

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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NETFLIX, INC.,  
Petitioner,

v.

AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED,  
Patent Owner.

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*Inter Partes* Review No. IPR2020-01582

U.S. Patent No. 8,572,138 B2

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**PATENT OWNER'S SUR-REPLY**

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### LIST OF EXHIBITS

1001	U.S. Patent No. 8,572,138 ("the '138 Patent")
1002	Prosecution File History for the '138 Patent
1003	Declaration of Prashant Shenoy
1004	U.S. Patent No. 7,577,722 to Khandekar et al. ("Khandekar")
1005	U.S. Patent No. 8,209,680 to Le et al. ("Le")
1006	U.S. Patent No. 7,962,633 to Sidebottom et al. ("Sidebottom")
1007	U.S. Patent Application Publication No. 2003/0036886 to Stone ("Stone")
1008	Khanna et al., <i>Application Performance Management in Virtualized Server Environments</i> , NOMS 2006 ("Khanna")
1009	Urgaonkar et al., <i>Dynamic Provisioning of Multi-tier Internet Applications</i> , ICAC '05 ("Urgaonkar")
1010	Excerpt of S. Russell, P. Norvig, <i>Artificial Intelligence - A Modern Approach</i> (2d. ed. Prentice-Hall 2003) ("Russell")
1011	Barham et al., <i>Xen and the Art of Virtualization</i> , SOSP '03: ACM Symposium on Operating Systems Principles, 164-177 (Oct. 2003)
1012	U.S. Patent No. 6,496,847 to Bugnion et al. ("Bugnion")
1013	U.S. Patent Application Publication No. 2004/0019672 to Das et al. ("Das")
1014	U.S. Patent Application Publication No. 2007/0220246 to Powell et al. ("Powell")
1015	JP Patent Application Publication No. 2001-318797 to French
1016	English translation of JP Patent Application Publication No. 2001-318797 to French ("French")

1017	Declaration of Sylvia D. Hall-Ellis
1018	Reserved
1019	Reserved
1020	Reserved
1021	Broadcom PR 3-1 and 3-2 Disclosures from <i>Broadcom Corp. et al. v. Netflix, Inc.</i> , Case No. 3:20-cv-04677-JD
1022	Preliminary Infringement Contentions for Sundar '138 <i>Broadcom Corp. et al. v. Netflix, Inc.</i> , Case No. 3:20-cv-04677-JD
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1025	Plaintiffs' Patent L.R. 4-2 Disclosures, <i>Broadcom Corp. et al. v. Netflix, Inc.</i> , Case No. 3:20-cv-04677-JD
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1027	Plaintiffs' Claim Construction Brief (July 2, 2021), <i>Broadcom Corp. et al. v. Netflix, Inc.</i> , Case No. 3:20-cv-04677-JD
1028	Netflix's Response to Claim Construction (July 16, 2021), <i>Broadcom Corp. et al. v. Netflix, Inc.</i> , Case No. 3:20-cv-04677- JD
1029	Reply Declaration of Prashant Shenoy
2001	Declaration of Dr. David Rosenblum ("Rosenblum Decl.")
2002	Deposition Transcript of Dr. Prashant Shenoy (May 14, 2021) ("Shenoy Dep.")
2003	Joint Claim Construction and Prehearing Statement, <i>Broadcom Corp. et al. v. Netflix, Inc.</i> , No. 3:20-cv-04677-JD (N.D. Cal. May 18, 2021), ECF No. 112
2004	Tanenbaum et al., Excerpts from <i>Operating Systems: Design and Implementation</i> , Pearson Education, Inc. (3d. ed. 2006)

2005	Apple, Inc., <i>Mac OS X "Gold Master" Released to Manufacturing</i> , Apple Press Release, Apple Newsroom; available at: <a href="https://www.apple.com/newsroom/2001/03/07Mac-OS-X-Gold-Master-Released-To-Manufacturing/">https://www.apple.com/newsroom/2001/03/07Mac-OS-X-Gold-Master-Released-To-Manufacturing/</a> (Mar. 7, 2001)
2006	Excerpt from <i>Information and Communications Technologies: OECD Information Technology Outlook</i> , Organization for Economic Co-Operation and Development, OECD Publishing (2006)
2007	Second Deposition Transcript of Dr. Prashant Shenoy (Oct. 27, 2021) ("Shenoy Dep. II")
2008	Errata Sheet to Deposition Transcript of David Rosenblum (Aug. 6, 2021) ("Rosenblum Dep. Errata")

## **I. INTRODUCTION**

Petitioner's Reply ("Reply") (Paper 17) does nothing to rehabilitate Petitioner's failure to show that the claims of the '138 Patent are unpatentable. The Reply consists of a series of strawman arguments that cumulatively fail to address the arguments in Patent Owner's ("PO") Response ("POR") (Paper 13).

## **II. THE VIRTUAL MACHINES IN THE CHALLENGED CLAIMS ARE NOT THE SAME AS THE VMS DISCLOSED IN THE PRIOR ART**

Petitioner's first strawman argument asserts that Khandekar and Le teach the same "VMs" as the '138 Patent because they disclose using the same VMware ESX software as disclosed in the '138 Patent. Reply, 4. However, any similarity between these references and the '138 Patent concerning VMWare ESX software is wholly immaterial to any position set forth in POR. What is material – and what Petitioner refuses to address in its Reply – is that the term "virtual machine" set forth in the Challenged Claims does not have the same meaning as the term "VM" used in the Petitioner's cited prior art and this difference in meaning creates fundamental differences between the teachings of Khandekar and Le and the Challenged Claims. POR, 4, 45-49, 57-60. This difference is a fact acknowledged by Petitioner's expert, Dr. Shenoy.

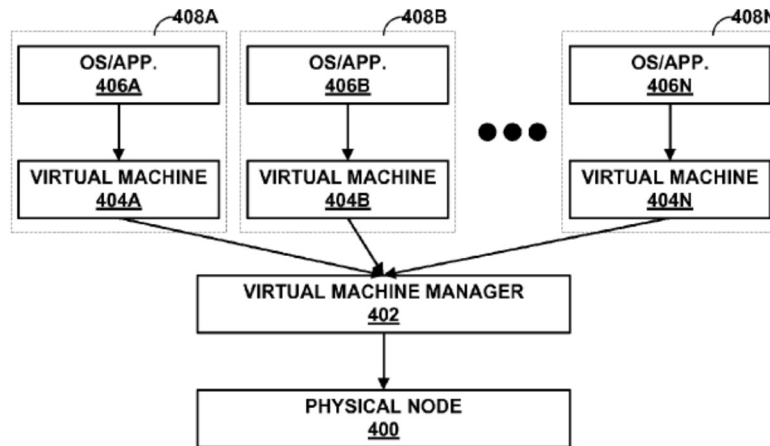
Q Is a virtual machine and a virtual machine image two different things?



A So I've explained that is right in my declaration. A **virtual machine image is different from a virtual machine. I've also explained that Khandekar sometimes uses the shorthand when he says VM, it's referring to the VM images, and depending on the context, sometimes the VM means the virtual machine itself.**

EX-2007 (Shenoy Dep. II), 95:4-12 (emphasis added).

As explained in detail in POR, and as used in the Challenged Claims, each of the plurality of virtual machines are "operatable to provide an **environment that emulates a computer platform**" on which the control node deploys the image instances of the software applications. EX-1001, 36:25-49, 38:1-21, 38:61-39:15 (emphasis added); *see also* POR 45-49, 57-60. The virtual machines in the Challenged Claims are created by the execution of the plurality of image instances of the virtual machine manager on the application nodes. *See id.* FIG. 24 (and accompanying text) shows this process clearly – the virtual machine manager (402) executes on an application (physical) node (400) and provides one or more emulated environments (virtual machines) 404A-N on which to deploy image instances of software applications 408A-408N:



EX-1001, FIG. 24, 32:59-33:24.

In describing FIG. 24, the '138 Patent explains that:

When deployed on physical node [4]00, virtual machine manager 402 hosts virtual machines 404A through 404N (collectively, virtual machines 404). **The term virtual machine is used herein to refer to software that creates an environment that emulates a computer platform.** For example, virtual machines 40[4] **provide environments on which guest operating systems (OS) execute** as through the operating systems were operating directly on a physical computing platform.

*Id.*, 32:65-33:6 (emphasis added); *see also* Decision (Paper 9), 4-5; EX-2007, 48:22-49:11 (agreeing with Board's characterization that "virtual machines 404 provide environments on which guest operating systems execute"). The '138 Patent further states, "[f]or example, if virtual machine 404A emulates an x86 machine, an instance

of the Microsoft Windows operating system (e.g., OS 406A) **may execute on virtual machine** 404A as [though] the instance of Windows were running on a physical x86 machine." EX-1001, 33:11-15. Each of Petitioner's references to Dr. Rosenblum's testimony merely supports PO's position. *See, e.g.*, EX-1024, 49:11-16 (stating that "the virtual machines are created when the virtual machine manager is executed").

In contrast, in Khandekar, "a 'model virtual machine' is a virtual machine (VM) that contains **a certain configuration of guest operating system 320, service pack, and applications 360, where the applications have been tested and are known to work correctly.**" EX-1004, 8:51-56; POR, 47 (emphasis added). As explained in POR, the VMs (*i.e.*, VM images) in Khandekar are "created in the provisioning server with an operating system and (in most cases) software applications." POR, 47 (citing Dr. Shenoy's testimony (EX-2002, 108:17-109:13)). Khandekar teaches deploying the VMs (VM images) from the provisioning server in a **single step** that in no way satisfies the limitations of the Challenged Claims. *See* POR, 45-57.

Rather than address the clear distinction between the creation and use of "virtual machines" as disclosed in the '138 Patent and the creation and use of VMs (VM images) disclosed in Khandekar, Petitioner manufactures a strawman argument (*i.e.*, "PO attempts to argue that the '138 Patent somehow has a different

kind of VM than Khandekar" (Reply, 4)) and then argues against it by stating that the same commercial VMware ESX software is disclosed in both its prior art references and the '138 Patent – akin to arguing that two painters must have painted the same picture because they used the same brushes and paint. Petitioner's argument is both irrelevant and telling as an attempt to distract from PO's clearly stated position.

### **III. PETITIONER ATTEMPTS TO AVOID PO'S CLAIM CONSTRUCTION POSITION**

#### **A. The Board Requested Briefing on Whether the Challenged Claims Require An Ordered Sequence of Steps**

In its Preliminary Response, PO set forth the ordered sequences of steps in the Challenged Claims and highlighted in blue, red, and green text the precise claim language that pertain to each step. *Id.*, 10-15. In its Institution Decision, the Board stated the "parties are encouraged to address, in the response and reply, whether claim 1 must be construed to require the performance of an ordered sequence of steps, as argued by Patent Owner." Decision, 9, 26 n.9, 28 n.12.

#### **B. PO's Claim Construction Follows Federal Circuit Law**

PO set forth the Federal Circuit standard on this issue: "a patent claim 'requires an ordering of steps when the claim language, as a matter of logic or grammar, requires that the steps be performed in the order written, or the specification directly or implicitly requires' an order of steps." POR, 8-9 (citing

*Mformation Techs., Inc. v. Rsch. in Motion Ltd.*, 764 F.3d 1392, 1398-400 (Fed. Cir. 2014)). POR set forth in detail that as a matter of logic and grammar the **claim language** itself and the **specification both** require an ordered sequence of steps. POR, 11-31 (section entitled "The Specification of the '138 Patent"); *see id.*, 31-44 (section entitled "The Language of the Challenged Claims").

**C. Petitioner Erects Strawman Arguments Rather Than Address the Claim Construction Issue Requested by the Board**

Petitioner does not address PO's claim construction position head-on, but once again erects strawman arguments to fight against PO's claim construction.

**1. Petitioner Ignores the Claim Language Requiring PO's Claim Construction Position**

Petitioner first argues that PO did not identify "a term that requires construction." Reply, 5. However, the Board specifically requested the parties address whether the Challenged Claims require an order of steps as a matter of logic and grammar – not to identify a certain claim term for construction. The cases cited by Petitioner in support of its position (*MBO Laboratories* and *NTP, Inc.*) do not address whether a claim requires an ordered sequence of steps. Reply, 5. In contrast, the cases cited by PO directly address whether certain elements of a claim must be performed in a certain order as a matter of logic and grammar. POR, 8-10; *see, e.g., Trans Ova Genetics v. Xy, LLC*, IPR2018-00249, Paper 7 at 8 (PTAB June 25, 2018). In its analysis in *Trans Ova Genetics*, the Board did not construe a specific claim

term, but rather decided that "the sorting limitation must be performed separately from and subsequent to the determining limitation" as a "matter of logic and grammar." *Id.* PO set forth in detail why the specification and the language of the Challenged Claims require an ordered sequence of steps. POR, 11-45. Rather than address these issues directly, Petitioner disregards the Board's instruction and incorrectly accuses PO of failing to identify specific claim language to construe. Reply, 5.

## **2. PO Does Not Import the Three-Step Process Into the Challenged Claims**

Petitioner next argues that PO seeks to "literally import an entire three-stage process from the embodiments into the claims, including *system* claim 1." Reply, 6 (emphasis in original). PO does no such thing. As described above, PO first explains how the specification describes the three-step deployment process (POR, 11-31) – a description which Petitioner's expert confirmed in its entirety – and then explains how this same process is reflected in the language of the Challenged Claims (POR, 31-42) – an explanation also supported significantly by Petitioner's expert.

As set forth in POR, the language of the Challenged Claims requires the following:

- a software repository that stores at least two separate sets of image instances: (1) "a plurality of image instances of a virtual machine manager" and (2) "a plurality of image instances of software

applications" – a position Petitioner's expert acknowledges with respect to Challenged Claim 1 (EX-1001, 36:27-38; POR, 33-35);

- the image instances of the virtual machine manager must be "executable on a plurality of application nodes, wherein when executed on the applications nodes, the image instances of the virtual machine manager **provide a plurality of virtual machines**," and the image instances of the software applications must be "executable on the plurality of virtual machines" (EX-1001, 36:27-38 (emphasis added); POR, 35-40); and
- a control node that "comprises automation infrastructure to provide autonomic deployment of the plurality of image instances of the virtual machine manager on the application nodes by causing the plurality of image instances of the virtual machine manager to be copied from the software image repository to the application nodes and to provide autonomic deployment of the plurality of image instances of the software applications **on the virtual machines** by causing the plurality of image instances of the software applications to be copied from the software image repository to the application nodes." EX-1001, 36:39-49 (emphasis added); POR, 35-40.

As explained in POR, the image instances of the software applications are deployed **on the virtual machines**. *Id.* Therefore, the language of the Challenged

Claims itself requires a deployment process of (1) deploying the image instances of the virtual machine manager, (2) executing the image instances of the virtual machine manager to provide the virtual machine,<sup>1</sup> and (3) deploying the image instances of the software application **on the virtual machines**. *Id.*

Tellingly, Petitioner never addresses the claim language "on the virtual machines" anywhere in its Reply.<sup>2</sup> Instead, Petitioner creates another strawman

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<sup>1</sup> Dr. Shenoy admits that the only way the '138 Patent teaches to create or provide virtual machines is by executing an image instance of a virtual machine manager. EX-2007, 14:10-20; POR, 20-24 (citing EX-2002, 33:12-21).

<sup>2</sup> Not only does the Reply refuse to address the "on the virtual machine" language of the Challenged Claims, but Petitioner's expert also both attempted to (1) read this language out of the Challenged Claims entirely and (2) change its meaning during his second deposition. *See, e.g.*, EX-2007, 55:20-56:18 (stating that **Claim 1** only requires autonomic deployment of the software applications by causing the image instances to be copied – not deployed "on the virtual machines"); 60:13-62:6 (stating that **Claim 19** only requires deploying the image instances of the software applications by causing the image instances of the software applications to be copied to the application nodes – not deployed "on the virtual machines"); 66:22-67:12 (testifying that "on the virtual machines" of the Challenged Claims "means that the



argument that PO's "supposed 'logic' creates a paradox" because "under PO's logic the software image repository cannot store images, as recited in claim 1, until after the control node has deployed VMM images to application nodes." Reply, 15.

This is a frivolous attempt to distract from the real issues before the Board. As explained in POR, because the image instances of the virtual machine manager are first found in the storage limitation, "the phrase 'when executed' used to describe the image instances of the virtual machine manager is appropriate because when the plurality of image instances of the virtual machine manager are stored in the software repository, these images are obviously not executing on the application nodes." POR, 37. More importantly, however, the Challenged Claims require that the "virtual machines" be provided by the virtual machine manager "when executed on the application nodes." EX-1001, 36:28-32. In other words, the "virtual machines" themselves are **not** stored as images in the software repository – they are created on the application nodes by the image instances of the virtual machine manager – a point clear from the claim language itself and ignored by the Petitioner.

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software applications have been deployed **to run** on the virtual machines" – where deployed "to run" is not found in the Challenged Claims or anywhere in the specification of the '138 Patent).

### 3. The Nature of the Challenged Claims Does Not Eliminate the Claimed Deployment Process

Petitioner also argues that "Claim 1 is a system claim that focuses on *capabilities* – specifically, those of the control node." Reply, 8 (emphasis in original). PO addressed this position in detail in its POR. Specifically, PO explained, "[e]ach of these independent Challenged Claims requires the three-step deployment process **(or include claim elements that must perform the three-step deployment process)** described in the specification of the '138 Patent." POR, 32 (emphasis added). Petitioner's argument is simply a restatement of Dr. Shenoy's testimony, during which he argued that "executable is not the same as executing" – a position PO fully addressed in POR. POR, 36-40. To summarize, because the control node must comprise "automation infrastructure" to, *inter alia*, "provide autonomic deployment of the plurality of image instances of the software applications **on the virtual machines**," the virtual machines *must exist* on the application nodes before the control node can provide autonomic deployment of the image instances of the software applications. EX-1001, 36:39-49; POR, 36-40.<sup>3</sup>

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<sup>3</sup> PO explains how the principles of antecedent basis require that the virtual machines on which the image instances of the software applications are deployed are the same virtual machines that must be first created by the execution of the image instances

This is particularly true with Challenged Claim 19 – a method claim – which requires "executing the rules engine to perform operations to autonomically deploy the image instances of the software applications **on the virtual machines.**" EX-1001, 38:17-19 (emphasis added). The virtual machines in Claim 19 are provided in the same manner as Claim 1 – created by the image instances of a virtual machine manager that are "executable on a plurality of application nodes" and "provide a plurality of virtual machines." *Id.*, 38:3-6. How can the method of Claim 19 execute a rules engine to "perform operations to autonomically deploy the image instances of the software applications on the virtual machines" if the virtual machines do not first exist?<sup>4</sup>

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of the virtual machine manager. POR, 36-40. Notably, Petitioner does not address this position in its Reply, presumably because Petitioner's expert admitted that he did not know what antecedent basis was and had no opinion as to whether the "virtual machines" first cited in the Challenged Claims were the same "virtual machines" cited in subsequent elements of the Challenged Claims. POR, 53-57.

<sup>4</sup> Petitioner's expert argued in his second deposition that "[t]here's nothing in Claim 19 that talks about the creation of virtual machines." EX-2007, 67:4-12. Once again, Petitioner's expert ignores express language in the Challenged Claims. Claim 19 states that "the image instances of the virtual machine manager provide a

Petitioner asserts that Claim 19 does not require the creation of virtual machines on the application nodes by arguing that there is "no mention of a rules engine in the portions of the specification that describes VMMs and VMs (starting col. 32:51), and therefore there is no written description of a rules engine causing a VMM or VM image to be executed/booted at the application nodes." Reply, 16. Interestingly, Petitioner relies on the specification of the '138 Patent for this position, and at the same time argues that PO should not rely on the specification to support its position that the three-step deployment process set forth in detail in the specification is reflected in the language of the Challenged Claims – an analysis the Federal Circuit requires as part of its order-of-steps caselaw. *See* Reply, 5-7.

Nevertheless, the specification discusses rules engines (as part of the control node) with respect to deployment of applications as well as describing in detail the creation of virtual machines on application nodes by executing an image instance of the virtual machine manager. *See, e.g.*, EX-1001, 28:12-33, 35:6-12, 35:33-36. This provides Petitioner no real basis to argue that Claim 19 does not require the

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plurality of virtual machines," onto which the software applications are deployed. EX-1001, 38:4-6.

deployment process – a process that Petitioner's expert agreed with in his first deposition. POR, 41-42.<sup>5</sup>

#### 4. Petitioner's Allegedly Conflicting Evidence Is Unpersuasive

Finally, Petitioner attempts to dispute PO's position using Dr. Rosenblum's testimony and Broadcom's claim construction brief. Reply, 9-10. Both arguments are unfounded. First, Dr. Rosenblum is correct that Claim 1 does not expressly state that the virtual machine manager executes on an application node; however, he made very clear in his deposition that if a virtual machine is in existence (which they must be in order for the image instances of the software application to be deployed onto them), then the virtual machine manager must have been executed or running – testimony directly on point and completely ignored by Petitioner in its Reply.

Q Okay. So in the 138 patent, Exhibit 1001, column 32, starting on line 60 there's a sentence that says, "**as used herein, a virtual machine manager is a software program that is capable of managing one or more virtual machines.**" Do you see that?

A Yes.

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<sup>5</sup> In its Petition, Petitioner treats Claims 1, 19, and 26 as having similar scope and addresses them collectively. *See* Pet., 66-73 (referring to Claim 1 for both Claims 19 and 26).

Q You would agree that the virtual machine manager just has to be capable of managing one or more virtual machines, it doesn't actually have to be managing them, correct?

A **I wouldn't agree with that. I mean, the virtual machine manager does manage one or more virtual machines. That's its purpose.**

Q But when you read this portion of the specification, it seems clear that Claim 1 does not require that the virtual machine manager is actually running, correct?

MR. YOUNG: Objection, form.

THE WITNESS: **If there [are] to be virtual machines in existence, then Claim 1 requires the virtual machine manager to be executed or running.**

BY MR. LIANG:

Q This line, column 32, line 60, seems consistent with Claim 1 which would only require that the virtual machine manager must be able to manage virtual machines when executed, it doesn't actually require that the virtual machine manager is actually managing the virtual machines, correct?

MR. YOUNG: Objection, form.

THE WITNESS: **Well, if you read Claim 1, it doesn't say capable. It says, "when executed on the application nodes, the image instances of the virtual machine manager provide a plurality of virtual machines."**

BY MR. LIANG:

**Q So Claim 1 requires that the virtual machine manager must actually manage one more virtual machines; is that right?**

**A Yes.**

EX-1024, 75:22-77:4; EX-2008 (Rosenblum Dep. Errata), 76:9; *see also* EX-1024, 72:17-73:12 (testifying that Claim 1 requires image instances of the virtual machine manager to form the virtual machines); EX-2001 ¶¶ 71-99 (Dr. Rosenblum explaining his position on this issue in significant detail).

Second, Petitioner's argument with respect to Broadcom's claim construction brief fails for a similar reason. Specifically, the issue before the District Court was whether the term "virtual machine manager" needed construction. Broadcom's position, like PO's here, was that it does not. Moreover, Broadcom's position before the District Court did not concern the portion of Claim 1 that requires deployment of the image instances of the software applications "on the virtual machines" – an element of the Challenged Claims that requires, as a matter of logic and grammar, virtual machines to be created before the image instances of the software applications can be deployed onto them.

## **5. Petitioner's Defense of Its Own Claim Construction Position Is Unfounded**

Finally, Petitioner argues that the term "a plurality of image instances of a plurality of software applications that are executable on the plurality of virtual

machines" is satisfied by a "plurality of virtual disk images." Reply, 17. The entirety of Petitioner's reply argument is that the "PO admits that 'virtual disk image files' can satisfy this limitation." *Id.* This is an utterly false statement. Indeed, the citations relied on by Petitioner make this point clear. All of these citations state that virtual disk image files are examples of image instances of software applications – a point PO readily acknowledges. POR, 43; *see also* EX-1024, 39:2-20, 81:8-23. However, as explained in POR, Petitioner's construction also includes the phrase "that are executable on the plurality of virtual machines." Reply, 17; POR, 42-45. Petitioner disregards this language entirely in the Reply, because it reflects, in part, the three-step deployment process (*i.e.*, it defines where the image instances of the software applications must be deployed).

#### **IV. THE REPLY FAILS TO ESTABLISH THAT ANY CHALLENGED CLAIM IS INVALID**

##### **A. Khandekar (Ground 1) Does Not Disclose the Three-Step Deployment Process**

Petitioner's argument on this position requires little response. Petitioner claims that "[i]n summary, Khandekar teaches deploying VMM images to hosts and using the VMM to execute VM images on the hosts." Reply, 20. Even if this process were taught by Khandekar, which it is not, this process denotes a single step deployment process. Tellingly, POR provides detailed reasons why Khandekar fails



to disclose the three-step deployment process and Petitioner elects not to address any of these reasons in its Reply. *See, e.g.*, POR, 49-56.

Moreover, as explained in POR, nothing in Khandekar teaches the deployment of image instances of a virtual machine manager onto a host. POR, 57-60. In its Reply, Petitioner first argues that "Khandekar teaches that *'[t]he image instances of the VMM are executed on the host computer.'*" Reply, 19 (emphasis in original). However, the internal quotation marks refer, not to a quote from Khandekar, but a quote from its own expert, unsupported by any teaching of Khandekar. *Id.* (quoting paragraph 113 of Dr. Shenoy's declaration (EX-1003) that refers to 13:17-35 of Khandekar, which says nothing about image instances of a virtual machine manager, but only that "a VMM is typically included for each VM"). Indeed, Petitioner even cites the Petition for support of its argument that Khandekar teaches separate image instances of virtual machine managers. *See* Reply, 17. However, in the Petition, Petitioner argues that, in Khandekar, "[s]ince the VMM is included with the VM, it is obviously *copied along with the VM* to the host computer." Pet., 50 (emphasis added).<sup>6</sup> This is precisely PO's point – Khandekar

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<sup>6</sup> Dr. Shenoy admitted that Khandekar does not contain the words "VMM image instance." EX-2007, 96:1-97:6. Rather, his position is that a POSITA would have found this obvious – a position founded on nothing but hindsight and refuted by

teaches a one-step deployment process and does not teach separate images of the virtual machine manager being deployed first to create the virtual machine on which the image instances of the software applications may be subsequently deployed. POR, 49-50.

The POR explains in detail why the citations of Khandekar relied on by Petitioner do not disclose image instances of a virtual machine manager – let alone executing such image instances to create virtual machines on which to deploy image instances of software applications as required by the Challenged Claims. POR, 57-60. Dr. Rosenblum explains why it would not have been obvious to a POSITA to create image instances of a virtual machine manager in the provisioning server of Khandekar and the distinct advantages provided by these teachings in the '138 Patent – testimony not addressed at all in the Reply. EX-2001, ¶¶ 138-141, 144-147. Without teaching storing separate image instances of a virtual machine manager, Khandekar cannot teach "deploying VMM images to hosts, executing the VMM

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Dr. Rosenblum. EX-2001, ¶¶ 138-141 ("To the extent Khandekar possibly could be read as storing a virtual machine manager image at all, any assertion by Petitioner that such storage might be separate from the storage of Khandekar's VMs themselves is pure speculation.").

images, and then deploying and executing VMs on hosts" as argued by Petitioner. Reply, 21.

Finally, with respect to the description in Khandekar that the "VMM is included with the VM," Dr. Shenoy testified that "[s]o this is referring to the case where you have not preinstalled the VMM on the host. So in this case, you have to have a VMM on that host in order to subsequently install a VM." EX-2007, 99:13-100:2 (emphasis added). Therefore, in this opinion, Dr. Shenoy interjects the word "subsequently" into this description of Khandekar, when Petitioner itself earlier argued the VM and VMM were copied together. *See supra* n.6 and accompanying text. Khandekar does not contain the word "subsequently," let alone in any description involving a VMM. The '138 Patent, however, does use "subsequently" after discussing deployment of a VMM image instance: "Subsequently, control node 12 may deploy an image instance of virtual disk image files 408 to one of the new unallocated nodes" – nodes that already contain virtual machines from the prior deployment and execution of the image instances of the virtual machine manager. EX-1001, 34:1-13. Dr. Shenoy's interpretation is clear evidence of the improper use of hindsight. *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1376-78 (Fed. Cir. 2012) (holding that "[a] telltale sign of impermissible hindsight analysis is the 'use [of] the invention to define the problem that the invention solves'" – precisely what Petitioner does here).

**B. Khandekar and Le (Ground 2) Does Not Disclose the Three-Step Deployment Process**

Petitioner argues that, in the Petition, "Petitioner and Dr. Shenoy explained how the combination teaches PO's three-stage deployment process by deploying the physical image of a host computer (including the VMM) using Le's teachings, booting the host computer, and then deploying the virtual image of a VM to the host using Khandekar's teachings" and that "[t]his evidence is un rebutted." Reply, 21. While PO certainly rebuts the combination of Khandekar and Le (POR, 64-65), Petitioner never made this argument in the Petition. In fact, the terms "physical image" and "booting the host computer" are found nowhere in the Petition.<sup>7</sup> This is a new theory of obviousness that should be disregarded. *Satco Prod., Inc. v. Seoul Viosys Co., Ltd.*, IPR2020-00750, Paper 42 at 30 (PTAB Sept. 20, 2021).

Nevertheless, the new argument is unpersuasive. First, assuming one were able to deploy a VMM image using Le's technique and reboot the machine, nothing in Le or Khandekar indicates that operation would provide a virtual machine, as the Challenged Claims require. Instead, Le teaches, "[a] powered-off (i.e., inactive) virtual machine generally comprises a configuration file that describes the VM's set

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<sup>7</sup> When questioned extensively where this argument appeared in his original declaration, Dr. Shenoy could identify only his "**reply** dec." EX-2007, 133:15-140:5 (emphasis added).

of hardware devices, such as memory size and input/output ports, and a virtual disk file." EX-1005, 14:14-17. According to this teaching, the virtual machine manager cannot create a virtual machine until the VM image has been deployed. Thus, even on this novel theory, one would have to (1) deploy the virtual machine manager image and (2) deploy the VM image before the virtual machine manager could create a virtual machine, as required by the Challenged Claims. Even this alleged combination does not include another step of deploying a software application image on to this virtual machine, as the Challenged Claims also require.

Moreover, as stated in POR, Le does not teach creating separate image instances of a virtual machine manager, but "Le teaches only that, '[t]o power on and run the cloned virtual machine, all that the host computer needs is to have the appropriate VMM software installed.'" POR, 64 (citing EX-1005, 14:28-30; EX-2001, ¶ 149). The Petition confirms this position, explaining "Le teaches 'us[ing] disk imaging to quickly provision a bare-metal computer on the network *with a complete software stack consisting of an operating system and a set of core applications*.'" Pet., 34 (emphasis in original). This is exactly the point – Le teaches imaging a complete software stack (consisting of an operating system, which Petitioner claims is the VMM, and software applications), not separate creation and deployment of image instances of virtual machines and image instances of software applications. Petitioner's expert admitted that Le does not disclose a deployment

process using two sets of images. EX-2007, 119:19-120:4. While Petitioner now claims that Le discloses standalone images of a virtual machine manager, this is neither disclosed in Le nor ever argued in the Petition. *See* Pet. 34-36; EX-2001 ¶¶ 148-152.

**C. Khandekar (Ground 1) and Khandekar and Le (Ground 2) Do Not Disclose All the Limitations of the Challenged Claims**

One of the primary arguments actually advanced in the Petition is that Khandekar teaches deploying image instances of VMs (which include applications – *see* POR, 46-48), and that teaching is "consistent with teaching of the prior art, where VMM images were stored separately from VMs." Reply, 26; Pet., 35, 50. Petitioner claims that "PO did not dispute this." Reply, 26. This is not true. As POR explained, "[a]s Dr. Rosenblum notes, no reference cited by Petitioner, including the references cited as part of the grounds for review (Khandekar, Le, Sidebottom, and Stone) and other references mentioned in the Petition (such as Powell (EX-1014) and French (EX-1016)), even remotely suggests storing an image of a virtual machine manager in a software repository, let alone storing a plurality of such images." POR, 59 (quoting EX-2001, ¶ 130). This directly rebuts Petitioner's position and, more importantly, demonstrates that absolutely nothing cited by Petitioner (in any prior art – let alone the Khandekar and Le references) even suggests storing separate images on virtual machine managers. If Petitioner had such a reference, it would have cited it expressly but did not.

In further support of its position, Petitioner creates another strawman argument that "PO offers no explanation of how the VMM—an OS or application on the *physical* host computer—could be included in the *virtual* disk image of a VM." Reply, 27 (emphasis in original). This misstates PO's position, which merely restates the actual teachings of Khandekar that the VMM is either preferably "pre-installed on each host" or "[i]t would also be possible, however, for a corresponding VMM to be included *along with* each staged VM, as long as the characteristics of the host on which the VM is to be installed are known." POR, 57-60 (emphasis added). It is not the burden of PO to explain how Khandekar's teachings can be enabled.<sup>8</sup> That is Petitioner's burden, which it does not meet. Indeed, Petitioner presumably agrees that Khandekar does not provide this teaching, because Petitioner

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<sup>8</sup> Nonetheless, Dr. Rosenblum explains his understanding of this single sentence in Khandekar. See EX-2001, ¶¶ 139-141. Moreover, as stated above, Petitioner argues that "Le teaches 'us[ing] disk imaging to quickly provision a bare-metal computer on the network *with a complete software stack consisting of an operating system and a set of core applications.*'" Pet., 34 (emphasis in original) (citations omitted). This whole disk imaging could be used to install a VMM together with a VM image. This, however, fails to disclose the limitations of the Challenged Claims as discussed in the POR. See, e.g., POR, 57-60, 64-65.

relies on prior art not cited in its Grounds (EX-1014 and EX-1016) to claim that a POSITA would have known to store separate images of VMMs. Pet., 50. However, as stated above, even EX-1014 and EX-1016 omit this disclosure. POR, 59 (citing to EX-2001, ¶ 130).

Finally, Petitioner argues that Grounds 1-2 teach software application images. Reply, 28. PO has never disputed this. However, PO strenuously disputes that either Khandekar and/or Le disclose "a plurality of image instances of a plurality of software applications that are executable on the plurality of virtual machines" as required by the Challenged Claims. EX-1001, 36:30-32, 38:9-11, 39:4-6.

The claim language "on the plurality of virtual machines" and/or "on the virtual machines" is mentioned in almost every section of POR. POR *passim*. Tellingly, the Reply never addresses the term "on the virtual machines" and uses the term "on the plurality of virtual machines" exactly one time (Reply, 14) where it cites to Dr. Shenoy's declaration stating that "'the plurality of virtual machines' simply refers to the VMs that the VMM images are *capable* of creating." Ex. 1029, ¶ 10 (emphasis in original); *see supra* 10 n.2. This position fails, however, as the Challenged Claims recite "on the plurality of virtual machines," which Petitioner completely ignores, along with the limitation that requires control node to provide "autonomic deployment of the plurality of image instances of the software applications on the virtual machines." *See, e.g.*, 36:25-49 (emphasis added).



While it is abundantly clear that Petitioner would like the Board to read "**on** the virtual machines" out of the Challenged Claims, these words are expressly contained in the Challenged Claims in multiple locations and are critical to understanding the scope and meaning of the Challenged Claims. The fact that Petitioner ignores this language in its Reply highlights the significant shortcomings of Petitioner's Grounds 1 and 2.

## **V. CONCLUSION**

For these reasons, and those set forth in POR, PO respectfully requests that the Board reject Petitioner's Grounds.

**VI. CERTIFICATION PURSUANT TO 37 C.F.R. § 42.24(d)**

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner certifies that based on the "word count" feature of Microsoft Word, this Sur-Reply includes 5,581 words.

Respectfully submitted,

Dated: November 9, 2021

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**CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. § 42.6, the undersigned hereby certifies that a copy of the foregoing **PATENT OWNER'S SUR-REPLY** was filed through the Patent Trial and Appeal Board End to End (PTAB E2E) electronic filing system on November 9, 2021 with a confirmation copy served via electronic mail, on the following counsel of record for Petitioner:

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