IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
SHERMAN DIVISION

R2 Solutions LLC, Plaintiff, v. Citigroup Inc., Defendant.	Civil Action No. 4:22-cv-00357 Jury Trial Demanded

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff R2 Solutions LLC files this Complaint against Citigroup Inc. for infringement of U.S. Patent Nos. 8,190,610 ("the '610 patent"), 8,341,157 ("the '157 patent"), 7,698,329 ("the '329 patent"), 8,209,317 ("the '317 patent"), and 7,370,011 ("the '011 patent"). The '610 patent, '157 patent, '329 patent, '317 patent, and '011 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 Citigroup Inc. ("Citi") is a Delaware corporation with headquarters at 388 Greenwich Street, New York, NY, and other regular and established places of business in this State, including 931 Litsey Rd, Roanoke, TX 76262 (the "Roanoke Location"), and 6400 Las Colinas Blvd, Irving, TX 75039 (the "Irving Global Command Center"). Citi may be served with process through its registered agent, CT Corporation System, at 1999 Bryan St., Ste. 900, Dallas, TX 75201.

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 Citi in accordance with due process and/or the Texas Long Arm Statute because, among other things, Citi does business in this State. For example, Citi maintains two campuses that comprise the Irving Global Command Center in Dallas/Irving, which serves as "[h]ome [to] more than 9,500 employees."[1] The Citi mobile application was developed in Dallas.[2] Additionally, Citi owns and operates a data center in Roanoke, TX, which serves as an integral piece to Citi's nationwide infrastructure for all of its business activities.[3] Citi also "recruits Texas residents, directly or through an intermediary located in this state, for employment inside or outside this state." TEX. CIV. PRAC. & REM. CODE § 17.042(3). For instance, Citi had 2,090 job openings listed in Texas as of April 25, 2022[4]:

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[1] https://jobs.citi.com/Dallas.
[2] https://www.citigroup.com/citi/citiforcities/pdfs/city_profile_texas.pdf at 4.
[3] https://www.citigroup.com/citi/news/2017/170110b.htm.
[4] https://jobs.citi.com/search-jobs/Texas%2C%20US/287/3/6252001-4736286/31x25044/-99x25061/50/2.

5. Further, this Court has personal jurisdiction over Citi because it has engaged, and continues to engage, in continuous, systematic, and substantial activities within this State, including the substantial marketing and sale of products and services within this State and this District. Indeed, this Court has personal jurisdiction over Citi because it has committed acts giving rise to R2's claims for patent infringement within and directed to this District, has derived substantial revenue from its goods and services provided to individuals in this State and this District, and maintains regular and established places of business in this District, including at least its Roanoke Location.

6. Relative to patent infringement, Citi 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 and services in this State, including in this District, and otherwise has engaged in infringing conduct within and directed at, or from, this District. Such infringing

products and services include: (1) computer-implemented functionality (including functionality associated with web and mobile applications), computer-readable storage media, and attendant servers, databases, and other devices and equipment to proliferate Citi's services via its web platform and mobile application; such computer-implemented functionality, computer-readable storage media, and attendant equipment performing and/or embodying the functionalities and features discussed and particularly described and claimed in the '157 patent, '329 patent, and '317 patent and the Exhibits accompanying this Complaint, including, without limitation, the search functionalities incorporated into the Citi online banking and/or trading platform accessible via the web (e.g., Citi.com) and the Citi mobile application (the "Accused Citi Search Systems"); (2) the Citi data analytics systems 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, including, but not limited to, the data analytics systems built on Apache Hadoop, Hive, Spark and/or other functionalities (the "Accused Citi Data Analytics Systems"); and (3) the Citi account linking systems that perform and/or embody the functionalities and features discussed and particularly described and claimed in the '011 patent and the related Exhibit accompanying this Complaint, including, but not limited to, the Citi account linking systems associated with the Citi web platform and mobile application, which allow Citi users to associate their account with a third-party service (such as Plaid) (the "Accused Citi Account Linking Systems"). All such infringing systems are hereinafter referred to collectively as "Citi Systems." Such Citi Systems have been and continue to be offered for sale, distributed to, sold, and used in this District, and the infringing conduct has caused, and continues to cause, injury to R2, including injury suffered within this District. These are

purposeful acts and transactions in this State and this District such that Citi reasonably should know and expect that it could be haled into this Court.

7. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400(b) because Citi has a regular and established place of business in the District, including Citi's Roanoke Location. As of 2022, the Roanoke Location is owned by Citigroup Technology, Inc., a wholly-owned subsidiary of Citi, and has an appraisal value of over $43M. *See* Ex. 1. Upon information and belief, Citi employs personnel at the Roanoke Location and further recruits people to work specifically at the Roanoke Location. *See* Ex. 2.

8. Venue is further proper in this District because Citi has directly infringed and/or induced the infringement of others, including its customers, in this District. Citi operates a data center at the Roanoke Location, which, upon information and belief, serves as an integral component to the Accused Citi Data Analytics Systems. Citi further markets and provides District residents with access to the Accused Citi Search Systems and Accused Citi Account Linking Systems. Moreover, Citi's activities, the actions of Citi Systems, and/or the actions of Citi customers using the Citi Systems in this District constitute infringements of the patents-in-suit.

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 '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. 3.

14. 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. 4.

15. 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. 5.

16. 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, which was 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. 6.

17. The ’011 patent is entitled, “Financial Information Portal.” The ’011 patent lawfully issued on May 6, 2008 and stems from U.S. Patent Application No. 09/896,438, which was filed on June 28, 2001. The ’011 patent claims priority to Provisional Application No. 60/214,662, which was filed on June 28, 2000. A copy of the ’011 patent is attached hereto as Ex. 7.

18. 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.

19. 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.

20. 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. The '610 patent explains, for instance, 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.

21. 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.

22. 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).

23. 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.

24. 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.

25. 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.

26. 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.

27. 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.

28. 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.

29. 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).

30. 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.

31. 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.

32. 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.

33. 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.

34. 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).

35. 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.

36. 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.

37. 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.

38. 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).

39. 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.

40. The specification of the '011 patent likewise details how the inventions embodied in the patent's claims resolve technical shortcomings in the prior art. As the '011 specification explains, users hoping to obtain account information from a financial institution by accessing an HTTP server could not securely access or monitor all of their data in one place if those users had different accounts, even with the same institution. '011 patent at 1:40-47. Two prior-art portals emerged to provide users with a more desirable level of customization: (1) the "stand-in" system; and (2) the "client-handoff" system. *See id.* at 1:54-3:15. However, both prior-art portals have notable technical drawbacks, for which the inventions claimed in the '011 patent provide technical solutions.

41. In a "stand-in" system, "a portal operator stands in place of the user to get data from the financial institution." *Id.* at 1:54-56. The user could set up an account with a portal operator and establish a user identification and password that authenticated the user with the portal. *Id.* at 2:5-8. The user could then provide his or her credentials (e.g., a username and password) for connecting to a financial institution server via the portal operator's server, along with other relevant information (e.g., a domain name, URL, or IP address). *Id.* at 2:8-12. This information was then stored by the portal operator and later used to connect to the financial institution on the user's behalf if the user requested information from the portal. *Id.* at 2:12-17. A major drawback to this approach was that the financial institution generally could not control, via any technical means, what the portal system did with the user's account when the portal system logged on as the user. *Id.* at 2:29-31. Thus, if the security of the portal server were compromised and a database of user IDs and passwords were stolen, the attacker could have

accessed the bank accounts of those users without the financial institution being able to control the individual accounts or even determine that anything was amiss. *Id.* at 2:32-35.

42. The other approach available at the time was a client-handoff system. *Id.* at 2:40-42. The user of a client-handoff system would log onto a financial institution system using an interactive client, such as a browser plug-in, that retrieved some user information from the financial institution and provided it to the portal server for storage. *Id.* at 2:42-46. While this avoided the risk of maintaining sensitive user authentication data at the portal server, it resulted in stale user data. *See id.* at 3:6-15. This was because portal information was "only current as of the last time the user logged onto the financial institution server and performed a transfer of data to the portal server." *Id.* at 3:11-15.

43. To solve these technical problems, the '011 patent provides a technical solution in the form of a novel portal authentication system. In one embodiment, the '011 patent provides a dual authentication protocol executed by portal servers utilizing a trusted link to a non-portal server. The dual-authentication protocol utilized by the portal enhances security of the system by generating and utilizing portal authentication data, which differs from the authentication data utilized by a user's institution (and the prior art systems). As the specification explains:

> In one such portal information system, a financial institution or other information maintainer, has a list of its account holders that also have accounts with a portal and have agreed to link their portal account and user account with the financial institution or other information maintainer. When a user logs onto the user's portal account, the portal server can request information from the user account over a trusted link to the financial institution or other information maintainer. The portal can request data for a particular user over the trusted link or can request bulk data for all users, using portal authentication data, as opposed to user authentication data. In the preferred embodiment, the actions allowed on a user account by the portal authentication data are more restrictive than the actions allowed by the user authentication data.

Id. at 3:20-40.

44. Such a solution is embodied, for example, in Claim 7 of the '011 patent:

A computer readable medium storing instructions for execution in a computer, the medium when executed by a computer performing the method comprising:

accepting a connection at an institution server, the connection initiated by a user following a link from a portal, ***the link including a user identification***;

responsive to the connection, ***enabling the user to authenticate with the institution server using user-institution authentication data***;

responding to the authentication by ***associating the user identification with the portal***; and

servicing a request by the portal, after authenticating the portal using portal authentication data, by providing, to the portal, data of the user at the institution, ***wherein the user-institution authentication data and the portal authentication data are not the same data.***

(emphases added).

45. At a minimum, the claims of the '011 patent are directed to solutions to computer-functionality problems. For example, the '011 patent claims improvements to computer functionality that have the specificity required to transform a claim from one claiming only a result to one claiming a way of achieving it.

46. The inventions claimed in the '011 patent provide a non-abstract improvement in computer functionality by improving network security and by improving the functioning of a portal server by use of a specific technique that departs from earlier approaches to solve a particular computer problem. As discussed above, "stand-in" systems pose a security risk because the portal must store user login data for each financial account in order to access the account data on behalf of the user. Unlike conventional "stand-in" systems where a user provides a portal with the user ID and password that the user would use to directly retrieve information from a financial institution, and then relies on the portal to interact with the financial institution using that user ID and password in the user's stead, the '011 patent claims a portal

"wherein the user-institution authentication data and the portal authentication data are not the same." *Id*. at claim 1. During prosecution, the patent examiner acknowledged that the claims improve portal security by the use of a specific technique that departs from earlier approaches to solve a particular computer problem. The examiner explained in the Notice of Allowance:

> With the usage of a dual authentication protocol, security is enhanced. Under the conventional system should unauthorized personnel infiltrate the information portal they could conceivably obtain a user's userid and password from the portal system, allowing them authorized access to user information at a financial institution. However, the instant application does not require storage of such information at the information portal, rather the information portal possesses a separate and distinct userid and password for access to user information at a financial institution. Usage of a separate and distinct userid and password for authentication of the information portal allows the financial institution server to establish separate security protocols for the information portal, such as limiting the actions that the information portal can take on the user's behalf.

Ex. 8 at 3.

47. In turn, the improved security allows the inventions claimed in the '011 patent to directly address the internet-centric challenge of providing up-to-date information on the status of financial accounts without risking exposure of sensitive user data. User login information only provides security if malicious parties do not have a way of determining the information. Each time a user's account login credentials are saved in a new location there is a new risk that malicious parties can infiltrate that location and obtain the user's login credentials. The specification of the '011 patent explains that previous approaches to reduce such security threats relied on a client-handoff system. *See* '011 patent at 2:42-46.

48. Unlike such systems, which require users to repeat the authentication process with the financial institution each time the user wants the portal to receive updated information from the financial information, the dual authentication protocol claimed in the '011 patent allows the

portal to obtain periodic updates from the financial institution without requiring the user to submit its financial institution login credentials again. *See id*. at 5:44-62. Claim 7 explains that after the user has the opportunity to authenticate with the institution server, data requests submitted to the institution server by the portal server require "authenticating the portal using portal authentication data." Importantly, the claimed "portal authentication data" is different from the "user-institution authentication data." Thus, after the user's initial login with "user-institution authentication data," "the portal server can make a trusted server-to-server connection to the financial institution server to get information for one or more signed up users." *Id*. at 5:56-60.

49. In light of the foregoing, the '011 patent claims are more complex than merely reciting the performance of a known business practice on the Internet, and are better understood as being necessarily rooted in computer technology in order to solve a specific problem in the realm of computer networks.

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

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

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

52. R2 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.

53. 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))

54. Citi 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.

55. To this end, Citi 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 Citi Data Analytics Systems.

56. Attached hereto as Ex. 9, and incorporated herein by reference, is a representative claim chart detailing how Citi infringes the ’610 patent.

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

Damages

58. R2 has been damaged as a result of Citi’s infringing conduct described in this Count. Citi is, thus, liable to R2 in an amount that adequately compensates it for Citi’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. 8,341,157

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

60. 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.

61. 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))

62. Citi 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.

63. To this end, Citi 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 Citi Search Systems.

64. Attached hereto as Ex. 10, and incorporated herein by reference, is a representative claim chart detailing how Citi infringes the ’157 patent.

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

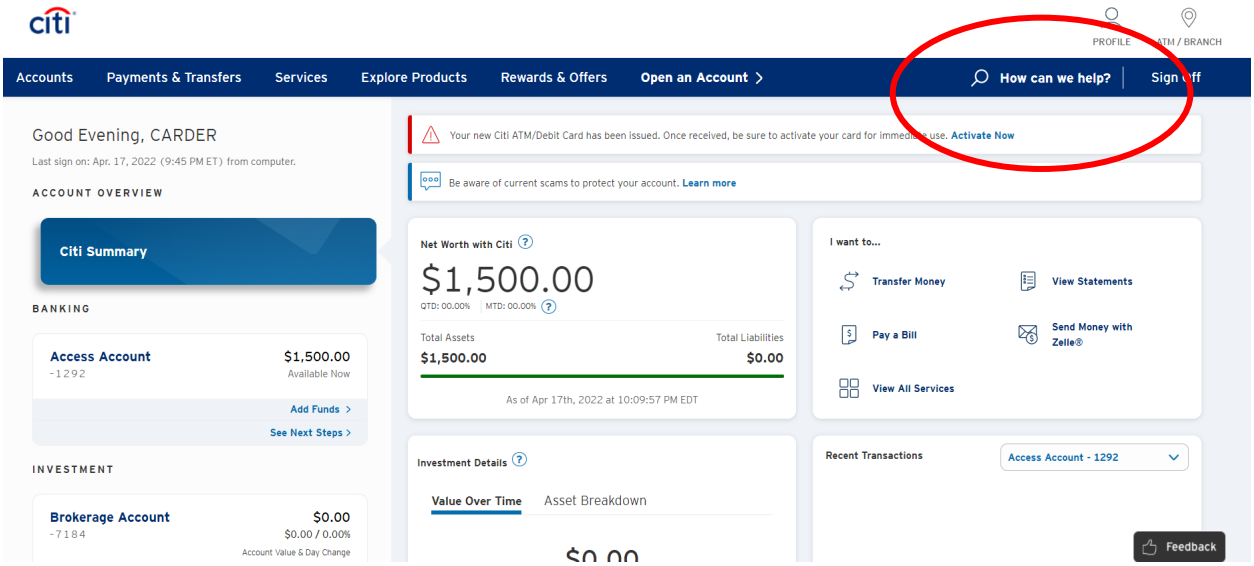
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

66. In addition and/or in the alternative to its direct infringement, Citi 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.

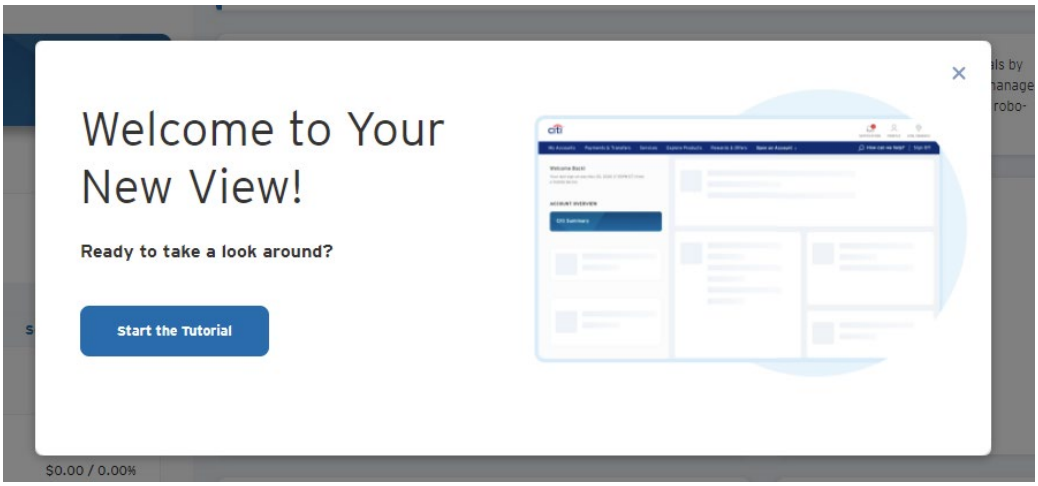
67. Citi has had knowledge of the ’157 patent at least since being served with this Complaint.

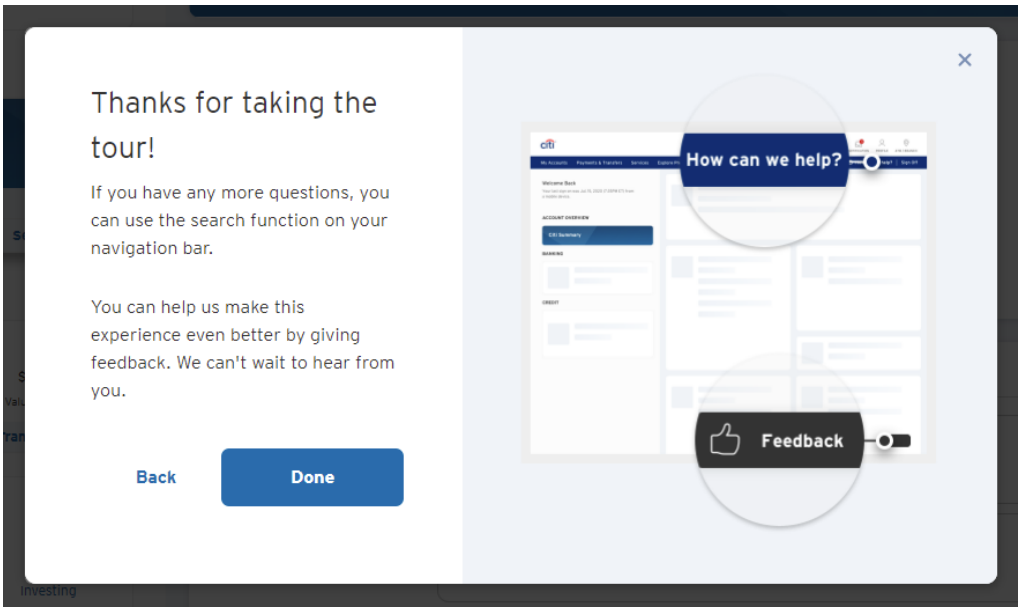
68. Despite having knowledge (or being willfully blind to the fact) that use of the Accused AA Search Systems infringes the ’157 patent, Citi has specifically intended, and continues to specifically intend, for persons (such as Citi’s customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Citi Search Systems in ways that infringe the ’157 patent, including at least claim 2. Indeed, Citi knew or should have known that its actions have induced, and continue to induce, such infringements.

69. Citi instructs and encourages customers and end users to use the Accused Citi Search Systems in ways that infringe the '157 patent. For example, the Citi website prominently displays an interface inviting users to search by asking "How can we help?":



70. Citi further provides users of the Citi website with instructions and tutorials directing them to applications on the Citi website that implement search functionality in a way that results in infringement of the '157 patent:





Damages

71. R2 has been damaged as a result of Citi's infringing conduct described in this Count. Citi is, thus, liable to R2 in an amount that adequately compensates it for Citi'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. 7,698,329

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

73. 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.

74. 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))

75. Citi 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.

76. To this end, Citi 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 Citi Search Systems.

77. Attached hereto as Ex. 11, and incorporated herein by reference, is a representative claim chart detailing how Citi infringes the '329 patent.

78. Citi is liable for its infringements of the '329 patent pursuant to 35 U.S.C. § 271.

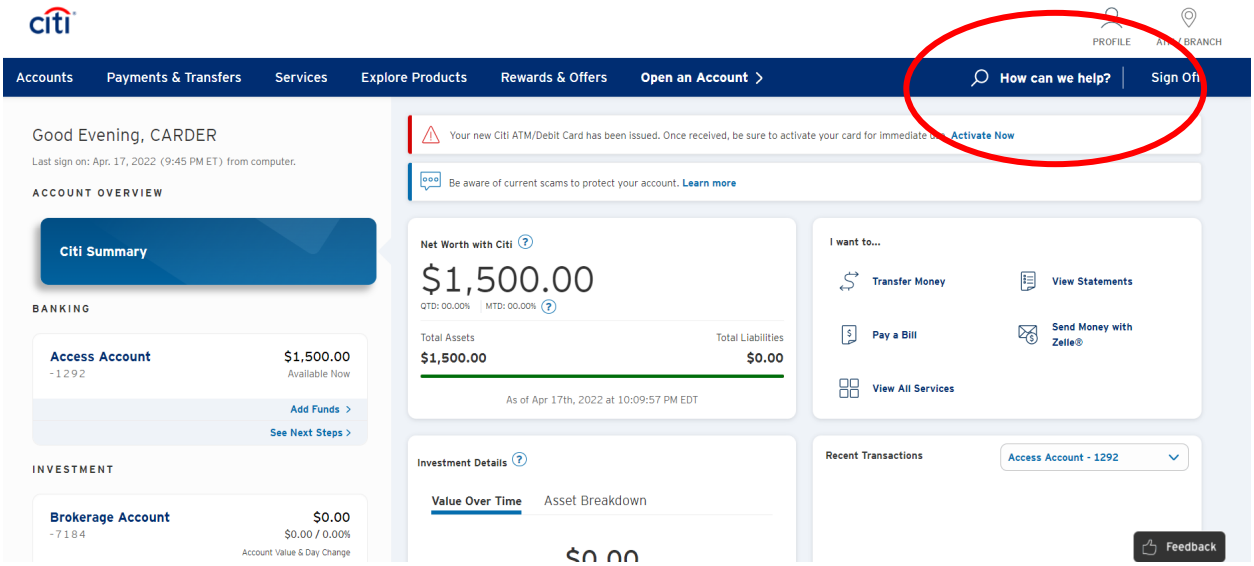
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

79. In addition and/or in the alternative to its direct infringement, Citi 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.

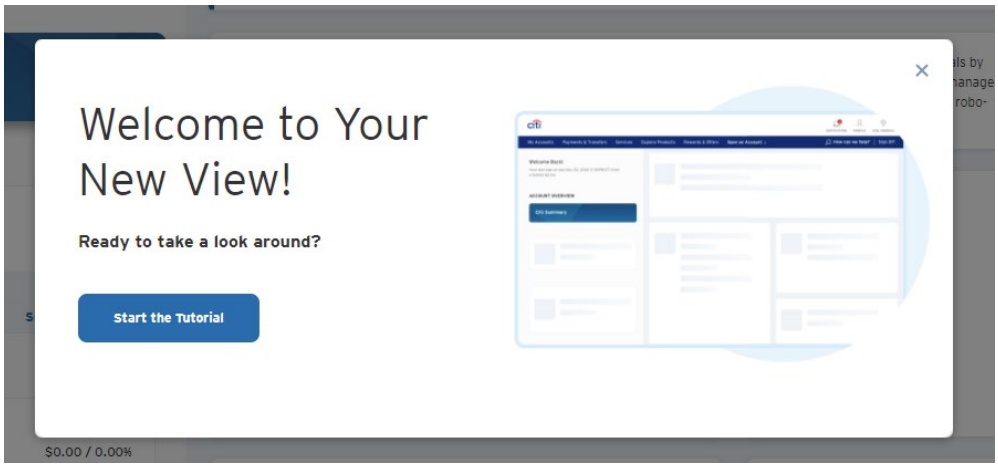
80. Citi has had knowledge of the '329 patent at least since being served with this Complaint.

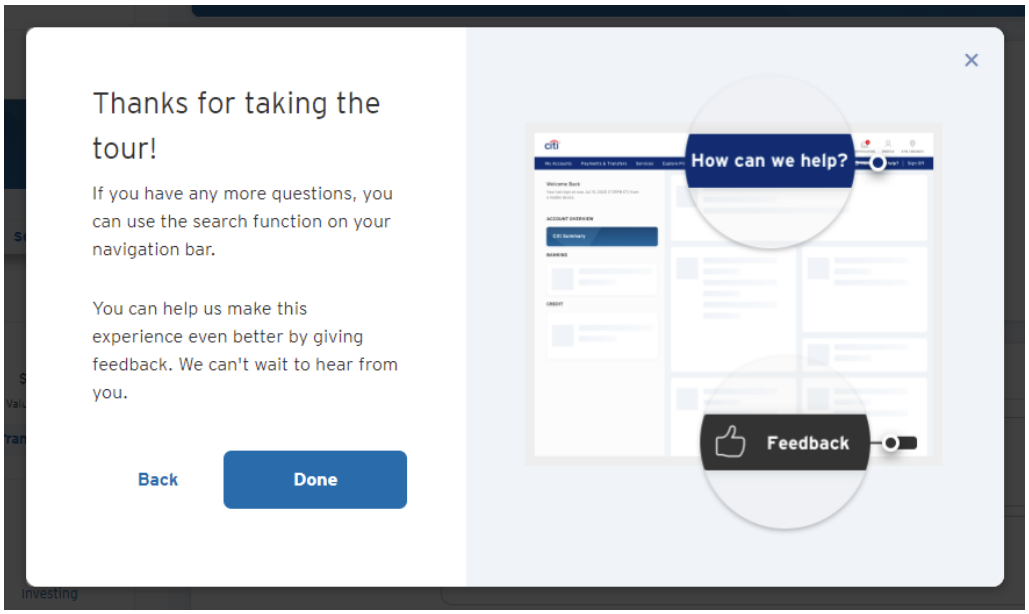
81. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Citi Search Systems infringes the '329 patent, Citi has specifically intended, and continues to specifically intend, for persons (such as Citi's customers and end users) to access, exercise control over, benefit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

82. Citi instructs and encourages customers and end users to use the Accused Citi Search Systems in ways that infringe the '329 patent. For example, the Citi website prominently displays a search interface inviting users to search by asking "How can we help?":



83. Citi further provides users of the Citi website with instructions and tutorials directing them to applications on the Citi website that implement search functionality in ways that infringe the '329 patent:





Damages

84. R2 has been damaged as a result of Citi's infringing conduct described in this Count. Citi is, thus, liable to R2 in an amount that adequately compensates it for Citi'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. 8,209,317

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

86. 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.

87. 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))

88. Citi 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.

89. To this end, Citi 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 Citi Search Systems.

90. Attached hereto as Ex. 12, and incorporated herein by reference, is a representative claim chart detailing how Citi infringes the '317 patent.

91. Citi is liable for its infringements of the '317 patent pursuant to 35 U.S.C. § 271.

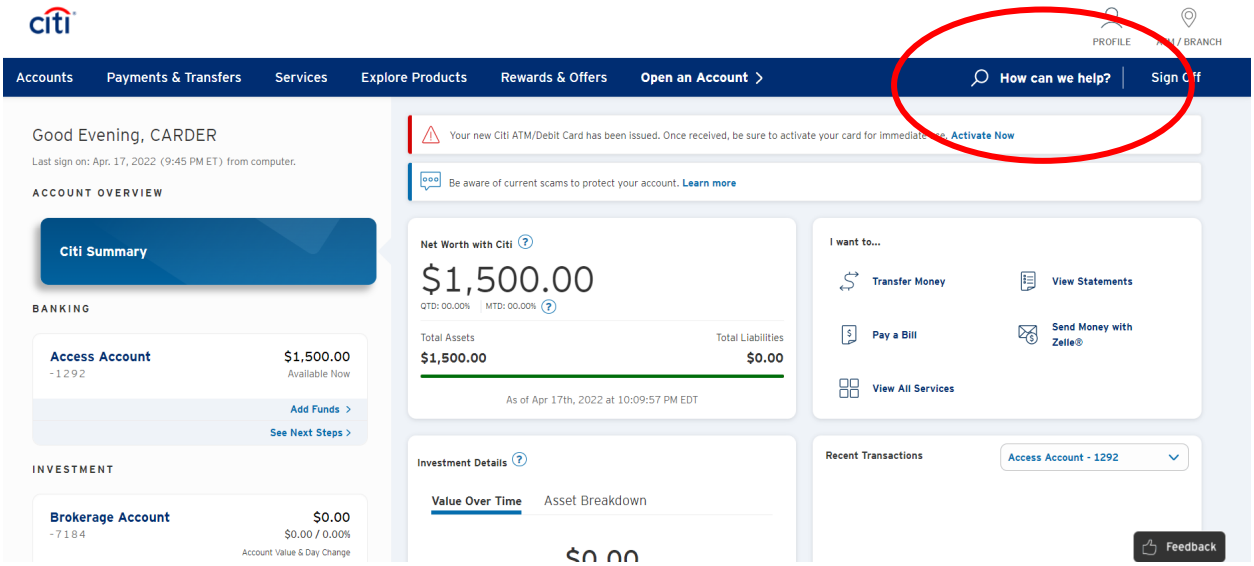
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

92. In addition and/or in the alternative to its direct infringement, Citi 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.

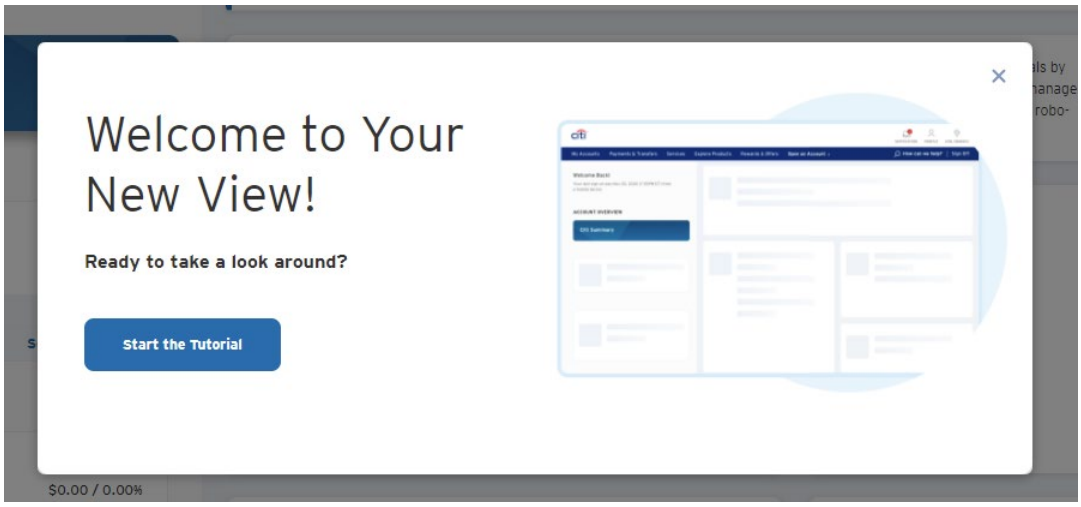
93. Citi has had knowledge of the '317 patent at least since being served with this Complaint.

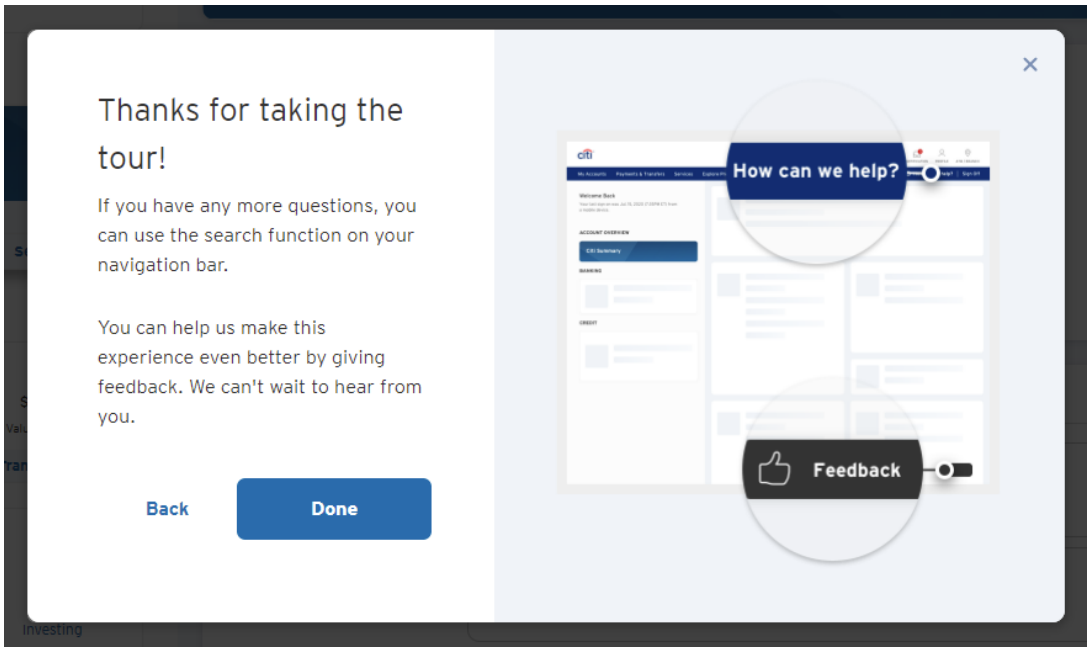
94. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Citi Search Systems infringes the '317 patent, Citi has specifically intended, and continues to specifically intend, for persons (such as Citi's customers and end users) to access, exercise control over, benefit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

95. Citi instructs and encourages customers and end users to use the Accused Citi Search Systems in ways that infringe the '317 patent. For example, the Citi website prominently displays a search interface inviting users to search by asking "How can we help?":



96. Citi further provides users of the Citi website with instructions and tutorials directing them to applications on the Citi website that implement search functionality in ways that infringe the '317 patent:





Damages

97. R2 has been damaged as a result of Citi's infringing conduct described in this Count. Citi is, thus, liable to R2 in an amount that adequately compensates it for Citi'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. 7,370,011

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

99. R2 is the owner of the '011 patent with all substantial rights to the '011 patent, including the exclusive right to enforce, sue, and recover damages for past and future infringements.

100. The '011 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))

101. Citi has directly infringed and continues to directly infringe one or more claims of the '011 patent in this District and elsewhere in Texas and the United States.

102. To this end, Citi has infringed and continues to infringe, either by itself or via an agent, at least claims 7 and 9–11 of the '011 patent by, among other things, making, offering to sell, selling, testing and/or using databases and servers hosting the Accused Citi Account Linking Systems.

103. Attached hereto as Ex. 13, and incorporated herein by reference, is a representative claim chart detailing how Citi infringes the '011 patent.

104. Citi is liable for its infringements of the '011 patent pursuant to 35 U.S.C. § 271.

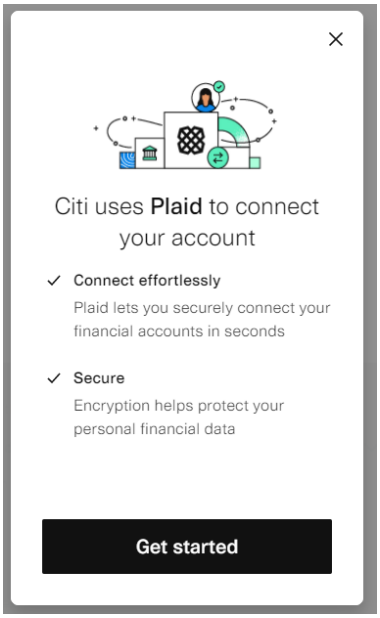
Indirect Infringement (Inducement – 35 U.S.C. § 271(b))

105. In addition and/or in the alternative to its direct infringement, Citi has indirectly infringed and continues to indirectly infringe one or more claims of the '011 patent by inducing direct infringement by its customers and end users.

106. Citi has had knowledge of the '011 patent at least since being served with this Complaint.

107. Despite having knowledge (or being willfully blind to the fact) that use of the Accused Citi Account Linking Systems infringes the '011 patent, Citi has specifically intended, and continues to specifically intend, for persons (such as Citi's customers and end users) to access, exercise control over, benefit from, use, and/or otherwise interact with the Accused Citi Account Linking Systems in ways that infringe the '011 patent, including at least claims 7 and 11. Indeed, Citi knew or should have known that its actions have induced, and continue to induce, such infringements.

108. Citi instructs and encourages customers and end users to use the Accused Citi Account Linking Systems in ways that infringe the '011 patent. For example, when a user opens an account with Citi, Citi redirects users to an interface that requests that the user associate the user's account with a third-party service (e.g., Plaid), such as to allow a user to fund their Citi account with funds from another bank:



Ex. 13 at slide 10.

Damages

109. R2 has been damaged as a result of Citi's infringing conduct described in this Count. Citi is, thus, liable to R2 in an amount that adequately compensates it for Citi'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 Citi has directly and/or indirectly infringed one or more claims of each of the patents-in-suit;

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

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

(v) Judgment and Order that Citi 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 Citi to pay R2's attorneys' fees; and

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

Dated: April 28, 2022

Respectfully submitted,

/s/ Edward R. Nelson III

EDWARD R. NELSON III
State Bar No. 00797142
ed@nelbum.com
BRENT N. BUMGARDNER
State Bar No. 00795272
brent@nelbum.com
CHRISTOPHER G. GRANAGHAN
State Bar No. 24078585

chris@nelbum.com
JOHN P. MURPHY
State Bar No. 24056024
murphy@nelbum.com
CARDER W. BROOKS
State Bar No. 24105536
carder@nelbum.com
NELSON BUMGARDNER CONROY PC
3131 West 7th Street, Suite 300
Fort Worth, Texas 76107
817.377.9111

COUNSEL FOR PLAINTIFF
R2 SOLUTIONS LLC