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14 TERADATA US, INC.

15

16   UNITED STATES DISTRICT COURT

17   NORTHERN DISTRICT OF CALIFORNIA

18

19 TERADATA US, INC,   Case No. 3:20-cv-06127-WHO

20   Plaintiff,
                                            **FIRST AMENDED COMPLAINT FOR
21   v.   PATENT INFRINGEMENT**

22 SAP SE, SAP AMERICA, INC., and   **DEMAND FOR JURY TRIAL**
   SAP LABS, LLC,
23
                Defendants.
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1   Plaintiff Teradata US, Inc. ("Teradata") complains and alleges as follows against

2 Defendants SAP SE, SAP America, Inc., and SAP Labs, LLC (collectively, "SAP").

3   **THE NATURE OF THE ACTION**

4   1.   This is an action against SAP for its infringement of United States Patents

5 owned by Teradata. Teradata, along with Teradata Corporation and Teradata Operations,

6 Inc. have sued SAP in a pending action in this District challenging practices by SAP that

7 constitute misappropriation of trade secrets and violate antitrust laws, *Teradata Corp., et al.*

8 *v. SAP SE et al.*, 3:18-CV-03670-WHO (JCS) (the "Trade Secret/Antitrust Action"). In that

9 case, SAP has filed counterclaims alleging that Teradata Corporation and Teradata

10 Operations, Inc. infringe five United States patents. Responding to the counterclaims,

11 Teradata investigated the patents SAP is asserting and has shown that Teradata prior art

12 systems preceded several of the asserted SAP patents in practicing technology that SAP

13 claimed to be novel when it sought issuance of the patents. The investigation led Teradata

14 also to identify its own five patents that are infringed by SAP, and in particular by the SAP

15 HANA product.

16   2.   Teradata's pending Trade Secret/Antitrust Action arises because SAP engaged

17 Teradata under false pretenses in a purported joint venture beginning in 2008 to gain access

18 to Teradata's valuable intellectual property. SAP stole Teradata's trade secrets and used

19 them in a competing (though inferior) product, SAP HANA. SAP's violation of Teradata's

20 intellectual property rights did not stop there. In adapting SAP HANA to compete with

21 Teradata Database, SAP also created a product that infringes the following patents owned by

22 Teradata US, Inc.:

23   • United States Patent No. 6,763,357 (the '357 Patent).

24   • United States Patent No. 7,185,000 (the '000 Patent).

25   • United States Patent No. 7,904,419 (the '419 Patent).

26   • United States Patent No. 9,851,923 (the '923 Patent).

27   • United States Patent No. 9,720,623 (the '623 Patent).

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FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT
CASE NO. 3:20-CV-06127-WHO
sf-4371664

1

PARTIES

3.   Teradata US, Inc. is a corporation organized under the laws of Delaware, with its headquarters at to 17095 Via del Campo, San Diego, California 92127. Teradata US, Inc. is the owner of the patents being asserted in this action. Teradata, along with its affiliates owned directly or indirectly by its parent Teradata Corporation, makes Teradata Database and other information processing products that it sells to its United States distributor, Teradata Operations, Inc. Teradata Operations, Inc. sells Teradata products to customers.

4.   Defendant SAP SE is a European company. Its principal place of business is located at Dietmar-Hopp-Allee 16, Walldorf, Germany, 69190. SAP SE converted from a German "AG" corporation to an "SE" European company in 2014.

5.   Defendant SAP America, Inc. ("SAP America"), a wholly-owned subsidiary of SAP SE, is a Delaware corporation. Its principal place of business is 3999 West Chester Pike, Newtown Square, PA 19073, and it also has a place of business located in this District, at 1999 Harrison Street, Suite 675, Oakland, CA 94612. SAP America is responsible for sales, marketing, distribution, technical support, and customer service related to SAP HANA occurring in the United States, including throughout this District.

6.   Defendant SAP Labs, LLC ("SAP Labs"), a wholly owned subsidiary of SAP America, is a Delaware limited liability company. SAP Labs has places of business in Palo Alto and San Francisco, California, including its Co-Innovation Lab ("COIL") facility located at 3410 Hillview Avenue, Palo Alto, CA 94304. COIL housed a development, analysis, and testing environment for the SAP-Teradata joint venture discussed herein (known as the "Bridge Project") and featured customer demonstrations of the integrated solution jointly developed by SAP and Teradata (referred to as "Teradata Foundation"). SAP Labs conducts research, development, and engineering activities related to SAP HANA.

JURISDICTION

7.   This Court has subject matter jurisdiction under 28 U.S.C. 1331 and under 28 U.S.C. § 1400(b).

8.   This Court has personal jurisdiction over SAP SE, SAP America, and SAP Labs (collectively, "SAP"). This Court has personal jurisdiction over SAP SE because it has submitted to this court's jurisdiction by bringing claims of patent infringement here, and it has committed acts of patent infringement and, through its subsidiaries, has a regular and established place of business within this District.

9.   This Court has personal jurisdiction over SAP America because it has committed acts of patent infringement and has a regular and established place of business within this District.

10.   This Court has personal jurisdiction over SAP Labs because it has committed acts of patent infringement and has a regular and established place of business within this District.

VENUE AND INTRADISTRICT ASSIGNMENT

11.   Venue is proper under 28 U.S.C. § 1391(b) because a substantial part of the events or omissions giving rise to the claims occurred or a substantial part of property that is the subject of the action is situated in this District. Venue as to SAP SE is proper under 28 U.S.C. § 1391(c)(3) because SAP SE is not a resident in the United States. Additionally, venue is proper under 28 U.S.C. § 1400(b) because SAP Labs and SAP America (and SAP SE, through its subsidiaries) each has a regular and established place of business in this district.

12.   This is a Patent Infringement action to be assigned on a district-wide basis pursuant to Civil Local Rule 3-2(c).

BACKGROUND

Teradata Is One of the World's Leading Technology Companies and a Pioneer of Enterprise Data Analysis and Warehousing.

13.   Teradata's flagship product, and the cornerstone of all of its enterprise-analytics offerings, is Teradata Database. Teradata Database is a massively parallel relational database management system (RDBMS) specifically designed for Enterprise Data Analytics and Warehousing (EDAW). EDAW involves the centralized storage and

1   integration of vast amounts of data collected from numerous sources across an entire

2   business enterprise in its day-to-day operations, giving the business a complete "enterprise

3   view" of its operational activities. In addition to data storage, EDAW is especially valuable

4   in helping the world's largest companies (most of whom serve millions or even billions of

5   customers and/or process millions or billions of transactions or data-generating events every

6   day) analyze and fully understand the entirety of their business operations, including how

7   events happening in one area of the business impact operations in other areas. EDAW also

8   assists these companies in making the strategic and tactical decisions, often in real-time,

9   which allow them to operate as efficiently and profitably as possible.

10   14.   Teradata has been a leading provider of EDAW products for nearly 40 years.

11   Teradata pioneered and was the first commercial EDAW vendor to employ the highly

12   scalable computing architecture known as "massively parallel processing" (MPP).

13   Teradata's MPP architecture is designed specifically for executing high volumes of complex

14   analytical queries (tens of thousands at a time) on the massive amounts of data generated by

15   EDAW customers. As the term MPP suggests, Teradata's architecture accomplishes this by

16   distributing both the data and the analytical workload across dozens, hundreds, or (in many

17   cases) thousands of parallel processor units, and executing the analytical tasks concurrently

18   across these parallel units.

19   15.   Teradata's technology grew out of research conducted at the California

20   Institute of Technology. After starting the company in a garage in Marina Del Rey,

21   California, the founders obtained funding in mid-1979 and Teradata was born on July 13,

22   1979. The founders chose the name "Teradata" to symbolize the ability of their flagship

23   database to manage trillions of bytes of data, an unimaginable amount of data at that time.

24   16.   Teradata released the first commercial system incorporating its MPP

25   architecture in the early 1980s and has spent the last four decades expanding and improving

26   its technology. In 1983, Teradata received the seminal patent on first-generation MPP

27   design for data analytics (hardware-based parallelism; U.S. No. 4,412,285, "Multiprocessor

28   Interconnection System and Method"). Eleven years later it also received the seminal patent

1   on second-generation MPP design (software-based parallelism; U.S. No. 5,640,584, "Virtual

2   Processor Method and Apparatus for Enhancing Parallelism and Availability in Computer

3   Systems"), technology that continues to distinguish Teradata's systems from those of its

4   competitors today.

5   17.   In the 25 years since its early breakthroughs, Teradata has continued in its role

6   as the pioneer for massively parallel analytics, developing and patenting technologies that

7   remain the gold standard in a wide variety of technology areas. Teradata has developed

8   extensive intellectual property related to its database and data-analytics technologies,

9   obtaining more than 1000 patents.

10   **SAP Quickly Developed and Improved HANA, SAP's Flagship Database Offering,**
          by Misappropriating Teradata's Intellectual Property.
11

12   18.   Teradata's Trade Secret/Antitrust Action will demonstrate that while SAP led

13   Teradata to believe the two companies were actively partnering on a joint technology

14   development effort called the Bridge Project, SAP also was developing its own competing

15   database solution—SAP HANA. In the summer of 2009, just months after the Bridge

16   Project formally began, SAP co-founder Hasso Plattner and then-CTO Dr. Vishal Sikka

17   announced their goal of revitalizing SAP's lackluster and outdated product offerings by

18   developing a new, faster database architecture. Dr. Sikka restructured SAP's engineering

19   teams to develop and deploy SAP HANA less than a year later.

20   19.   On August 19, 2011, after the parties had been working on the Bridge Project

21   for nearly three years, SAP unilaterally terminated the project. Just days later in September

22   2011, SAP announced HANA for SAP BW, which combined front-end software with the

23   back-end database engine (HANA) for the purpose of creating an EDAW solution—and

24   entering competition with Teradata Database.

25   20.   The Teradata patents asserted in this action show that Teradata's innovations

26   predated the technology claimed in patents that SAP is asserting against Teradata in the

27   Trade Secret/Antitrust Action. Teradata's patents also predicted and addressed problems

28   that came to be inherent in the architecture of databases like HANA. Accordingly, in

1 addition to incorporating fruits of the trade secret misappropriation that Teradata will prove

2 in the Trade Secret/Antitrust Action, SAP HANA infringes the Teradata patents asserted

3 here.

COUNT I: INFRINGEMENT OF U. S. PATENT NO. 6,763,357

5   21.   Teradata hereby restates and re-alleges the allegations set forth in paragraphs 1

6 through 20 above and incorporates them by reference.

7   22.   A fundamental function of a relational database management system is to

8 make, manage, and select among alternative ways of performing queries seeking data from

9 the enterprise's database. Teradata's '357 Patent discloses and claims, among other things, a

10 system for storage of multi-dimensional data from a relational database management system

11 in active cache in response to at least a portion of a query, determining whether it is possible

12 to answer a second query by aggregating the cached data, and then answering the second

13 query by selecting an aggregation path from a plurality of possible aggregation paths.

14 Dependent claims of the '357 Patent describe a variety of selection criteria for aggregation

15 paths.

16   23.   The innovations in the '357 Patent involving storing data for responses to

17 queries in active cache can provide dramatic performance improvements over other ways of

18 generating query responses from data in a database.

19   24.   In July 2011, the '357 Patent was cited to SAP's subsidiary, Business Objects,

20 by a patent examiner during the prosecution of United States Patent No. 8,005,818. Further,

21 technology from Business Objects is currently integrated into SAP's products.[1] Teradata

22 will seek to determine in discovery whether SAP became aware of the '357 Patent or

23 whether SAP deliberately avoided learning about the '357 Patent given its familiarity with

24 Teradata's technology and its developers from working with Teradata on the Bridge Project,

25 its awareness of Teradata's activities in the EDAW field—specifically targeting the same

26 _____

27 [1] For example, SAP's website brands one if its products as "SAP BusinessObjects Business Intelligence Suite." *See* SAP, *SAP BusinessObjects Business Intelligence suite*, https://www.sap.com/products/bi-platform/features.html?btp=9a031e57-6ae4-4028-9894-

28 80ad97cf6f7a (last visited Nov. 13, 2020).

1   market that Teradata serves when developing its own products—and because of the prior

2   litigation between the two parties that is currently pending before this Court (Case No. 3:18-

3   cv-03670-WHO).[2]

4   25.   SAP has been and is now directly infringing, contributing to infringement,

5   and/or inducing others to infringe, the '357 Patent in this District and elsewhere in violation

6   of 35 U.S.C. § 271 at least by making, using, selling, offering to sell, and/or importing into

7   the United States software, or products containing such software, that practices one or more

8   claims of the '357 Patent, including at least SAP HANA, alone or in combination with SAP

9   BW. On information and belief, SAP has also infringed the '357 Patent by at least providing

10   demonstrations and testing of such software.

11   26.   SAP has committed infringing acts without the permission, consent,

12   authorization, or license of Teradata.

13   27.   SAP's infringement is literal or under the doctrine of equivalents, or both.

14   28.   On information and belief, SAP, in addition to its own direct infringement, is

15   currently actively inducing and encouraging infringement of the '357 Patent, and, unless

16   enjoined, will continue to actively induce and encourage infringement of the '357 Patent. In

17   addition to Business Objects' prior knowledge of the '357 Patent, SAP has known of the

18   '357 Patent at least since the time of Teradata's transmittal of the Complaint to SAP on

19   August 31, 2020. On information and belief, SAP nevertheless actively encourages others to

20   infringe the '357 Patent such as by promoting and/or encouraging the use of the '357

21   Patent's active caching of query response data described below. On information and belief,

22   SAP knowingly induces infringement by others, including resellers, retailers, and end users

23   of SAP HANA. For example, SAP's customers and end users test and/or operate SAP

24   HANA in the United States in accordance with SAP's instructions contained in, for instance,

25   its user manuals, thereby also performing the claimed methods and directly infringing the

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[2] For example, SAP's website provides technical support for its customers who are also working with Teradata's products. *See* SAP, *HELP CENTER for SAP Cloud Platform Integration*, https://help.sap.com/viewer/dab65b1584e04026a132a06a711e3f5a/Cloud/en-US/cce57b9724bc4a7089c145cf9fa8a22d.html (last visited Nov. 13, 2020).

1   asserted claims of the '357 Patent reciting such operation. Further, SAP encourages its

2   customers and end users to operate SAP HANA in the United States through

3   advertisements,[3] marketing,[4] and product support.[5] These facts give rise to a reasonable

4   inference that SAP knowingly induces others, including resellers, retailers, and end users, to

5   directly infringe the '357 Patent, and that SAP possesses a specific intent to cause such

6   infringement. Teradata will seek to determine in discovery whether SAP was aware of the

7   '357 Patent prior to August 31, 2020, and seek liability for induced infringement based on

8   when SAP learned of the '357 Patent or when it became willfully blind to the '357 Patent.

9   29.   SAP also contributes to infringement of the '357 Patent by offering to sell or

10   selling within the United States or importing into the United States (i) SAP HANA or

11   products that contain it, (ii) the non-staple constituent parts of such software, which are not

12   suitable for substantial non-infringing use and which embody a material part of the invention

13   claimed in the '357 Patent, and (iii) components of such software, which are not suitable for

14   substantial non-infringing use and which embody a material part of the invention claimed in

15   the '357 Patent. Such software is known by SAP to be especially made or especially adapted

16   for use in the infringement of the '357 Patent. Specifically, on information and belief, SAP

17   sells such software to resellers, retailers, and end users with knowledge that such software is

18   used for infringement. End users of such software directly infringe the '357 Patent.

19   30.   As one example, SAP HANA infringes at least claim 1 of the '357 Patent.

20   31.   Independent claim 1 of the '357 Patent reads as follows (claim element

21   enumeration added for convenience):

22

23   [3] For example, SAP advertises HANA on its website. *See* SAP, *Harness the power of an in-memory database with SAP HANA*, https://www.sap.com/products/hana.html?btp=b8d4f21f-19e9-4feb-925a-4fedefd353e3 (last visited Nov. 13, 2020).

24   [4] For example, SAP markets HANA by publishing videos about the product. *See* SAP, *openSAP Course: A First Step Towards SAP HANA Query Optimization – Teaser Video*, YouTube (Sept.

25   30, 2020), https://www.youtube.com/watch?v=M3E1R6O7Ueo.

26   [5] For example, SAP provides technical support for HANA. *See* SAP, *SAP HANA, platform edition*, https://support.sap.com/en/product/support-by-product/01200314690800001945.html (last visited Nov. 13, 2020). This includes technical support for Multidimensional Expressions.

27   *See also* SAP, *SAP HANA Client Interface Programming Reference for SAP HANA Platform*, https://help.sap.com/viewer/0eec0d68141541d1b07893a39944924e/2.0.04/en-

28   US/e9830a92f752438285a4629f27dde4f2.html (last visited Nov. 13, 2020).

Claim 1
1. [pre] A method for caching multi-dimensional data sets for an on-line analytical processing (OLAP) system, comprising:
[a] accessing multi-dimensional data from a relational database management system (RDBMS) in order to answer at least a portion of a first query;
[b] storing the multi-dimensional data in an active cache;
[c] determining when it is possible to answer at least a portion of a second query by aggregating the multi-dimensional data stored in the cache; and
[d] selecting from among a plurality of aggregation paths and answering the portion of the second query by aggregating the multi-dimensional data stored in the cache using the selected aggregation path, after it has been determined that it is possible to answer the portion of the second query by aggregating the multi-dimensional data stored in the cache.

32.   SAP's public descriptions state that SAP HANA accesses multi-dimensional data from a relational database management system in order to answer queries. For example, SAP's website states that "SAP HANA is a column-oriented, in-memory *relational database* that combines OLAP and OLTP operations into a single system."[6] SAP's website further indicates that SAP HANA supports multidimensional data: "SAP has developed extensions to MDX [Multidimensional Expressions] to enable faster and more efficient access to multidimensional data; for example, to serve specific SAP HANA application requirements and to optimize the result set for SAP HANA clients."[7]

33.   At least some of the multi-dimensional data is stored by SAP HANA in memory that corresponds with a description of "active cache" in the '357 Patent: a cache "that can not only speed queries that 'match' data in the cache, but can also answer queries that require aggregation of data in the cache." For example, SAP's website notes that

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[6] SAP, *Harness the power of an in-memory database with SAP HANA*, https://www.sap.com/products/hana/what-is-sap-hana.html (last visited Nov. 8, 2020) (emphasis added); *see also* SAP, *Database Management*, https://www.sap.com/products/hana/features/in-memory-database.html (last visited Feb. 6, 2020) ("At the core, SAP HANA is a relational database management system (RDBMS).").
[7] SAP, *SAP HANA Client Interface Programming Reference for SAP HANA Platform*, https://help.sap.com/viewer/0eec0d68141541d1b07893a39944924e/2.0.04/en-US/e9830a92f752438285a4629f27dde4f2.html (last visited Nov. 13, 2020).

1   "[c]aching is used widely in SAP HANA as a strategy to improve performance by re-using

2   queried data rather than re-reading and processing the data every time it is requested."[8]

3   34.   It is consistent with public information about SAP HANA to infer that the

4   software determines whether the answer to at least a portion of a second query can be

5   provided by aggregating the data stored in the active cache. For example, and without

6   limitation, SAP's website states that "[u]sing implicit matching the SQL optimizer reads the

7   query plan of the current statement and analyzes the structure to check if the requested data

8   can be retrieved from cached data."[9] Upon information and belief, SAP HANA satisfies

9   element 1[c] of claim 1 of the '357 Patent.

10   35.   Public information describing SAP HANA indicates that its methods of

11   optimizing query processing includes selection from among a plurality of aggregation paths,

12   and selecting one aggregation path. For example, the SAP HANA Performance Guide for

13   Developers describes choosing between various plans to improve query performance.[10] On

14   information and belief, the software determines whether an answer to the second query can

15   be provided by aggregating data in the active cache, and element 1[d] as well as element 1[c]

16   of claim 1 of the '357 Patent are satisfied.

17   36.   As a direct and proximate result of SAP's infringement of the '357 Patent,

18   Teradata has suffered, and will continue to suffer damages, the loss of sales and profits.

19   Teradata will suffer additional damages and irreparable harm unless SAP is enjoined from

20   further infringement.

21

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24   [8] SAP, *SAP HANA Troubleshooting and Performance Analysis Guide: Result Cache*,
     https://help.sap.com/viewer/bed8c14f9f024763b0777aa72b5436f6/2.0.04/en-
25   US/cab4caf63b54448faa1f8a1372a433f4.html (last visited Nov. 13, 2020).
     [9] SAP, *SAP HANA Troubleshooting and Performance Analysis Guide: Working With The
26   Dynamic Result Cache*,
     https://help.sap.com/viewer/bed8c14f9f024763b0777aa72b5436f6/2.0.04/en-
27   US/a5afa24b477e4e2a8d6d8f9888d501ca.html (last visited Nov. 13, 2020).
     [10] *See* https://help.sap.com/doc/05b8cb60dfd94c82b86828ee77f7e0d9/2.0.04/en-
28   US/SAP_HANA_Performance_Developer_Guide_en.pdf.

1

COUNT II: INFRINGEMENT OF U. S. PATENT NO. 7,185,000

2   37.   Teradata hereby restates and re-alleges the allegations set forth in paragraphs 1

3   through 36 above and incorporates them by reference.

4   38.   Teradata's corporate focus has been to develop parallel processing—indeed,

5   massively parallel processing—that can achieve unrivalled speed and scalability in handling

6   complex queries addressed to the databases of the largest enterprises in the world. The '000

7   Patent facilitates query optimization on parallel database systems and claims, among other

8   things, methods for determining steps of the query execution plan for a parallel database

9   system and displaying the steps in a graphical user interface.

10   39.   A company that is a customer of Teradata or SAP that maintains and uses a

11   data warehouse may conduct many thousands of queries per hour worldwide. A portion of

12   those will be one-off queries and many more will be queries embedded in programs used

13   constantly to conduct the company's high-value operations. Query optimization technology

14   is used to develop execution plans for all of the queries in both categories. Teradata

15   Database and SAP HANA each have query optimization technology.

16   40.   Execution of a query in a data warehouse can be an immensely complex task,

17   involving many sources of data, very large tables, and an array of alternative choices and

18   sequences of execution steps. Optimizing an execution plan for a query that will run on a

19   database using many parallel processors is a different, much more demanding task. In order

20   to realize the benefits associated with parallel processing, the execution steps of a query

21   should be distributed across parallel processors, each of which may be responsible for

22   different types and quantities of data relevant to the query. The advantages of parallelism

23   depend not only on skillful management of the choices that may lead to efficient steps in

24   query logic, but also the appropriate sharing of work among parallel processors. In a system

25   such as Teradata Database, which may run on hundreds or thousands of parallel nodes,

26   optimization for parallel processing is highly demanding.

27   41.   Query optimization software is designed to make these choices automatically.

28   A relatively high fraction of queries are successfully optimized automatically to provide

1   accurate answers and acceptable performance. However, given the demands of optimization

2   in a multiprocessor DBMS and the huge number of queries in a large data warehouse, even a

3   small percentage of problematic queries can detract from the usefulness of the data

4   warehouse, absent technology enabling the database administrators in the company's IT

5   department to analyze such query problems efficiently and without disrupting the availability

6   of the DBMS for ongoing company business operations. The '000 Patent provides such

7   technology.

8   42.   In some instances, query performance problems at a customer (company)

9   require the customer's database administrators to seek assistance from the supplier of the

10   database management system — Teradata or SAP. The ability to provide acceptable

11   responses by the supplier when a customer presents such query problems contributes to the

12   value of the database management systems that Teradata and SAP sell. The '000 Patent's

13   claimed technology addresses this need as well.

14   43.   SAP has been and is now directly infringing, contributing to infringement,

15   and/or inducing others to infringe, the '000 Patent in this District and elsewhere in violation

16   of 35 U.S.C. § 271 at least by making, using, selling, offering to sell, and/or importing into

17   the United States software, or products containing such software, that practices one or more

18   claims of the '000 Patent, including at least SAP HANA incorporating a feature referred to

19   as PlanViz. On information and belief, SAP has also infringed the '000 Patent by at least

20   providing demonstrations and testing of such software.

21   44.   SAP has committed infringing acts without the permission, consent,

22   authorization, or license of Teradata.

23   45.   SAP's infringement is literal or under the doctrine of equivalents, or both.

24   46.   SAP also contributes to infringement of the '000 Patent by offering to sell or

25   selling within the United States or importing into the United States (i) SAP HANA or

26   products that contain it, (ii) the non-staple constituent parts of such software, which are not

27   suitable for substantial non-infringing use and which embody a material part of the invention

28   claimed in the '000 Patent, and (iii) components of such software, which are not suitable for

1   substantial non-infringing use and which embody a material part of the invention claimed in

2   the '000 Patent. Such software is known by SAP to be especially made or especially adapted

3   for use in the infringement of the '000 Patent. Specifically, on information and belief, SAP

4   sells such software to resellers, retailers, and end users with knowledge that such software is

5   used for infringement. End users of such software directly infringe the '000 Patent.

6   47.   Independent claim 1 of the '000 Patent reads as follows (claim element

7   enumeration added for convenience):

Claim 1
1. [pre] A method of presenting an execution plan for a query, comprising:
[a] determining steps of the query execution plan for a parallel database system;
[b] displaying the steps of the query execution plan in a graphical user interface;
[c] and depicting parallel execution of steps of the query execution plan in the graphical user interface,
[d] wherein depicting the parallel execution of steps comprises displaying plural elements corresponding to concurrently executing plural steps on respective processors of the parallel database system;
[e] and wherein determining the steps comprises determining steps of the query execution plan for the parallel database system running in a platform having plural virtual processors to handle access to data in the parallel database system.

18   48.   The claimed method of claim 1 involved innovations over technology for the

19   analysis of query execution plans at the time when the patent application was filed. The

20   innovations included specific features for the analysis of execution plans for queries tailored

21   to run on parallel processors. The method combining display on a graphical user interface

22   with the depiction of concurrent parallel execution of steps of a query and doing so on

23   parallel virtual processors was an innovation over conventional methods.   The significance

24   of making this new combination depended upon the inventors' understanding of the

25   development at Teradata of database management systems running complex queries on

26   multiple processors. The '000 Patent arose from a new appreciation of how to enable

27   database administrators to better analyze problems resulting from the distribution of query

28   execution across multiple parallel virtual processors, including unexpected performance

1   problems resulting from what the '000 Patent labels as the system environment. It was a

2   valuable innovation for query problem-solving to display concurrent elements of the

3   execution plan on multiple processors as they run a single query in parallel, each node

4   responsible for different data sets that may present different challenges. Such a display

5   allowed database operators to uncover issues that may have not been otherwise evident.

6   Additionally, running the query on a platform that could emulate a production database was

7   another valuable innovation that allowed for problem-solving to occur outside of the normal

8   operational environment of the database. This feature allowed for database operators to

9   safely test problematic queries without occupying the valuable resources of the operational

10   computing environment. In combination, these two features provided database operators

11   with a comprehensive and robust toolset to safely and accurately diagnose problem queries.

12   49.   These innovations were valuable to customer IT staffs in at least two types of

13   work: One situation was responding to reports of performance problems—e.g. a database

14   operation taking minutes or hours instead of microseconds or seconds. Another was for use

15   in designing or checking software for company operations in which database queries are

16   embedded. Further, this is especially useful for situations where the execution performance

17   of the database query becomes the rate-limiting factor for the company's operations.

18   50.   The fact that the '000 Patent claims innovative technology is demonstrated by

19   the prosecution history. The patent examiner initially rejected the claim that later issued

20   claim 1 as obvious in view of prior art references. Teradata appealed the rejection to the

21   Board of Patent Appeals and Interferences. The Board overruled the patent examiner,

22   holding that prior art disclosing graphical user interfaces used in database query analysis did

23   not involve concurrent execution of steps of plans for the same query, distributed among

24   plural, parallel processors. *Ex parte* Brown and Sinclair, No. 2006-0179 (B.P.A.I. Apr. 28,

25   2006) at 16-17. The board also found that the prior art had not disclosed doing what claim 1

26   claims using virtual processors. *Id*. at 15.

27   51.   Independent claim 19 and its dependent claims cover a system that determines

28   an execution plan of a query based on emulation data that emulates an environment of a

system in which a parallel database system is implemented, including several options. As examples, dependent claims 20–24 of the '000 Patent read as follows (claim element enumeration is added, with elements labeled [a] through [c] from independent claim 19 and, for each of respective claims 20–24, an additional element labeled [d]):

Claim 19
19. [pre] A system comprising:
[a] a graphical user interface; and
[b] a controller to determine an execution plan of a query based on emulation data that emulates an environment of a target system in which a parallel database system is implemented,
[c] the controller to display a representation of the execution plan in the graphical user interface.

Claim 20
20. The system of claim 19, wherein
[d] the emulation data comprises cost-related information including a number of nodes in the target system and a number of CPUs in each node.

Claim 21
21. The system of claim 19, wherein
[d] the emulation data comprises cost-related information including a number of virtual processors running in the target system.

Claim 22
22. The system of claim 19, wherein
[d] the emulation data comprises cost-related information relating to costs of doing operations in the target system.

Claim 23
23. The system of claim 19, wherein
[d] the emulation data represents a target system having a multi-node parallel processing system.

Claim 24

24. The system of claim 19, wherein
[d] the emulation data represents a target system running plural virtual processors for handling access to the parallel database system.

52.   Each of these claims defines technology that was innovative at the time when the patent application was filed. The claimed system of each of claims 19–24 used emulation data regarding the environment of a target system with parallel processors. Emulation greatly aids the task of the customer company's database administrators in the two situations noted in paragraph 49 above. First, when a user reports a query performance problem, emulation of the system's environmental information allows the IT staff to analyze the problem without using the company's production environment to do so. In the case of parallel processors executing steps of a single query, environmental conditions may differ among parallel nodes, and that presents novel challenges for analysis of unexpected performance problems. Second, emulation permits the development of new operational software including embedded queries within a "sandbox" that runs independently of the operational parallel processing database management system, but accurately reflects conditions of the company's operational, production system. In combination with the graphical user interface, the emulation of target environments provided database operators with toolsets configured to safely and accurately diagnose problem queries.

53.   That these claims include innovative steps is further established by the prosecution history. The Board of Patent Appeals and Interferences overruled the patent examiner's rejection of claims now numbered 19–24 on the basis that the prior art did not suggest emulating an environment of a target system in which a parallel database system is implemented. *Ex parte* Brown and Sinclair, No. 2006-0179 (B.P.A.I. Apr. 28, 2006) at 19.

54.   Independent claim 25 of the '000 Patent reads as follows (claim element enumeration added for convenience):

Claim 25
25. [pre] An article comprising

[a] one or more storage media containing instructions that when executed cause a controller to: determine an execution plan of a query for a parallel database system;

[b] display the steps of the execution plan in a graphical user interface; and depict parallel execution of steps of the execution plan in the graphical user interface,

[c] wherein depicting the parallel execution of steps comprises displaying plural elements corresponding to concurrently executing plural steps on respective processors of the parallel database system;

[d] and wherein the instructions when executed cause the controller to receive environment information to emulate a target database system.

55.   Claim 25 includes the innovations of claim 1 and claim 19—display of the steps of a query execution plan running concurrently on plural processors of a parallel database system, with emulation of a target system based on receipt of environmental information from the target system. As alleged in the preceding paragraphs, individually and in combination, these were innovative features at the time the patent application was filed.

56.   Public information describing SAP HANA with the feature referred to as PlanViz states that HANA uses multiple processors operating in parallel, that the system calculates costs for estimated and actual queries performed on a target system, and that it displays the results to a user using a graphical view. The user can then use this information to troubleshoot and/or optimize the queries for subsequent execution in the actual SAP HANA database. SAP HANA also includes several engines such as an SQL Engine, Calculation Engine, OLAP Engine, and Join Engine, each of which can perform certain aspects of search queries. PlanViz calculates and displays the costs associated with performing searches using these engines. A reasonable inference from available public information is that SAP HANA infringes claim 1 of the '000 Patent.

57.   Public descriptions of SAP HANA with the feature referred to as PlanViz state that the system also includes processors that can determine an execution plan of a query based on emulation data used to emulate the environment of a target system, wherein the processors can also display a graphical representation of the calculated execution plan. For example, the emulation data can include the number of databases or processors in the target system, the number of engines involved in performing the query, cost-related information for

1 performing certain database manipulation tasks such as join operations of a database, cost-

2 related information for performing queries in a multi-node parallel processing system, or

3 cost-related information for distributing work across multiple engines within SAP HANA. A

4 reasonable inference from available public information is that SAP HANA also infringes

5 claims 19–25 of the '000 Patent.

6   58.   In July 2012, SAP acquired ownership of United States Patent No. 7,493,304

7 from IBM Corporation. The '000 patent is listed in that patent as prior art cited by a patent

8 examiner. Teradata will seek to determine in discovery whether SAP became aware of the

9 '000 Patent after this event or whether SAP deliberately avoided learning about the '000

10 Patent after this event given its familiarity with Teradata's technology and its developers

11 from working with Teradata on the Bridge Project, its awareness of Teradata's activities in

12 the EDAW field, specifically targeting the same market that Teradata serves when

13 developing its own products, and because of the prior litigation between the two parties that

14 is currently pending before this Court (Case No. 3:18-cv-03670-WHO).[11]

15   59.   On information and belief, SAP, in addition to its own direct infringement, is

16 currently actively inducing and encouraging infringement of the '000 Patent, and, unless

17 enjoined, will continue to actively induce and encourage infringement of the '000 Patent.

18 SAP has known of the '000 Patent at least since the time of Teradata's transmittal of the

19 Complaint to SAP on August 31, 2020. On information and belief, SAP nevertheless

20 actively encourages others to infringe the '000 Patent such as by promoting and/or

21 encouraging the use of the features in SAP HANA incorporating PlanViz for the display of

22 data query structure as described below. On information and belief, SAP knowingly induces

23 infringement by others, including resellers, retailers, and end users of SAP HANA. For

24 example, SAP's customers and end users test and/or operate SAP HANA in the United States

25 in accordance with SAP's instructions contained in, for instance, its user manuals, thereby

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27 [11] For example, SAP's website provides technical support for its customers who are also working
with Teradata's products. *See* SAP, *HELP CENTER for SAP Cloud Platform Integration*,
https://help.sap.com/viewer/dab65b1584e04026a132a06a711e3f5a/Cloud/en-
US/cce57b9724bc4a7089c145cf9fa8a22d.html (last visited Nov. 13, 2020).

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1   also performing the claimed methods and directly infringing the asserted claims of the '000

2   Patent reciting such operation. Further, SAP encourages its customers and end users to

3   operate SAP HANA in the United States through advertisements,[12] marketing,[13] and product

4   support.[14] These facts give rise to a reasonable inference that SAP knowingly induces

5   others, including resellers, retailers, and end users, to directly infringe the '000 Patent, and

6   that SAP possesses a specific intent to cause such infringement. Teradata will seek to

7   determine in discovery whether SAP was aware of the '000 Patent prior to August 31, 2020,

8   and seek liability for induced infringement based on when SAP learned of the '000 Patent or

9   when it became willfully blind to the '000 Patent.

10   60.   As a direct and proximate result of SAP's infringement of the '000 Patent,

11   Teradata has suffered, and will continue to suffer damages, the loss of sales and profits.

12   Teradata will suffer additional damages and irreparable harm unless SAP is enjoined from

13   further infringement.

14   **COUNT III: INFRINGEMENT OF U. S. PATENT NO. 7,904,419**

15   61.   Teradata hereby restates and re-alleges the allegations set forth in paragraphs 1

16   through 60 above and incorporates them by reference.

17   62.   One of the fundamental challenges of data processing for enterprises that

18   possess enormous volumes of data is how to manage storage. A robust system must manage

19   storage devices in different ways for data that is to be permanent—in that it will remain

20   available unless it is deleted or modified at the user's request—versus data that is temporary.

21   Performance can be improved and management overhead can be reduced by storing

22   _____

23   [12] For example, SAP advertises HANA on its website. *See* SAP, *Harness the power of an in-memory database with SAP HANA*, https://www.sap.com/products/hana.html?btp=b8d4f21f-19e9-4feb-925a-4fedefd353e3 (last visited Nov. 13, 2020).

24   [13] For example, SAP markets HANA by publishing videos about the product. *See* SAP, *openSAP Course: A First Step Towards SAP HANA Query Optimization – Teaser Video*, YouTube (Sept.

25   30, 2020), https://www.youtube.com/watch?v=M3E1R6O7Ueo.

[14] For example, SAP provides technical support for HANA. *See* SAP, *SAP HANA, platform*

26   *edition*, https://support.sap.com/en/product/support-by-product/01200314690800001945.html (last visited Nov. 13, 2020). This includes technical support for PlanViz. *See* SAP, *SAP HANA*

27   *Performance Guide for Developers: Plan Visualizer*, https://help.sap.com/viewer/9de0171a6027400bb3b9bee385222eff/2.0.05/en-

28   US/29205ee07ec1419198bd89825e807f87.html (last visited Nov. 13, 2020).

temporary data on memory devices that are volatile and will lose data if power is not maintained, but retrieve data faster than permanent memory devices. On the other hand, persistence is essential for long-term storage of data. By distinguishing the data types and performing certain tasks, such as updating file management information, only on temporary data, storage capacity can be used more efficiently. Teradata's '419 patent enables and claims systems and methods for using the classification of data as permanent or temporary to achieve these benefits.

63.   SAP became aware of the '419 Patent no later than the date of Teradata's transmittal of the Complaint to SAP on August 31, 2020.

64.   SAP has been and is now directly infringing, contributing to infringement, and/or inducing others to infringe, the '419 Patent in this District and elsewhere in violation of 35 U.S.C. § 271 at least by making, using, selling, offering to sell, and/or importing into the United States software, or products containing such software, that practices one or more claims of the '419 Patent, including at least SAP HANA. On information and belief, SAP has also infringed the '419 Patent by at least providing demonstrations and testing of such software.

65.   SAP has committed infringing acts without the permission, consent, authorization, or license of Teradata.

66.   SAP's infringement is literal or under the doctrine of equivalents, or both.

67.   On information and belief, SAP, in addition to its own direct infringement, is currently actively inducing and encouraging infringement of the '419 Patent, and, unless enjoined, will continue to actively induce and encourage infringement of the '419 Patent. SAP has known of the '419 Patent at least since the time of Teradata's transmittal of the Complaint to SAP on August 31, 2020. On information and belief, SAP nevertheless actively encourages others to infringe the '419 Patent such as by promoting and/or encouraging the use of the method and system for managing storage in and updating of data in persistent storage and non-persistent memory, as described below. On information and belief, SAP knowingly induces infringement by others, including resellers, retailers, and end

1   users of SAP HANA. For example, SAP's customers and end users test and/or operate SAP

2   HANA in the United States in accordance with SAP's instructions contained in, for instance,

3   its user manuals, thereby also performing the claimed methods and directly infringing the

4   asserted claims of the '419 Patent reciting such operation. Further, SAP encourages its

5   customers and end users to operate SAP HANA in the United States through

6   advertisements,[15] marketing,[16] and product support.[17] These facts give rise to a reasonable

7   inference that SAP knowingly induces others, including resellers, retailers, and end users, to

8   directly infringe the '419 Patent, and that SAP possesses a specific intent to cause such

9   infringement.

10   68.   SAP also contributes to infringement of the '419 Patent by offering to sell or

11   selling within the United States or importing into the United States (i) SAP HANA or

12   products that contain it, (ii) the non-staple constituent parts of such software, which are not

13   suitable for substantial non-infringing use and which embody a material part of the invention

14   claimed in the '419 Patent, and (iii) components of such software, which are not suitable for

15   substantial non-infringing use and which embody a material part of the invention claimed in

16   the '419 Patent. Such software is known by SAP to be especially made or especially adapted

17   for use in the infringement of the '419 Patent. Specifically, on information and belief, SAP

18   sells such software to resellers, retailers, and end users with knowledge that such software is

19   used for infringement. End users of such software directly infringe the '419 Patent.

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22   [15] For example, SAP advertises HANA on its website. *See* SAP, *Harness the power of an in-memory database with SAP HANA*, https://www.sap.com/products/hana.html?btp=b8d4f21f-
23   19e9-4feb-925a-4fedefd353e3 (last visited Nov. 13, 2020).
     [16] For example, SAP markets HANA by publishing videos about the product. *See* SAP, *openSAP*
24   *Course: A First Step Towards SAP HANA Query Optimization – Teaser Video*, YouTube (Sept.
     30, 2020), https://www.youtube.com/watch?v=M3E1R6O7Ueo.
25   [17] For example, SAP provides technical support for HANA. *See* SAP, *SAP HANA, platform*
     edition, https://support.sap.com/en/product/support-by-product/01200314690800001945.html
26   (last visited Nov. 13, 2020). This includes technical support for HANA Disaster Recovery. *See*
     SAP, *SAP HANA Administration Guide: SAP HANA Disaster Recovery Support*,
27   https://help.sap.com/viewer/6b94445c94ae495c83a19646e7c3fd56/2.0.00/en-
     US/b74e16a9e09541749a745f41246a065e.html (last visited Nov. 13, 2020).
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69.   As one example, SAP HANA infringes at least claims 1 and 2 of the '419 Patent.

70.   Independent claims 1 and 2 of the '419 Patent reads as follows (claim element enumeration added for convenience):

Claims 1 and 2
1. [pre] A database system comprising:
[a] a persistent data storage device storing a first file management context and having a pool of storage elements; and
[b] a non-persistent memory storing a second file management context,
[c] the first file management context to indicate allocated permanent files in the pool of storage elements, and
[d] the second file management context to indicate allocated temporary files and permanent files in the pool of storage elements.
2. [pre] A method for use in a database system having a persistent storage device and a non-persistent memory, comprising:
[a] storing a first file management context in the persistent storage device;
[b] storing a second file management context in the non-persistent memory;
[c] updating both the first and second file management contexts to allocate a permanent file; and
[d] updating the second file management context without updating the first file management context if the flag indicates a temporary file.

71.   Public information describing SAP HANA indicates that it is a database system that uses a persistent data storage apparatus that contains a configuration of managed data and uses a pool of storage elements, in which the configuration includes an indication of allocated permanent files in the pool of storage elements. Public information describing SAP HANA indicates that it also uses a non-persistent memory apparatus that contains a configuration of managed data, in which the configuration includes an identification of allocated temporary files and permanent files in the pool of storage elements in the persistent data storage apparatus.

1   72.   Public information describing SAP HANA indicates that the configuration of

2 data in the persistent data storage apparatus and the configuration of data in the non-

3 persistent memory apparatus both are updated to allocate a permanent file; and that the

4 configuration of data in the non-persistent memory apparatus is updated without updating of

5 the configuration of data in the persistent data storage apparatus with respect to data in what

6 is indicated to be a temporary file.

7   73.   The features described in paragraphs 71 and 72 are fundamental to the

8 "Disaster Recovery" functionality of SAP HANA. Without an effective Disaster Recovery

9 function, an enterprise database management system such as SAP HANA is commercially

10 unacceptable.

11   74.   As a direct and proximate result of SAP's infringement of the '419 Patent,

12 Teradata has suffered, and will continue to suffer damages, the loss of sales and profits.

13 Teradata will suffer additional damages and irreparable harm unless SAP is enjoined from

14 further infringement.

15   **COUNT IV: INFRINGEMENT OF U. S. PATENT NO. 9,851,923**

16   75.   Teradata hereby restates and re-alleges the allegations set forth in paragraphs 1

17 through 74 above and incorporates them by reference.

18   76.   Teradata's '923 Patent also relates to the improvement of data storage using

19 methods and devices for volatile storage. As explained above, volatile storage can lose data

20 if power is disrupted and has advantages such as speed and disadvantages such as cost, and

21 these tradeoffs must be managed actively. Enterprise-level databases handle data that must

22 be maintained and available, and cannot be lost or inadvertently changed, but is infrequently

23 used. Such a system also handles data that is very frequently used, modified, and updated.

24 The term "temperature" has come to distinguish "cold" data of the first type from "hot" data

25 of the second type. Volatile storage needs to handle both types of data. The '923 Patent

26 claims data management techniques that use temperature-based storage management in one

27 portion and non-temperature-based storage management in a different portion of the volatile

28 memory.

77.   On August 23, 2018, the patent application that led to the issuance of the '923 Patent was cited to SAP SE by a patent examiner during the prosecution of SAP's United States Patent No. 10,606,502. Teradata will seek to determine in discovery whether SAP became aware of the '923 Patent after its issuance or whether SAP deliberately avoided learning about the '923 Patent after its issuance given its familiarity with Teradata's technology and its developers from working with Teradata on the Bridge Project, its awareness of Teradata's activities in the EDAW field, specifically targeting the same market that Teradata serves when developing its own products, and because of the prior litigation between the two parties that is currently pending before this Court (Case No. 3:18-cv-03670-WHO).[18] Additionally, SAP cited the '923 patent in its August 19, 2019 infringement allegations against Teradata in Case No. 3:18-cv-03670-WHO.

78.   SAP has been and is now directly infringing, contributing to infringement, and/or inducing others to infringe, the '923 Patent in this District and elsewhere in violation of 35 U.S.C. § 271 at least by making, using, selling, offering to sell, and/or importing into the United States software, or products containing such software, that practices one or more claims of the '923 Patent, including at least SAP HANA. On information and belief, SAP has also infringed the '923 Patent by at least providing demonstrations and testing of such software.

79.   SAP has committed infringing acts without the permission, consent, authorization, or license of Teradata.

80.   SAP's infringement is literal or under the doctrine of equivalents, or both.

81.   On information and belief, SAP, in addition to its own direct infringement, is currently actively inducing and encouraging infringement of the '923 Patent, and, unless enjoined, will continue to actively induce and encourage infringement of the '923 Patent. SAP has known of the '923 Patent since at least the service of its infringement contentions in

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[18] For example, SAP's website provides technical support for its customers who are also working with Teradata's products. *See* SAP, *HELP CENTER for SAP Cloud Platform Integration*, https://help.sap.com/viewer/dab65b1584e04026a132a06a711e3f5a/Cloud/en-US/cce57b9724bc4a7089c145cf9fa8a22d.html (last visited Nov. 13, 2020).

1   the related case (Case No. 3:18-cv-03670-WHO) on August 19, 2019. On information and

2   belief, SAP nevertheless actively encourages others to infringe the '923 Patent such as by

3   promoting and/or encouraging the use of the data storage management features described

4   below. On information and belief, SAP knowingly induces infringement by others, including

5   resellers, retailers, and end users of SAP HANA. For example, SAP's customers and end

6   users test and/or operate SAP HANA in the United States in accordance with SAP's

7   instructions contained in, for instance, its user manuals, thereby also performing the claimed

8   methods and directly infringing the asserted claims of the '923 Patent reciting such

9   operation. Further, SAP encourages its customers and end users to operate SAP HANA in

10   the United States through advertisements,[19] marketing,[20] and product support.[21] These facts

11   give rise to a reasonable inference that SAP knowingly induces others, including resellers,

12   retailers, and end users, to directly infringe the '923 Patent, and that SAP possesses a

13   specific intent to cause such infringement. Teradata will seek to determine in discovery

14   whether SAP was aware of the '923 Patent prior to August 19, 2019, and seek liability for

15   induced infringement based on when SAP learned of the '923 Patent or when it became

16   willfully blind to the '923 Patent.

17   82.   SAP also contributes to infringement of the '923 Patent by offering to sell or

18   selling within the United States or importing into the United States (i) SAP HANA or

19   products that contain it, (ii) the non-staple constituent parts of such software, which are not

20   suitable for substantial non-infringing use and which embody a material part of the invention

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22   [19] For example, SAP advertises HANA on its website. *See* SAP, *Harness the power of an in-memory database with SAP HANA*, https://www.sap.com/products/hana.html?btp=b8d4f21f-

23   19e9-4feb-925a-4fedefd353e3 (last visited Nov. 13, 2020).
     [20] For example, SAP markets HANA by publishing videos about the product. *See* SAP, *openSAP*

24   *Course: A First Step Towards SAP HANA Query Optimization – Teaser Video*, YouTube (Sept.
     30, 2020), https://www.youtube.com/watch?v=M3E1R6O7Ueo.

25   [21] For example, SAP provides technical support for HANA. *See* SAP, *SAP HANA, platform edition*, https://support.sap.com/en/product/support-by-product/01200314690800001945.html

26   (last visited Nov. 13, 2020). This includes technical support for Data Tiering. *See* SAP, *SAP HANA Administration Guide for SAP HANA Platform: Data Tiering*,

27   https://help.sap.com/viewer/6b94445c94ae495c83a19646e7c3fd56/2.0.04/en-US/00421f8985a14e1b878195f4ce829be9.html (last visited Nov. 13, 2020).

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1   claimed in the '923 Patent, and (iii) components of such software, which are not suitable for

2   substantial non-infringing use and which embody a material part of the invention claimed in

3   the '923 Patent. Such software is known by SAP to be especially made or especially adapted

4   for use in the infringement of the '923 Patent. Specifically, on information and belief, SAP

5   sells such software to resellers, retailers, and end users with knowledge that such software is

6   used for infringement. End users of such software directly infringe the '923 Patent.

7   83.   As one example, SAP HANA infringes at least claim 1 of the '923 Patent.

8   84.   Independent claim 1 of the ' Patent reads as follows (claim element

9   enumeration added for convenience):

Claim 1
1. [pre] A method of managing data in a volatile storage, wherein the method is implemented at least partly by a device, and wherein the method comprises:
[a]. using a combination of a data temperature-based storage management technique and a non-temperature-based storage management technique together to manage the storage of data in the volatile storage,
[b]. wherein a first portion of the volatile memory is used to provide the temperature-based storage management technique and a second portion of the volatile memory is used to provide non-temperature-based storage management technique.

17   85.   SAP has stated publicly that SAP HANA manages data in volatile storage by

18 using both data temperature classifications (e.g. "hot" for frequently used data, "warm" for

19 less frequently used data, and "cold" for the least-frequently used data) and user designations

20 on a basis not limited to temperature to manage the storage of data within the volatile

21 memory.

22   86.   According to SAP's public statements, the use of non-temperature based

23 storage applies to other data stored in a different location in the volatile memory in which

24 temperature-classified data are stored.

25   87.   Accordingly SAP HANA's tiered data storage method infringes claim 1 of the

26 '923 Patent.

27   88.   As a direct and proximate result of SAP's infringement of the '923 Patent,

28 Teradata has suffered, and will continue to suffer damages, the loss of sales and profits.

1   Teradata will suffer additional damages and irreparable harm unless SAP is enjoined from

2   further infringement.

3   **COUNT V: INFRINGEMENT OF U. S. PATENT NO. 9,720,623**

4   89.   Teradata hereby restates and re-alleges the allegations set forth in paragraphs 1

5   through 88 above and incorporates them by reference.

6   90.   Teradata's '623 Patent is directed to another aspect of the management of data

7   storage in a system that uses multiple storage units, as must occur for enterprises that possess

8   enormous volumes of data. Although not limited to parallel data processing systems such as

9   the Teradata Database and SAP HANA, the '623 Patent is particularly valuable for such

10   systems. Among other things, the '623 Patent claims methods and devices that use storage

11   information, such as data access information, for data stored in one storage element to

12   manage storage operations in a different storage element. Overall system performance for

13   large databases, is thereby substantially improved.

14   91.   SAP became aware of the '623 Patent no later than the date of Teradata's

15   transmittal of the Complaint to SAP on August 31, 2020.

16   92.   SAP has been and is now directly infringing, contributing to infringement,

17   and/or inducing others to infringe, the '623 Patent in this District and elsewhere in violation

18   of 35 U.S.C. § 271 at least by making, using, selling, offering to sell, and/or importing into

19   the United States software, or products containing such software, that practices one or more

20   claims of the '623 Patent, including at least SAP HANA. On information and belief, SAP

21   has also infringed the '623 Patent by at least providing demonstrations and testing of such

22   software.

23   93.   SAP has committed infringing acts without the permission, consent,

24   authorization, or license of Teradata.

25   94.   SAP's infringement is literal or under the doctrine of equivalents, or both.

26   95.   On information and belief, SAP, in addition to its own direct infringement, is

27   currently actively inducing and encouraging infringement of the '623 Patent, and, unless

28   enjoined, will continue to actively induce and encourage infringement of the '623 Patent.

SAP has known of the '623 Patent at least since the time of Teradata's transmittal of the Complaint to SAP on August 31, 2020. On information and belief, SAP nevertheless actively encourages others to infringe the '623 Patent such as by promoting and/or encouraging the use of dynamic tiering features to manage the locations among multiple data storage locations, corresponding to the claim elements described below. On information and belief, SAP knowingly induces infringement by others, including resellers, retailers, and end users of SAP HANA. For example, SAP's customers and end users test and/or operate SAP HANA in the United States in accordance with SAP's instructions contained in, for instance, its user manuals, thereby also performing the claimed methods and directly infringing the asserted claims of the '623 Patent reciting such operation. Further, SAP encourages its customers and end users to operate SAP HANA in the United States through advertisements,[22] marketing,[23] and product support.[24] These facts give rise to a reasonable inference that SAP knowingly induces others, including resellers, retailers, and end users, to directly infringe the '623 Patent, and that SAP possesses a specific intent to cause such infringement.

96.   SAP also contributes to infringement of the '623 Patent by offering to sell or selling within the United States or importing into the United States (i) SAP HANA or products that contain it, (ii) the non-staple constituent parts of such software, which are not suitable for substantial non-infringing use and which embody a material part of the invention claimed in the '623 Patent, and (iii) components of such software, which are not suitable for

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[22] For example, SAP advertises HANA on its website. *See* SAP, *Harness the power of an in-memory database with SAP HANA*, https://www.sap.com/products/hana.html?btp=b8d4f21f-19e9-4feb-925a-4fedefd353e3 (last visited Nov. 13, 2020).
[23] For example, SAP markets HANA by publishing videos about the product. *See* SAP, *openSAP Course: A First Step Towards SAP HANA Query Optimization – Teaser Video*, YouTube (Sept. 30, 2020), https://www.youtube.com/watch?v=M3E1R6O7Ueo.
[24] For example, SAP provides technical support for HANA. *See* SAP, *SAP HANA, platform edition*, https://support.sap.com/en/product/support-by-product/01200314690800001945.html (last visited Nov. 13, 2020). This includes technical support for Data Tiering. *See* SAP, *SAP HANA Administration Guide for SAP HANA Platform: Data Tiering*, https://help.sap.com/viewer/6b94445c94ae495c83a19646e7c3fd56/2.0.04/en-US/00421f8985a14e1b878195f4ce829be9.html (last visited Nov. 13, 2020).

1 substantial non-infringing use and which embody a material part of the invention claimed in

2 the '623 Patent. Such software is known by SAP to be especially made or especially adapted

3 for use in the infringement of the '623 Patent. Specifically, on information and belief, SAP

4 sells such software to resellers, retailers, and end users with knowledge that such software is

5 used for infringement. End users of such software directly infringe the '623 Patent.

6   97.   As one example, SAP HANA infringes at least claim 1 of the '623 Patent.

7   98.   Independent claim 1 of the '623 Patent reads as follows (claim element

8 enumeration added for convenience):

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

      99.   SAP publicly states that the data management methods used by SAP HANA include the use of multiple types of data storage. Among other reasons SAP provides for this is not only the differential cost of data storage hardware, but also SAP's system of license pricing based on the amount of data stored in the SAP HANA main memory.

      100.   SAP's public statements also disclose that information about one of multiple storage devices — such as the available storage space in main memory — is used to manage storage of data in disk-based extended storage — a different storage device and location. In doing so, the storage of data in disk-based extended storage manages storage based on information about the storage of data in the main memory.

      101.   Accordingly, a reasonable inference from available public information is that SAP HANA infringes claim 1 of the '623 Patent.

102.   As a direct and proximate result of SAP's infringement of the '623 Patent, Teradata has suffered, and will continue to suffer damages, the loss of sales and profits. Teradata will suffer additional damages and irreparable harm unless SAP is enjoined from further infringement.

PRAYER FOR RELIEF

WHEREFORE, Teradata respectfully requests the following relief:

a.   Judgment in Teradata's favor in all claims against SAP;

b.   An award of damages to Teradata in an amount to be proven at trial, including lost profits but in no event less than a reasonable royalty for its infringement, including pre-judgment and post-judgment interest at the maximum rate permitted by law;

c.   Factual findings supporting and enhancement of any damages awarded to Teradata by virtue of the exceptional nature of this case under 35 U.S.C. § 285;

d.   Issuance of permanent injunctive relief against SAP; and

e.   Such other relief as the Court deems just and proper.

JURY DEMAND

Teradata hereby demands TRIAL BY JURY of all claims and issues presented in this Second Amended Complaint so triable.

Dated: November 13, 2020

Respectfully submitted,

MORRISON & FOERSTER LLP

By: _/s/ Jack W. Londen_
     Jack W. Londen

Counsel for Plaintiff
TERADATA US, INC.