

THE HONORABLE RICARDO S. MARTINEZ

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IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

WORD TO INFO, INC.,

Plaintiff,

v.

MICROSOFT CORPORATION,

Defendant.

Civil Action No. 2:17-cv-00596

JURY TRIAL DEMANDED

CORRECTED FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Word to Info, Inc. (“Plaintiff” or “Word to Info”), by way of its First Amended Complaint for Patent Infringement (“Complaint”) against the above-named Defendant Microsoft Corporation (“Microsoft” or “Defendant”), alleges the following:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code.

THE PARTIES

2. Plaintiff Word to Info, Inc. is a corporation organized under the laws of the State of Texas with a place of business at 1106 Edgewood Dr., Richardson, Texas 75081.

1 Natural Language Queries” (the ’603 Patent); U.S. Patent No. 8,688,436 entitled “Memory
2 System for Storing and Retrieving Experience and Knowledge by Utilizing Natural Language
3 Responses” (the ’436 Patent) (collectively, the “Patents-in-Suit”).

4 8. Word to Info is the assignee and owner of the right, title and interest in and to,
5 including the right to assert all causes of action arising under said patents and the right to any
6 remedies for infringement of them. The Patents-in-Suit were previously owned by their sole
7 inventor, Robert L. Budzinski, who is the owner of Word to Info.

8 9. At least one of the Patents-in-Suit has been cited during prosecution of numerous
9 issued United States Patents relating to natural language processing. In particular, one of the
10 patents-in-suit has been cited during prosecution of patents listing Defendant Microsoft as
11 assignee, such patents including but not limited to U.S. Patent Nos. 7,113,905; 7,398,210;
12 7,421,386; 7,447,627; 7,490,034; 7,716,158; 7,822,992; 7,890,744; 7,894,677; 7,228,268;
13 7,228,269; 7,254,527; 7,315,809; 8,249,871; 7,376,551; 7,624,018; and 7,668,791.

14 10. On February 3, 1998, the ’468 Patent, was duly and legally issued by the United
15 States Patent and Trademark Office. A true and correct copy of the ’468 Patent is attached as
16 Exhibit A to this Complaint.

17 11. On October 24, 2000, the ’087 Patent was duly and legally issued by the United
18 States Patent and Trademark Office. A true and correct copy of the ’087 Patent is attached as
19 Exhibit B to this Complaint.

20 12. On August 19, 2003, the ’091 Patent was duly and legally issued by the United
21 States Patent and Trademark Office. A true and correct copy of the ’091 Patent is attached as
22 Exhibit C to this Complaint.

23 13. On March 25, 2008, the ’840 Patent was duly and legally issued by the United
24 States Patent and Trademark Office. A true and correct copy of the ’840 Patent is attached as
25 Exhibit D to this Complaint.

26 14. On January 18, 2011, the ’509 Patent was duly and legally issued by the United
27 States Patent and Trademark Office. A true and correct copy of the ’509 Patent is attached as

1 Exhibit E to this Complaint.

2 15. On December 4, 2012, the '603 Patent was duly and legally issued by the United
3 States Patent and Trademark Office. A true and correct copy of the '603 Patent is attached as
4 Exhibit F to this Complaint.

5 16. On April 1, 2014, the '436 Patent was duly and legally issued by the United States
6 Patent and Trademark Office. A true and correct copy of the '436 Patent is attached as Exhibit G
7 to this Complaint.

8 **FIRST CLAIM FOR RELIEF**

9 **INFRINGEMENT OF U.S. PATENT NO. 5,715,468**

10 17. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 16 as
11 though fully set forth herein.

12 18. Defendant Microsoft has been directly infringing and continues to directly
13 infringe one or more claims of the '468 Patent, including but not limited to Claims 1, 8, 21, 29,
14 and 33, in the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of
15 equivalents, through at least its development, testing, support, and operation of Microsoft's
16 Cortana personal assistant software.

17 19. For example, on information and belief, Microsoft Cortana provides electronically
18 encoded data which is representative of natural language by encoding natural language inputs
19 into audio files and/or text files which represent the natural language input. For example,
20 Microsoft Cortana encodes natural language speech using one or more audio codecs. *See*
21 "Welcome to Cortana Workshop" (available at
22 <https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf>) at slides 6, 14.

23 20. On information and belief, Microsoft Cortana provides a dictionary database
24 containing entries having syntax usage data. Microsoft Cortana utilizes Microsoft Bing
25 technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is "powered by
26 Bing"). Bing provides syntax usage data based on Satori technology which provides a plurality
27 of entities and relationships between entities. *See* <https://blogs.bing.com/search/2013/03/21/>

1 understand-your-world-with-bing/. In particular, Bing utilizes a “synonym service” that includes
2 a plurality of synonyms for entities in the database. *See* “Data services leveraging Bing’s data
3 assets” by Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He,
4 Microsoft Research, IEEE Computer Society, Bulletin of the Technical Committee on Data
5 Engineering, Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/
6 A16sept/A16SEP-CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)). The entities in Satori includes addresses. *See* “Trinity: A Distributed
7 Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft
8 Research Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The
9 entities in Satori are organized in relation to other entities. *Id.*; “Knowledge Graph Inference for
10 Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of 40th
11 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
12 (available at [https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/
13 Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

14 21. On information and belief, Microsoft Cortana provides a dictionary database
15 containing entries having associated word sense numbers. “Word sense number” has been
16 construed in the Northern District of California as “[a]n address to the meaning of a word, which
17 has meaning data that is (1) utilized to determine the intended meaning of a word usage, and (2)
18 organized into relations to other word sense numbers.” Although Plaintiff does not take a
19 position regarding whether or not this construction is correct, the extent the Court chooses to
20 adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
21 Microsoft Bing technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is
22 “powered by Bing”). Bing utilizes Satori technology which provides a plurality of entities and
23 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/
24 understand-your-world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). The entities in Satori are associated with entries of a knowledge repository
25 database. Database entries are associated with start addresses. *See* B. Stroustrup, *The C++
26 Programming Language* (3rd ed.) at Section 5.1 pp.87-88. *See also* “Trinity: A Distributed Graph
27 Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research

1 Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in
2 Satori are organized in relation to other entities. *See id.*; *see also* “Knowledge Graph Inference
3 for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of
4 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
5 (available at [https://www.microsoft.com/en-us/research/wp-](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
6 [content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

7 22. On information and belief, the dictionary database provided by Microsoft Cortana
8 comprises entries having associated adjective word sense numbers. “Adjective word sense
9 number” has been construed in the Northern District of California as follows: “An adjective
10 word sense number is composed of an identification number, a state value or value range, and an
11 owner word sense number”. Although Plaintiff does not take a position regarding whether or not
12 this construction is correct, the extent the Court chooses to adopt this construction, Microsoft
13 Cortana meets this construction. Microsoft Cortana utilizes Microsoft Bing technology which
14 utilizes Satori technology. *See above*. Satori entities associated with adjectives comprise an
15 associated identification number. *See* “Knowledge Graph Inference for Spoke Dialog Systems”
16 by Ma, et al., Microsoft Corporation, published in Proceedings of 40th IEEE International
17 Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at
18 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3;
19 *see also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and
20 Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
21 www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed Real-time
22 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
23 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
24 at 34; Satori entities associated with adjectives comprise a data value representing a state. *See id.*
25 Satori entities associated with adjectives comprise an owner word sense number. *See id.*

26 23. On information and belief, the dictionary database provided by Microsoft Cortana
27 comprises entries having associated concrete noun word sense numbers. “Concrete noun word

1 sense number” has been construed in the Northern District of California as follows: “The word
2 sense number of a concrete noun contains a word sense identification number, a type number, a
3 specificity number, and an experience number.” Although Plaintiff does not take a position
4 regarding whether or not this construction is correct, the extent the Court chooses to adopt this
5 construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft
6 Bing technology which utilizes Satori technology. *See above*. Satori entities associated with
7 concrete nouns comprise an associated identification number. *See* “Distributed Real-time
8 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
9 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
10 at 34.

11 Satori entities associated with concrete nouns comprise a type number. *See id; see also id.* at 30.
12 Satori entities associated with concrete nouns comprise a specificity number. *See id.* Satori
13 entities associated with concrete nouns comprise an experience number. *See* B. Stroustrup, *The*
14 *C++ Programming Language* (3rd ed.) at Section 5.1 pp.87-88.

15 24. On information and belief, the dictionary database provided by Microsoft Cortana
16 comprises entries having associated verb word sense numbers. “Verb word sense number” has
17 been construed in the Northern District of California as follows: “ A verb word sense number
18 contains an identification number which defines the verb word sense number, and includes
19 partial to complete word sense identification numbers of main sentence roles.” Although Plaintiff
20 does not take a position regarding whether or not this construction is correct, the extent the Court
21 chooses to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana
22 utilizes Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities
23 associated with verbs comprise an associated identification number. Satori entities associated
24 with verbs comprise identification numbers identifying the source entity (e.g. the subject role of
25 a sentence) and the destination entity (e.g. the object role of a sentence). *See* “Distributed Real-
26 time Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
27 Asia (n.d.) (available at

1 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 63; see also
2 “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al., Proceedings of the
3 VLDB Endowment, Vol. 6, No. 4 (2013), (available at
4 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5.

5 25. On information and belief, the dictionary database provided by Microsoft Cortana
6 comprises entries having syntax usage data. “Syntax usage data” has been construed in the
7 Northern District of California as “data comprised of sets of words which can syntactically be
8 used interchangeably in a natural language construction.” Although Plaintiff does not take a
9 position regarding whether or not this construction is correct, the extent the Court chooses to
10 adopt this construction, Microsoft Cortana meets this construction. For example, Microsoft
11 Cortana provides data comprised of synonyms that can syntactically be used interchangeably.
12 Microsoft Cortana utilizes Microsoft Bing technology. *See*
13 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
14 provides syntax usage data based on Satori technology which provides a plurality of entities and
15 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-
16 world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes a plurality of
17 synonyms for entities in the database. *See* “Data services leveraging Bing’s data assets” by
18 Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft
19 Research, IEEE Computer Society, Bulletin of the Technical Committee on Data Engineering,
20 Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/A16sept/A16SEP-
21 CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-
21 CD.pdf)).

22 26. On information and belief, Microsoft Cortana lexically processes the
23 electronically encoded data to access the dictionary database. *See* above; *see also*
24 [https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-
25 voice-recognition-behind-anything/](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/) (stating, “As the speech is processed, the Bing speech APIs
26 use entity discovery to try to assemble the semantic meaning of the recognized text and correct
27 the results, streaming back changes to previous text until the speech recognition is complete” and

1 “The final product of the speech recognition service is a JSON data structure that can include the
2 text in several forms: the ‘lexical’ form, which is the raw, unadulterated speech recognition result
3 in text; or various flavors of ‘display text’ with a best guess at capitalization, punctuation,
4 conversion of number words to numerals, and application of common abbreviations such as
5 ‘Mr.’ for ‘mister’ and ‘St.’ for ‘street.’”).

6 27. On information and belief, Microsoft Cortana provides a grammar specification.
7 *See* <https://msdn.microsoft.com/library/windows/apps/xaml/dn630426.aspx> (stating that speech
8 recognition “includes support for pre-defined grammars for free-text dictation and web search,
9 and support for custom grammars”).

10 28. On information and belief, Microsoft Cortana utilizes syntax usage data from the
11 database, with reference to the grammar specification to produce output data representing a
12 grammatical parse of the natural language. In particular, Microsoft Cortana utilizes a syntactic
13 parser which performs syntactic parsing of the speech. *See* [https://www.microsoft.com/
14 cognitive-services/en-us/Linguistic-Analysis-API/documentation/Constituency-Parsing](https://www.microsoft.com/cognitive-services/en-us/Linguistic-Analysis-API/documentation/Constituency-Parsing). Parsing
15 includes specification of a Speech Recognition Grammar Specification (SRGS) and a grammar
16 specification for a language (such as English) for the speech. *See* [https://msdn.microsoft.com/
17 library/windows/apps/xaml/dn630426.aspx](https://msdn.microsoft.com/library/windows/apps/xaml/dn630426.aspx) and [https://www.microsoft.com/cognitive-services/
18 en-us/Linguistic-Analysis-API/documentation/AnalyzeMethod](https://www.microsoft.com/cognitive-services/en-us/Linguistic-Analysis-API/documentation/AnalyzeMethod).

19 29. Because of Microsoft’s infringement of the ’468 Patent, Plaintiff has suffered
20 damages and will continue to suffer damages in the future. Plaintiff is entitled to an award of
21 such damages, but in no event less than a reasonable royalty, the precise amount to be
22 determined at trial.

23 **SECOND CLAIM FOR RELIEF**

24 **INFRINGEMENT OF U.S. PATENT NO. 6,138,087**

25 30. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 29 as
26 though fully set forth herein.

27 31. Defendant Microsoft has been directly infringing and continues to directly

1 infringe one or more claims of the '087 Patent, including but not limited to Claims 17 and 18, in
2 the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of equivalents,
3 through at least its development, testing, support, and operation of Microsoft's Cortana personal
4 assistant software.

5 32. For example, on information and belief, Microsoft Cortana provides electronically
6 encoded data which is representative of natural language by encoding natural language inputs
7 into audio files and/or text files which represent the natural language input. For example,
8 Microsoft Cortana encodes natural language speech using one or more audio codecs. *See*
9 "Welcome to Cortana Workshop" (available at
10 <https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf>) at slides 6, 14.

11 33. On information and belief, Microsoft Cortana provides a dictionary database
12 containing entries having associated word sense numbers. "Word sense number" has been
13 construed in the Northern District of California as "[a]n address to the meaning of a word, which
14 has meaning data that is (1) utilized to determine the intended meaning of a word usage, and (2)
15 organized into relations to other word sense numbers." Although Plaintiff does not take a
16 position regarding whether or not this construction is correct, the extent the Court chooses to
17 adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
18 Microsoft Bing technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is
19 "powered by Bing"). Bing utilizes Satori technology which provides a plurality of entities and
20 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
21 [world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). The entities in Satori are associated with entries of a knowledge repository
22 database. Database entries are associated with start addresses. *See* B. Stroustrup, *The C++*
23 *Programming Language* (3rd ed.) at Section 5.1 pp.87-88. *See also* "Trinity: A Distributed Graph
24 Engine on a Memory Cloud" by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
25 Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in
26 Satori are organized in relation to other entities. *See id.*; *see also* "Knowledge Graph Inference
27 for Spoke Dialog Systems" by Ma, et al., Microsoft Corporation, published in Proceedings of

1 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
2 (available at [https://www.microsoft.com/en-us/research/wp-](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
3 [content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

4 34. On information and belief, the dictionary database provided by Microsoft Cortana
5 comprises entries having associated adjective word sense numbers. “Adjective word sense
6 number” has been construed in the Northern District of California as follows: “An adjective
7 word sense number is composed of an identification number, a state value or value range, and an
8 owner word sense number”. Although Plaintiff does not take a position regarding whether or not
9 this construction is correct, the extent the Court chooses to adopt this construction, Microsoft
10 Cortana meets this construction. Microsoft Cortana utilizes Microsoft Bing technology which
11 utilizes Satori technology. *See above*. Satori entities associated with adjectives comprise an
12 associated identification number. *See* “Knowledge Graph Inference for Spoke Dialog Systems”
13 by Ma, et al., Microsoft Corporation, published in Proceedings of 40th IEEE International
14 Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at
15 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3;
16 *see also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and
17 Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
18 www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed Real-time
19 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
20 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
21 at 34; Satori entities associated with adjectives comprise a data value representing a state. *See id.*
22 Satori entities associated with adjectives comprise an owner word sense number. *See id.*

23 35. On information and belief, the dictionary database provided by Microsoft Cortana
24 comprises entries having associated concrete noun word sense numbers. “Concrete noun word
25 sense number” has been construed in the Northern District of California as follows: “The word
26 sense number of a concrete noun contains a word sense identification number, a type number, a
27 specificity number, and an experience number.” Although Plaintiff does not take a position

1 regarding whether or not this construction is correct, the extent the Court chooses to adopt this
2 construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft
3 Bing technology which utilizes Satori technology. *See above*. Satori entities associated with
4 concrete nouns comprise an associated identification number. *See* “Distributed Real-time
5 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
6 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
7 at 34. Satori entities associated with concrete nouns comprise a type number. *See id*; *see also id*.
8 at 30. Satori entities associated with concrete nouns comprise a specificity number. *See id*. Satori
9 entities associated with concrete nouns comprise an experience number. *See* B. Stroustrup, *The*
10 *C++ Programming Language* (3rd ed.) at Section 5.1 pp.87-88.

11 36. On information and belief, the dictionary database provided by Microsoft Cortana
12 comprises entries having associated verb word sense numbers. “Verb word sense number” has
13 been construed in the Northern District of California as follows: “ A verb word sense number
14 contains an identification number which defines the verb word sense number, and includes
15 partial to complete word sense identification numbers of main sentence roles.” Although Plaintiff
16 does not take a position regarding whether or not this construction is correct, the extent the Court
17 chooses to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana
18 utilizes Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities
19 associated with verbs comprise an associated identification number. Satori entities associated
20 with verbs comprise identification numbers identifying the source entity (e.g. the subject role of
21 a sentence) and the destination entity (e.g. the object role of a sentence). *See* “Distributed Real-
22 time Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
23 Asia (n.d.) (available at
24 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 63; see also
25 “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al., *Proceedings of the*
26 *VLDB Endowment*, Vol. 6, No. 4 (2013), (available at
27 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5.

1 37. On information and belief, the dictionary database provided by Microsoft Cortana
2 comprises entries having syntax usage data. “Syntax usage data” has been construed in the
3 Northern District of California as “data comprised of sets of words which can syntactically be
4 used interchangeably in a natural language construction.” Although Plaintiff does not take a
5 position regarding whether or not this construction is correct, the extent the Court chooses to
6 adopt this construction, Microsoft Cortana meets this construction. For example, Microsoft
7 Cortana provides data comprised of synonyms that can syntactically be used interchangeably.
8 Microsoft Cortana utilizes Microsoft Bing technology. *See*
9 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
10 provides syntax usage data based on Satori technology which provides a plurality of entities and
11 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
12 [world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes a plurality of
13 synonyms for entities in the database. *See* “Data services leveraging Bing’s data assets” by
14 Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft
15 Research, IEEE Computer Society, Bulletin of the Technical Committee on Data Engineering,
16 Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf) A16sept/A16SEP-
17 CD.pdf).

18 38. On information and belief, Microsoft Cortana lexically processes the
19 electronically encoded data to access the dictionary database. *See* above; *see also*
20 [https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/)
21 [voice-recognition-behind-anything/](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/) (stating, “As the speech is processed, the Bing speech APIs
22 use entity discovery to try to assemble the semantic meaning of the recognized text and correct
23 the results, streaming back changes to previous text until the speech recognition is complete.”
24 and “The final product of the speech recognition service is a JSON data structure that can include
25 the text in several forms: the ‘lexical’ form, which is the raw, unadulterated speech recognition
26 result in text; or various flavors of ‘display text’ with a best guess at capitalization, punctuation,
27 conversion of number words to numerals, and application of common abbreviations such as

1 ‘Mr.’ for ‘mister’ and ‘St.’ for ‘street.’”).

2 39. On information and belief, Microsoft Cortana utilizes syntax usage data and word
3 sense numbers which are from entries of the dictionary database and which are associated with
4 words of the natural language with reference to associated state representation data to select and
5 access word sense numbers for words of the natural language. For example, Microsoft Cortana
6 utilizes an algorithm based on relationships between database entries and synonyms to select and
7 access database entries. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-world-](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
8 [with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/) (presenting information on Mt. Everest when asked “what is the tallest mountain in
9 the world”); *see also* “Knowledge Graph Inference for Spoke Dialog Systems” by Ma, et al.,
10 Microsoft Corporation, published in Proceedings of 40th IEEE International Conference on
11 Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at
12 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 3
13 (providing an algorithm and example for selecting word sense numbers with reference to
14 associated state representation data).

15 40. Because of Microsoft’s infringement of the ’087 Patent, Plaintiff has suffered
16 damages. Plaintiff is entitled to an award of such damages, but in no event less than a reasonable
17 royalty, the precise amount to be determined at trial.

18 **THIRD CLAIM FOR RELIEF**

19 **INFRINGEMENT OF U.S. PATENT NO. 6,609,091**

20 41. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 40 as
21 though fully set forth herein.

22 42. Defendant Microsoft has been directly infringing and continues to directly
23 infringe one or more claims of the ’091 Patent, including but not limited to Claims 1 and 12, in
24 the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of equivalents,
25 through at least its development, testing, support, and operation of Microsoft’s Cortana personal
26 assistant software.

27 43. For example, on information and belief, Microsoft Cortana provides electronically

1 encoded data which is representative of natural language by encoding natural language inputs
2 into audio files and/or text files which represent the natural language input. For example,
3 Microsoft Cortana encodes natural language speech using one or more audio codecs. *See*
4 “Welcome to Cortana Workshop” (available at
5 <https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf>) at slides 6, 14.

6 44. On information and belief, Microsoft Cortana provides a dictionary database
7 containing entries having syntax usage data. Microsoft Cortana utilizes Microsoft Bing
8 technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is “powered by
9 Bing”). Bing provides syntax usage data based on Satori technology which provides a plurality
10 of entities and relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/
11 understand-your-world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes
12 a plurality of synonyms for entities in the database. *See* “Data services leveraging Bing’s data
13 assets” by Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He,
14 Microsoft Research, IEEE Computer Society, Bulletin of the Technical Committee on Data
15 Engineering, Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/
16 A16sept/A16SEP-CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)). The entities in Satori includes addresses. *See* “Trinity: A Distributed
17 Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft
18 Research Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The
19 entities in Satori are organized in relation to other entities. *Id.*; “Knowledge Graph Inference for
20 Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of 40th
21 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
22 (available at [https://www.microsoft.com/en-us/research/wp-
23 content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

24 45. On information and belief, Microsoft Cortana provides a dictionary database
25 containing entries having associated word sense numbers. “Word sense number” has been
26 construed in the Northern District of California as “[a]n address to the meaning of a word, which
27 has meaning data that is (1) utilized to determine the intended meaning of a word usage, and (2)

1 organized into relations to other word sense numbers.” Although Plaintiff does not take a
2 position regarding whether or not this construction is correct, the extent the Court chooses to
3 adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
4 Microsoft Bing technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is
5 “powered by Bing”). Bing utilizes Satori technology which provides a plurality of entities and
6 relationships between entities. *See* <https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/>. The entities in Satori are associated with entries of a knowledge repository
7 database. Database entries are associated with start addresses. *See* B. Stroustrup, *The C++*
8 *Programming Language* (3rd ed.) at Section 5.1 pp.87-88. *See also* “Trinity: A Distributed Graph
9 Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
10 Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in
11 Satori are organized in relation to other entities. *See id.*; *see also* “Knowledge Graph Inference
12 for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of
13 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
14 (available at [https://www.microsoft.com/en-us/research/wp-](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
15 [content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

17 46. On information and belief, the dictionary database provided by Microsoft Cortana
18 comprises entries having associated adjective word sense numbers. “Adjective word sense
19 number” has been construed in the Northern District of California as follows: “An adjective
20 word sense number is composed of an identification number, a state value or value range, and an
21 owner word sense number”. Although Plaintiff does not take a position regarding whether or not
22 this construction is correct, the extent the Court chooses to adopt this construction, Microsoft
23 Cortana meets this construction. Microsoft Cortana utilizes Microsoft Bing technology which
24 utilizes Satori technology. *See above*. Satori entities associated with adjectives comprise an
25 associated identification number. *See* “Knowledge Graph Inference for Spoke Dialog Systems”
26 by Ma, et al., Microsoft Corporation, published in Proceedings of 40th IEEE International
27 Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at

1 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3;
2 *see also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and
3 Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
4 www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed Real-time
5 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
6 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
7 at 34; Satori entities associated with adjectives comprise a data value representing a state. *See id.*
8 Satori entities associated with adjectives comprise an owner word sense number. *See id.*

9 47. On information and belief, the dictionary database provided by Microsoft Cortana
10 comprises entries having associated concrete noun word sense numbers. “Concrete noun word
11 sense number” has been construed in the Northern District of California as follows: “The word
12 sense number of a concrete noun contains a word sense identification number, a type number, a
13 specificity number, and an experience number.” Although Plaintiff does not take a position
14 regarding whether or not this construction is correct, the extent the Court chooses to adopt this
15 construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft
16 Bing technology which utilizes Satori technology. *See above.* Satori entities associated with
17 concrete nouns comprise an associated identification number. *See* “Distributed Real-time
18 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
19 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
20 at 34.

21 Satori entities associated with concrete nouns comprise a type number. *See id.; see also id.* at 30.
22 Satori entities associated with concrete nouns comprise a specificity number. *See id.* Satori
23 entities associated with concrete nouns comprise an experience number. *See* B. Stroustrup, *The*
24 *C++ Programming Language* (3rd ed.) at Section 5.1 pp.87-88.

25 48. On information and belief, the dictionary database provided by Microsoft Cortana
26 comprises entries having associated verb word sense numbers. “Verb word sense number” has
27 been construed in the Northern District of California as follows: “A verb word sense number

1 contains an identification number which defines the verb word sense number, and includes
2 partial to complete word sense identification numbers of main sentence roles.” Although Plaintiff
3 does not take a position regarding whether or not this construction is correct, the extent the Court
4 chooses to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana
5 utilizes Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities
6 associated with verbs comprise an associated identification number. Satori entities associated
7 with verbs comprise identification numbers identifying the source entity (e.g. the subject role of
8 a sentence) and the destination entity (e.g. the object role of a sentence). *See* “Distributed Real-
9 time Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
10 Asia (n.d.) (available at
11 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 63; see also
12 “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al., Proceedings of the
13 VLDB Endowment, Vol. 6, No. 4 (2013), (available at
14 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5.

15 49. On information and belief, the dictionary database provided by Microsoft Cortana
16 comprises entries having syntax usage data. “Syntax usage data” has been construed in the
17 Northern District of California as “data comprised of sets of words which can syntactically be
18 used interchangeably in a natural language construction.” Although Plaintiff does not take a
19 position regarding whether or not this construction is correct, the extent the Court chooses to
20 adopt this construction, Microsoft Cortana meets this construction. For example, Microsoft
21 Cortana provides data comprised of synonyms that can syntactically be used interchangeably.
22 Microsoft Cortana utilizes Microsoft Bing technology. *See*
23 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
24 provides syntax usage data based on Satori technology which provides a plurality of entities and
25 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-
26 world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes a plurality of
27 synonyms for entities in the database. *See* “Data services leveraging Bing’s data assets” by

1 Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft
2 Research, IEEE Computer Society, Bulletin of the Technical Committee on Data Engineering,
3 Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/A16sept/A16SEP-
4 CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)).

5 50. On information and belief, Microsoft Cortana lexically processes the
6 electronically encoded data to access the dictionary database. *See above; see also*
7 [https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-
8 voice-recognition-behind-anything/](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/) (stating, “As the speech is processed, the Bing speech APIs
9 use entity discovery to try to assemble the semantic meaning of the recognized text and correct
10 the results, streaming back changes to previous text until the speech recognition is complete” and
11 “The final product of the speech recognition service is a JSON data structure that can include the
12 text in several forms: the ‘lexical’ form, which is the raw, unadulterated speech recognition result
13 in text; or various flavors of ‘display text’ with a best guess at capitalization, punctuation,
14 conversion of number words to numerals, and application of common abbreviations such as
15 ‘Mr.’ for ‘mister’ and ‘St.’ for ‘street.’”).

16 51. On information and belief, Microsoft Cortana provides a grammar specification.
17 *See* <https://msdn.microsoft.com/library/windows/apps/xaml/dn630426.aspx> (stating that speech
18 recognition “includes support for pre-defined grammars for free-text dictation and web search,
19 and support for custom grammars”).

20 52. On information and belief, Microsoft Cortana provides a database of requirements
21 such that the requirements must be met by the associated state representation data of the word
22 sense numbers for the word sense numbers to be selected. For example, for entities to be
23 selected, they must meet certain relationship and user requirements. *See also* “Knowledge Graph
24 Inference for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, at 3-4, (available at
25 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>)
26 (providing an algorithm and example for selecting word sense numbers with reference to
27 associated state representation data). Furthermore, word sense numbers are selected according to

1 an analysis of syntactic structure and application of syntactic rules. *See* “Linguistic Analysis
2 API” available at <https://www.microsoft.com/cognitive-services/en-us/linguistic-analysis-api>
3 (stating that “The Linguistic API uses advanced linguistic analysis tools for natural language
4 processing, giving you access to part-of-speech tagging and parsing”).

5 53. On information and belief, Microsoft Cortana utilizes syntax usage data which
6 includes entries of the dictionary database and which are associated with words of the natural
7 language with reference to the grammar specification to produce output data representative of a
8 grammatical parse of the natural language, the output data including selected syntax usage. For
9 example, an exemplary workflow comprises sentence separation, tokenization, parts-of-speech
10 tokens and syntactic parsing is performed against grammar, in order to create natural language
11 output such as speech. *See* “Linguistic Analysis API” available at [https://www.microsoft.com/](https://www.microsoft.com/cognitive-services/en-us/linguistic-analysis-api)
12 [cognitive-services/en-us/linguistic-analysis-api](https://www.microsoft.com/cognitive-services/en-us/linguistic-analysis-api). *See also* [https://blogs.bing.com/search/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
13 [2013/03/21/understand-your-world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/) (presenting information on Mt. Everest when
14 asked “what is the tallest mountain in the world”).

15 54. Because of Microsoft’s infringement of the ’091 Patent, Plaintiff has suffered
16 damages. Plaintiff is entitled to an award of such damages, but in no event less than a reasonable
17 royalty, the precise amount to be determined at trial.

18 **FOURTH CLAIM FOR RELIEF**

19 **INFRINGEMENT OF U.S. PATENT NO. 7,349,840**

20 55. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 54 as
21 though fully set forth herein.

22 56. Defendant Microsoft has been directly infringing and continues to directly
23 infringe one or more claims of the ’840 Patent, including but not limited to Claims 1, 2, 3, and 5,
24 in the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of
25 equivalents, through at least its development, testing, support, and operation of Microsoft’s
26 Cortana personal assistant software.

27 57. For example, on information and belief, Microsoft Cortana provides electronically

1 encoded data which is representative of natural language by encoding natural language inputs
2 into audio files and/or text files which represent the natural language input. For example,
3 Microsoft Cortana encodes natural language speech using one or more audio codecs. *See*
4 “Welcome to Cortana Workshop” (available at [https://sec.ch9.ms/slides/winHEC/CortanaAudio](https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf)
5 [SystemDesignGuide.pdf](https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf)) at slides 6, 14.

6 58. On information and belief, Microsoft Cortana provides a dictionary database
7 containing entries having syntax usage data. Microsoft Cortana utilizes Microsoft Bing
8 technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is “powered by
9 Bing”). Bing provides syntax usage data based on Satori technology which provides a plurality
10 of entities and relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
11 [understand-your-world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes
12 a plurality of synonyms for entities in the database. *See* “Data services leveraging Bing’s data
13 assets” by Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He,
14 Microsoft Research, IEEE Computer Society, Bulletin of the Technical Committee on Data
15 Engineering, Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)
16 [debull/A16sept/A16SEP-CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)). The entities in Satori includes addresses. *See* “Trinity: A
17 Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma,
18 Microsoft Research Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf)
19 at 33. The entities in Satori are organized in relation to other entities. *Id.*; “Knowledge Graph
20 Inference for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in
21 Proceedings of 40th IEEE International Conference on Acoustics, Speech and Signal Processing
22 (ICASSP) 2015 (available at [https://www.microsoft.com/en-us/research/wp-content/uploads/](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
23 [2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

24 59. On information and belief, Microsoft Cortana provides a dictionary database
25 containing entries having associated word sense numbers. “Word sense number” has been
26 construed in the Northern District of California as “[a]n address to the meaning of a word, which
27 has meaning data that is (1) utilized to determine the intended meaning of a word usage, and (2)

1 organized into relations to other word sense numbers.” Although Plaintiff does not take a
2 position regarding whether or not this construction is correct, the extent the Court chooses to
3 adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
4 Microsoft Bing technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is
5 “powered by Bing”). Bing utilizes Satori technology which provides a plurality of entities and
6 relationships between entities. *See* <https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/>. The entities in Satori are associated with entries of a knowledge repository
7 database. Database entries are associated with start addresses. *See* B. Stroustrup, *The C++*
8 *Programming Language* (3rd ed.) at Section 5.1 pp.87-88. *See also* “Trinity: A Distributed Graph
9 Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
10 Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in
11 Satori are organized in relation to other entities. *See id.*; *see also* “Knowledge Graph Inference
12 for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of
13 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
14 (available at [https://www.microsoft.com/en-us/research/wp-](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
15 [content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

17 60. On information and belief, the dictionary database provided by Microsoft Cortana
18 comprises entries having associated adjective word sense numbers. “Adjective word sense
19 number” has been construed in the Northern District of California as follows: “An adjective
20 word sense number is composed of an identification number, a state value or value range, and an
21 owner word sense number”. Although Plaintiff does not take a position regarding whether or not
22 this construction is correct, the extent the Court chooses to adopt this construction, Microsoft
23 Cortana meets this construction. Microsoft Cortana utilizes Microsoft Bing technology which
24 utilizes Satori technology. *See above*. Satori entities associated with adjectives comprise an
25 associated identification number. *See* “Knowledge Graph Inference for Spoke Dialog Systems”
26 by Ma, et al., Microsoft Corporation, published in Proceedings of 40th IEEE International
27 Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at

1 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3;
2 *see also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and
3 Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
4 www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed Real-time
5 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
6 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
7 at 34; Satori entities associated with adjectives comprise a data value representing a state. *See id.*
8 Satori entities associated with adjectives comprise an owner word sense number. *See id.*

9 61. On information and belief, the dictionary database provided by Microsoft Cortana
10 comprises entries having associated concrete noun word sense numbers. “Concrete noun word
11 sense number” has been construed in the Northern District of California as follows: “The word
12 sense number of a concrete noun contains a word sense identification number, a type number, a
13 specificity number, and an experience number.” Although Plaintiff does not take a position
14 regarding whether or not this construction is correct, the extent the Court chooses to adopt this
15 construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft
16 Bing technology which utilizes Satori technology. *See above.* Satori entities associated with
17 concrete nouns comprise an associated identification number. *See* “Distributed Real-time
18 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
19 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
20 at 34.

21 Satori entities associated with concrete nouns comprise a type number. *See id.; see also id.* at 30.
22 Satori entities associated with concrete nouns comprise a specificity number. *See id.* Satori
23 entities associated with concrete nouns comprise an experience number. *See* B. Stroustrup, *The*
24 *C++ Programming Language* (3rd ed.) at Section 5.1 pp.87-88.

25 62. On information and belief, the dictionary database provided by Microsoft Cortana
26 comprises entries having associated verb word sense numbers. “Verb word sense number” has
27 been construed in the Northern District of California as follows: “A verb word sense number

1 contains an identification number which defines the verb word sense number, and includes
2 partial to complete word sense identification numbers of main sentence roles.” Although Plaintiff
3 does not take a position regarding whether or not this construction is correct, the extent the Court
4 chooses to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana
5 utilizes Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities
6 associated with verbs comprise an associated identification number. Satori entities associated
7 with verbs comprise identification numbers identifying the source entity (e.g. the subject role of
8 a sentence) and the destination entity (e.g. the object role of a sentence). *See* “Distributed Real-
9 time Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
10 Asia (n.d.) (available at
11 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 63; see also
12 “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al., Proceedings of the
13 VLDB Endowment, Vol. 6, No. 4 (2013), (available at
14 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5.

15 63. On information and belief, the dictionary database provided by Microsoft Cortana
16 comprises entries having syntax usage data. “Syntax usage data” has been construed in the
17 Northern District of California as “data comprised of sets of words which can syntactically be
18 used interchangeably in a natural language construction.” Although Plaintiff does not take a
19 position regarding whether or not this construction is correct, the extent the Court chooses to
20 adopt this construction, Microsoft Cortana meets this construction. For example, Microsoft
21 Cortana provides data comprised of synonyms that can syntactically be used interchangeably.
22 Microsoft Cortana utilizes Microsoft Bing technology. *See*
23 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
24 provides syntax usage data based on Satori technology which provides a plurality of entities and
25 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-
26 world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes a plurality of
27 synonyms for entities in the database. *See* “Data services leveraging Bing’s data assets” by

1 Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft
2 Research, IEEE Computer Society, Bulletin of the Technical Committee on Data Engineering,
3 Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/A16sept/A16SEP-
4 CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)).

5 64. On information and belief, Microsoft Cortana lexically processes the
6 electronically encoded data to access the dictionary database. *See above; see also*
7 [https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-
8 voice-recognition-behind-anything/](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/) (stating, “As the speech is processed, the Bing speech APIs
9 use entity discovery to try to assemble the semantic meaning of the recognized text and correct
10 the results, streaming back changes to previous text until the speech recognition is complete” and
11 “The final product of the speech recognition service is a JSON data structure that can include the
12 text in several forms: the ‘lexical’ form, which is the raw, unadulterated speech recognition result
13 in text; or various flavors of ‘display text’ with a best guess at capitalization, punctuation,
14 conversion of number words to numerals, and application of common abbreviations such as
15 ‘Mr.’ for ‘mister’ and ‘St.’ for ‘street.’”).

16 65. On information and belief, Microsoft Cortana provides a grammar specification.
17 *See* <https://msdn.microsoft.com/library/windows/apps/xaml/dn630426.aspx> (stating that speech
18 recognition “includes support for pre-defined grammars for free-text dictation and web search,
19 and support for custom grammars”).

20 66. On information and belief, Microsoft Cortana provides a context data base
21 containing entries having word sense numbers. For example, Microsoft Cortana provides data
22 base entities that are associated with query contexts, to present data to a user in a specific
23 context. *See* “Data services leveraging Bing’s data assets” by Kaushik Chakrabarti, Surajit
24 Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft Research, IEEE Computer Society,
25 Bulletin of the Technical Committee on Data Engineering, Vol. 39, No. 3, September 2016
26 (available at <http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf>). *See also* “Question
27 Answering at Bing” by Yan Ke, Principal Software Engineering Manager Entity Understanding

1 Group, Microsoft Research Faculty Summit 2015, July 8-9, 2015, at 5 (available at
2 https://www.microsoft.com/en-us/research/wp-content/uploads/2015/03/Ke-Yan_QnAAtBing.pdf)
3 (providing an example of Microsoft Cortana presenting data to a user based upon the context of
4 the user's location and time).

5 67. On information and belief, Microsoft Cortana utilizes syntax usage data and word
6 sense numbers which are from entries of the dictionary database and which are associated with
7 words of the natural language with reference to the grammar specification and the context
8 database to select word sense numbers associated with the natural language words. For example,
9 Microsoft Cortana utilizes an algorithm based on relationships between database entries and
10 synonyms with reference to the grammar specification and the context database to select and
11 access database entries. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-world-
12 with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/) (presenting information on Mt. Everest when asked "what is the tallest mountain in
13 the world"); *see also* "Knowledge Graph Inference for Spoke Dialog Systems" by Ma, et al.,
14 Microsoft Corporation, published in Proceedings of 40th IEEE International Conference on
15 Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at
16 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3
17 (providing an algorithm and example for selecting word sense numbers with reference to
18 associated state representation data). *See also* "Question Answering at Bing" by Yan Ke,
19 Principal Software Engineering Manager Entity Understanding Group, Microsoft Research
20 Faculty Summit 2015, July 8-9, 2015, at 5 (available at [https://www.microsoft.com/en-
22 us/research/wp-content/uploads/2015/03/Ke-Yan_QnAAtBing.pdf](https://www.microsoft.com/en-
21 us/research/wp-content/uploads/2015/03/Ke-Yan_QnAAtBing.pdf)) (providing an example of
23 Microsoft Cortana presenting data to a user based upon the context of the user's location and
24 time). *See also* <https://msdn.microsoft.com/library/windows/apps/xaml/dn630426.aspx> (stating
25 that speech recognition "includes support for pre-defined grammars for free-text dictation and
26 web search, and support for custom grammars").

26 68. Because of Microsoft's infringement of the '840 Patent, Plaintiff has suffered
27 damages. Plaintiff is entitled to an award of such damages, but in no event less than a reasonable

1 royalty, the precise amount to be determined at trial.

2 **FIFTH CLAIM FOR RELIEF**

3 **INFRINGEMENT OF U.S. PATENT NO. 7,873,509**

4 69. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 68 as
5 though fully set forth herein.

6 70. Defendant Microsoft has been directly infringing and continues to directly
7 infringe one or more claims of the '509 Patent, including but not limited to Claims 9, 10, and 16,
8 in the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of
9 equivalents, through at least its development, testing, support, and operation of Microsoft's
10 Cortana personal assistant software.

11 71. On information and belief, Microsoft Cortana provides an experience and
12 knowledge database comprising directed graphs that are associated with word sense numbers.
13 Microsoft Cortana utilizes directed graphs associated with Resource Description Framework
14 (RDF) triples having paths and conditions for accessing each path. *See* "Path-Tree: An Efficient
15 Reachability Indexing Scheme for Large Directed Graphs" by Ruoming Jin, et al., ACM
16 Transactions on Database Systems, Vol. 1, No. 1, Article 1, (January 2011), (available at
17 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. *See also* "Knowledge
18 Graph Inference for Spoke Dialog Systems" by Ma, et al., Microsoft Corporation, published in
19 Proceedings of 40th IEEE International Conference on Acoustics, Speech and Signal Processing
20 (ICASSP) 2015 (available at [https://www.microsoft.com/en-us/research/wp-content/uploads/](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
21 [2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1. "Word sense number" has been construed in the Northern District of
22 California as "[a]n address to the meaning of a word, which has meaning data that is (1) utilized
23 to determine the intended meaning of a word usage, and (2) organized into relations to other
24 word sense numbers." Although Plaintiff does not take a position regarding whether or not this
25 construction is correct, the extent the Court chooses to adopt this construction, Microsoft Cortana
26 meets this construction. Microsoft Cortana utilizes Microsoft Bing technology. *See*
27 <http://www.bing.com/explore/personal> (stating that Cortana is "powered by Bing"). Bing utilizes

1 Satori technology which provides a plurality of entities and relationships between entities. *See*
2 <https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/>. The entities in
3 Satori are associated with entries of a knowledge repository database. Database entries are
4 associated with start addresses. *See* B. Stroustrup, *The C++ Programming Language* (3rd ed.) at
5 Section 5.1 pp.87-88. *See also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by
6 Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
7 www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in Satori are organized in
8 relation to other entities. *See id.*; *see also* “Knowledge Graph Inference for Spoke Dialog
9 Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of 40th IEEE
10 International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 (available
11 at <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 1.

12 72. On information and belief, the experience and knowledge database provided by
13 Microsoft Cortana comprises directed graphs that are associated with adjective word sense
14 numbers. “Adjective word sense number” has been construed in the Northern District of
15 California as follows: “An adjective word sense number is composed of an identification
16 number, a state value or value range, and an owner word sense number”. Although Plaintiff does
17 not take a position regarding whether or not this construction is correct, the extent the Court
18 chooses to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana
19 utilizes Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities
20 associated with adjectives comprise an associated identification number. *See* “Knowledge Graph
21 Inference for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in
22 Proceedings of 40th IEEE International Conference on Acoustics, Speech and Signal Processing
23 (ICASSP) 2015 (available at [https://www.microsoft.com/en-us/research/wp-](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
24 [content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 2-3; *see also* “Trinity: A Distributed Graph Engine on
25 a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia (n.d.)
26 (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed
27 Real-time Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft

1 Research Asia (n.d.) (available at
2 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 34; Satori
3 entities associated with adjectives comprise a data value representing a state. *See id.* Satori
4 entities associated with adjectives comprise an owner word sense number. *See id.* Microsoft
5 Cortana is configured to run on a computer having memory for providing the forgoing described
6 functionality.

7 73. On information and belief, the experience and knowledge database provided by
8 Microsoft Cortana comprises directed graphs that are associated with concrete noun word sense
9 numbers. “Concrete noun word sense number” has been construed in the Northern District of
10 California as follows: “The word sense number of a concrete noun contains a word sense
11 identification number, a type number, a specificity number, and an experience number.”
12 Although Plaintiff does not take a position regarding whether or not this construction is correct,
13 the extent the Court chooses to adopt this construction, Microsoft Cortana meets this
14 construction. Microsoft Cortana utilizes Microsoft Bing technology which utilizes Satori
15 technology. *See above.* Satori entities associated with concrete nouns comprise an associated
16 identification number. *See* “Distributed Real-time Knowledge Graph Serving” by Bin Shao,
17 Yatao Li, and Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
18 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 34. Satori
19 entities associated with concrete nouns comprise a type number. *See id;* *see also id.* at 30. Satori
20 entities associated with concrete nouns comprise a specificity number. *See id.* Satori entities
21 associated with concrete nouns comprise an experience number. *See* B. Stroustrup, *The C++*
22 *Programming Language* (3rd ed.) at Section 5.1 pp.87-88. Microsoft Cortana is configured to run
23 on a computer having memory for providing the forgoing described functionality.

24 74. On information and belief, the experience and knowledge database provided by
25 Microsoft Cortana comprises directed graphs with nodes that are associated with verb word
26 sense numbers. “Verb word sense number” has been construed in the Northern District of
27 California as follows: “ A verb word sense number contains an identification number which

1 defines the verb word sense number, and includes partial to complete word sense identification
2 numbers of main sentence roles.” Although Plaintiff does not take a position regarding whether
3 or not this construction is correct, the extent the Court chooses to adopt this construction,
4 Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft Bing technology
5 which utilizes Satori technology. *See above*. Satori entities associated with verbs comprise an
6 associated identification number. Satori entities associated with verbs comprise identification
7 numbers identifying the source entity (e.g. the subject role of a sentence) and the destination
8 entity (e.g. the object role of a sentence). *See* “Distributed Real-time Knowledge Graph Serving”
9 by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
10 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 63; see also
11 “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al., Proceedings of the
12 VLDB Endowment, Vol. 6, No. 4 (2013), (available at
13 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5. Microsoft Cortana is configured to
14 run on a computer having memory for providing the forgoing described functionality.

15 75. On information and belief, the experience and knowledge database provided by
16 Microsoft Cortana comprises entries having syntax usage data. “Syntax usage data” has been
17 construed in the Northern District of California as “data comprised of sets of words which can
18 syntactically be used interchangeably in a natural language construction.” Although Plaintiff
19 does not take a position regarding whether or not this construction is correct, the extent the Court
20 chooses to adopt this construction, Microsoft Cortana meets this construction. For example,
21 Microsoft Cortana provides data comprised of synonyms that can syntactically be used
22 interchangeably. Microsoft Cortana utilizes Microsoft Bing technology. *See*
23 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
24 provides syntax usage data based on Satori technology which provides a plurality of entities and
25 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
26 [world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes a plurality of
27 synonyms for entities in the database. *See* “Data services leveraging Bing’s data assets” by

1 Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft
2 Research, IEEE Computer Society, Bulletin of the Technical Committee on Data Engineering,
3 Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/A16sept/A16SEP-
4 CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)). Microsoft Cortana is configured to run on a computer having memory for providing the
5 forgoing described functionality.

6 76. For example, on information and belief, Microsoft Cortana provides an
7 experience and knowledge database having directed graphs with nodes with associated clause
8 implying word sense numbers organized into paths of the nodes such that the nodes have access
9 conditions which determine zero or more next nodes on zero or more paths that are accessible.
10 Microsoft Cortana utilizes directed graphs associated with Resource Description Framework
11 (RDF) triples having paths and conditions for accessing each path. *See* “Path-Tree: An Efficient
12 Reachability Indexing Scheme for Large Directed Graphs” by Ruoming Jin, et al., ACM
13 Transactions on Database Systems, Vol. 1, No. 1, Article 1, (January 2011), (available at
14 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. *See also* “Knowledge
15 Graph Inference for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in
16 Proceedings of 40th IEEE International Conference on Acoustics, Speech and Signal Processing
17 (ICASSP) 2015 (available at [https://www.microsoft.com/en-us/research/wp-content/uploads/
18 2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1. *See* “Path-Tree: An Efficient Reachability Indexing Scheme for
19 Large Directed Graphs” by Ruoming Jin, et al., ACM Transactions on Database Systems, Vol. 1,
20 No. 1, Article 1, (January 2011), (available at
21 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. Microsoft Cortana software
22 is configured to run on a computer having memory for providing the forgoing described
23 functionality.

24 77. On information and belief, Microsoft Cortana performs relation path identification
25 processing to find zero or more paths from nodes associated with a clause implying word sense
26 numbers associated with natural language using the experience and knowledge database such
27 that access conditions of the nodes on the found paths are met. *See* “Path-Tree: An Efficient

1 Reachability Indexing Scheme for Large Directed Graphs” by Ruoming Jin, et al., ACM
2 Transactions on Database Systems, Vol. 1, No. 1, Article 1, (January 2011), (available at
3 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. Microsoft Cortana software
4 is configured to run on a computer having memory for providing the forgoing described
5 functionality.

6 78. On information and belief, Microsoft Cortana provides criteria for selecting an
7 experience and knowledge path using the previously identified directed graph. *See* “Path-Tree:
8 An Efficient Reachability Indexing Scheme for Large Directed Graphs” by Ruoming Jin, et al.,
9 ACM Transactions on Database Systems, Vol. 1, No. 1, Article 1, (January 2011), (available at
10 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. Microsoft Cortana software
11 is configured to run on a computer having memory for providing the forgoing described
12 functionality.

13 79. On information and belief, Microsoft Cortana utilizes criteria to select one or
14 more found paths using the previously identified directed graph. *See* “Path-Tree: An Efficient
15 Reachability Indexing Scheme for Large Directed Graphs” by Ruoming Jin, et al., ACM
16 Transactions on Database Systems, Vol. 1, No. 1, Article 1, (January 2011), (available at
17 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. Microsoft Cortana software
18 is configured to run on a computer having memory for providing the forgoing described
19 functionality.

20 80. Because of Microsofts’ infringement of the ’509 Patent, Plaintiff has suffered
21 damages. Plaintiff is entitled to an award of such damages, but in no event less than a reasonable
22 royalty, the precise amount to be determined at trial.

23 **SIXTH CLAIM FOR RELIEF**

24 **INFRINGEMENT OF U.S. PATENT NO. 8,326,603**

25 81. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 80 as
26 though fully set forth herein.

27 82. Defendant Microsoft has been directly infringing and continues to directly

1 infringe one or more claims of the '603 Patent, including but not limited to Claims 14 and 16, in
2 the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of equivalents,
3 through at least its development, testing, support, and operation of Microsoft's Cortana personal
4 assistant software.

5 83. For example, on information and belief, Microsoft Cortana provides natural
6 language with associated clause implying word sense numbers. "Word sense number" has been
7 construed in the Northern District of California as "[a]n address to the meaning of a word, which
8 has meaning data that is (1) utilized to determine the intended meaning of a word usage, and (2)
9 organized into relations to other word sense numbers." Although Plaintiff does not take a
10 position regarding whether or not this construction is correct, the extent the Court chooses to
11 adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
12 Microsoft Bing technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is
13 "powered by Bing"). Bing utilizes Satori technology which provides a plurality of entities and
14 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-
15 world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). The entities in Satori are associated with entries of a knowledge repository
16 database. Database entries are associated with start addresses. *See* B. Stroustrup, *The C++
17 Programming Language* (3rd ed.) at Section 5.1 pp.87-88. *See also* "Trinity: A Distributed Graph
18 Engine on a Memory Cloud" by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
19 Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in
20 Satori are organized in relation to other entities. *See id.*; *see also* "Knowledge Graph Inference
21 for Spoke Dialog Systems" by Ma, et al., Microsoft Corporation, published in Proceedings of
22 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
23 (available at [https://www.microsoft.com/en-us/research/wp-
24 content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1. Microsoft Cortana is configured to run on a
25 computer having memory for providing the forgoing described functionality.

26 84. On information and belief, Microsoft Cortana provides natural language with
27 associated clause implying adjective word sense numbers. "Adjective word sense number" has

1 been construed in the Northern District of California as follows: “An adjective word sense
2 number is composed of an identification number, a state value or value range, and an owner
3 word sense number”. Although Plaintiff does not take a position regarding whether or not this
4 construction is correct, the extent the Court chooses to adopt this construction, Microsoft Cortana
5 meets this construction. Microsoft Cortana utilizes Microsoft Bing technology which utilizes
6 Satori technology. *See above*. Satori entities associated with adjectives comprise an associated
7 identification number. *See* “Knowledge Graph Inference for Spoke Dialog Systems” by Ma, et
8 al., Microsoft Corporation, published in Proceedings of 40th IEEE International Conference on
9 Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at
10 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3;
11 *see also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and
12 Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
13 www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed Real-time
14 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
15 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
16 at 34; Satori entities associated with adjectives comprise a data value representing a state. *See id.*
17 Satori entities associated with adjectives comprise an owner word sense number. *See id.*
18 Microsoft Cortana is configured to run on a computer having memory for providing the forgoing
19 described functionality.

20 85. On information and belief, Microsoft Cortana provides natural language with
21 associated clause implying concrete noun word sense numbers. “Concrete noun word sense
22 number” has been construed in the Northern District of California as follows: “The word sense
23 number of a concrete noun contains a word sense identification number, a type number, a
24 specificity number, and an experience number.” Although Plaintiff does not take a position
25 regarding whether or not this construction is correct, the extent the Court chooses to adopt this
26 construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft
27 Bing technology which utilizes Satori technology. *See above*. Satori entities associated with

1 concrete nouns comprise an associated identification number. *See* “Distributed Real-time
2 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
3 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
4 at 34. Satori entities associated with concrete nouns comprise a type number. *See id*; *see also id*.
5 at 30. Satori entities associated with concrete nouns comprise a specificity number. *See id*. Satori
6 entities associated with concrete nouns comprise an experience number. *See* B. Stroustrup, *The*
7 *C++ Programming Language* (3rd ed.) at Section 5.1 pp.87-88. Microsoft Cortana is configured
8 to run on a computer having memory for providing the forgoing described functionality.

9 86. On information and belief, Microsoft Cortana provides natural language with
10 associated clause implying verb word sense numbers. “Verb word sense number” has been
11 construed in the Northern District of California as follows: “A verb word sense number contains
12 an identification number which defines the verb word sense number, and includes partial to
13 complete word sense identification numbers of main sentence roles.” Although Plaintiff does not
14 take a position regarding whether or not this construction is correct, the extent the Court chooses
15 to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
16 Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities associated
17 with verbs comprise an associated identification number. Satori entities associated with verbs
18 comprise identification numbers identifying the source entity (e.g. the subject role of a sentence)
19 and the destination entity (e.g. the object role of a sentence). *See* “Distributed Real-time
20 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
21 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
22 at 63; *see also* “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al.,
23 *Proceedings of the VLDB Endowment*, Vol. 6, No. 4 (2013), (available at
24 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5. Microsoft Cortana is configured to
25 run on a computer having memory for providing the forgoing described functionality.

26 87. On information and belief, Microsoft Cortana provides an experience and
27 knowledge database comprising directed graphs that are associated with word sense numbers.

1 Microsoft Cortana utilizes Microsoft Bing technology. *See*
2 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
3 provides data based on Satori technology which provides a plurality of entities and relationships
4 between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-world-with-](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/)
5 [bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). The entities in Satori include addresses. *See* “Trinity: A Distributed Graph Engine on a
6 Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia (n.d.)
7 (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. Microsoft Cortana
8 utilizes directed graphs associated with Resource Description Framework (RDF) triples having
9 paths and conditions for accessing each path. The Satori database contains over 4 trillion
10 knowledge entries of various types: raw Resource Description Framework (RDF) data, entities,
11 relationships between entities, and multi-lingual and synonymous terms that represent the
12 entities. *See* “Path-Tree: An Efficient Reachability Indexing Scheme for Large Directed Graphs”
13 by Ruoming Jin, et al., ACM Transactions on Database Systems, Vol. 1, No. 1, Article 1,
14 (January 2011), (available at <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-
15 10. *See also* “Knowledge Graph Inference for Spoke Dialog Systems” by Ma, et al., Microsoft
16 Corporation, published in Proceedings of 40th IEEE International Conference on Acoustics,
17 Speech and Signal Processing (ICASSP) 2015 (available at [https://www.microsoft.com/en-](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)
18 [us/research/wp-content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1. Microsoft Cortana further includes
19 accessing associated word sense numbers having associated state representation data and which
20 are utilized in traversing directed graphs. *See* “Path-Tree: An Efficient Reachability Indexing
21 Scheme for Large Directed Graphs” by Ruoming Jin, et al., ACM Transactions on Database
22 Systems, Vol. 1, No. 1, Article 1, (January 2011), (available at
23 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. Microsoft Cortana is
24 configured to run on a computer having memory for providing the forgoing described
25 functionality.

26 88. On information and belief, Microsoft Cortana identifies zero or more paths from
27 nodes associated with a clause implying word sense numbers associated with natural language

1 with reference to the experience and knowledge database such that the access conditions of the
2 nodes on the found paths are met. *See* “Path-Tree: An Efficient Reachability Indexing Scheme
3 for Large Directed Graphs” by Ruoming Jin, et al., ACM Transactions on Database Systems,
4 Vol. 1, No. 1, Article 1, (January 2011), (available at
5 <http://research.microsoft.com/pubs/144985/TODSFinal.pdf>), at 9-10. Microsoft Cortana is
6 configured to run on a computer having memory for providing the forgoing described
7 functionality.

8 89. Because of Microsoft's infringement of the '603 Patent, Plaintiff has suffered
9 damages. Plaintiff is entitled to an award of such damages, but in no event less than a reasonable
10 royalty, the precise amount to be determined at trial.

11 **SEVENTH CLAIM FOR RELIEF**

12 **INFRINGEMENT OF U.S. PATENT NO. 8,688,436**

13 90. Plaintiff repeats and re-alleges the allegations of paragraphs 1 through 89 as
14 though fully set forth herein.

15 91. Defendant Microsoft has been directly infringing and continues to directly
16 infringe one or more claims of the '468 Patent, including but not limited to Claims 1, 2, and 7, in
17 the United States in violation of 35 U.S.C. § 271(a), literally or under the doctrine of equivalents,
18 through at least its development, testing, support, and operation of Microsoft's Cortana personal
19 assistant software.

20 92. For example, on information and belief, Microsoft Cortana provides electronically
21 encoded data which is representative of natural language by encoding natural language inputs
22 into audio files and/or text files which represent the natural language input. For example,
23 Microsoft Cortana encodes natural language speech using one or more audio codecs. *See*
24 “Welcome to Cortana Workshop” (available at [https://sec.ch9.ms/slides/winHEC/CortanaAudio](https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf)
25 [SystemDesignGuide.pdf](https://sec.ch9.ms/slides/winHEC/CortanaAudioSystemDesignGuide.pdf)) at slides 6, 14.

26 93. On information and belief, Microsoft Cortana provides a dictionary database
27 containing entries having associated word sense numbers. “Word sense number” has been

1 construed in the Northern District of California as “[a]n address to the meaning of a word, which
2 has meaning data that is (1) utilized to determine the intended meaning of a word usage, and (2)
3 organized into relations to other word sense numbers.” Although Plaintiff does not take a
4 position regarding whether or not this construction is correct, the extent the Court chooses to
5 adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes
6 Microsoft Bing technology. *See* <http://www.bing.com/explore/personal> (stating that Cortana is
7 “powered by Bing”). Bing utilizes Satori technology which provides a plurality of entities and
8 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-
9 world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). The entities in Satori are associated with entries of a knowledge repository
10 database. Database entries are associated with start addresses. *See* B. Stroustrup, *The C++
11 Programming Language* (3rd ed.) at Section 5.1 pp.87-88. *See also* “Trinity: A Distributed Graph
12 Engine on a Memory Cloud” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
13 Asia (n.d.) (available at www.graphengine.io/downloads/slides/Trinity.pdf) at 33. The entities in
14 Satori are organized in relation to other entities. *See id.*; *see also* “Knowledge Graph Inference
15 for Spoke Dialog Systems” by Ma, et al., Microsoft Corporation, published in Proceedings of
16 40th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
17 (available at [https://www.microsoft.com/en-us/research/wp-
18 content/uploads/2015/04/Template.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf)) at 1.

19 94. On information and belief, the dictionary database provided by Microsoft Cortana
20 comprises entries having associated adjective word sense numbers. “Adjective word sense
21 number” has been construed in the Northern District of California as follows: “An adjective
22 word sense number is composed of an identification number, a state value or value range, and an
23 owner word sense number”. Although Plaintiff does not take a position regarding whether or not
24 this construction is correct, the extent the Court chooses to adopt this construction, Microsoft
25 Cortana meets this construction. Microsoft Cortana utilizes Microsoft Bing technology which
26 utilizes Satori technology. *See above*. Satori entities associated with adjectives comprise an
27 associated identification number. *See* “Knowledge Graph Inference for Spoke Dialog Systems”

1 by Ma, et al., Microsoft Corporation, published in Proceedings of 40th IEEE International
2 Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015 (available at
3 <https://www.microsoft.com/en-us/research/wp-content/uploads/2015/04/Template.pdf>) at 2-3;
4 *see also* “Trinity: A Distributed Graph Engine on a Memory Cloud” by Bin Shao, Yatao Li, and
5 Wei-Ying Ma, Microsoft Research Asia (n.d.) (available at
6 www.graphengine.io/downloads/slides/Trinity.pdf) at 33; *see also* “Distributed Real-time
7 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
8 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
9 at 34; Satori entities associated with adjectives comprise a data value representing a state. *See id.*
10 Satori entities associated with adjectives comprise an owner word sense number. *See id.*

11 95. On information and belief, the dictionary database provided by Microsoft Cortana
12 comprises entries having associated concrete noun word sense numbers. “Concrete noun word
13 sense number” has been construed in the Northern District of California as follows: “The word
14 sense number of a concrete noun contains a word sense identification number, a type number, a
15 specificity number, and an experience number.” Although Plaintiff does not take a position
16 regarding whether or not this construction is correct, the extent the Court chooses to adopt this
17 construction, Microsoft Cortana meets this construction. Microsoft Cortana utilizes Microsoft
18 Bing technology which utilizes Satori technology. *See above.* Satori entities associated with
19 concrete nouns comprise an associated identification number. *See* “Distributed Real-time
20 Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research Asia
21 (n.d.) (available at <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>)
22 at 34. Satori entities associated with concrete nouns comprise a type number. *See id;* *see also id.*
23 at 30. Satori entities associated with concrete nouns comprise a specificity number. *See id.* Satori
24 entities associated with concrete nouns comprise an experience number. *See B. Stroustrup, The*
25 *C++ Programming Language* (3rd ed.) at Section 5.1 pp.87-88.

26 96. On information and belief, the dictionary database provided by Microsoft Cortana
27 comprises entries having associated verb word sense numbers. “Verb word sense number” has

1 been construed in the Northern District of California as follows: “ A verb word sense number
2 contains an identification number which defines the verb word sense number, and includes
3 partial to complete word sense identification numbers of main sentence roles.” Although Plaintiff
4 does not take a position regarding whether or not this construction is correct, the extent the Court
5 chooses to adopt this construction, Microsoft Cortana meets this construction. Microsoft Cortana
6 utilizes Microsoft Bing technology which utilizes Satori technology. *See above*. Satori entities
7 associated with verbs comprise an associated identification number. Satori entities associated
8 with verbs comprise identification numbers identifying the source entity (e.g. the subject role of
9 a sentence) and the destination entity (e.g. the object role of a sentence). *See* “Distributed Real-
10 time Knowledge Graph Serving” by Bin Shao, Yatao Li, and Wei-Ying Ma, Microsoft Research
11 Asia (n.d.) (available at
12 <https://www.graphengine.io/downloads/slides/Trinity.KnowledgeServing.pdf>) at 63; see also
13 “A Distributed Graph Engine for Web Scale RDF Data” by Kai Zen et al., Proceedings of the
14 VLDB Endowment, Vol. 6, No. 4 (2013), (available at
15 research.microsoft.com/pubs/183717/Trinity.RDF.pdf) at 4-5.

16 97. On information and belief, the dictionary database provided by Microsoft Cortana
17 comprises entries having syntax usage data. “Syntax usage data” has been construed in the
18 Northern District of California as “data comprised of sets of words which can syntactically be
19 used interchangeably in a natural language construction.” Although Plaintiff does not take a
20 position regarding whether or not this construction is correct, the extent the Court chooses to
21 adopt this construction, Microsoft Cortana meets this construction. For example, Microsoft
22 Cortana provides data comprised of synonyms that can syntactically be used interchangeably.
23 Microsoft Cortana utilizes Microsoft Bing technology. *See*
24 <http://www.bing.com/explore/personal> (stating that Cortana is “powered by Bing”). Bing
25 provides syntax usage data based on Satori technology which provides a plurality of entities and
26 relationships between entities. *See* [https://blogs.bing.com/search/2013/03/21/understand-your-
27 world-with-bing/](https://blogs.bing.com/search/2013/03/21/understand-your-world-with-bing/). In particular, Bing utilizes a “synonym service” that includes a plurality of

1 synonyms for entities in the database. *See* “Data services leveraging Bing’s data assets” by
2 Kaushik Chakrabarti, Surajit Chaudhuri, Zhimin Chen, Kris Ganjam, Yeye He, Microsoft
3 Research, IEEE Computer Society, Bulletin of the Technical Committee on Data Engineering,
4 Vol. 39, No. 3, September 2016 (available at [http://sites.computer.org/debull/A16sept/A16SEP-](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)
5 [CD.pdf](http://sites.computer.org/debull/A16sept/A16SEP-CD.pdf)).

6 98. On information and belief, Microsoft Cortana as installed in a computer system
7 lexically processes the electronically encoded data to access the dictionary database. *See* above;
8 *see also* [https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/)
9 [plan-to-put-voice-recognition-behind-anything/](https://arstechnica.com/information-technology/2015/05/cortana-for-all-microsofts-plan-to-put-voice-recognition-behind-anything/) (stating, “As the speech is processed, the Bing
10 speech APIs use entity discovery to try to assemble the semantic meaning of the recognized text
11 and correct the results, streaming back changes to previous text until the speech recognition is
12 complete” and “The final product of the speech recognition service is a JSON data structure that
13 can include the text in several forms: the ‘lexical’ form, which is the raw, unadulterated speech
14 recognition result in text; or various flavors of ‘display text’ with a best guess at capitalization,
15 punctuation, conversion of number words to numerals, and application of common abbreviations
16 such as ‘Mr.’ for ‘mister’ and ‘St.’ for ‘street.’”).

17 99. On information and belief, Microsoft Cortana as installed in a computer
18 system provides a natural language plausibility and expectedness processor. For example,
19 Microsoft Cortana provides alternate choices via the autocomplete functionality (*see*
20 <https://blogs.bing.com/search-quality-insights/September-2016/more-intelligent-autocomplete>)
21 or the autosuggest functionality ([https://www.microsoft.com/cognitive-services/en-us/bing-](https://www.microsoft.com/cognitive-services/en-us/bing-autosuggest-api/documentation)
22 [autosuggest-api/documentation](https://www.microsoft.com/cognitive-services/en-us/bing-autosuggest-api/documentation)).

23 100. On information and belief, Microsoft Cortana utilizes the natural language
24 plausibility and expectedness processor to initiate accessing entries of the dictionary database
25 which are associated with words of the natural language. For example, the query autocomplete
26 service performs analysis for relationships that exist between a search term and terms found
27 in the surrounding context using available domain knowledge. (*See* <https://blogs.bing.com/>

1 search-quality-insights/September-2016/more-intelligent-autocomplete. *See also*
2 <https://www.microsoft.com/cognitive-services/en-us/bing-autosuggest-api/documentation>).

3 101. Because of Microsoft's infringement of the '436 Patent, Plaintiff has suffered
4 damages. Plaintiff is entitled to an award of such damages, but in no event less than a reasonable
5 royalty, the precise amount to be determined at trial.

6 **JURY DEMAND**

7 Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Plaintiff demands a trial by
8 jury on all issues triable as such.

9 **PRAYER FOR RELIEF**

10 WHEREFORE, Plaintiff Word to Info, Inc. respectfully demands entry of judgment
11 against Microsoft as follows:

12 A. finding that Microsoft in the United States in violation of 35 U.S.C. § 271(a),
13 literally or under the doctrine of equivalents, through at least its development, testing, support,
14 and operation of Microsoft's Cortana personal assistant software has infringed one or more
15 claims of the Patents-in-Suit;

16 B. finding Microsoft's infringement of at least one of the Patents-in-Suit to be
17 willful;

18 C. awarding Plaintiff damages to be paid by Microsoft adequate to compensate
19 Plaintiff for Microsoft's past infringement of the Patents-in-Suit and any continuing or future
20 infringement of the Patents-in-Suit through the date such judgment is entered, together with pre-
21 judgment and post-judgment interest, costs, expenses and an accounting of all infringing acts
22 including, but not limited to, those acts not presented at trial as justified under 35 U.S.C. § 284;

23 D. a declaration that this case is exceptional under 35 U.S.C. § 285, and an award of
24 Plaintiff's reasonable attorneys' fees;

25 E. ordering an accounting of all infringing acts including, but not limited to, those
26 acts not presented at trial and an award of damages to Plaintiff for any such acts; and
27

1 F. awarding such other and further relief at law or in equity as the Court deems just
2 and proper.

3
4 DATED this 7th day of July, 2017.

5 Respectfully submitted,

6 By: /s/ Bryan D. Atkinson
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8 Bryan D. Atkinson (*Pro Hac Vice*)
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16 AND

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23 *Attorneys for Plaintiff Word to Info, Inc.*

24
25 **CERTIFICATE OF SERVICE**

26 I hereby declare that on July 7, 2017, I caused to be electronically filed the foregoing
27 Corrected First Amended Complaint with the Clerk of the Court using the CM/ECF system
which will send notification of such filing to the registered users of the CM/ECF system in this
case.

Dated: July 7, 2017

/s/Bryan D. Atkinson
Bryan D. Atkinson