

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NETFLIX, INC.,
Petitioner,

v.

AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED,
Patent Owner.

IPR2021-00045
Patent 7,457,722 B1

Before MELISSA A. HAAPALA, *Vice Chief Administrative Patent Judge*,
KRISTEN L. DROESCH, and NATHAN A. ENGELS,
Administrative Patent Judges.

ENGELS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision on Remand
Determining All Challenged Claims Unpatentable
35 U.S.C. §§ 144, 318

I. INTRODUCTION

This Final Written Decision is entered pursuant to 35 U.S.C. § 318 and pursuant to a remand from the United States Court of Appeals for the Federal Circuit in *Netflix, Inc. v. Avago Technologies International Sales PTE. Limited*, 2024 WL 3507601 (Fed. Cir. July 23, 2024).¹ For the reasons explained below, we determine, in view of the Federal Circuit’s decision and the record, that Netflix, Inc. (“Petitioner”) has proven by a preponderance of the evidence that the challenged claims are unpatentable.

II. BACKGROUND

A. Procedural History

Petitioner filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–3, 5, 9–11, 13, 17–19, and 21 of U.S. Patent No. 7,457,722 B1 (Ex. 1001, “the ’722 patent”), which we granted (Paper 8). During the trial phase, Avago Technologies International Sales Pte. Limited (“Patent Owner”) filed a Response (Paper 19, “PO Resp.”), Petitioner filed a Reply (Paper 24, “Reply”), and Patent Owner filed a Sur-reply (Paper 26, “Sur-reply”). Each party presented oral arguments at a hearing, and a transcript of the hearing was entered into the record. Paper 33. At the conclusion of trial, we issued a Final Written Decision determining Petitioner had not proven by a preponderance of the evidence that any of the challenged claims were unpatentable. Paper 34.

Petitioner appealed our Final Written Decision to the Court of Appeals for the Federal Circuit. The Federal Circuit issued a decision vacating our Final Written Decision and remanding for further proceedings. *Netflix, Inc. v. Avago Techs. Intl Sales PTE.*, No. 2022-1936, 2024 WL

¹ The Federal Circuit’s slip opinion is in the record as Paper 39.

3507601 (Fed. Cir. July 23, 2024). Among other things, the Federal Circuit stated that on remand, the Board should “adopt a new construction that includes application instance-level, application-level, device-level, and tier-level data” and “the Board should determine whether Masters, including its Decision Review Display and Path Display, renders the ‘collecting’ and ‘correlating’ limitations obvious in view of the Board’s new construction. In addition, the Board should consider Masters’ Appendix J in assessing whether Masters’ Path Display teaches life cycle events and the claimed correlating step.” *Netflix*, 2024 WL 3507601 at *8.

After the Federal Circuit issued its mandate, with our authorization, the parties filed the following briefs: Petitioner’s Opening Brief on Remand (Paper 41, “Pet. Remand Br.”), Patent Owner’s Response Brief on Remand (Paper 42, “PO Remand Resp.”), Petitioner’s Reply Brief on Remand (Paper 43, “Pet. Remand Reply”), and Patent Owner’s Sur-Reply Brief on Remand (Paper 44, “PO Remand Sur-Reply”).

B. Related Matters

The parties state that the ’722 patent has been asserted in *Broadcom Corp. et al. v. Netflix, Inc.*, Case No. 3:20-cv-04677 (N.D. Cal. 2020), which was originally filed as *Broadcom Corp. et al. v. Netflix, Inc.*, Case No. 8:20-cv-0059 (C.D. Cal.). Pet. 84; PO Resp. 2.

In addition, claims 4, 6–8, 12, 14–16, 20, and 22 of the ’722 patent are the subject of IPR2021-00431, which was also remanded to the Board by the Federal Circuit’s decision.

C. Real Parties-in-Interest

Petitioner identifies Netflix, Inc. and Netflix Streaming Services, Inc. as the real parties-in-interest. Pet. 84. Patent Owner states that Avago

Technologies International Sales Pte. Limited is the real party-in-interest.
Paper 5, 1.

D. The '722 Patent

Titled “Correlation of Application Instance Life Cycle Events in Performance Monitoring,” the '722 patent describes monitoring the performance of instances of a software application and correlating performance data to application instance life cycle events in a distributed computing system. Ex. 1001, codes (54), (57). In a distributed computing system, multiple computers work together in a coordinated manner. Each computer, or node, may execute multiple instances of one or more applications,² and instances of an application may be created or destroyed as demand changes. Ex. 1001, 1:30–36. “Application instances may also migrate from node to node in response to a hardware or software failure, or in response to a load-balancing algorithm.” Ex. 1001, 1:37–39. The creation, destruction, and migration of application instances are referred to as “life cycle events.” Ex. 1001, 1:54–59.

The '722 patent is directed to monitoring performance in such an environment. Ex. 1001, 1:53–56. Specifically, the '722 patent describes monitoring the life cycle events undergone by each application instance and relating those life cycle events to collected performance data for each application instance. Ex. 1001, 3:35–40. The system and method of the '722 patent “collect[s] performance data for one or more application instances, detect[s] one or more instance life cycle events associated with the one or more application instances, correlat[es] the performance data to the one or

² An application is a piece of software. If a piece of software is installed and run on a computer, the software running on the computer is an “application instance.” Ex. 1001, 1:8–49, 10:2–3.

more instance life cycle events, and stor[es] the correlated performance data.” Ex. 1001, 1:59–65.

Examples of life cycle events include creation, destruction, or migration of a particular application instance; these events may occur, for example, as demand changes or in response to a load-balancing algorithm. Ex. 1001, 1:35–39, 1:58–59. Correlating performance data to such life cycle events may comprise determining the change in performance of an application as one or more application instances are created, destroyed, or migrated from one location to another. Ex. 1001, 2:3–10.

E. Alleged Grounds of Unpatentability

Petitioner asserts that claims 1–3, 5, 9–11, 13, 17–19, and 21 would have been unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §³	References/Basis
1–3, 9–11, 17–19	103	Masters ⁴
5, 13, 21	103	Masters, Stone ⁵

Pet. 14.

F. Summary of Prior Art References

1. Masters (Ex. 1004)

Masters describes a Resource Management Architecture (“RMA”) that serves as a monitoring system for a distributed computing system having a plurality of hosts capable of executing multiple copies of a scalable

³ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the ’722 patent has a priority date before March 16, 2013, we apply the pre-AIA version of the statutory basis for unpatentability. *See* Ex. 1001, code (22).

⁴ U.S. Patent Application No. 7,051,098, issued May 23, 2006 (Ex. 1004).

⁵ U.S. Patent Application No. 2003/0036886, published Feb. 20, 2003 (Ex. 1005).

application. Ex. 1004, 2:44–47, 4:8–12. Masters teaches “provid[ing] capabilities for monitoring system performance along with the ability to dynamically allocate and reallocate system resources as required.”

Ex. 1004, 4:27–30. Figure 1A of Masters is reproduced below.

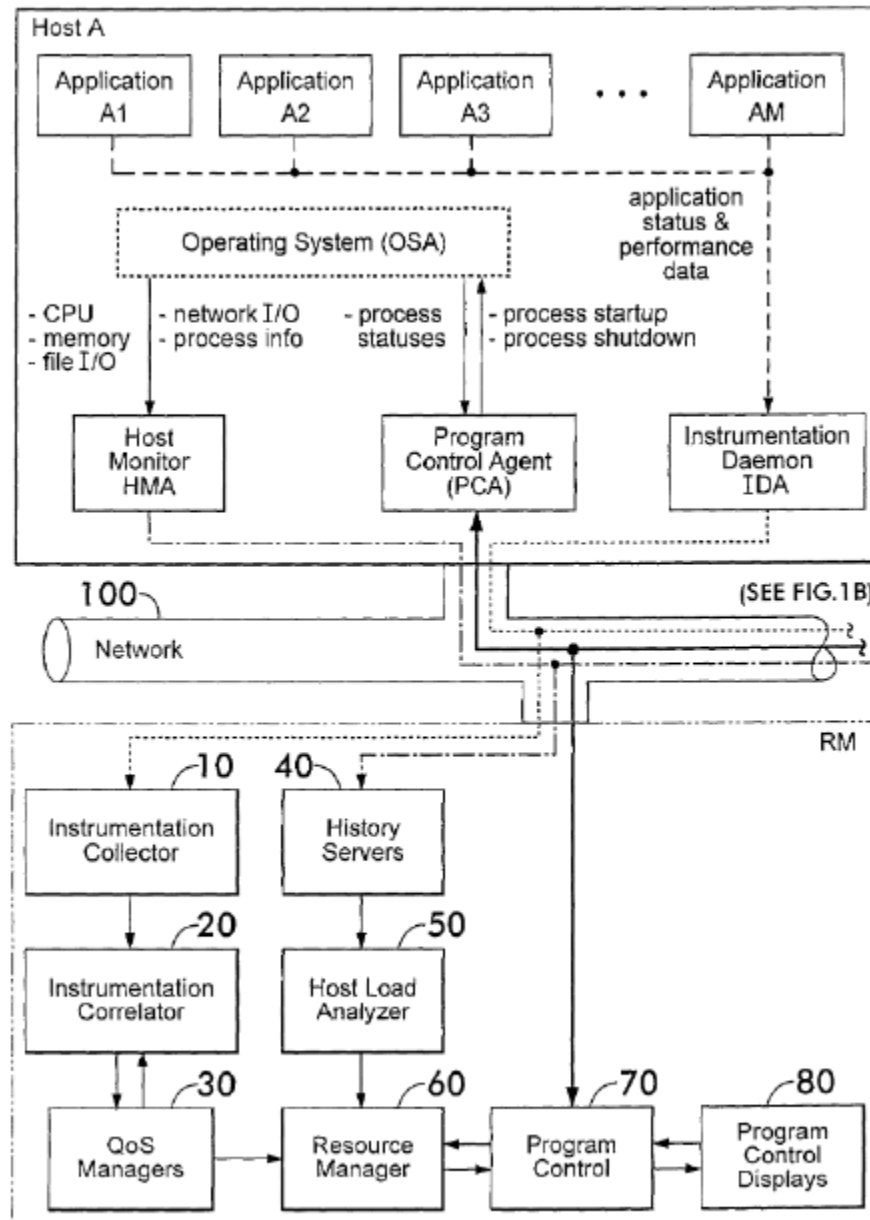


FIG. 1A

Figure 1A of Masters shows Host A executing instantiated applications A1–AM. Ex. 1004, 5:45–61. Host A also has an instrumentation daemon⁶ that receives “application status & performance data” from applications A1–AM. Ex. 1004, 5:52–61.

The RMA, labeled “RM” in Figure 1A, includes instrumentation collector 10 that receives data from the instrumentation daemon in each host over network 100 and provides data to instrument correlator 20. Ex. 1004, 5:35–37, 62–65. Instrumentation correlator 20 provides correlation data to quality of service (“QoS”) managers 30, which in turn provide information to resource manager 60. Ex. 1004, 5:65–67, 6:40–42. Resource manager 60 communicates with program controller 70, which “sends startup and shutdown orders” to the program control agents in each host. Ex. 1004, 6:35–49. Masters teaches the need for “allowing autonomous start up and shut down of application copies on host machines to accommodate changes in data processing requirements.” Ex. 1004, 2:20–24.

Figures 9A and 9B of Masters are reproduced below.

⁶ Masters defines a “daemon” as “[a] background process on a host or Web server . . . waiting to perform tasks.” Ex. 1004, col. 4, table.

FIG. 9A

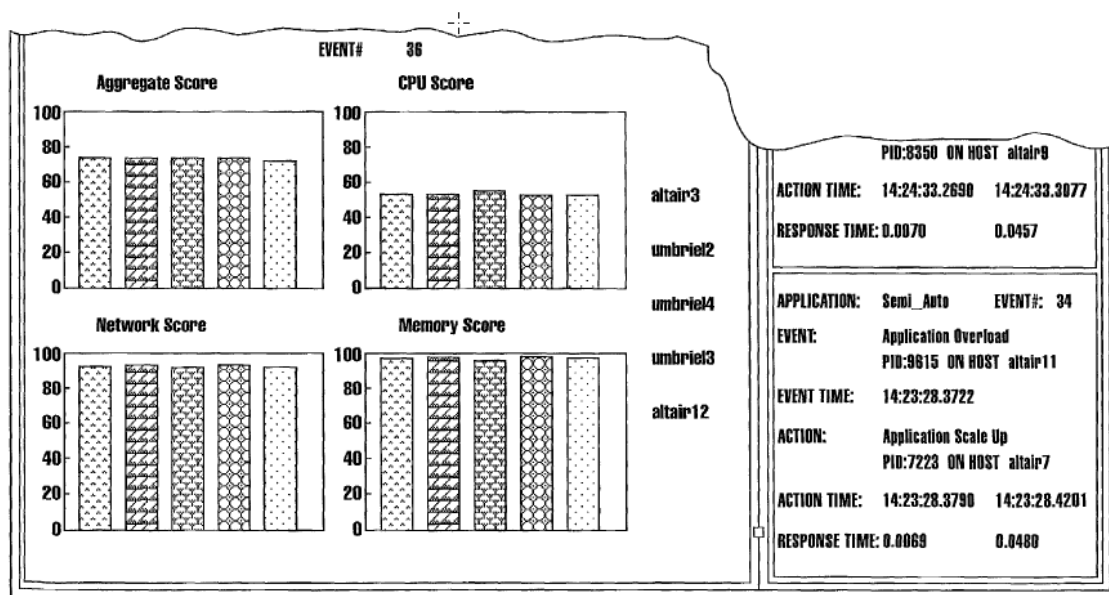
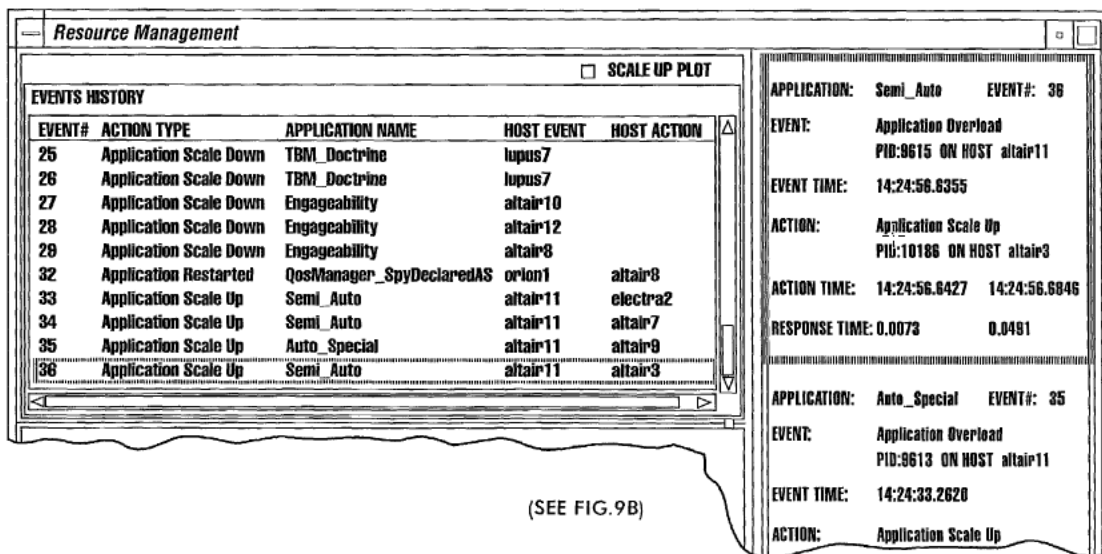


FIG. 9B

Figures 9A and 9B represent a screen capture of Masters’ “Decision Review Display,” which “can provide a summary of allocation and reallocation actions taken by” the RMA. Ex. 1004, 30:1–4. “For each action, timing information regarding how long it took the Resource Management functions, e.g., the Resource Manager . . . and the Program Controller . . . , to both

arrive at a decision and to enact the decided action are shown along with host fitness scores that were used in arriving at the allocation decision.” *Id.* at 30:4–10.

2. *Stone*

Titled “Monitoring and Control Engine for Multi-Tiered Service-Level Management of Distributed Web-Application Servers,” Stone describes performance monitoring and control of server computers and applications in distributed computing systems. Ex. 1005, code (54), ¶ 1. Among other things, Stone teaches a “multi-tiered service model” for “better monitoring, diagnosing, and automated control” of various software components to meet desired service-level objectives. Ex. 1005 ¶¶ 24, 27. Stone’s tiered service model organizes the component of a distributed system into functional levels or tiers that correspond to the data flow for each service the system provides. Ex. 1005 ¶¶ 33, 37. Stone includes a “service-level-objective monitoring and control system” that is used to monitor the performance of the tiers and their components. Ex. 1005 ¶ 40.

G. *Illustrative Claim*

Of the challenged claims, claims 1, 9, and 17 are independent claims. Claim 1, reproduced below, is illustrative of the subject matter of the challenged claims, with each of claims 1, 9, and 17 including substantially similar “collecting,” “detecting,” “correlating,” and “storing” limitations. *See* Pet. 27 (stating that the preambles/initial elements of claims 1, 9, and 17 differ “while the other elements of the claims are the same”); PO Resp. 15 (noting that claims 1, 9, and 17 “generally comprise four distinct limitations”).

1. A method, comprising:

collecting performance data for one or more application instances, wherein the performance data is associated with the performance of said one or more application instances, wherein each application instance is a computer program executing on a computer system;

detecting one or more instance life cycle events associated with said one or more application instances, wherein said one or more instance life cycle events comprise at least one of the creation of at least one of said one or more application instances, the destruction of at least one of said one or more application instances, and the migration of at least one of said application instances;

correlating said performance data to said one or more instance life cycle events; and

storing the correlated performance data.

III. ANALYSIS

A. Legal Standards

The Supreme Court set out a framework for assessing obviousness under 35 U.S.C. § 103 that requires consideration of four factors: (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) “secondary considerations” of non-obviousness such as “commercial success, long felt but unsolved needs, failure of others, etc.”⁷ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the

⁷ The record does not include arguments or evidence regarding secondary considerations.

rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1011 (Fed. Cir. 1983).

Petitioner contends a person of ordinary skill in the art (“POSITA”) at the time of the invention would have been a person with “a bachelor’s degree in electrical engineering, computer science, or a similar field with at least two years of experience in distributed computing systems or a person with a master’s degree in electrical engineering, computer science, or a similar field with a specialization in distributed computing systems.” Pet. 24 (citing Ex. 1003 ¶¶ 46–47). Petitioner further states that a person of ordinary skill in 2004 would have had

the knowledge and skills necessary to: (i) create a distributed computing system with a network of computing devices/servers; (ii) implement and use software for the monitoring of distributed applications; (iii) understand how to define the events that are monitored as part of the performance monitoring system; (iv) implement a monitoring system that allows for the storage of the monitoring data being created; and (v) create reports that correlate performance information and data from the monitoring system to allow the user to assess and visually review the performance of the system.

Pet. 24–25 (citing Ex. 1003 ¶ 48).

Patent Owner contends that a person of ordinary skill in the art would have had “a bachelor’s degree in Electrical Engineering, Computer Science, or a similar discipline, with one or two years of experience in this or a related field” and “would have been familiar with computing environments and distributed computing systems.” PO Resp. 22–23 (citing Ex. 2001 ¶ 24). Patent Owner states that Petitioner’s description of a POSITA is

“similar” but that it “includes some additional requirements that Patent Owner does not deem necessary.” PO Resp. 23. Further, Patent Owner states that any differences between the parties’ view of a POSITA are not material. PO Resp. 23 (citing Ex. 2001 ¶ 25).

We determine a POSITA would have had “a bachelor’s degree in Electrical Engineering, Computer Science, or a similar discipline, with one or two years of experience,” which is consistent with the parties’ arguments and testimony of the parties’ declarants, as well as the level reflected in the ’722 patent and the asserted prior art. We determine it is unnecessary to reach the parties’ additional statements of the knowledge and skills that a POSITA would allegedly possess, as the parties’ arguments do not hinge on those statements.

C. Claim Construction

The parties did not expressly address the scope and meaning of “performance data” prior to our Final Written Decision. The Federal Circuit’s Decision provides guidance regarding the scope and meaning of “performance data,” and the parties address the issue in subsequent briefing. First, citing dependent claims 2, 3, and 4, the Federal Circuit stated that “[t]he recitation of applications and application tiers in the context of performance data in these dependent claims is persuasive evidence that the ‘performance data’ of claim 1 is not limited to instance-level data, even though the performance data must be ‘associated with’ the performance of the one or more application instances.” *Netflix*, 2024 WL 3507601 at *5. The Federal Circuit additionally cites the ’722 patent’s specification as evidence that “performance data” is not limited to instance-level data and “can include application-level and/or application-tier-level data.” *Id.* (citing Ex. 1001, 1:56–2:17). Also, the Federal Circuit stated that “‘performance

data’ includes data pertaining to the performance of a server and/or a technology tier.” *Id.* (citing Ex. 1001, 3:56–57, 4:3–8, 4:14–18, 7:26–29).

In its briefing on remand, Petitioner contends “performance data” means “data relating to the performance of one or more application instances, including instance-level, application-level, device-level, and tier-level data.” Pet. Remand Br. 2. Petitioner states that its proposed construction encompasses CPU utilization data (*id.*) and “timing metrics that measure how long it takes a computer system to perform a task—e.g., processing time, response time, and latency” (*id.* at 3 (citing Ex. 1001, 1:22–25, 3:62–67; Ex. 1028, 83:20–84:25)). Further, according to Petitioner, “[p]erformance data’ thus encompasses, for example, ‘how long an application instance . . . takes to be created, to migrate . . . and to be destroyed.” *Id.* at 3 (quoting Ex. 1001, 7:38–41; citing Ex. 1028, 75:24–76:16).

Patent Owner states on remand that the Board should interpret “performance data” as “data, including application instance-level, application-level, device-level, and tier-level data.” PO Remand Resp. 2. Patent Owner argues “Petitioner’s proposed construction is identical to [Patent Owner’s] proposal except that it adds the unnecessary phrase ‘relating to the performance of one or more application instances,’” which “would be superfluous and risk improperly broadening claim scope.” *Id.* Patent Owner additionally argues that Petitioner’s arguments that performance data “encompasses CPU utilization data” and “timing metrics that measure how long it takes a computer system to perform a task” are irrelevant. *Id.*

In its Remand Reply, Petitioner contends Patent Owner’s construction would improperly remove “performance” from the definition. Pet. Remand

Reply 1. In its Remand Sur-reply, Patent Owner argues Petitioner’s definition would improperly broaden the claim language because “related to” is different than “associated with” and would eliminate the antecedent basis established by the word “said.” PO Remand Sur-reply 1.

We find Petitioner’s proposed construction to be generally consistent with the intrinsic record (including the claim language) and the Federal Circuit’s guidance. However, we decline to adopt the use of “related to” instead of “associated with” in Petitioner’s proposed construction because we determine the language used in the claim, “associated with,” is clear enough on its face and Petitioner provides no persuasive justification for altering the plain meaning to “related to”. Consistent with the Federal Circuit’s guidance, we determine the proper construction of “performance data” further includes data pertaining to the performance of a server and/or a technology tier. *Netflix*, 2024 WL 3507601 at *6 (citing Ex. 1001, 3:56–57, 4:3–8, 4:14–18, 7:26–29). Accordingly, we determine “performance data” means “data associated with the performance of one or more application instances, including instance-level, application-level, device-level, and tier-level data and includes data pertaining to the performance of a server and/or a technology tier.”

We determine no other terms require express construction. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. Independent Claims 1, 9, and 17

Petitioner’s analysis addresses independent claims 1, 9, and 17 collectively, as the claims differ only in the preambles and preliminary

elements. *See* Pet. 27. The Petition includes a limitation-by-limitation comparison of Masters to each limitation of each claim with citations to the Declaration of Prashant Shenoy (Ex. 1003) as additional support.

Pet. 28–62.

1. Preambles/Preliminary Elements

1[a]. A method, comprising:

9[a]. A computer accessible medium, including program instructions executable to implement a method comprising:

17[a]. A performance monitoring system, comprising: a processor; a memory coupled to the processor for storing program instructions executable by said processor to implement:

The parties do not specifically address whether the preambles of claims 1, 9, and 17 are limiting. Petitioner states that to the extent the preambles are limiting, Masters teaches each preamble with its “system that monitors the performance of ‘hosts, networks, and applications within a distributed computing environment.’” Pet. 28 (quoting Ex. 1004, 4:8–12). Petitioner additionally cites Masters as teaching a system embodied in software stored in memory and executed by a processor. Pet. 28–32 (citing, e.g., Ex. 1004, 1:31–34, 55:41–56:33, Figs. 1A, 1B, 15; Ex. 1003 ¶¶ 63–70).

Patent Owner does not address or rebut Petitioner’s showing for the preambles and preliminary elements. We determine Petitioner shows Masters teaches the preamble limitations, to the extent they are limiting.

2. *Collecting Limitations*

[1b] collecting performance data for one or more application instances, wherein the performance data is associated with the performance of said one or more application instances, wherein each application instance is a computer program executing on a computer system;

[9b] collecting performance data for one or more application instances, wherein the performance data is associated with the performance of said one or more application instances, wherein each application instance is a computer program executing on a computer system;

[17b] collecting performance data for one or more application instances, wherein the performance data is associated with the performance of said one or more application instances, wherein each application instance is a computer program executing on a computer system;

Petitioner contends Masters teaches the collecting limitations with its descriptions of collecting performance data “for all copies of a scalable application—i.e., for each ‘application instance.’” Pet. 32 (citing Ex. 1004, 2:44–52, 4:8–12, 5:48–51, 6:64–7:2; Ex. 1003 ¶¶ 73–74). Petitioner states Masters teaches that application status and performance data is collected from each application instance and transmitted to the Resource Management hardware. Pet. 34 (citing Ex. 1004, Figs. 1A, 1B). Petitioner further contends that Masters teaches that different “functional groups” in the Resource Management Architecture are part of the collection of performance data. Pet. 35–36 (citing Ex. 1004, 7:33–58, 9:28–42, 10:18–31, 12:1–10; Ex. 1003 ¶¶ 78, 88).

Among other cited portions, Petitioner cites Masters’ teachings of “Application Level Instrumentation” and an “instrumentation function group provides general-purpose application event reporting and event correlation

capabilities. Capabilities are provided for collecting and correlating application-provided data such as application statuses, states, performance, and internally detected errors.” Pet. 36 (citing Ex. 1004, 7:44–58).

Petitioner also states that Masters teaches that performance data is associated with a “process id” for tracking specific application instances. Pet. 38 (citing Ex. 1004, 22:63–23:13; Ex. 1003 ¶ 82). Further, Petitioner contends Masters’ “Quality of Service” managers use the performance data to determine whether copies of an application should be made, terminated, or moved. Pet. 38 (citing Ex. 1004, 18:43–48, 18:56–58, 22:63–23:27, 39:58–40:25; Ex. 1003 ¶ 114). And Petitioner cites examples of performance data that is collected, including “inter-processing times, throughputs, and latencies,” as well as “host computer performance data” and “network performance data” such as “CPU utilization, memory utilization, network packets in, network packets out, and paging activity.” Pet. 38 (citing Ex. 1004, 7:33–43, 8:16–34, 9:28–42, 10:18–31, 18:24–39, 29:51–56, 45:36–48, Fig. 9B; Ex. 1003 ¶¶ 85–88).

Patent Owner does not directly rebut Petitioner’s showings for the Collecting Limitations, but Patent Owner contends Petitioner is not consistent with its mapping of the Collecting Limitations and the Correlating Limitations. *See, e.g.*, PO Resp. 36, 47, 53. We determine Petitioner shows Masters teaches the Collecting Limitations. We address Patent Owner’s arguments about the consistency of Petitioner’s mapping below with our discussion of the Correlating Limitations.

3. *Detecting Limitations*

[1c] detecting one or more instance life cycle events associated with said one or more application instances, wherein said one or more instance life cycle events comprise at least one of: the creation of at least one of said one or more application instances, the destruction of
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at least one of said one or more application instances, and the migration of at least one of said application instances;

[9c] detecting one or more instance life cycle events associated with said one or more application instances, wherein said one or more instance life cycle events comprise at least one of: the creation of at least one of said one or more application instances, the destruction of at least one of said one or more application instances, and the migration of at least one of said one or more application instances;

[17c] detecting one or more instance life cycle events associated with said one or more application instances, wherein said one or more instance life cycle events comprise at least one of: the creation of at least one of said one or more application instances, the destruction of at least one of said one or more application instances, and the migration of at least one of said one or more application instances;

Petitioner contends Masters teaches the detecting limitations with its “Application Control” function that detects when an application instance starts and stops as a result of decisions to “scale up” and “scale down” instances of the application. Pet. 39. Among other things, Petitioner asserts that a person of ordinary skill would have understood that “starting/scaling-up copies of an application is a ‘creation’ event and stopping/scaling-down copies of an application is a ‘destruction’ event.” Pet. 39–40 (citing Ex. 1004, 33:56–63, 53:7–14; Ex. 1003 ¶ 89). Petitioner states that Masters’ “Application Control functional group [FG5]” controls starting, stopping, and configuring applications on each host in the distributed computing environment and “Program Control FG50 of FG5” sends out immediate notifications when applications are started up, are shutdown, or fail. Pet. 41 (citing Ex. 1004, 26:39–43). Petitioner also contends Masters teaches detecting life cycle events and sending “application status updates” upon the

detection of faults and critical errors. Pet. 42–43 (citing Ex. 1004, 8:53–56, 24:5–6, 24:26–29, 24:42–44, 26:15–20, 32:65–33:8; Ex. 1003 ¶ 92).

Patent Owner does not expressly address or rebut Petitioner’s showings regarding the Detecting Limitations, but, as explained in our analysis of the correlating limitation below, Patent Owner’s arguments regarding the Correlating Limitations reflect disagreements with Petitioner’s position that Masters teaches life cycle events, as claimed. We determine Petitioner shows Masters teaches the Detecting Limitations. We address Patent Owner’s arguments regarding life cycle events below with our discussion of the Correlating Limitations.

4. Correlating Limitations

[1d] correlating said performance data to said one or more instance life cycle events; and

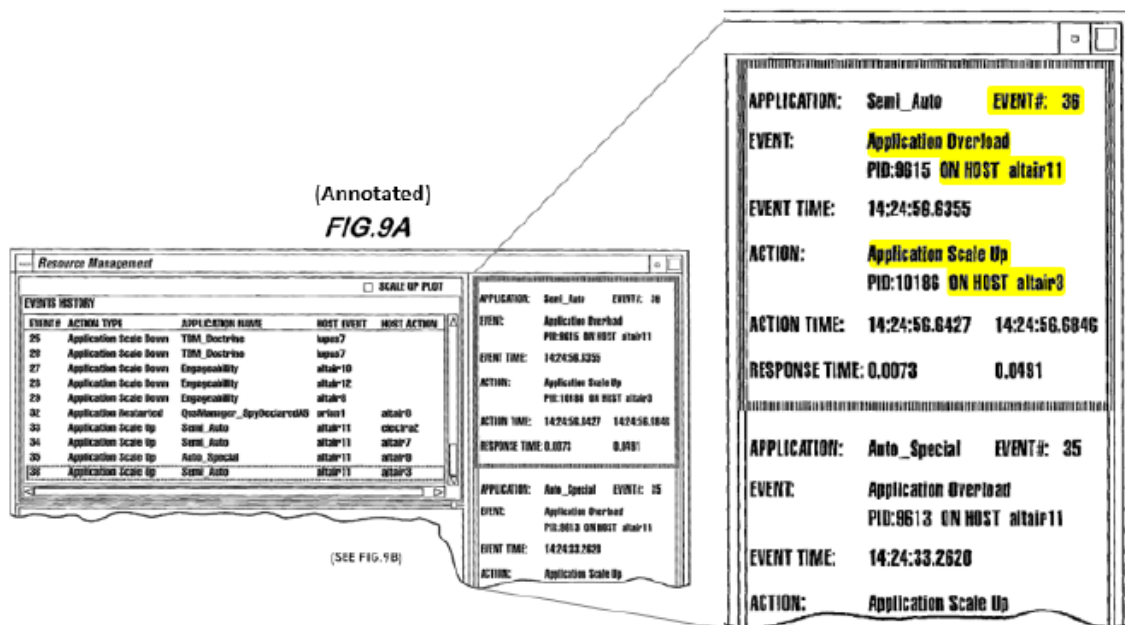
[9d] correlating said performance data to said one or more instance life cycle events; and

[17d] correlating said performance data to said one or more instance life cycle events; and

Petitioner contends that the Correlating Limitations would have been obvious in view of Masters because, according to Petitioner, “Masters teaches that the RMA correlates performance data with the starting/scaling-up (i.e., creation) and stopping/scaling-down (i.e., destruction) of application instances.” Pet. 45 (citing Ex. 1003 ¶ 94). Petitioner contends that Masters specifically teaches that its RMA correlates application statuses, states, performance, and internally detected errors. Pet. 45 (citing Ex. 1004, 7:48–49, 12:7–10). According to Petitioner, “[t]he ‘application statuses’ that are correlated with performance data include indications ‘of any applications which have been started or stopped.’” Pet. 45 (citing Ex. 1004 22:48–53,

39:42–47, 33:56–63, 53:7–14). Petitioner contends Masters teaches “Instrumentation Correlators” that receive application data and correlate the performance data with different events into higher-level metrics for use by displays or other functions of the RMA. Pet. 45–46 (citing Ex. 1004, 7:55–58, 12:15–19, 13:18–24; Ex. 1003 ¶ 95).

Petitioner also contends that Masters use of correlated data for reports and displays, such as the “‘Resource Management Decision Review Display[s],’ provide users with performance data correlated to ‘allocation decisions’—i.e., the decision to start, stop, or move application instances.” Pet. 46 (citing Ex. 1004, 18:24–47, 20:37–49, 29:36–40, 30:1–10, Figs. 9A, 9B; Ex. 1003 ¶ 97–99). According to Petitioner, Masters’ Figure 9A, copied below with Petitioner’s highlighting, “provides an example of a ‘Resource Management Decision Review Display’” showing performance data.



Pet. 47–48. Masters’ Figure 9A represents “a screen capture of the Resource Management Decision Review Display, which provides a summary of

allocation and reallocation actions taken by the Resource Manager.”

Ex. 1001, 3:22–25.

Petitioner contends that “Figure 9A depicts ‘Event #36’ (highlighted in yellow), which is associated with the creation of a new application instance (‘Application Scale Up’) on host ‘altair3.’” Pet. 47. According to Petitioner, Figure 9A indicates that the life cycle event was triggered for load balancing reasons, as indicated by the “Event: Overload” on host “altair11.” Pet. 47. Further, Petitioner states that Figure 9A “shows that Event 36 correlates the ‘Application Scale Up’ life cycle event (i.e., the creation of a new application instance) with performance data, such as the response time for creating the new application instance and the time-of-day of the creation event.” Pet. 48 (citing Ex. 1004, 20:37–44, 34:60–35:3, Fig. 9A; Ex. 1003 ¶¶ 102–103).

Petitioner also cites Masters’ Figure 9B, copied below with Petitioner’s annotations.

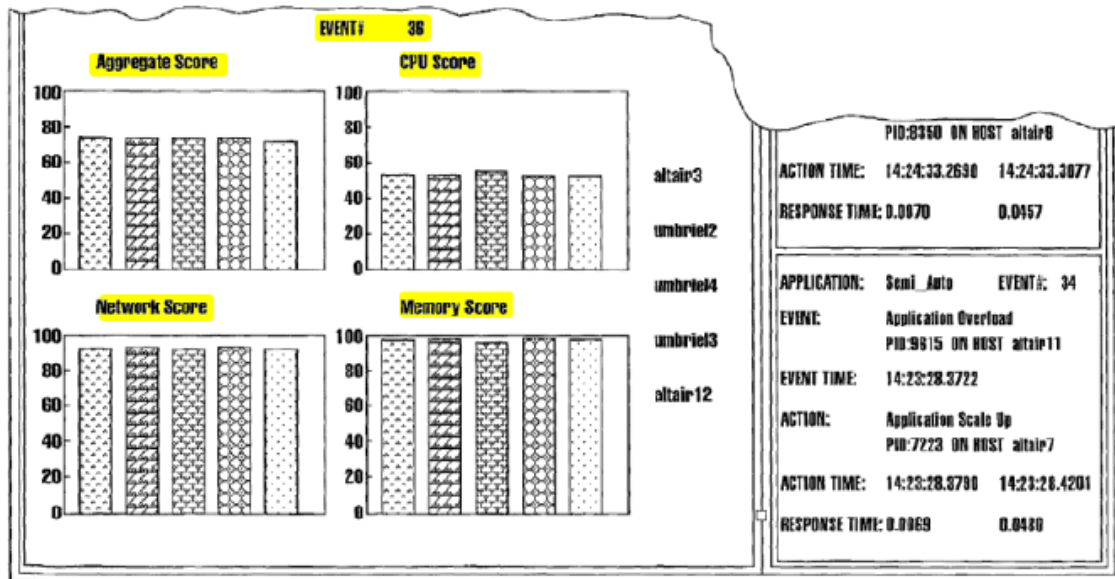


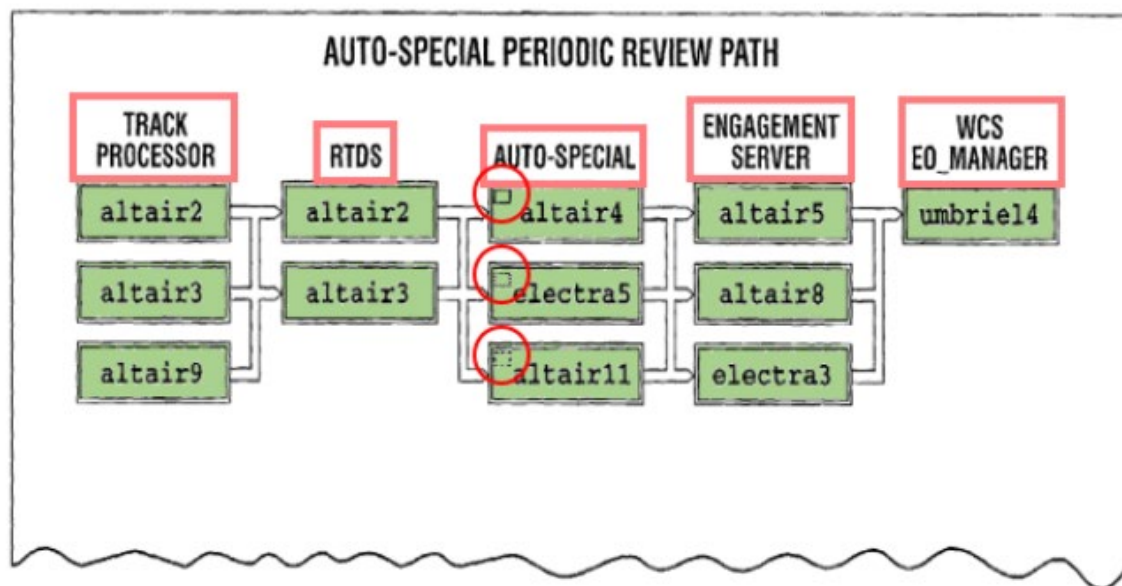
FIG.9B

Pet. 49. Masters' Figure 9B represents "a screen capture of the Resource Management Decision Review Display, which provides a summary of allocation and reallocation actions taken by the Resource Manager."

Ex. 1001, 3:22–25. According to Petitioner, Figure 9B is another example of "performance data correlated with the 'Application Scale Up' event (Event 36), including the 'aggregate' health score, and the memory, CPU, and network health for various hosts in the distributed computing system at the time of the life cycle event." Pet. 49 (citing Ex. 1003 ¶ 104).

Petitioner additionally cites the "Path Displays" of Figures 8A and 8B. Pet. 50–55. Copied below are Petitioner's annotated versions of Figures 8A and 8B.

FIG. 8A
(Annotated)



(SEE FIG. 8B)

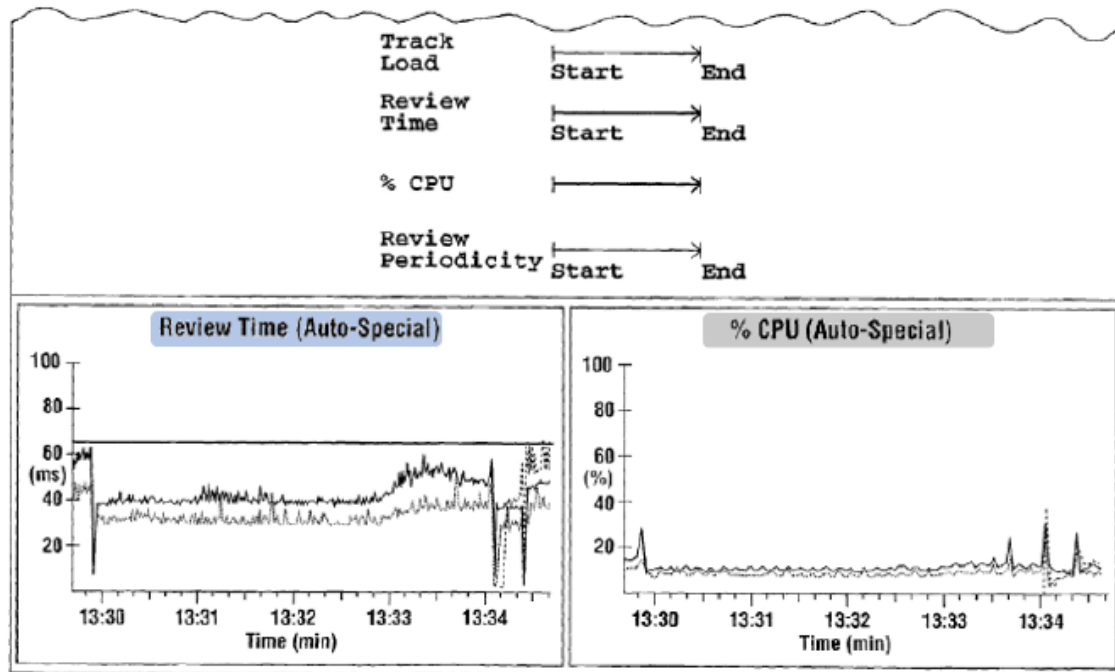


FIG. 8B
(Annotated)

Masters' Figures 8A and 8B “represent a screen capture of a path display generated by the Resource Management Architecture.” Ex. 1001, 3:19–21.

According to Petitioner, Figure 8A depicts five applications (boxed in red) and 12 application instances (highlighted in green) (Pet. 50), and Petitioner states that “three instances of the ‘Auto-Special’ application have been selected for reporting, as indicated by the broken-line rectangles shown for those instances (circled in red)” (Pet. 51). Petitioner states that Figure 8B “correlates an application instance life cycle event—the creation of a new application instance on altair11 at approximately 13:34 [Time (min)]—with the performance of each of the application instances executing the ‘Auto-Special’ application.” Pet. 53 (citing Ex. 1003 ¶ 111). Petitioner contends Figure 8B correlates the creation of that application instance shortly after 13:34 with the performance of each of the “Auto-Special” instances, and “upon creation of the third application instance, the review

time of the two other application instances drops (at first dramatically), while the review time for the new instance climbs.” Pet. 53–54. Petitioner additionally argues that, to the extent Masters does not directly teach correlating, “a POSITA would have been motivated to correlate these life cycle events with performance data to verify that creating/destroying/migrating an application instance solved the performance issue that triggered the life cycle action.” Pet. 58 (citing Ex. 1003 ¶ 120).

Patent Owner argues Masters does not teach or suggest the Correlating Limitations and that Petitioner’s mapping of the claim elements to the Correlating Limitations is not consistent with the antecedent bases of each claim element. PO Resp. 25–60. According to Patent Owner, “the timing information shown in FIGS. 9A and 9B indicate (a) how long the RMA (through FG42) took to make a decision and (b) how long the RMA (through FG50) took to implement the decision.” *Id.* at 29 (citing Ex. 1004, 30:1–19; Ex. 2001 ¶¶ 63–65). More specifically, Patent Owner states that in Figure 9A, “RESPONSE TIME 0.0073 is the amount of time it took the RMA (through FG42) to make a decision to start up an application and RESPONSE TIME 0.0491 is the amount of time it took the RMA (through FG50) to implement this decision—*i.e.*, these numbers are response times of the RMA, not the response times of any application instance.” PO Resp. 33 (citing Ex. 2001 ¶¶ 70–74); PO Remand Resp. 4. Patent Owner similarly argues Figure 9B shows “‘host-level performance data’ for various hosts (*i.e.*, machines) – not performance data for application instances.” PO Resp. 35. Further, Patent Owner argues “the data displayed on FIGS. 9A and 9B cannot satisfy the Collecting Limitations of the Challenged Claims” and “it is impossible for FIGS. 9A and 9B to satisfy the Correlating Limitations because to do so would require FIGS. 9A and 9B to show a

correlation between data associated with the performance of the scaled up application from Event #36 and the scaled up event itself – performance data that is simply not contained in FIGS. 9A and 9B.” PO Resp. 38. Patent Owner additionally argues that nothing in Figures 9A and 9B shows any type of relationship established between the scaled up event of Event # 36 and any other data whatsoever.” PO Resp. 39 (citing Ex. 2001 ¶ 80); PO Remand Resp. 4–5. According to Patent Owner, “the performance data and the life cycle event must *both* be associated with *the same* application instance,” but Masters’ CPU data and response time have “no connection to the performance of a new application instance because the new application instance does not perform until after the response time has passed.” PO Remand Sur-reply 3–4.

Addressing Figures 8A and 8B, Patent Owner argues “it is entirely unclear whether the data shown in the Review Time (Auto-Special) and/or % CPU (Auto-Special) graphs are performance data associated with the Auto-Special application” and “Petitioner has not satisfied its burden to demonstrate that FIG. 8B shows the collection of performance data for an application instance.” PO Resp. 47 (citing Ex. 2001 ¶¶ 84, 88–89). Patent Owner also argues that Petitioner has not carried its burden to show that “Figure 8B depicts a detection of a life cycle event associated with the same one or more application instances for which the system collects performance data.” PO Resp. 48. According to Patent Owner, “FIG. 8B shows certain performance data for the copies of application Auto-Special on the three hosts from the period just before 13:30 to just after 13:34” and “[w]hile these graphs indicate that an application instance on host altair11 begins functioning at approximately 13:34, nothing in FIGS. 8A or 8b indicate[s] that this application instance was ‘created’ at 13:34.” PO Resp. 48–49; PO

Remand Resp. 6–7, 10. Rather, quoting Dr. Rosenblum, Patent Owner argues that Figure 8B depicts that host altair11 “began to service some sort of load at around 13:34” and it is “equally likely, if not more likely, that the copy of Auto-Special on altair11 was in existence during the entire period depicted on Fig. 9B, and the RMA merely shifted load to the copy of the Auto-Special application on altair11 in response to the increased overall load on the system.” PO Resp. 49 (quoting Ex. 2001 ¶¶ 87, 91); *see* PO Remand Sur-reply 5 (arguing that the Board previously held that Figure 8B does not indicate that a life cycle event occurred at 13:34). Further, Patent Owner argues Petitioner’s declarant Dr. Shenoy was unable to explain what information is depicted in Figure 8B. PO Resp. 49–54; PO Remand Resp. 6–7.

Contrary to Patent Owner’s argument, Masters depicts the creation of an application instance and related performance data in Figures 8A and 8B. This is confirmed by Masters’ Appendix J⁸ (Ex. 1024), which includes the screen capture copied below:

⁸ Appendix J was filed on a CD-ROM with the patent application that ultimately issued as Masters (US Patent No. 7,051,098) and is part and parcel to Masters itself. *Netflix*, 2024 WL 3507601 at *8.

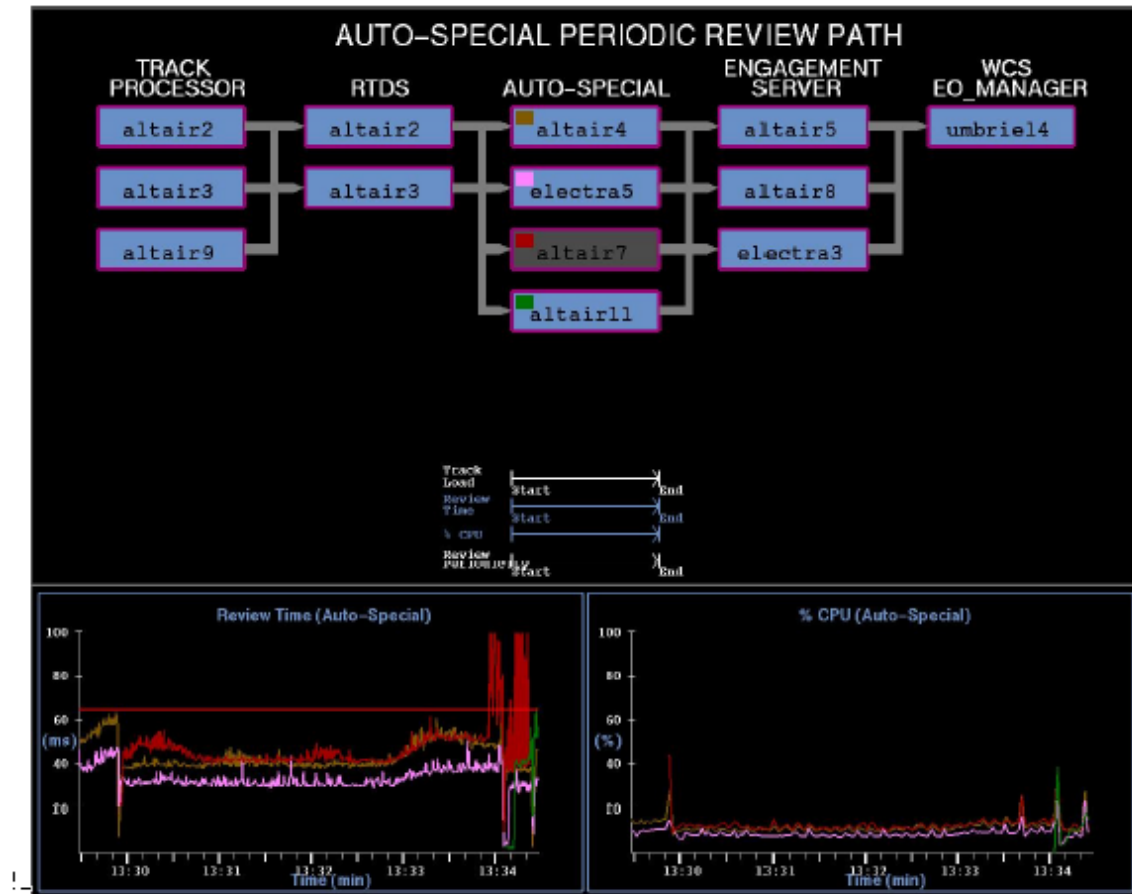


Figure 5.6.2.1-2

Ex. 1024, 38. Figure 5.6.2.1-2 in Masters' Appendix J "is a screen capture of the Path Display that shows a[] Resource Manager action was taken."

Ex. 1024, 38. The Figure "shows the review times in the first graph (from the left) and the CPU utilization by each process in the second graph, corresponding to the blue lines in the center of the screen." Ex. 1024, 39. In the Figure "[t]he color of the lines in the graph correspond to the colors in the corner of the process boxes at the top of the screen in this case the Auto-Special processes." *Id.* The Figure shows that "[t]he Altair7 Auto-Special process clearly has longer review times than other processes, so the Resource Manager terminates this copy and starts another on Altair11. The

green line at the edge of the first graph indicates the new process' review time." *Id.*

Applying our construction of "performance data," we agree with Petitioner that, among other things, the CPU utilization and review time shown in Masters' Figure 5.6.2.1-2 and Figures 8A and 8B fall within the scope of the claimed "performance data." *See* Pet. 50–56; Reply 17. The CPU utilization data and review time data are both data associated with the performance of one or more application instances. Further, the Figures and corresponding description in Appendix J evidence collection of the performance data for each application instance. Pet. 34–38, 50; Ex. 1024, 39. Similarly, the startup of a copy of the Auto-Special process on Altair11 constitutes a life cycle event, as it is the creation of an application instance, and the termination of Auto-Special on Altair7 is another example of a life cycle event, as claimed. Ex. 1024, 39; *see* Pet. 39–44. We agree with Petitioner that these Figures and related descriptions in Masters teach collecting performance data and correlating the performance data to the life cycle events. *See* Pet. 46, 50–55.

We also agree with Petitioner that Masters' Figures 9A and 9B similarly show the collection and correlation of performance data, at least with the response time, action time, CPU score, and similar metrics depicted in the Figures. Pet. 47–49. Figures 9A and 9B show the correlation of the performance data to a life cycle event, by, for example, depicting the performance issue (an overload on Altair11) that cause the creation of a new application instance on Altair3. Pet. Reply 12. We agree with Petitioner that the response time to trigger the creation of an application instance on Altair3 and the amount of time the application instance takes to start are two examples of performance data correlated with the life cycle event. Pet.

Reply 12–14; *see Netflix*, 2024 WL 3507601 at *2, n.5. As stated in Masters, Figures 9A and 9B depict Masters’ Decision Review Display that provides a summary of allocation and reallocation actions taken by the RMA, and “[f]or each action, timing information regarding how long it took the Resource Management functions, e.g., the Resource Manager . . . and the Program Controller . . . , to both arrive at a decision and to enact the decided action are shown along with host fitness scores that were used in arriving at the allocation decision.” Ex. 1004, 30:1–10. We disagree with Patent Owner’s arguments that the Masters’ “response time” “cannot be associated with the performance of the ‘Semi-Auto’ application instance because the response time passes before the instance exists” (PO Remand Br. 4), and we agree with Petitioner that the time required to start an application instance is a metric associated with the creation of that instance.

In sum, we agree with Petitioner that Masters teaches the Correlating Limitations.

5. *Storing Limitations*

[1e] storing the correlated performance data.

[9e] storing the correlated performance data.

[17e] storing the correlated performance data.

Among other things, Petitioner contends Masters teaches the use of history servers to store performance data. Pet. 60 (citing Ex. 1004, 5:67–6:36, 9:66–10:5, 19:53–59, 44:58–60, 46:41–44; Ex. 1003 ¶ 123). Petitioner also argues Masters teaches storing performance data correlated to life cycle events for use in displays and in making resource allocation recommendations. Pet. 60–63. Specifically, Petitioner contends that Figures 8A, 8B, 9A, and 9B display CPU usage, review time, response time, and

other metrics correlated to the creation of a new application instance and that a person of ordinary skill would have understood that such data is stored in a memory so that it can be displayed. Pet. 62.

Patent Owner argues that “the data set forth in FIGS. 8A–9B does not satisfy the Correlating Limitations” and “[t]herefore, Petitioner cannot rely on this data to satisfy the Storing Limitations.” PO Resp. 61. Patent Owner additionally contends that Masters does not state that the information in Figures 8A, 8B, 9A, and 9C is stored in its History Servers, and Patent Owner argues displaying “real-time graphs” such as those in Masters’ Figures “does not capture the correlation relationship to the extent there was any correlated relationship to begin with.” *Id.* (citing Ex. 2001 ¶¶ 106–109).

We agree with Petitioner that Masters’ Figures and related descriptions teach or suggest storing performance data correlated with the one or more life cycle events. Pet. 60–63. We find credible Dr. Shenoy’s testimony that, among other things, Masters teaches storing performance data correlated to life cycle events at least because Masters teaches displaying that the correlated performance data in displays and using the correlated performance data to make resource allocation decisions, and a POSITA would reasonably understand Masters’ history servers to store such data. Ex. 1003 ¶¶ 123–127. Patent Owner and Dr. Rosenblum apply an incorrect construction of “performance data” to argue that storage of the data illustrated in Figures 8A, 8B, 9A, and 9B does not satisfy the Storing Limitations. We also agree with Petitioner that the Storing Limitations merely claim conventional activity that would have been obvious in view of Masters’ teachings. *See* Reply 28.

6. Conclusion Regarding Claims 1, 9, and 17

Having considered the complete record, for the reasons explained above, we determine Petitioner has proven by a preponderance of the evidence that claims 1, 9, and 17 are unpatentable as obvious in view of Masters.

E. Dependent claims 2, 10, and 18

2. The method of claim 1, wherein the one or more application instances are instances of an application, and wherein said correlating said performance data to one or more instance life cycle events comprises correlating the one or more instance life cycle events to the performance of the application.

10. The computer accessible medium of claim 9, wherein the one or more application instances are instances of an application, and wherein said correlating said performance data to one or more instance life cycle events comprises correlating the one or more instance life cycle events to the performance of the application.

18. The performance monitoring system of claim 17, wherein the one or more application instances are instances of an application, and wherein said correlating said performance data to one or more instance life cycle events comprises correlating the one or more instance life cycle events to the performance of the application.

Petitioner argues Masters teaches that its RMA monitors the performance of instances of each application instance running on its host computers. Pet. 64–65. Petitioner further states that Masters teaches correlating the one or more instance life cycle events to the performance of the application for the same reasons discussed above with the Correlating Limitations of claims 1, 9, and 17. Pet. 65. As one example, Petitioner contends Figures 8A and 8B correlate the creation of a new application instance with the performance of the overall application Auto-Special. *Id.*

Patent Owner relies on the same arguments addressed above to assert that Masters' Figures 8A–9A fail to demonstrate any correlation that would satisfy the Correlating Limitations of claims 1, 9, and 17. PO Resp. 64.

For the same reasons addressed above, we agree with Petitioner that Masters' Figures 8A and 8B teach correlating the creation of a new application instance with the performance of the application, e.g., Auto-Special. We further agree with Petitioner that Masters teaches correlating one or more life cycle events to the performance of the application. Accordingly, we determine Petitioner has shown by a preponderance of the evidence that claims 2, 10, and 18 are unpatentable in view of Masters.

F. Dependent claims 3, 11, and 19

3. The method of claim 2, wherein said correlating said performance data to one or more instance life cycle events comprises determining the change in performance of the application as the one or more application instances are created and destroyed.

11. The computer accessible medium of claim 10, wherein said correlating said performance data to one or more instance life cycle events comprises determining the change in performance of the application as the one or more application instances are created and destroyed.

19. The performance monitoring system of claim 18, wherein said correlating said performance data to one or more instance life cycle events comprises determining the change in performance of the application as the one or more application instances are created and destroyed.

Petitioner contends claims 3, 11, and 19 are obvious for the same reasons addressed above regarding claims 1, 9, and 17. Pet. 67. Specifically, Petitioner argues that, among other things, Figures 8A and 8B show how the performance of the Auto-Special application changed when

one application instance was terminated and when a new instance was created. Pet. 67–68; Reply 31–32.

Patent Owner relies on the same arguments addressed above to assert that Masters’ Figures 8A and 8B fail to demonstrate any correlation that would satisfy the Correlating Limitations of claims 1, 9, and 17. PO Resp. 67–68.

For the same reasons addressed above, we agree with Petitioner that Masters’ Figures 8A and 8B teach correlating the creation of a new application instance with the performance of the application, e.g., Auto-Special and we further find Petitioner shows that Masters teaches determining the change in performance of the application as one or more application instances are created and destroyed. Accordingly, we determine Petitioner has shown by a preponderance of the evidence that claims 3, 11, and 19 are unpatentable in view of Masters.

G. Dependent claim 5, 13, and 21

5. The method of claim 1, wherein the one or more application instances are instances of a plurality of applications, wherein the plurality of applications are part of an application tier, and wherein said correlating said performance data to one or more instance life cycle events comprises correlating the one or more instance life cycle events to the performance of the application tier.

13. The computer accessible medium of claim 9, wherein the one or more application instances are instances of a plurality of applications, wherein the plurality of applications are part of an application tier, and wherein correlating said performance data to one or more instance life cycle events comprises correlating the one or more instance life cycle events to the performance of the application tier.

21. The performance monitoring system of claim 17, wherein the one or more application instances are instances of a plurality of applications, wherein the plurality of applications are part of an

application tier, and wherein correlating said performance data to one or more instance life cycle events comprises correlating the one or more instance life cycle events to the performance of the application tier.

In addition to its showings for independent claims 1, 9, and 17, Petitioner contends that Masters teaches a plurality of applications executing on hosts and that the hosts can be arranged into “pools.” Pet. 69–70, 75–77. Further, Petitioner contends that Masters’ Figures 8A and 8B depict monitoring and reporting the performance of applications at the instance level and at the application level, but, “[a]lthough Masters teaches grouping hardware components and applications for the purposes of performance monitoring, Masters does not specifically call any of these groupings an ‘application tier.’” Pet. 70 (citing Ex. 1003 ¶ 143); *see* Pet. 75–78.

Petitioner additionally cites Stone for its teachings of a “tiered service model” in which service components, such as servers, applications, databases, and other components are grouped into functional levels or tiers that correspond to the data flow for each service. Pet. 70 (citing Ex. 1005 ¶ 37), 78–83. Petitioner contends that a POSITA would have understood Stone to teach that a plurality of applications are part of an application tier in a tiered service model, which are organized into tiers based on their functional levels or their data flows. Pet. 80–81 (citing Ex. 1005 ¶¶ 9, 33, 37). Petitioner also contends that Stone teaches correlating instance life cycle events to the performance of the application tier. Pet. 81 (citing Ex. 1003 ¶ 164). According to Petitioner, “Stone teaches that grouping resources into these ‘tiers,’ including ‘application tiers,’ makes it easier to monitor performance and make resource allocation decisions.” Pet. 70 (citing Ex. 1005 ¶¶ 37, 38; Ex. 1003 ¶ 144).

Petitioner contends a POSITA would have been motivated to modify the RMA of Masters in view of Stone's teachings of multi-tiered service models for diagnosing performance issues for several reasons. Pet. 71 (citing Ex. 1003 ¶ 146). First, Petitioner contends Masters and Stone are both directed to monitoring systems for distributed computing environments, monitoring for compliance with performance objects, and automatically reallocating resources to ensure compliance with such objectives. Pet. 71 (citing Ex. 1003 ¶ 147; Ex. 1004, 2:44–47, 4:16–30, 8:24–30, 18:4–14, 18:43–48, 21:35–54, 37:39–59; Ex. 1005 ¶¶ 1, 23, 24, 33, 72, 80–87, Figs. 7, 8). Petitioner also argues Masters teaches grouping system resources by application and hardware components and monitoring applications and application instances as part of data flow groups such that “modifying the existing structure of Masters to adopt the similar ‘tiered’ organization as taught in Stone would be a very small step and further the goals already taught in Masters of tracking performance requirements that are tied to the data flow.” Pet. 72 (citing Ex. 1003 ¶ 148). Petitioner contends that adopting a tiered model as part of the RMA offered by Masters would allow the system to better diagnose problems and predict the impact on compliance with service-level objects and that organizing and monitoring service components by their functional levels into different tiers would allow the system to pinpoint the root cause of critical problems. Pet. 72–73 (citing Ex. 1003 ¶ 149; Ex. 1005 ¶¶ 26, 27, 33, 37, 38). Petitioner further argues that Stone's teachings are “complimentary to the resource allocation functions of Masters, where the RMA monitors the performance of data flow paths and scales software instances up and down to adjust application performance” and applying Stone's tiered model to Masters can lead to more

effective monitoring and management of distributed systems. Pet. 73 (citing Ex. 1004, 16:19–25, 18:42–62, 29:58–67; Ex. 1003 ¶ 150).

Petitioner also argues that “organizing system resources into tiers corresponding to the functional tiers or data flow was a routine and conventional design decision in November 2004.” Pet. 73 (citing Ex. 1012, 1:32–43, 1:54–63; Ex. 1003 ¶ 151). Petitioner contends a POSITA would have expected success in modifying the RMA of Masters in view of Stone because Masters’ QoS Managers perform similar roles to Stone’s SLO agents: “Just as the QoS Managers in Masters determine whether to scale up or move an application instance to improve performance, Stone uses the SLO agent and local agent monitors to identify performance issues and take corrective action, including by replicating a service component (software application.” Pet. 74 (citing Ex. 1004, 8:24–27, 21:40–59; Ex. 1005 ¶ 72, claim 10; Ex. 1003 ¶ 152). Further, Petitioner contends a POSITA would have expected success in modifying the RMA of Masters in view of Stone because Masters already monitors and correlates the performance of related or interconnected applications and application instances and organizing related applications and hardware components into an application tier in the RMA would have been routine and easily accomplished. Pet. 74 (citing Ex. 1003 ¶ 153).

Patent Owner does not substantively rebut Petitioner’s showings regarding the combined teachings of Masters and Stone nor Petitioner’s proposed motivations for combining the references’ teachings. Instead, Patent Owner argues that Stone fails to remedy the alleged deficiencies of Masters addressed above for independent claims 1, 9, and 17, and Patent Owner argues “Stone fails to teach anything more than allocating resources

based on performance data, which . . . is cumulative over the art of record in the '722 [p]atent.” PO Resp. 68.

We agree with Petitioner that Masters’ teachings regarding arranging applications and hosts in pools and Stone’s teachings regarding application tiers teach or reasonably suggest the additional requirements of claims 5, 13, and 21 and that a person of ordinary skill would have reason to combine the references’ complimentary teachings as the combination of conventional organization techniques with reasonable expectations of success.

Accordingly, having considered the complete record, we determine Petitioner has proven by a preponderance of the evidence that claims 5, 13, and 21 are unpatentable as obvious in view of the combined teachings of Masters and Stone.

IV. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 5, 9–11, 13, 17–19, and 21 of the '722 patent are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 9–11, 17–19	103(a)	Masters	1–3, 9–11, 17–19	
5, 13, 21	103(a)	Masters, Stone	5, 13, 21	
Overall Outcome			1–3, 5, 9–11, 13, 17–19, 21	

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–3, 5, 9–11, 13, 17–19, and 21 have been proven by a preponderance of the evidence to be unpatentable; and

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.

rvb

IPR2021-00045
Patent 7,457,722 B1

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