over the prior art. Accordingly, we deny entry of claim 19.

4. Patentability over the Prior Art — Claims 20 and 21

We are not persuaded that Patent Owner has shown that a preponderance of the evidence supports a conclusion that claim 20 is patentable over the prior art. In particular, we are not persuaded that Patent Owner has explained convincingly why an ordinary artisan would have considered the computer program product recited in claim 20 unobvious in view of the prior art of record.

As discussed above, we find that Ohran and Kleiman each describe a computer product having all of the features of claim 14, which claim 20 replaces. As also discussed above, we conclude that DeKoning and Linde would have rendered obvious the computer program product recited in claim 14. As to the added features in claim 20, of utilizing a second storage object

corresponding to a second storage volume, in which the second storage object includes a point-in-time copy of the second storage volume and a second storage volume map, as noted above, each of Ohran, Kleiman, and DeKoning teaches using a second point-in-time copy of the second storage volume when synchronizing the remote storage volume. *See* Ex. 1003, 25:3–9, Fig. 3 (describing Ohran's capture buffer at the backup storage volume); Ex. 1004 ¶¶ 131–132 (describing Kleiman's "incremental mirror data structure" maintained at the destination file system); Ex. 1005, 8:30–38, 9:32–37 (describing DeKoning's snapshot repository at the remote storage device and its use).

While Ohran, Kleiman, and DeKoning might not describe a second storage volume map associated with their second point-in-time copies, both Ohran and Linde teach that a storage volume map associated with the primary storage allows the system to keep track of the changes in the primary storage volume. Ex. 1003, 10:55–62, 11:30–33; Ex. 1006, 7:40–54.

Thus, because the prior art teaches that storage volume maps were useful for keeping track of changes in an associated storage volume as compared to the storage volume's point-in-time copy, we find that an ordinarily skilled artisan would have been prompted to use storage volume maps at the secondary storage volumes used in backup systems, such as those described in Ohran, Kleiman, and DeKoning, in order to track the changes in the secondary storage volumes as compared to their respective point-in-time copies. Accordingly, although Ohran, Kleiman, and DeKoning might not describe their second point-in-time copies as having associated second storage volume maps as Patent Owner argues (Mot. to Amend 13–14), given the previously discussed teachings in Ohran, Kleiman,

DeKoning, and Linde, we are not persuaded that Patent Owner has explained persuasively why an ordinary artisan would have considered it unobvious to include a storage volume map at the secondary storage volumes of Ohran, Kleiman, and DeKoning.

Patent Owner contends that using a storage object comprised of a second point-in-time copy and storage volume map as required by claim 20 is a "significant advancement over the prior art" because it "allows continued use of this volume during replication, avoids changing the second volume, and forms an update history." *Id.* at 14–15. We are not persuaded however, that Patent Owner has explained persuasively how or why an ordinary artisan would have viewed these advantages as unexpected or otherwise unobvious, particularly given the fact that, as discussed above, point-in-time technology was known in the art. Indeed, Linde's express teaching, that primary data storage volume accessibility during backup was an advantage of point-in-time techniques (*see* Ex. 1006, 1:62–65), would have provided an incentive for using those point-in-time techniques to similarly provide accessibility to the secondary storage volumes of Ohran, Kleiman, and DeKoning.

In sum, having reviewed Patent Owner's contentions and supporting evidence, we are not persuaded, for the reasons discussed, that Patent Owner has shown, by a preponderance of the evidence, that an ordinarily skilled artisan would have considered the computer product recited in claim 20 unobvious over the prior art. Accordingly, we deny entry of claim 20.

Claim 21 is a proposed substitute for claim 15. Mot. to Amend 5. The only change in claim 21, as compared to claim 15, is that claim 21 depends from claim 20, rather than claim 14. *Id.* Accordingly, for the

reasons discussed above as to claim 20, we are not persuaded that Patent Owner has shown, by a preponderance of the evidence, that an ordinarily skilled artisan would have considered the computer product recited in claim 21 unobvious over the prior art. We, therefore, deny entry of claim 21.

III. CONCLUSION

Petitioner has shown, by a preponderance of the evidence, that claims 1, 2, 4, 5, 12, 14, and 15 of the '299 patent are unpatentable (1) under 35 U.S.C. § 102(b) as anticipated by Ohran, (2) under 35 U.S.C. § 102(b) as anticipated by Kleiman, and (3) under 35 U.S.C. § 103(a) as obvious over DeKoning and Linde.

Patent Owner has not shown, by a preponderance of the evidence, that its proposed substitute claims 18–21 are patentable over the prior art.

IV. ORDER

In consideration of the foregoing, it is

ORDERED that claims 1, 2, 4, 5, 12, 14, and 15 of the '299 patent be held unpatentable;

FURTHER ORDERED Patent Owner's Motion to Amend is *denied*;

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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