IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF TEXAS
DALLAS DIVISION

R2 Solutions LLC, Plaintiff, v. Hilton Domestic Operating Company Inc., Defendant.	Civil Action No. 3:22-cv-02761 Jury Trial Demanded

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff R2 Solutions LLC files this Complaint against Hilton Domestic Operating Company Inc. for infringement of U.S. Patent Nos. 8,341,157 ("the '157 patent"), 7,698,329 ("the '329 patent"), 8,209,317 ("the '317 patent"), 9,805,097 ("the '097 patent"), 10,176,272 ("the '272 patent"), and 8,190,610 ("the '610 patent"). The '157 patent, '329 patent, '317 patent, '097 patent, '272 patent, and '610 patent are referred to collectively as the "patents-in-suit."

THE PARTIES

1. Plaintiff R2 Solutions LLC ("R2") is a Texas limited liability company located in Frisco, Texas.

2. Defendant Hilton Domestic Operating Company ("HDOC") is a corporation with headquarters at 7930 Jones Branch Drive, McLean, VA 22102. HDOC may be served with process through its registered agent, Corporation Service Company dba CSC – Lawyers Incorporating Service Company, at 211 E. 7th Street, Suite 620, Austin, TX 78701.

JURISDICTION AND VENUE

3. This action arises under the patent laws of the United States, 35 U.S.C. § 101, *et seq.* This Court's jurisdiction over this action is proper under the above statutes, including 35 U.S.C. § 271, *et seq*., 28 U.S.C. § 1331 (federal question jurisdiction), and 28 U.S.C. § 1338 (jurisdiction over patent actions).

4. This Court has personal jurisdiction over HDOC in accordance with due process and/or the Texas Long Arm Statute.

5. Relative to patent infringement, HDOC has committed and continues to commit acts in violation of 35 U.S.C. § 271, and has made, used, marketed, distributed, offered for sale, and/or sold infringing products, systems, and/or services in this State, including this District, and has otherwise engaged in infringing conduct within and directed at, or from, this District. Such infringing products, systems, and/or services (collectively, the "Accused Instrumentalities") include systems, services, processes, methods, acts, components (hardware and/or software), and/or other instrumentalities associated with widgets and/or searches or queries performed in connection with Hilton's web platform(s) and mobile application(s). The "Accused Instrumentalities" include, without limitation, all systems, processes, and instrumentalities associated with receiving, handling, processing, responding to, or otherwise interacting with queries (including user queries and back-end queries) and all instrumentalities related to the location, identification, delivery, display, rendering, ranking, and communication of information relating to such queries. The "Accused Instrumentalities" include, without limitation, the front-end(s) and back-end(s) of Hilton's online hotel locator and/or travel booking services incorporated into the Hilton web platform and/or Hilton mobile application. The Accused Instrumentalities that perform and/or embody the functionalities and features discussed and

particularly described and claimed in the ’157 patent, the ’329 patent, the ’317 patent, the ’097 patent, the ’272 patent, and the related Exhibits accompanying this Complaint are referred to specifically as the “Accused Hilton Search Instrumentalities.”

6. The “Accused Instrumentalities” also include systems, services, processes, methods, acts, components (hardware and/or software), and/or other instrumentalities that process big data and/or data analytics. The “Accused Instrumentalities” include, without limitation, all instrumentalities associated with mapping and/or reducing functionalities, all instrumentalities associated with merging and/or joining data having different schemas, and any other instrumentalities associated with similar functionality, including all instrumentalities related to how data is received, input, stored, organized, partitioned, accessed, analyzed, delivered, processed, and transformed into outputs. The “Accused Instrumentalities” include data analytics systems utilizing, at least in part, Cloudera, Apache Hadoop, Hive, Spark, and/or similar applications. The Accused Instrumentalities that perform and/or embody the functionalities and features discussed and particularly described and claimed in the ’610 patent and the related Exhibit accompanying this Complaint are referred to specifically as the “Accused Hilton Data Analytics Instrumentalities.”

7. The Accused Hilton Search Instrumentalities and Accused Hilton Data Analytics Instrumentalities have been, and continue to be, offered for sale, distributed to, sold, and used in this District, and the associated infringing conduct has caused, and continues to cause, injury to R2, including injury suffered within this District.

8. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400(b).

BACKGROUND

9. The patents-in-suit were filed by Yahoo! Inc. ("Yahoo!") between 2006 and 2009. At the time, Yahoo! was a leading Internet communications, commerce, and media company. Yahoo! invested billions of dollars in research and development over this period, filing hundreds of patent applications each year to cover the innovative computing technologies emerging from its expansive research and development efforts.

10. Yahoo! began as a directory of websites that two Stanford graduate students developed as a hobby. The name "Yahoo" stands for "Yet Another Hierarchical Officious Oracle," a nod to how the original Yahoo! database was arranged hierarchically in layers of subcategories. From this initial database, Yahoo! would develop and promulgate numerous advancements in the field of data storage and recall.

11. For example, in 1995, Yahoo! introduced Yahoo! Search. This software allowed users to search the Yahoo! directory, making it the first popular online directory search engine. This positioned Yahoo! as the launching point for most users of the World Wide Web. By 1998, Yahoo! had the largest audience of any website or online service.

12. However, the early iterations of Yahoo! Search did not operate like a modern search engine because Yahoo! Search was only a directory. Yahoo! Search first integrated a Web crawling engine in 2000. Yahoo! Search used Google's Web crawling engine from 2000–2004. During this time, Yahoo! was developing its own Web search technologies. Yahoo! deployed its own Web crawler in early 2004. The engine, known as Slurp, allowed Yahoo! to collect documents from the Web and build a searchable index. The patents-in-suit relate to innovations associated with Yahoo! Search that were developed and implemented during this

period, which enabled Yahoo! to become Google's biggest competitor in the search engine space.

THE PATENTS-IN-SUIT

13. The '157 patent is entitled, "System and Method for Intent-Driven Search Result Presentation." The '157 patent lawfully issued on December 25, 2012 and stems from U.S. Patent Application No. 12/533,299, which was filed on July 31, 2009. A copy of the '157 patent is attached hereto as Ex. 1.

14. The '329 patent is entitled, "Method for Improving Quality of Search Results by Avoiding Indexing Sections of Pages." The '329 patent lawfully issued on April 13, 2010 and stems from U.S. Patent Application No. 11/652,356, which was filed on January 10, 2007. A copy of the '329 patent is attached hereto as Ex. 2.

15. The '317 patent is entitled, "Method and Apparatus for Reconstructing a Search Query." The '317 patent lawfully issued on June 26, 2012 and stems from U.S. Patent Application No. 13/270,933 filed on October 11, 2011. The '317 patent is a continuation of U.S. Patent Application No. 12/765,676 filed on April 22, 2010, which is a continuation of U.S. Patent Application No. 11/502,202 filed on August 10, 2006. A copy of the '317 patent is attached hereto as Ex. 3.

16. The '097 patent is entitled, "Method and System for Providing a Search Result." The '097 patent lawfully issued on October 31, 2017 and stems from PCT Application No. PCT/CN2014/094122, which was filed on December 17, 2014. A copy of the '097 patent is attached hereto as Ex. 4.

17. The '272 patent is entitled, "System and Method of Automatically Sizing and Adapting a Widget to Available Space." The '272 patent lawfully issued on January 8, 2019,

and stems from U.S. Patent Application No. 11/864,589, which was filed on September 28, 2007. A copy of the '272 patent is attached hereto as Ex. 5.

18. The '610 patent is entitled, "MapReduce for Distributed Database Processing." The '610 patent lawfully issued on May 29, 2012, and stems from U.S. Patent Application No. 11/539,090, which was filed on October 5, 2006. A copy of the '610 patent is attached hereto as Ex. 6.

19. R2 Solutions is the owner of the patents-in-suit with all substantial rights, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

20. The claims of the patents-in-suit are directed to patent eligible subject matter under 35 U.S.C. § 101. They are not directed to abstract ideas, and the technologies covered by the claims consist of ordered combinations of features and functions that, at the time of invention, were not, alone or in combination, well-understood, routine, or conventional.

21. Indeed, the specifications of the patents-in-suit disclose shortcomings in the prior art and then explain, in detail, the technical way the claimed inventions resolve or overcome those shortcomings. For example, relative to the '157 patent, the specification explains that if, as in the case of traditional search engines, the "engine simply regards a web query as, for example, a 'bag of words', the search engine will search for web pages and other data objects (e.g., images, audio files, text files) that contain, or are otherwise associated with, the individual words within the query." '157 patent at 4:1-5. However, simply treating a user query as a "bag of words" may yield results that do not align with the purpose of the user's search. Additionally, it can be onerous to scrutinize generated results for a desired returned object, as the objects can be unremarkable as to each other. *Id*. at 4:10-15. Thus, the specification teaches:

> Search results could be significantly enhanced if the likely intent of the query is known. For example, search results may be ranked such that results that are more relevant to the user's intent appear at or near the top of the search results. Perhaps more significantly, however, the user's intent can be used to customize the display and behavior of a search result to be narrowly targeted to a user's intent. An illustrative list of such customizations could include a customized title or abstract for the result or specialized parameters of a displayed clickable URL to provide the landing page with information regarding the user's intent or triggered by the user's intent.

Id. at 4:16-26.

22. This "intents"-driven search engine process offers significant technical features that constitute enhancements over then-existing search engine technology. For example, the '157 patent discusses how pre-programmed "intents" can be mapped to from query keywords, and how "intents" determination can be fine-tuned via particular parameters:

> The query is then classified into one or more likely intents, which can include an unclassified intent when no defined intents match the query 2300. An intent is a mapping from many combinations of keywords to a relatively small set of common goals that users pursue in a search query or session of multiple queries. Often, the intent of the query is not explicitly stated in the keywords. While the space of possible queries, is very large, the set of intents is much smaller. Examples of intents relating to product queries can be, for example: official-site, research, purchase, dealer, support, or reviews. Examples of intents relating to local/map queries: directions, reviews, phone, hours-of-operation. In one embodiment, query intent may be determined by linguistic analysis of query keywords. In one embodiment, previous queries in the user session, user profile information such as preferences, the set of all queries from all users or any subset of all users (e.g. a subset of users having specific demographics or usage patterns), and click data from previous sessions for the current user as well as the set of all users or any subset of all users are used to determine query intent.

’157 patent at 9:42-61.

23. The “intents”-driven search engine process of the ’157 patent ensures that query keywords, via the “intents,” can even ultimately impact how particular data objects are constructed within a result. This provides an added benefit of enabling keywords to be utilized for more than just relevancy analysis. Also, while other search engines existing at the time could tailor search results by ranking the results and displaying each result with a title and brief abstract taken from the document, the ’157 patent explains how “results could be significantly enhanced if the likely intent of the query is known.” ’157 patent at 4:16-17. Rather than return all documents having a matching keyword—i.e., by using traditional indexing methods—a narrower set of results can be returned if the search results are “ranked such that results that are more relevant to the user’s intent appear at or near the top of the search results.” *Id.* at 4:17-19.

24. Indeed, the claims of the ’157 patent provide just such a solution to the problem of generating robust yet usable search results in response to a user query. For example, Claim 1 of the ’157 patent discloses a method comprising:

> receiving, over a network, a query from a user, the query comprising at least one query token;
>
> analyzing the query, using at least one computing device, to ***identify at least one query keyword***;
>
> determining, at least the one computing device, ***a plurality of intents from the at least one keyword, each of the plurality of intents indicates a type of information regarding the query keyword that is likely to be desired by a user submitting the query***;
>
> classifying the query, using the at least one computing device, ***into at least one of the plurality of intents***;
>
> identifying, using the at least one computing device, a plurality of data objects available over the network that match the at least one query keyword;

assigning, using the at least one computing device, ***at least one of the plurality of intents to at least some of the plurality of data objects***;

ranking, using the at least one computing device, the plurality of data objects;

building a result, using the at least one computing device, using the ranked plurality of data objects, the result comprises a plurality of display entries, ***at least one display entry customized to a respective assigned intent is constructed for each of the ranked plurality of data objects***; and

transmitting the result, over the network, to the user.

(emphasis added).

25. These technical features highlight that Claim 1 itself outlines a novel process executed by a specialized programming architecture that constitutes a significant improvement in computer functionality. Each of the technical features emphasized above operates cooperatively to enhance the technological process of search engine application, and these advances define a novel improvement in computer capabilities.

26. Thus, the inventions claimed in the ’157 patent improve the speed, efficiency, effectiveness, and functionality of computer systems rather than improve upon some other task for which a computer is used in its ordinary capacity. For example, the ’157 patent focuses on circumventing the “bag of words” approach in result generation, and ultimately achieves better, more-usable computer-generated results as compared to technologies that existed in 2009. As another example, the ’157 patent can rank documents based on intent rather than using “a traditional {query,document} score,” increasing the probability that a relevant result will be in the final result set presented to the user. ’157 patent at 12:7-22. This reduces the number of queries that must be processed in order to return relevant results to the user. As a result, the processor is free to allocate more resources to other tasks.

27. With respect to the '329 patent, the specification explains that nefarious parties can trick traditional search engines "into recalling documents and inflating their ranking" using techniques known as "search engine spamming." '329 patent at 2:6-8. For example, spamming may be used to "trick search engine ranking algorithms into recalling and highly ranking documents that contain . . . sponsored links to a web merchant." *Id.* at 2:8-11. The result is that search results for many queries include irrelevant content that the querier did not desire. *Id.* at 2:14-17. The specification gives a specific example of an online shopper:

> A typical example of search engine spam is when a user tries to search for the terms "digital camera reviews" and expects to find pages which review various models of digital cameras, detailing performance specifications, sample images and reviewer pros and cons list. Having this expectation when the user clicks on a link for one of the results, the user is instead led to a page that contains nothing but a plethora of keywords and links to other stores where he can buy the camera.

Id. at 2:18-27. Thus, the specification recognizes that "there is need for mechanisms that prevent hiding of search engine spam but yet allow webmasters to designate page content that should not be indexed." *Id.* at 2:34-37.

28. The specification describes a novel approach to achieve this goal:

> As a crawler examines an individual document, one of the attributes that can be considered is section structure. In examining the various sections, the crawler identifies sections to ignore, that is, to not index in search engine indexes and or otherwise use for recalling the document. Such sections are referred to herein as "no-recall sections." Those portions that are indexed for recalling are referred to as recall sections. In an embodiment, a crawler ignores no-recall sections demarcated by, for example, a tag. In another embodiment a no-recall section may be identified by analyzing section content rather than examining only delimiters. The terms inside no-recall sections do not contribute to the document term frequency counts and are not used for recalling the documents in response to

> search engine queries. However the no-recall sections are included as input to forms of analysis of the document that affect, for example, the document's ranking. Links inside the no-recall sections as well as the rest of the document may be followed in order to discover new content. The document may be analyzed for the amount of advertisements or other features in its entirety. Therefore, terms inside the no-recall sections can affect document ranking.

Id. at 3:7-27. This approach solves the problem described in the specification by simultaneously enabling ranking that is not dictated by relevance scores and preventing nefarious parties from hiding search engine spam, e.g., because pages with "copious amounts of advertisements, or low quality links, will be readily identified and ranked accordingly." *Id.* at 3:28-31.

29. Claim 1 of the '329 patent embodies this solution:

> A method, comprising:
>
> ranking a plurality of documents recalled by a search engine for a query;
>
> wherein the plurality of documents contain certain documents, ***each document of said certain documents containing at least one section that is not used by said search engine for recall*** and one or more sections that are used by said search engine for recall;
>
> ***wherein ranking*** a plurality of documents includes ranking said plurality of documents ***based, at least in part, on the at least one section of said certain documents not used by said search engine to recall documents***; and;
>
> wherein the method is performed by one or more computing devices.

(emphasis added).

30. Claim 1 communicates two overarching technological improvements: 1) an improved data structure that is capable of facilitating both search engine recall and improved ranking via the attributes of recall and no-recall sections; and 2) an improved ranking process rooted in a specialized computing device and/or software capable of delineating between and selectively employing recall and no-recall sections found in a plurality of the aforementioned

improved data structures. These two technological advancements, working in tandem, realize a discrete process and/or system that greatly improves upon search engine technology that existed in 2007.

31. The claimed method of search engine architecture improves navigation of the World Wide Web by increasing the relevance of search results and thwarting nefarious Web users seeking to game Web query rankings. S*ee, e.g.*, '329 patent at 1:67 - 2:17. By improving the functionality of navigating the Web, the claimed invention is necessarily rooted in the improvement of computer functionality, as opposed to, e.g., enhancing the economy of a task usually performed by hand. For example, by not ignoring no-recall sections when ranking the documents, the claimed invention prevents a document from being "designed so that content that increases recall and/or ranking potential is placed in the recall section and content that diminishes high ranking potential is hidden in a no-recall section." '329 patent at 4:1-9. This allows "[a]ll the attributes in all of the sections of a document such as 'links', frequency of terms, coloring, font, etc." to be considered in the spam and relevancy analyses. *Id.* at 4:13-16. The result is that a search engine can "affect the recall and ranking of documents to more accurately reflect relevance of the documents to search engine queries." *Id.* at 3:1-3. This technological solution is the precise reason that the '329 patent was allowed, as is apparent from the prosecution history.

32. Relative to the '317 patent, the specification explains that existing search engine interfaces "may be rigid and require users to submit full queries to perform searche[s]." '317 patent at Abstract. Traditional search engines were built with desktop computer users in mind. Thus, they were designed with the assumption that a user had access to a full keyboard for composing a complete, properly structured search query. However, as noted in the specification

of the ’317 patent, users at the time could increasingly access the internet from a variety of devices, including “cell phones, personal digital assistants, and the like.” *Id.* at 1:44-47. Portability started to become “an increasingly important concern for users.” *Id.* at 1:50-52. The increasing portability of these devices came with a tradeoff in input capabilities. *See id.* at 1:50-52. For example, most phones at the time the ’317 patent was filed did not have a full keyboard. The simpler input mechanisms available on mobile devices presented a barrier to entering properly structured queries, thus limiting users’ ability to fully explore the Internet. *See id.* at 1:52-53.

33. To solve these problems, the ’317 patent discloses “a flexible and intuitive system for reconstructing a search query based on a received partial query.” *Id.* at 1:16-18. This solution is embodied in Claim 1 of the ’317 patent:

> A computer database system for providing search results to a user in response to user submissions over a data network, the computer database system comprising:
> a database configured to store information about events in the computer database system; and
> a query reconstruction server in data communication with the database and operative to receive a partial query submitted at a remote user client system by a user seeking search results matching the submitted partial query and, ***in response to the received partial query, determine a full query*** based on
> (i) the received partial query, and
> (ii) information stored in the database about queries previously-submitted by users,
> wherein the submitted partial query comprises an abbreviated or incomplete search query which is not fully representative of an entire search query desired by the user and the full query is better representative of the entire search query desired by the user.

(emphasis added).

34. The specification explains that partial queries are "shorthand ways of expressing typical search queries." *Id.* at 3:15-17. For example, "auto ins" may be a partial query for the full search query "auto insurance." *Id.* at 3:20-23. While "auto ins" may be an intentional abbreviation, it might also be a typographical error resulting from the restrictive input options of a mobile device. Because the claimed invention will nevertheless be able to take the incomplete query "auto ins" and return search results for "auto insurance," a broader array of mobile devices and input mechanisms may be used to search the Internet. *See id.* at 1:43-56.

35. With respect to the '097 patent, the specification addresses disadvantages in prior art approaches to searching algorithms and renderings. For example, the '097 patent explains that "[c]onventional approaches for providing a search result focus on presenting the items in the search result as a list. For example, a conventional search result includes items listed from top to bottom on a screen. This can limit user engagement on the search result as the user may lose interest after viewing the top two items." '097 patent at 1:30-35. "It is [also] time consuming for the user to scroll up and down to find an interesting item with a listed presentation…." *Id*. at 1:35-40.

36. As a solution to this drawback, the '097 patent enables, in response to a search query, the displaying of content items in a framed structure (e.g., displaying thumbnails of the video content in some framed structure), as opposed to a list of search results going from top to bottom, where there is a correspondence between one or more content items and at least one sub-component. The solution is embodied in Claim 1 of the '097 patent:

> A method, implemented on at least one computing device each of which has at least one processor, storage, and a communication platform connected to a network for providing a search result, the method comprising:
>
> receiving a search request from a user;

determining a plurality of content items based on the search request;

selecting one or more content items from the plurality of content items;

generating a framed structure having at least one sub-component;

determining a correspondence between the one or more content items and the at least one sub-component;

arranging each of the one or more content items with respect to a corresponding sub-component;

generating a search result based on the one or more content items and the framed structure; and

providing the search result.

(emphasis added).

37. The inventions described and claimed in the '097 patent improve the speed, efficiency, effectiveness, and functionality of computer systems. Moreover, the inventions provide an improvement in computer functionality beyond rote tasks for which a computer is used in its ordinary capacity. For example, the '097 patent enhances "search result generation and presentation, realized as a specialized and networked system by utilizing one or more computing devices (e.g., mobile phone, personal computer, etc.) and network communications (wired or wireless)." *Id*. at 4:29-33. The '097 patent provides significant advantages over prior art by "providing a search result to a user to improve the user engagement and/or increase revenue for a search engine. After submitting a query to a search engine, a user may receive a search result including one or more content items. The user's interest on the items may be stimulated not only by their content but also by a manner of providing or presenting them." *Id*. at 4:33-40.

38. Relative to the '272 patent, the specification explains that with respect to web-page widgets, "[e]ven though multiple sizes are offered, their limited number cannot account for all web-page sizing variations; not only do web pages come in a wide number of styles and

designs, but an end user ultimately has control, to a greater or lesser relative extent, over the monitor size and the web browser dimensions; if the web page is designed using mostly relative constraints, then the size of the web page can vary widely depending on monitor size, browser-window size, etc." '272 patent at 1:40-48. The specification further explains that "changing the size of a widget is often a frustrating experience," especially with respect to incorporating the widget into a webpage, which can require a user to "repeat the entire settings-choosing process, including placing the widget code on the web page." *Id*. at 48-51. Thus, "[i]n light of the immutable nature of current widgets, it is often the case that they do not or cannot fit into an already-established web page layout," meaning that a widget will often "overflow[] out of its section," "not appear[] at all," or cause other errors, such as pushing other sections "down and out of view" or causing other sections to be "resized to fit [the] widget." *Id*. at 2:38-52.

39. To address these failings in the art, the '272 patent discloses an enhanced widget technology that realizes the "general object of…automatically siz[ing] a web-based widget relative to its real-time constraints to make optimal and efficient use of available space." *Id*. at 1:57-60. This solution is embodied in, e.g., claim 1 of the '272 patent:

> A method comprising:
>
> ***receiving structural data associated with a web page***, the web page including a widget, the widget including a plurality of widget elements, wherein the structural data includes a size of a browser window used to display the web page;
>
> ***accessing a constraint regarding a pre-determined number of the widget elements*** to display within the widget;
>
> ***triggering during a display of the browser window and the plurality of widget elements a reduction in a size of the widget and a reduction in a plurality of sizes of the***

widget elements to display within the widget when the size of the browser window reduces;

removing one or more of the widget elements from being displayed within the widget after reducing the sizes of the widget elements, wherein said removing the one or more of the widget elements is performed ***until the constraint is achieved***;

increasing a size of remaining one of the widget elements of the reduced size to fit within the widget of the reduced size upon achieving the constraint; and

sending data for displaying the widget.

(emphasis added).

40. The claimed inventions of the ’272 patent detail an enhanced widget technology that implements technological features like those emphasized above to improve upon computer functionality—indeed, the patent focuses on technology that can only exist in the realm of computers, e.g., widgets. Moreover, the inventions provide an improvement in computer functionality beyond rote tasks for which a computer is used in its ordinary capacity, and the inventions described and claimed in the ’272 patent improve the speed, efficiency, effectiveness, and functionality of computer systems. For example, the ’272 patent enhances widget technology by enabling a “widget [] to resize itself automatically relative to where it is being placed,” and further provides a widget that can “determine[], based on its available space…the elements it should display and at what size.” *Id*. at 2:66 – 3:1, 3:10-15. The ’272 patent realizes significant advantages over prior art by providing “web-based widgets” capable of making “optimal and efficient use of their bounded space.” *Id*. at 2:19-20.

41. Regarding the ’610 patent, the specification explains that “conventional MapReduce implementations do not have facility to efficiently process data from heterogeneous

sources" and that "it is impractical to perform joins over two relational tables that have different schemas." '610 patent at 3:9-20. To solve these problems, the '610 patent provides a clear technological improvement to existing MapReduce systems by describing and implementing a novel MapReduce architecture where mapping and reduce functions can be applied to data from heterogeneous data sources (i.e., data sources having different schema) to accomplish the merger of heterogeneous data based on a key in common between or among the heterogeneous data. For example, the '610 patent explains how implementation of, e.g., "data groups" realizes these improvements:

> In general, partitioning the data sets into data groups enables a mechanism to associate (group) identifiers with data sets, map functions and iterators (useable within reduce functions to access intermediate data) and, also, to produce output data sets with (group) identifiers. It is noted that the output group identifiers may differ from the input/intermediate group identifiers.

'610 patent at 3:58-64.

42. The technological advantages of a "data group"-centric system is shown to "enhance[] the utility of the MapReduce programming methodology." '610 patent at 1:32-33. As the specification explains:

> [T]he MapReduce concept may be utilized to carry out map processing independently on two or more related datasets (e.g., related by being characterized by a common key) even when the related data sets are heterogeneous with respect to each other, such as data tables organized according to different schema. The intermediate results of the map processing (key/value pairs) for a particular key can be processed together in a single reduce function by applying a different iterator to intermediate values for each group. In this way, operations on the two or more related datasets may be carried out more efficiently or in a way not even possible with the conventional MapReduce architecture.

Id. at 8:47-58.

43. Such a solution is embodied, for example, in Claim 1 of the ’610 patent:

A method of processing data of a data set over a distributed system, wherein the data set comprises a ***plurality of data groups***, the method comprising:

partitioning the data of each one of the data groups into a plurality of data partitions that each have a plurality of key-value pairs and ***providing each data partition to a selected one of a plurality of mapping functions*** that are each user-configurable to independently output a plurality of lists of values for each of a set of keys found in such map function’s corresponding data partition to form corresponding ***intermediate data for that data group and identifiable to that data group***, wherein ***the data of a first data group has a different schema than the data of a second data group*** and ***the data of the first data group is mapped differently than the data of the second data group*** so that different lists of values are output for the corresponding different intermediate data, ***wherein the different schema and corresponding different intermediate data have a key in common***; and

reducing the intermediate data for the data groups to at least one output data group, including ***processing the intermediate data for each data group in a manner that is defined to correspond to that data group***, so as to result in a ***merging of the corresponding different intermediate data based on the key in common***,

wherein the mapping and reducing operations are performed by a distributed system.

(emphasis added).

44. The concept of “data groups” as found in Claim 1 of the ’610 patent in the context of MapReduce attains a novel and technological improvement in computer capabilities. For example, employing “data groups” allows a diverse data set to be fed to a collection of mapping functions within the same MapReduce architecture to ultimately be reduced and/or merged in spite of the diversity, and this is facilitated by a character of each “data group” (i.e., the “mechanism for identifying data from that group”) of the diverse data set following the data

through the mapping. Per Claim 1, the improved MapReduce architecture in the reducing phase is able to selectively employ specialized processing based on the "data group" from which the data being reduced originated, and this specialized processing enables the MapReduce architecture in the reducing phase to accomplish the merger of intermediate data hailing from different data groups.

45. The inventions described and claimed in the '610 patent improve the speed, efficiency, effectiveness, and functionality of computer systems. Moreover, the inventions provide an improvement in computer functionality rather than improvement in performance of an economic task or other tasks for which a computer is used merely as a tool. The '610 patent itself states that the claimed inventions "enhance[] the utility of the MapReduce programming methodology." '610 patent at Abstract, 1:31-33, 1:66 - 2:2. The '610 patent specification goes on to explain that "[t]he intermediate results of the map processing (key/value pairs) for a particular key can be processed together in a single reduce function by applying a different iterator to intermediate values for each group." *Id.* at Abstract, 1:37-39, 2:4-8. And the specification discusses the use of multiple processors to perform processing functions in parallel. *See id.* As a result, computer functionality is improved. *Id.* at 1:42-44.

46. Additionally, the claimed inventions provide for more dynamic, customizable, and efficient processing of large sets of data. S*ee, e.g.*, '610 patent at 2:58-61, 4:18-22. The inventions provide optimization of such processing, which increases efficiency and reduces processor execution time. For example, the specification describes a combiner function that "helps reduce the network traffic and speed up the total execution time." '610 patent at 3:1-8. The specification also discusses the use of configurable settings to reduce processing overhead. *See, e.g.*, *id.* at 4:60-62, 5:33-39.

47. In essence, each of the patents-in-suit relate to novel and non-obvious inventions in the fields of search engines, data analytics, and database structures.

DEFENDANT'S PRE-SUIT KNOWLEDGE OF ITS INFRINGEMENT

48. Prior to the filing of this Complaint, Hilton was notified on numerous occasions of the R2 portfolio to which the patents-in-suit belong, and R2 has further attempted to engage Hilton in licensing discussions related to the patents-in-suit for over a year.

49. On June 17, 2021, Evan Woolley, the VP of Licensing for R2's owner, sent a letter to Kristin Campbell, Hilton's Executive Vice President and General Counsel, offering an opportunity to negotiate a broad license to the portfolio that includes the patents-in-suit. The letter explained that R2's portfolio originated from Yahoo! and that it includes patents covering a variety of technologies relevant to Hilton.

50. On October 15, 2021, Mr. Woolley sent Ms. Campbell another letter restating the information from the June 17 letter and, again, offering an opportunity to open negotiations. The October 15 letter further explained that since the June 17 letter, R2 had licensed many companies through negotiated deals and had also resolved several lawsuits involving patents at issue here.

51. Mr. Woolley followed up with Ms. Campbell via email on October 25, 2021, November 2, 2021, November 8, 2021, and November 23, 2021.

52. On November 23, 2021, Mr. Woolley sent Ms. Campbell yet another email and letter. The email and letter explained that since the October 20 letter, R2 had resolved certain, highly-relevant litigation, demonstrating the value of R2's portfolio to Hilton as a participant in the travel industry.

53. Mr. Woolley continued his attempts to engage Hilton in negotiations over the next several months. Specifically, Mr. Woolley sent emails to Ms. Campbell on November 29, 2021,

December 6, 2021, December 14, 2021, January 7, 2022, January 12, 2022, January 19, 2022, January 24, 2022, February 1, 2022, February 9, 2022, February 17, 2022, February 24, 2022, March 2, 2022, and March 7, 2022.

54. Hilton ignored each and every one of these attempts to open a licensing dialogue. As a result, R2 was left with no other choice but to file suit.

55. R2 filed suit against Hilton-related entities on April 28, 2022 in the Eastern District of Texas, alleging infringement of the ’157 patent, the ’329 patent, the ’317 patent, and the ’610 patent. The lawsuit was dismissed by agreement without prejudice on September 15, 2022. Hilton has been on notice of its infringements of, at least, the ’157 patent, the ’329 patent, the ’317 patent, and the ’610 patent since April 28, 2022, and all causes of action asserted by R2 in this lawsuit under the ’157 patent, the ’329 patent, the ’317 patent, and the ’610 patent relate back to the original filing date of the Complaint in the Eastern District of Texas suit for purposes of the statute of limitations and damages (e.g., 35 U.S.C. § 287).

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 8,341,157

56. This cause of action arises under the patent laws of the United States, and in particular, 35 U.S.C. §§ 271, *et seq*.

57. R2 is the owner of the ’157 patent with all substantial rights to the ’157 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

58. The ’157 patent is valid and enforceable and was duly issued in full compliance with Title 35 of the United States Code.

Direct Infringement (35 U.S.C. § 271(a))

59. HDOC has directly infringed and continues to directly infringe one or more claims of the ’157 patent in this District and elsewhere in Texas and the United States.

60. To this end, HDOC has infringed and continues to infringe, either by itself or via an agent, at least claims 1-5 and 7-10 of the ’157 patent by, among other things, making, offering to sell, selling, testing and/or using the Accused Hilton Search Instrumentalities.

61. Attached hereto as Ex. 7, and incorporated herein by reference, is a representative claim chart detailing how Hilton infringes the ’157 patent.

62. Hilton is liable for its infringements of the ’157 patent pursuant to 35 U.S.C. § 271.

Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

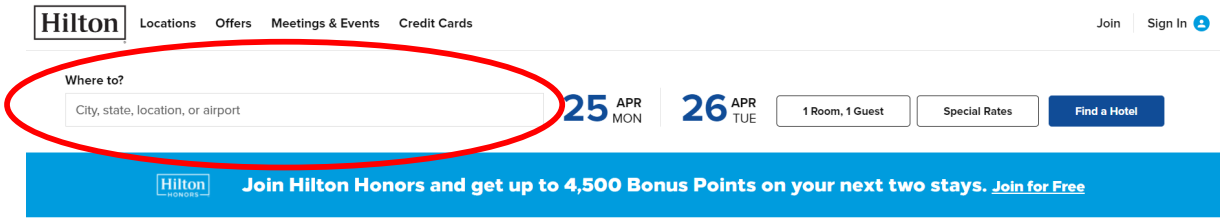
63. In addition and/or in the alternative to its direct infringement, Hilton has indirectly infringed and continues to indirectly infringe one or more claims of the ’157 patent by inducing direct infringement by its customers and end users.

64. Hilton has had knowledge of the ’157 patent as early as October 15, 2021, when Mr. Woolley informed Hilton that R2 resolved a lawsuit against Workday, which involved the ’157 patent. At a minimum, Hilton has had knowledge of the ’157 patent since April 28, 2022, the original filing date of the Complaint in the Eastern District of Texas.

65. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Hilton Search Instrumentalities infringes the ’157 patent, Hilton has specifically intended, and continues to specifically intend, for persons (such as Hilton’s customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Hilton Search Instrumentalities in ways that infringe the ’157 patent, including at least

claim 2. Indeed, Hilton knew or should have known that its actions have induced, and continue to induce, such infringements.

66. Hilton instructs and encourages customers and end users to use the Accused Hilton Search Instrumentalities in ways that infringe the '157 patent. For example, the Hilton website prominently displays a search interface instructing users to search for particular locations and/or input dates of travel by asking users "Where to?":



https://www.hilton.com/en/.

67. Hilton further provides directs users to its "official" booking channel, which includes Hilton's website and mobile application that implement search functionality in ways that infringe the '157 patent. *See* https://help.hilton.com/s/article/What-are-Hilton-s-official-booking-channels.

Damages

68. R2 has been damaged as a result of Hilton's infringing conduct described in this Count. Hilton is, thus, liable to R2 in an amount that adequately compensates it for Hilton's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 7,698,329

69. This cause of action arises under the patent laws of the United States, and in particular, 35 U.S.C. §§ 271, *et seq*.

70. R2 is the owner of the ’329 patent with all substantial rights to the ’329 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

71. The ’329 patent is valid and enforceable and was duly issued in full compliance with Title 35 of the United States Code.

Direct Infringement (35 U.S.C. § 271(a))

72. HDOC has directly infringed and continues to directly infringe one or more claims of the ’329 patent in this District and elsewhere in Texas and the United States.

73. To this end, HDOC has infringed and continues to infringe, either by itself or via an agent, at least claims 1, 4-5, 8, and 11-12 of the ’329 patent by, among other things, making, offering to sell, selling, testing and/or using the Accused Hilton Search Instrumentalities.

74. Attached hereto as Ex. 8, and incorporated herein by reference, is a representative claim chart detailing how HDOC infringes the ’329 patent.

75. HDOC is liable for its infringements of the ’329 patent pursuant to 35 U.S.C. § 271.

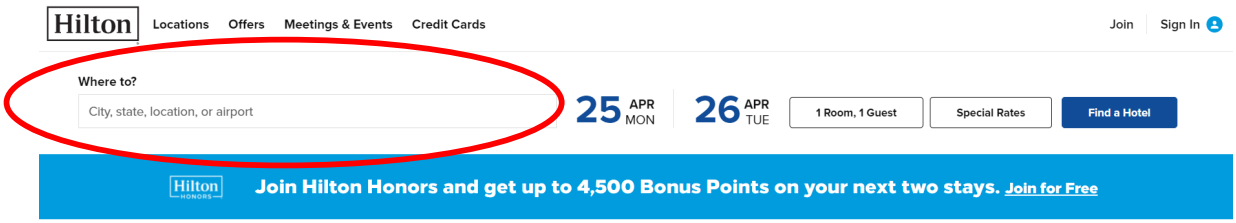
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

76. In addition and/or in the alternative to its direct infringement, HDOC has indirectly infringed and continues to indirectly infringe one or more claims of the ’329 patent by inducing direct infringement by its customers and end users.

77. HDOC has had knowledge of the ’329 patent as early as November 23, 2021, when Mr. Woolley informed Hilton that R2 resolved a lawsuit against Expedia Group, Inc., which involved the ’329 patent. At a minimum, Hilton has had knowledge of the ’329 patent since April 28, 2022, the original filing date of the Complaint in the Eastern District of Texas.

78. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Hilton Search Instrumentalities infringes the '329 patent, Hilton has specifically intended, and continues to specifically intend, for persons (such as Hilton's customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Hilton Search Instrumentalities in ways that infringe the '329 patent, including at least claims 8, 11, and 12. Indeed, Hilton knew or should have known that its actions have induced, and continue to induce, such infringements.

79. Hilton instructs and encourages customers and end users to use the Accused Hilton Search Instrumentalities in a manner than infringes the '329 patent. For example, the Hilton website prominently displays a search interface instructing users to search for particular locations and/or input dates of travel, etc. by asking users "Where to?":



https://www.hilton.com/en/.

80. Hilton further provides directs users to its "official" booking channel, which includes Hilton's website and mobile application that implement search functionality in ways that infringe the '329 patent. *See* https://help.hilton.com/s/article/What-are-Hilton-s-official-booking-channels.

Damages

81. R2 has been damaged as a result of Hilton's infringing conduct described in this Count. Hilton is, thus, liable to R2 in an amount that adequately compensates it for Hilton's

infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 8,209,317

82. This cause of action arises under the patent laws of the United States, and in particular, 35 U.S.C. §§ 271, *et seq*.

83. R2 is the owner of the ’317 patent with all substantial rights to the ’317 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

84. The ’317 patent is valid and enforceable and was duly issued in full compliance with Title 35 of the United States Code.

Direct Infringement (35 U.S.C. § 271(a))

85. HDOC has directly infringed and continues to directly infringe one or more claims of the ’317 patent in this District and elsewhere in Texas and the United States.

86. To this end, HDOC has infringed and continues to infringe, either by itself or via an agent, at least claims 1-2, 8-10, and 12 of the ’317 patent by, among other things, making, offering to sell, selling, testing and/or using the Accused Hilton Search Instrumentalities.

87. Attached hereto as Ex. 9, and incorporated herein by reference, is a representative claim chart detailing how HDOC infringes the ’317 patent.

88. HDOC is liable for its infringements of the ’317 patent pursuant to 35 U.S.C. § 271.

Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

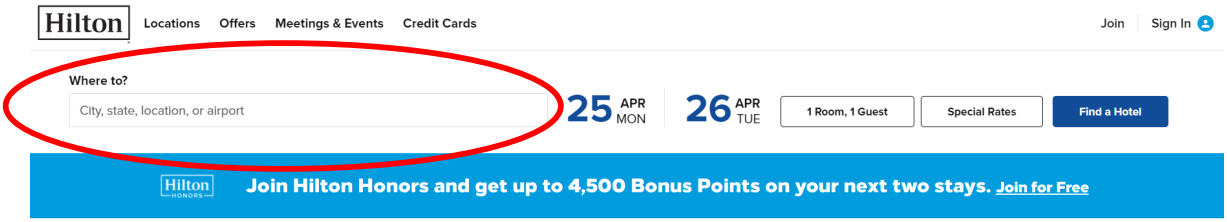
89. In addition and/or in the alternative to its direct infringement, HDOC has indirectly infringed and continues to indirectly infringe one or more claims of the ’317 patent by

inducing direct infringement by its customers and end users.

90. HDOC has had knowledge of the ’317 patent as early as October 15, 2021, when Mr. Woolley informed Hilton that R2 resolved a lawsuit against Samsung, which involved the ’317 patent. At a minimum, Hilton has had knowledge of the ’317 patent since April 28, 2022, the original filing date of the Complaint in the Eastern District of Texas.

91. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Hilton Search Instrumentalities infringes the ’317 patent, Hilton has specifically intended, and continues to specifically intend, for persons (such as Hilton’s customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Hilton Search Instrumentalities in ways that infringe the ’317 patent, including at least claims 1 and 2. Indeed, Hilton knew or should have known that its actions have induced, and continue to induce, such infringements.

92. Hilton instructs and encourages customers and end users to use the Accused Hilton Search Instrumentalities in ways that infringe the ’317 patent. For example, the Hilton website prominently displays a search interface instructing users to search for particular locations and/or input dates of travel, etc. by asking users “Where to?”:



https://www.hilton.com/en/.

93. Hilton further provides directs users to its “official” booking channel, which includes Hilton’s website and mobile application that implement search functionality in ways

that infringe the '317 patent. *See* https://help.hilton.com/s/article/What-are-Hilton-s-official-booking-channels.

Damages

94. R2 has been damaged as a result of Hilton's infringing conduct described in this Count. Hilton is, thus, liable to R2 in an amount that adequately compensates it for Hilton's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 9,805,097

95. This cause of action arises under the patent laws of the United States, and in particular, 35 U.S.C. §§ 271, *et seq*.

96. R2 Solutions is the owner of the '097 patent with all substantial rights to the '097 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

97. The '097 patent is valid and enforceable and was duly issued in full compliance with Title 35 of the United States Code.

Direct Infringement (35 U.S.C. § 271(a))

98. HDOC has directly infringed and continues to directly infringe one or more claims of the '097 patent in this District and elsewhere in Texas and the United States.

99. To this end, HDOC has infringed and continues to infringe, either by itself or via an agent, at least claims 1, 3, 8-10, and 17-20 of the '097 patent by, among other things, making, offering to sell, selling, testing and/or using the HDOC Systems.

100. Attached hereto as Ex. 10, and incorporated herein by reference, is a representative claim chart detailing how HDOC infringes the '097 patent.

101. HDOC is liable for its infringements of the ’097 patent pursuant to 35 U.S.C. § 271.

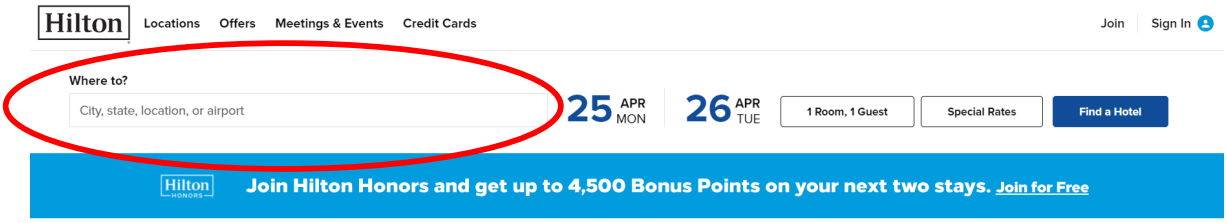
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

102. In addition and/or in the alternative to its direct infringement, HDOC has indirectly infringed and continues to indirectly infringe one or more claims of the ’097 patent by inducing direct infringement by its customers and end users.

103. At a minimum, Hilton has had knowledge of the ’097 patent since being served with this Complaint.

104. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Hilton Search Instrumentalities infringes the ’097 patent, Hilton has specifically intended, and continues to specifically intend, for persons (such as Hilton’s customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Hilton Search Instrumentalities in ways that infringe the ’097 patent, including at least claims 1 and 19. Indeed, Hilton knew or should have known that its actions have induced, and continue to induce, such infringements.

105. Hilton instructs and encourages customers and end users to use the Accused Hilton Search Instrumentalities in ways that infringe the ’097 patent. For example, the Hilton website prominently displays a search interface instructing users to search for particular locations and/or input dates of travel, etc. by asking users “Where to?”:



https://www.hilton.com/en/.

106. Hilton further provides directs users to its "official" booking channel, which includes Hilton's website and mobile application that implement search functionality in ways that infringe the '097 patent. *See* https://help.hilton.com/s/article/What-are-Hilton-s-official-booking-channels.

Damages

107. R2 Solutions has been damaged as a result of HDOC's infringing conduct described in this Count. HDOC is, thus, liable to R2 Solutions in an amount that adequately compensates it for HDOC's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 10,176,272

108. This cause of action arises under the patent laws of the United States, and in particular, 35 U.S.C. §§ 271, *et seq*.

109. R2 Solutions is the owner of the '272 patent with all substantial rights to the '272 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

110. The '272 patent is valid and enforceable and was duly issued in full compliance with Title 35 of the United States Code.

Direct Infringement (35 U.S.C. § 271(a))

111. HDOC has directly infringed and continues to directly infringe one or more claims of the '272 patent in this District and elsewhere in Texas and the United States.

112. To this end, HDOC has infringed and continues to infringe, either by itself or via an agent, at least claims 1 and 10 of the '272 patent by, among other things, making, offering to sell, selling, testing and/or using the HDOC Systems.

113. Attached hereto as Ex. 11, and incorporated herein by reference, is a representative claim chart detailing how HDOC infringes the ’272 patent.

114. HDOC is liable for its infringements of the ’272 patent pursuant to 35 U.S.C. § 271.

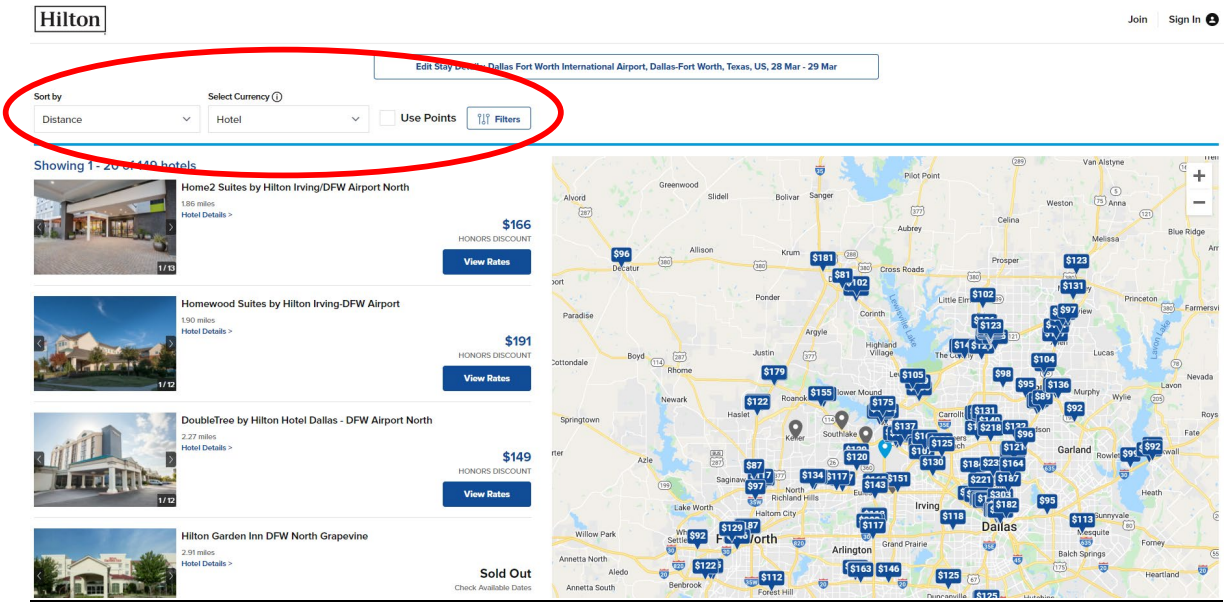
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

115. In addition and/or in the alternative to its direct infringement, HDOC has indirectly infringed and continues to indirectly infringe one or more claims of the ’272 patent by inducing direct infringement by its customers and end users.

116. At a minimum, Hilton has had knowledge of the ’272 patent since being served with this Complaint.

117. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Hilton Search Instrumentalities infringes the ’272 patent, Hilton has specifically intended, and continues to specifically intend, for persons (such as Hilton’s customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Hilton Search Instrumentalities in ways that infringe the ’272 patent, including at least claims 1 and 2. Indeed, Hilton knew or should have known that its actions have induced, and continue to induce, such infringements.

118. Hilton instructs and encourages customers and end users to use the Accused Hilton Search Instrumentalities in ways that infringe the ’272 patent. For example, the Hilton website prominently displays a booking widget instructing users to search for particular locations and/or input dates of travel, etc. by offering users “Sort by” options and an associated interactive widget interface:



https://www.hilton.com/en/.

119. Hilton further provides directs users to its "official" booking channel, which includes Hilton's website and mobile application that implement search functionality in ways that infringe the '272 patent. *See* https://help.hilton.com/s/article/What-are-Hilton-s-official-booking-channels.

Damages

120. R2 Solutions has been damaged as a result of HDOC's infringing conduct described in this Count. HDOC is, thus, liable to R2 Solutions in an amount that adequately compensates it for HDOC's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 8,190,610

121. This cause of action arises under the patent laws of the United States, and in particular, 35 U.S.C. §§ 271, *et seq*.

122. R2 Solutions is the owner of the ’610 patent with all substantial rights to the ’610 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

123. The ’610 patent is valid and enforceable and was duly issued in full compliance with Title 35 of the United States Code.

Direct Infringement (35 U.S.C. § 271(a))

124. HDOC has directly infringed and continues to directly infringe one or more claims of the ’610 patent in this District and elsewhere in Texas and the United States.

125. To this end, HDOC has infringed and continues to infringe, either by itself or via an agent, at least claims 1-5 and 17-21 of the ’610 patent by, among other things, making, offering to sell, selling, testing and/or using the Accused Hilton Data Analytics Instrumentalities.

126. Attached hereto as Ex. 12, and incorporated herein by reference, is a representative claim chart detailing how Hilton infringes the ’610 patent.

127. Hilton is liable for its infringements of the ’610 patent pursuant to 35 U.S.C. § 271.

Damages

128. R2 has been damaged as a result of Hilton’s infringing conduct described in this Count. Hilton is, thus, liable to R2 in an amount that adequately compensates it for Hilton’s infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

DEMAND FOR A JURY TRIAL

R2 demands a trial by jury on all issues triable of right by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

R2 respectfully requests that this Court enter judgment in its favor and grant the following relief:

(i) Judgment and Order that HDOC has directly and/or indirectly infringed one or more claims of each of the patents-in-suit;

(ii) Judgment and Order that HDOC must pay R2 past and future damages under 35 U.S.C. § 284, including supplemental damages arising from any continuing, post-verdict infringement for the time between trial and entry of the final judgment, together with an accounting, as needed, as provided under 35 U.S.C. § 284;

(iii) Judgment and Order that HDOC must pay R2 reasonable ongoing royalties on a go-forward basis after Final Judgment;

(iv) Judgment and Order that HDOC must pay R2 pre-judgment and post-judgment interest on the damages award;

(v) Judgment and Order that HDOC must pay R2's costs;

(vi) Judgment and Order that the Court find this case exceptional under the provisions of 35 U.S.C. § 285 and accordingly order Hilton to pay R2's attorneys' fees; and

(vii) Such other and further relief as the Court may deem just and proper.

Dated: December 12, 2022

Respectfully submitted,

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