

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

SOUND VIEW INNOVATIONS, LLC,)
)
) Plaintiff,
)
) v.) C.A. No. _____
)
WALMART INC., AND VUDU, INC.,) **JURY TRIAL DEMANDED**
)
) Defendants.
)

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Sound View Innovations, LLC (“Sound View”), for its Complaint for Patent Infringement against Walmart Inc. and Vudu, Inc. (collectively “Walmart”), alleges as follows:

INTRODUCTION

1. Sound View is an intellectual property licensing company with a patent portfolio including more than 500 active and pending patents worldwide, approximately 350 of which are active U.S. Patents. Those patents were developed by researchers at Alcatel Lucent (“Lucent”) and its predecessors. Lucent was home to the world-renowned Bell Laboratories, which has a long and storied history of innovation. Researchers at Lucent’s Bell Laboratories developed a wide variety of key innovations that have greatly enhanced the capabilities and utility of computer systems and networks. This has resulted in benefits such as better and more efficient computer networking, computer security, and user experiences.

2. Patents enjoy the same fundamental protections as real property. Sound View, like any property owner, is entitled to insist that others respect its property and to demand compensation from those who take that property for their own use. Walmart has used, and continues to use,

Sound View's patents without authorization. Moreover, despite Sound View's repeated attempts to negotiate, Walmart refuses to take a license though it continues to use Sound View's property.

NATURE OF THE CASE

3. This action arises under 35 U.S.C. § 271 for Defendants' infringement of Sound View's United States Patent Nos. 5,806,062 (the "'062 patent"), 7,426,715 (the "'715 patent"), 6,502,133 (the "'133 patent"), 6,708,213 (the "'213 patent"), and 6,725,456 (the "'456 patent") (collectively the "Patents-In-Suit").

THE PARTIES

4. Plaintiff Sound View is a Delaware limited liability company with its principal place of business at 2001 Route 46, Waterview Plaza, Suite 310, Parsippany, New Jersey 07054.

5. On information and belief, Defendant Walmart Inc. is a Delaware corporation, with its principal place of business at 702 S.W. 8th Street, Bentonville, Arkansas 72716. Walmart Inc. may be served with process by serving its registered agent, The Corporation Trust Company, Corporation Trust Center 1209 Orange Street, Wilmington, Delaware 19801.

6. On information and belief, Defendant Vudu Inc. ("Vudu") is a Delaware corporation, with its principal place of business at 600 W California Avenue, Sunnyvale, California 94086. Vudu may be served with process by serving its registered agent, The Corporation Trust Company, Corporation Trust Center 1209 Orange Street, Wilmington, Delaware 19801. Vudu is a wholly owned subsidiary of Walmart Inc.

JURISDICTION AND VENUE

7. This action arises under the patent laws of the United States, including 35 U.S.C. § 271 *et seq.* The jurisdiction of this Court over the subject matter of this action is proper under 28 U.S.C. §§ 1331 and 1338(a).

8. Venue is proper in this Court pursuant to 28 U.S.C. §§ 1391(b) and (c) and 1400(b),

at least because each of the defendants resides in this judicial district.

9. This Court has personal jurisdiction over each of the defendants because each of the defendants, among other things: is incorporated under the laws of the State of Delaware and has placed services that practice the claims of the Patents-in-Suit into the stream of commerce with the knowledge, or reasonable expectation, that actual or potential users of such services were located within this judicial district.

THE PATENTS-IN-SUIT

10. Sound View incorporates by reference the preceding paragraphs as if fully set forth herein.

A. The '062 Patent

11. The '062 patent, titled "Data Analysis System Using Virtual Databases," was duly and properly issued by the United States Patent and Trademark Office ("USPTO") on September 8, 1998. A copy of the '062 patent is attached hereto as Exhibit A.

12. Sound View is the owner and assignee of the '062 patent and holds the right to sue for and recover all damages for infringement thereof, including past infringement.

13. The '062 patent generally relates to customizable data processing applications that rely on a combination of reusable software operators, such as initial operators, query operators, terminal operators, and/or external operators, to process source information from a virtual database in a particular schema, such as HTML or XML, and transform that source information into another virtual database having the same schema.

14. Various types of documents may be stored in a computer system, such as word processing files, computer programs, HTML documents, financial files, employee files, etc. When dealing with large or complex files, it is often desirable to analyze or alter the structure and content

of the documents; for example, comparing a first version to a second version, or analyzing dependency relationships between various sections of computer code.

15. In order to aid such analysis, a database may be constructed which contains information describing the structure of the documents. Various database queries may be performed to extract and process information describing the structure of the source documents. A collection of source documents, along with an associated database that describes the structure of the documents, is called a repository.

16. To analyze source document information, it is necessary to process information contained in the repository. A computer program that extracts or converts information from a repository is called an operator. Thus, an operator receives a source document and/or a database as input, processes the input, and produces some output. A simple example of an operator is a program that takes a source document as input and counts the number of occurrences of a particular word, and outputs a number containing the number of times the particular word occurs. The overall function of the analysis—in the above example, a count of the number of occurrences of a particular word—is called an application.

17. At the time of the invention of the '062 patent, in existing repository analysis systems, operators were designed for single applications. Thus, the user indicated which operator he/she wished to apply to the repository, and the system processed the repository accordingly. The user was presented with the output when the processing was finished. Different operators processed the repository in different manners, but there was no convenient mechanism for combining the various operators to create new applications. Thus, when a new application was desired, a new operator would need to be designed from scratch.

18. Prior art repository analysis systems generally were closed systems, in that all operators were applied within the confines of the system, and all database accesses were performed within the system. For example, a repository analysis system operator may have produced as output a file containing information about the structure of a computer program. In conventional closed systems, this output could not be further processed by, for example, an external graphics program that would format the output in a desired manner. Instead, the output could only be formatted according to operators that were internal to the repository system. There was no convenient mechanism to allow the repository analysis system to communicate with operators that were external to the system.

19. The inventors of the '062 patent solved these discrete computer-based problems by providing, inter alia, a method for creating data analysis applications using reusable software operators. For example, query operators receive data in a particular virtual database format, process the data in the virtual database, and output the results of the processing in another virtual database that has the same format as the original virtual database. A plurality of query operators can be combined to customize the processing of the data. In addition, initial operators convert source information into the virtual database format so that the query operators can analyze the source data. External operators take an external format as input and create another external format as output. Also, terminal operators are used to convert a virtual database into an external format. A user can combine initial, query, terminal, and external operators to create customizable data processing applications.

20. The '062 Patent is directed to a technical improvement in software technology over the rigid general purpose data analysis applications and expensive custom applications that existed

in the 1990s. The novel software structure of the claimed inventions enabled users to engineer their own purpose-built data analysis applications with reusable interoperable software operators.

21. Creating data analysis applications using reusable software operators, as described in the '062 patent, is particularly useful in that the external format data may be processed in various ways, thus allowing flexible presentation of the analysis results.

B. The '715 Patent

22. The '715 patent, titled "Shutting Down a Plurality of Software Components in an Ordered Sequence," was duly and properly issued by the USPTO on September 16, 2008. A copy of the '715 patent is attached hereto as Exhibit B.

23. Sound View is the owner and assignee of the '715 patent and holds the right to sue for and recover all damages for infringement thereof, including past infringement.

24. The '715 patent generally relates to distributed software applications, and more particularly, to management of distributed software applications.

25. At the time of the invention of the '715 patent, distributed software applications included software components distributed among a plurality of executables (i.e., software capsules or software entities). Each executable contained one or more software components that performed some portion of the functionality of the distributed software application.

26. These distributed software application systems had disadvantages. For example, if the software components of a distributed software application shut down without a pre-planned shutdown sequence, then the distributed software application could leave system resources in an inconsistent state. As a further example, without a proper shutdown sequence, the distributed software application would not properly store state information, release the allocated system resources, and/or update databases.

27. If, during shutdown of a distributed software application divided into a plurality of executables running on a single processor, the distributed software application were to shut down the executables by following a preplanned shutdown sequence for the executables, it would suffer from other shortcomings. One shortcoming of this approach was that executing the shutdown sequence at the executable level did not serve to fully leave the system resources in a consistent state. Another shortcoming was that the shutdown sequence was unable to fully coordinate a shutdown of the executables and software components of the distributed software application divided across a plurality of processors.

28. Thus, a need existed to shut down a distributed software application in a manner that stores state information, releases system resources, and/or leaves the system resources in a consistent state.

29. The inventors of the '715 patent solved these discrete computer-based problems and improved upon distributed software application systems by providing, among other things, computing methods for shutting down software components that avoid the problems associated with doing so in conventional distributed software applications.

30. Shutting down distributed software applications in an ordered sequence, in the manner described and claimed by the '715 patent, was also particularly useful because it allowed the saving of state information, release of allocated system resources, and updating of databases.

C. The '133 Patent

31. The '133 patent, titled "Real-Time Event Processing System with Analysis Engine Using Recovery Information," was duly and properly issued by the USPTO on December 31, 2002. A copy of the '133 patent is attached hereto as Exhibit C.

32. Sound View is the owner and assignee of the '133 patent and holds the right to sue for and recover all damages for infringement thereof, including past infringement.

33. The '133 patent generally relates to real-time event processing in applications such as telecommunications and computer networks, and more particularly, to a method, apparatus, and system for processing events in a real-time analysis engine, and storing recovery information in a main-memory database system associated with the real-time analysis engine.

34. At the time of the invention of the '133 patent, high performance real-time event processing applications had performance requirements that could not be met by conventional general purpose database management systems. For example, some real-time event processing applications required the service time for such events to not exceed a few milliseconds. However, with conventional database technology, the service time costs of invoking a structured query language operation over a client-server interface, or the service time costs associated with a single access to secondary storage, could account for hundreds of milliseconds. These limitations led real-time event processing applications instead to rely on the use of custom database systems.

35. These custom database systems had disadvantages: (1) there was a high cost of developing and maintaining custom systems; (2) those high costs could not be amortized across a number of different applications; and (3) custom database systems were generally inflexible and difficult to adapt to unforeseen or evolving requirements.

36. At the time of the invention of the '133 patent, a need therefore existed for an improved real-time event processing system that could provide the performance benefits of custom database systems, but without sacrificing the flexibility and maintainability typically associated with conventional general-purpose database systems.

37. The inventors of the '133 patent solved that discrete computer-based problem and improved upon the existing real-time event processing systems by providing a real-time event processing system that avoids the problems associated with custom systems.

38. Using a real-time analysis engine operating in the manner described by the '133 patent is particularly useful because it can provide transactional access to persistent data, but at the speed of a main-memory system, and it also incorporates a recovery model which stores recovery information in order to facilitate roll-back to a recovery point after a failure.

39. The '133 Patent claims an improved real-time event-processing system delivering increased performance in telecommunications and computer networks. Conventional event-processing systems were only compatible with specialized custom database systems, which were costly to develop and maintain. The inventions of the '133 Patent claim an improvement in computer functionality—including a real-time analysis engine that is associated with a main-memory system. By associating a real-time analysis engine with a main-memory system (which is much faster than “secondary” storage used in the prior art), the invention provides the performance benefits of custom database systems with the cost savings and flexibility associated with conventional general-purpose database systems.

40. In accordance with the '133 patent, recovery information regarding a recovery point for a given real-time analysis engine may be stored in a memory portion of the main-memory database system. This way, the real-time event processing system provides a critical path for event processing that is specifically designed for high performance, while also retaining many desirable features of conventional database systems, including high-level declarative programming interfaces, and the transactional correctness properties of atomicity, consistency, isolation and durability. These features of the '133 patent enhance the reliability, robustness, usability and maintainability of the real-time event processing system and any applications built thereon.

D. The '213 Patent

41. The '213 patent, titled “Method for Streaming Multimedia Information Over Public Networks,” was duly and properly issued by the USPTO on March 16, 2004. A copy of the '213

patent is attached hereto as Exhibit D.

42. Sound View is the owner and assignee of the '213 patent and holds the right to sue for and recover all damages for infringement thereof, including past infringement.

43. The '213 patent generally relates to streaming multimedia data (*e.g.*, audio and video data) over the Internet and other networks, and, more specifically, to methods to improve caching of streaming multimedia data from a content provider over a network to a client's computer.

44. At the time of the invention of the '213 patent, multimedia data could either be downloaded by the client or streamed over the network to the client. Streaming eliminated the need for the client to wait for the downloading to complete before watching or listening to the multimedia data. However, with conventional unicast connections, streaming posed problems: to content providers in that server load increased linearly with the number of clients; to Internet service providers in that streaming caused network congestion problems; and to clients in that streaming often resulted in high start-up latency and unpredictable playback quality.

45. Conventional caching systems attempted to address network congestion, but these were unsuitable for streaming multimedia data: (1) video files were typically too large to be cached in their entirety, so only a few streams could be stored at a cache; (2) breaking video files into smaller pieces was not feasible because the caching systems would treat different chunks from the same video object independently; and (3) streaming multimedia has temporal characteristics, like the transmission rate, while conventional caching was only capable of handling static web objects.

46. The inventors of the '213 patent solved those discrete computer-based problems and improved upon conventional caching techniques by providing a novel architecture and method for supporting high quality live and on-demand streaming multimedia on network systems using

helper servers.

47. The techniques described in the '213 patent advantageously reduce server and network loads by employing helper servers with dynamic data transfer rate control to overcome arrival time and range heterogeneity in client requests, thereby improving the quality perceived by end users making requests for streaming media objects.

48. The '213 patent has been recognized with the 2013 Edison Patent Award in Multimedia Technology for inventing “fundamental concepts and techniques to design content distribution networks and caching systems originally built for text and images to better support streaming media over the Internet.” A press release regarding the award is attached as Exhibit E.

E. The '456 Patent

49. The '456 patent, titled “Methods and Apparatus for Ensuring Quality of Service in an Operating System,” was duly and properly issued by the USPTO on April 20, 2004. A copy of the '456 patent is attached hereto as Exhibit F.

50. Sound View is the owner and assignee of the '456 patent and holds the right to sue for and recover all damages for infringement thereof, including past infringement.

51. The '456 patent generally relates to computer systems, and more particularly to techniques for providing a desired quality of service (“QoS”) for an application running in a computer system.

52. At the time of the invention of the '456 patent, in a typical computer system multiple applications would contend for the same physical resources, such as a central processing unit, memory, and disk or network bandwidth. Conventional time-sharing operating systems could achieve acceptably low response time and high system throughput in some environments, but several trends made resource management techniques of conventional time-sharing operating systems increasingly inappropriate. For example, many workloads began including real-time

applications like multimedia, which required that requests be processed within certain performance bounds. Also, a trend towards distributed client-server architectures increased the importance of fairness, i.e., preventing certain clients from monopolizing system resources.

53. The aforementioned trend towards client-server architectures made it necessary to manage resources hierarchically. For example, web servers and other user-level servers often needed mechanisms for processing client requests with specified QoS and/or fairness bounds. However, conventional time-sharing operating systems did not provide such mechanisms.

54. Then-existing proportional share schedulers did not provide satisfactory solutions to many problems that arose in their adoption in operating systems. For example, proportional share schedulers were proposed without an application programming interface (“API”), since they were not implemented and were evaluated only analytically or in simulations. As a further example, proportional share schedulers that were implemented used an API limited to a given scheduler and resource. As yet another example, proportional share schedulers that simply added resource reservations to conventional objects such as files or sockets did not provide correct sharing semantics, as such proportional share schedulers allowed those objects to be shared inappropriately by different users. As yet another example, proportional share schedulers did not propose how a parent process running on an operating system could limit the resource reservations used by its children processes. Finally, proportional share schedulers would hold resource reservations for processes that terminated abnormally, causing the reserved resource to become permanently unavailable.

55. The inventors of the ’456 patent provided a technical solution for ensuring a desired QoS for an application running on an operating system addressing problems identified in existing computer systems.

56. Using the techniques for providing a desired QoS claimed by the '456 patent is particularly useful because it allows selected applications to isolate their performance and the performance of their corresponding client(s) from CPU, memory, disk, or network traffic overloads caused by other applications. Such a capability is increasingly important for real-time, multimedia, Web, and distributed client-server applications as demands on network resources grow.

BACKGROUND FACTS

57. On June 28, 2016, Sound View sent a letter notifying Walmart of its infringement of the '133 patent. Sound View notified Walmart of representative Walmart offerings that infringe that patents and explained its intention to allow Walmart to continue to use the invention covered in that patent through a license from Sound View. Sound View further requested a meeting to discuss the matter in more detail.

58. On August 15, 2016, counsel for Walmart replied, stating that it would respond to Sound View in due course.

59. Sound View responded to Walmart on August 15, 2016, thanking Walmart for its correspondence and requesting a brief phone call to expedite Walmart's evaluation of Sound View's materials.

60. On August 17, 2016, counsel for Walmart declined Sound View's request for a brief phone call.

61. On August 30, 2016, Sound View wrote to ask when Sound View could expect a response from Walmart.

62. Walmart did not respond to Sound View's August 30, 2016 correspondence.

63. On October 12, 2016, Sound View again wrote to ask when Sound View could expect a response from Walmart.

64. On October 19, 2016, Sound View spoke with counsel for Walmart over the phone regarding Walmart's infringement of Sound View's patents and a potential license.

65. On December 2, 2016, Sound View notified Walmart of its infringement of the '213 patent, and identified representative Walmart offerings that infringe that patent. Sound View informed Walmart that it was continuing to review its patent portfolio and expected to identify additional patents that Walmart infringed. Sound View additionally requested a phone call in order to understand how Walmart wished to proceed.

66. On December 21, 2016, Sound View spoke with Walmart over the phone to move forward with licensing discussions and arrange an in-person meeting.

67. On February 28, 2017, Walmart and Sound View met to discuss the benefits of a patent license from Sound View.

68. On March 3, 2017, Sound View wrote Walmart to schedule a meeting for continued licensing discussions.

69. Walmart did not respond to Sound View's March 3, 2017 correspondence.

70. On June 1, 2017, Sound View again wrote Walmart to schedule a meeting for continued licensing discussions.

71. On July 20, 2017, Sound View and Walmart met to continue licensing discussions. At this meeting, Sound View notified Walmart of its infringement of the '062 patent.

72. On October 19, 2017, Sound View and Walmart again met to continue licensing discussions, but no agreement was reached.

73. On June 11, 2018, Sound View notified Walmart of its infringement of the '715 patent and identified representative Walmart services that infringe that patent.

74. Licensing discussions continued, over the course of multiple calls and meetings,

but terminated with Walmart's refusal to take a license to Sound View's patents.

75. On April 5, 2019, Sound View notified Walmart of its infringement of the '456 patent and identified representative Walmart services that infringe that patent. Sound View also provided further details concerning Walmart's infringement of the '715 patent.

76. Despite Sound View's repeated efforts and lengthy correspondence, Walmart has refused to reach a licensing agreement to end its infringement of Sound View's patents. Instead, Walmart continues to knowingly, intentionally, and willfully infringe Sound View's patents so as to obtain their significant benefits without paying any compensation to Sound View. Sound View thus has no other choice but to seek relief through litigation.

COUNT ONE
INFRINGEMENT OF THE '062 PATENT

77. Sound View incorporates by reference the preceding paragraphs as if fully set forth herein.

78. The '062 patent is valid and enforceable.

79. Walmart's web pages and internet services, including at least walmart.com and vudu.com (the "Walmart DOM Services"), have used the Document Object Model ("DOM") to create and process customizable data analysis and processing applications. The DOM is an application programming interface ("API") that allows documents to be modelled using objects of a variety of data formats, including HTML and XML. It defines the logical structure of documents and the way a document is accessed and manipulated.

80. Using the DOM, the nodes (or objects) of every document are organized in a tree structure, called the "DOM tree," and can be manipulated individually using the DOM methods (or operators). With the DOM, programmers can build documents, navigate their structure, and add, modify, or delete elements and content. Anything found in an HTML or XML document can

be manipulated in this way using the DOM, with a few exceptions.

81. As an object model, the DOM identifies: (1) the interfaces and objects used to represent and manipulate a document; (2) the semantics of these interfaces and objects – including both behavior and attributes of the relationships; and (3) collaborations among these interfaces and objects.

82. jQuery is a DOM manipulation library that makes it easier to use JavaScript on a website by taking more complex code needed to manipulate the DOM and wrapping the code into simpler methods that can be called with smaller amounts of JavaScript.

83. On information and belief, Walmart has used jQuery throughout its websites, including at least the Walmart DOM Services.

84. Walmart has infringed one or more claims of the '062 patent under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, by making, using, selling, and/or offering for sale in the United States, and/or importing into the United States, products and/or methods encompassed by those claims, including for example, by making, using, selling, offering for sale, and/or importing its platforms, web pages, and servers, including for example the Walmart DOM Services, which have used jQuery.

85. For example, Walmart has infringed claim 14 by using a method for processing information (such as the Websites) comprising the steps of:

a. providing a plurality of software operators (such as jQuery methods, including, for example, “.attr(),” “.append(),” “.wrapAll(),” and “.clone()”) each configured to receive a virtual database (such as DOM nodes (or objects) or web pages, describing the structure of a document) having a first schema (such as HTML or XML), for processing information

contained in said virtual database (such as by applying a jQuery method to a node in the DOM tree), and for outputting a virtual database having said first schema; and

b. combining at least two of said software operators to create an application (such as that used to construct and serve the Websites).

86. Sound View has been damaged by Walmart's infringement of the '062 patent and is entitled to recover from Walmart the damages sustained by Sound View as a result of Walmart's wrongful acts in an amount adequate to compensate Sound View for Walmart's infringement subject to proof at trial.

COUNT TWO
INFRINGEMENT OF THE '715 PATENT

87. Sound View incorporates by reference the preceding paragraphs as if fully set forth herein.

88. The '715 patent is valid and enforceable.

89. Walmart has used software known as Apache Ambari ("Ambari") in its data systems. For example, Walmart's use of Ambari has been openly advertised by Walmart and its employees, and includes, without limitation, Hadoop Distributed File System ("HDFS") management and monitoring via Ambari (the "Walmart Ambari Services").

90. Ambari is a management platform for provisioning, managing, monitoring, and securing Apache Hadoop Clusters. Ambari allows Walmart to manage service dependencies and shutdown sequences in Hadoop, making it easier to provide ongoing cluster maintenance and management.

91. Ambari managed services include meta-info, as defined in an XML file, which is a declarative definition of an Ambari managed service describing its content. Those services further include additional files that define, for example, dependencies between managed services.

92. Services in Ambari are defined in its stacks folder. A “stack” is a collection of services.

93. Within Ambari, “role” is another name for a component. Each service can define its own role command order by including the Role Command Order file in its service folder. Furthermore, Ambari includes extensions that include role command orders based on default dependencies. On information and belief, Walmart can and has specified the order in which components are run by including the Role Command Order file in the stack version folder.

94. Ambari is responsible for starting and stopping components or services of Hadoop Clusters such as HDFS, Hbase, and Zookeeper. Communications between Hadoop nodes generally occur using Remote Procedure Call (“RPC”) as the mechanism. RPC communications between nodes are commonly layered on top of the TCP/IP protocol, as are other protocols for communication between nodes. Using the Role Command Order, Ambari shuts down software components according to an ordered sequence. For example, the “Stop” command ensures that HBase Master Servers and HBase Region Servers are stopped before Zookeeper servers, and that communication channels between components are torn down.

95. As another example, HDFS establishes communication channels between various software components in a distributed environment by using a NameNode server. In addition, an HDFS cluster includes a number of DataNodes, usually one per node in the cluster, which manage storage attached to the nodes that they run on. When a software component is shutdown, the communication channel to the NameNode is torn down.

96. Walmart infringes and has infringed one or more claims of the ’715 patent under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, by making, using, selling, and/or offering for sale in the United States, and/or importing into the United States, products

and/or methods encompassed by those claims, including for example, by making, using, selling, offering for sale, and/or importing systems and platforms that include or use the Walmart Ambari Services.

97. On June 11, 2018, Sound View informed Walmart that its systems and applications infringe the '715 patent. However, Walmart did not stop infringing.

98. For example, Walmart infringed claim 19 by using a method, comprising the steps of:

a. obtaining one or more dependency relationships among a plurality of software components that run within one or more executables of a distributed software application (such as those dependencies defined in metainfo);

b. establishing an ordered sequence for shutdown of the plurality of Software components based on one or more of the one or more dependency relationships (such as the sequence defined in Role Command Order); and

c. shutting down the plurality of software components according to the ordered sequence (such as in response to the Stop command using the Role Command Order); and

d. tearing down any communication channels between the plurality of software components upon deactivation of each of the plurality of software components (such as by tearing down communication channels between services such as Zookeeper, HBase, and HDFS).

99. Sound View has been damaged by Walmart's infringement of the '715 patent and is entitled to recover from Walmart the damages sustained by Sound View as a result of Walmart's wrongful acts in an amount adequate to compensate Sound View for Walmart's infringement subject to proof at trial.

100. In committing these acts of infringement, Walmart committed egregious misconduct including, for example, acting despite knowing that its actions constituted infringement of a valid patent, or recklessly disregarding the fact that its actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

101. Walmart's infringement of the '715 patent was and is deliberate and willful, entitling Sound View to increased damages under 35 U.S.C. § 284 and to attorney fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

COUNT THREE
INFRINGEMENT OF THE '133 PATENT

102. Sound View incorporates by reference the preceding paragraphs as if fully set forth herein.

103. The '133 patent is valid and enforceable.

104. On information and belief, Walmart uses and has used a framework known as Apache Storm ("Storm") to perform stream processing of events in real-time and continuous data processing, including database updates and processing messages. Walmart systems based on Storm include, without limitation, Walmart's Near Real Time Search Index (the "Walmart Storm Services").

105. The Walmart Storm Services' architectures are composed of three components: (1) "Streams," which are unbounded sequences of tuples that are processed; (2) "Spouts," which are sources of streams, and (3) "Bolts," which are responsible for processing the Streams in real-time.

106. Those services are integrated with Walmart's infrastructure, such as its database systems, messaging systems, and monitoring/alerting systems. Events are generated by various Walmart system applications, such as discovery, real-time analytics, personalization, search, and revenue optimization. When these system applications generate events, these events are grouped

into Streams.

107. Spouts emit Streams into the topology, so that they can subsequently be processed.

108. Bolts are real-time analysis engines that process the Streams. Bolts are capable of performing simple stream transformations, and multiple Bolts are used for more complex stream transformations.

109. Walmart's use of Storm enables Walmart to process billions of events per day.

110. The Walmart Storm Services systems have the capability to save and retrieve in-memory the state of the Bolts. For example, Storm has a default in-memory based state implementation and also a Redis backed implementation that provides state persistence. This main-memory database within Storm has the function known as state management, allowing it to automatically and periodically take snapshots of the state of the Bolts.

111. Walmart infringed one or more claims of the '133 patent under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, by making, using, selling, and/or offering for sale in the United States, and/or importing into the United States, products and/or methods encompassed by those claims, including for example, by making, using, selling, offering for sale, and/or importing servers and products, such as Walmart's servers used for real-time analytics and real-time processing, that include or use applications based on Apache Storm.

112. On June 28, 2016, Sound View informed Walmart that its systems and applications infringe the '133 patent. However, Walmart did not stop infringing.

113. For example, Walmart infringed claim 13 by using a method of processing events (such as Streams) generated by at least one system application (such as the Walmart Storm Services), the method comprising the steps of:

- a. processing the events in at least one real-time analysis engine (such as a Bolt); and
- b. storing in a main-memory database system (such as Storm's default in-memory based state implementation) associated with the real-time analysis engine recovery information regarding a recovery point for the real-time analysis engine (such as the state information relating to the Bolt's state).

114. Sound View has been damaged by Walmart's infringement of the '133 patent and is entitled to recover from Walmart the damages sustained by Sound View as a result of Walmart's wrongful acts in an amount adequate to compensate Sound View for Walmart's infringement subject to proof at trial.

115. In committing these acts of infringement, Walmart committed egregious misconduct including, for example, acting despite knowing that its actions constituted infringement of a valid patent, or recklessly disregarding the fact that its actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

116. Walmart's infringement of the '133 patent was deliberate and willful, entitling Sound View to increased damages under 35 U.S.C. § 284 and to attorney fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

COUNT FOUR
INFRINGEMENT OF THE '213 PATENT

117. Sound View incorporates by reference the preceding paragraphs as if fully set forth herein.

118. The '213 patent is valid and enforceable.

119. At least by December 2, 2016, Sound View informed Walmart that its systems and applications infringe the '213 patent. However, Walmart did not stop infringing.

120. A content delivery network, also called a content distribution network (CDN), is a network of connected computers that delivers internet content, such as streaming video, to end users. When a service, such as Walmart, uses a CDN, the content comes from an “origin server” and is replicated on numerous “edge servers.” When an end user requests particular content, the CDN provides the content from an edge server near the end user. This arrangement has numerous benefits, such as: faster response time (lower latency) because the content is served from a nearby edge server, instead of a potentially distant origin server; greater throughput because the edge server will be less loaded than a single origin server would be; and greater availability because the multiplicity of servers allows for a request to be failed over to another server if an edge server crashes.

121. Walmart provides and has provided streaming services, including at least Vudu streaming services on vudu.com (the “Walmart ’213 Services”), to allow users to watch streaming video. Walmart provides streaming video services to its users utilizing content delivery networks, including at least Akamai Technologies Inc. (“Akamai”) and Limelight Networks, Inc. (“Limelight”) (collectively, “the CDNs”). The Walmart ’213 Services provide video that is encoded using certain protocols, including the HTTP Live Streaming (“HLS”) protocol and the MPEG-DASH protocol.

122. HLS is an HTTP-based media streaming communications protocol. It works by breaking the overall stream into a sequence of small HTTP-based file downloads; each download is one short chunk that is part of an overall potentially unbounded transport stream. As the stream is played, the client may select from a number of different alternate chunks containing the same material encoded at a variety of data rates.

123. MPEG-DASH is an adaptive bitrate streaming technique that enables high quality

streaming of media content over the Internet delivered from conventional HTTP web servers. Similar to HLS, MPEG-DASH works by breaking the content into a sequence of small HTTP-based file segments, each segment containing a short interval of playback time of content that is potentially many hours in duration, such as a live broadcast of a sports event. The content is made available at a variety of different bit rates, with alternative segments encoded at different bit rates covering aligned short intervals of playback time.

124. The CDNs each support Walmart's delivery of video content to users using MPEG-DASH and/or HLS. Moreover, each of the CDNs openly advertises and promotes the use of those protocols to deliver video content to users.

125. Knowing that each of the CDNs supports the delivery of video content using MPEG-DASH and/or HLS, and directing and controlling such support, Walmart delivers video streams to its users, including the Walmart '213 Services, using at least the CDNs by transcoding videos into MPEG-DASH segments with different bit rates, and providing those segments to each of the CDNs, and/or by transcoding, packaging, and delivering live and on-demand streams into segments at different data rates with HLS. The CDNs store those MPEG-DASH or HLS segments in caches, and send them to Walmart users who request to view the video files.

126. Walmart contracts or has contracted with each of the CDNs, so that when at least certain Walmart users request a video stream, the request is routed to one of the edge servers of the CDN, which receives the request. The edge server then allocates a local buffer to store portions of the stream.

127. On information and belief, Walmart can and has configured and/or customized aspects of the operation of each of the CDNs in delivering content to its users. For example, Walmart can customize the operation of the Akamai CDN through configuration tools, such as

Akamai's Luna Control Center. As a further example, Walmart can customize the operation of the Limelight CDN through configuration tools, such as Limelight Control.

128. At least through contracting with Akamai and configuring and/or customizing aspects of the operation of the Akamai CDN, Walmart has knowledge of the operations of the Akamai CDN and the steps the Akamai systems will perform in order to deliver content to Walmart's users. Walmart thus knowingly causes and specifically intends for Akamai to perform those steps, or directs and controls Akamai's performance of these steps by means of at least its contractual relationship with Akamai and by configuring and customizing Akamai's CDN.

129. For example, utilizing Akamai's CDN requires storing segments in a local buffer on an edge server, and at least by entering into a contractual relationship with Akamai, Walmart knowingly intends for Akamai to do so, or directs and controls Akamai (either implicitly or explicitly) to do so. Walmart intends for, or directs, the Akamai edge server to request the MPEG-DASH or HLS segments from a datacenter cache, store them in the local buffer, and send them to Walmart users who view the video. Further, Walmart intends for, or directs, the edge server to store data in the buffer so that its end users can receive content with a lower latency.

130. While the Akamai edge server sends the requested segments to the user, it concurrently requests the next few segments in the stream from the datacenter cache or from the cache of another server. By doing so, the content can be streamed smoothly without pauses for buffering. Akamai advertises this process as "pre-fetching." Walmart intends for and contracts with Akamai to use pre-fetching so that its users can receive content without pauses for buffering. Walmart and other customers have the ability to configure the size of the segments to be fetched in the Akamai system. The Akamai CDN, as configured and customized by Walmart, also allows Walmart users to receive content without pauses for buffering by allowing end users to send byte

range requests to the edge server.

131. While the content is being played back by an MPEG-DASH or HLS client, the client automatically selects the next segment to download and play based on current network conditions. The streaming server then provides the requested alternate segment, resulting in the server adjusting the data rate. Walmart intends for and controls the Akamai CDN to adjust the data rate by directing, controlling, and/or inducing Akamai to provide the content on its CDN at different data rates.

132. As a further example, at least through contracting with Limelight and configuring and/or customizing aspects of the operation of the Limelight CDN, Walmart has knowledge of the operations of the Limelight CDN and the steps the Limelight systems will perform in order to deliver content to Walmart's users. Walmart thus knowingly causes and specifically intends for Limelight to perform those steps, or directs and controls Limelight's performance of those steps by means of at least its contractual relationship with Limelight and by configuring and customizing Limelight's CDN.

133. For instance, utilizing Limelight's CDN requires storing segments in a local buffer on an edge server, and at least by entering into a contractual relationship with Limelight, Walmart knowingly intends for Limelight to do so, or directs and controls Limelight (either implicitly or explicitly) to do so. Walmart intends for, or directs, the Limelight edge server to request the MPEG-DASH or HLS segments from a datacenter cache, store them in the local buffer, and send them to Walmart users who view the video. Further, Walmart intends for, or directs, the edge server to store data in the buffer so that its end users can receive content with a lower latency.

134. While the Limelight edge server sends the requested segments to the user, it concurrently requests the next few segments in the stream from the datacenter cache or from the

cache of another server. By doing so, the content can be streamed smoothly without pauses for buffering. Walmart intends for and contracts with (or has contracted with) Limelight to deliver content in this manner so that its users can receive content without pauses for buffering. Walmart and other customers have the ability to configure the size of the segments to be fetched in the Limelight system. The Limelight CDN, as configured and customized by Walmart, also allows Walmart users to receive content without pauses for buffering by allowing end users to send byte range requests to the edge server.

135. While the content is being played back by an MPEG-DASH or HLS client, the client automatically selects from the alternatives the next segment to download and play based on current network conditions. The streaming server then provides the requested alternate segment, resulting in the server adjusting the data rate. Walmart intends for and controls the Limelight CDN to adjust the data rate by directing, controlling, and/or inducing Limelight to provide the content on its CDN at different data rates.

136. Walmart directly infringes one or more claims of the '213 patent (including at least claim 16) under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, at least by directing and/or controlling at least the performance of the claimed steps by the CDNs to infringe the '213 patent to deliver the Walmart '213 Services.

137. For example, Walmart has directly infringed, and continues to directly infringe, claim 16 of the '213 patent under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, at least by directing and/or controlling Akamai to deliver the Walmart '213 Services. For example, Walmart has directly infringed, and continues to directly infringe, claim 16 of the '213 patent under 35 U.S.C. § 271(a) literally and/or under the doctrine of equivalents, at least by directing and/or controlling Akamai (through at least contracting with Akamai and customizing

the Akamai CDN) to infringe claim 16 by using a method of reducing latency in a network having a content server which hosts streaming media (“SM”) objects (such as videos) which comprise a plurality of time-ordered segments (such as HLS or MPEG-DASH segments) for distribution over said network through a plurality of helpers (“HSs”) (such as Akamai cache or edge servers) to a plurality of clients (such as users of the Walmart ’213 Services). Further:

a. Walmart directs and/or controls Akamai, at least via its contract with Akamai and/or its configuration and customization of Akamai’s CDN, to receive a request for an SM object from one of said plurality of clients (such as a user of one of the Walmart ’213 Services requesting to watch a hosted video) at one of said plurality of helper servers (such as by directing and/or controlling one of the Akamai cache or edge servers to receive such a request from a user of one of the Walmart ’213 Services to watch a hosted video);

b. Walmart directs and/or controls Akamai, at least via its contract with Akamai and/or its configuration and customization of Akamai’s CDN, to allocate a buffer at one of said plurality of HSs to cache at least a portion of said requested SM object (such as by directing and/or controlling Akamai to allocate a local buffer to store portions of the stream as HLS or MPEG-DASH segments at the Akamai cache or edge servers);

c. Walmart directs and/or controls Akamai, at least via its contract with Akamai and/or its configuration and customization of Akamai’s CDN, to download said portion of said requested SM object to said requesting client, while concurrently retrieving a remaining portion of said requested SM object from one of another HS and said content server (such as by directing and/or controlling Akamai to cause the Akamai cache or edge server to pre-fetch the next segment of video content by requesting the next HLS or MPEG-DASH segments in the stream from the datacenter cache, and/or by directing and/or controlling Akamai to cause the Akamai

cache or edge server to be capable of receiving a byte range request in order to download a segment of a requested video stream to a client while concurrently downloading the next segments from another server); and

d. Walmart directs and/or controls Akamai, at least via its contract with Akamai and/or its configuration and customization of Akamai's CDN and/or its provision of content encoded at multiple bitrates, to adjust a data transfer rate at said one of said plurality of HSs for transferring data from said one of said plurality of helper servers to said one of said plurality of clients (such as by directing and/or controlling Akamai to provide alternate segments encoded at different data rates to the client to accommodate the current network conditions (e.g., the client's current bandwidth), such that providing the requested alternate segment results in an adjusted data rate).

138. As a further example, Walmart also has directly infringed, and continues to directly infringe, one or more claims of the '213 patent (including at least claim 16) under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, at least by directing and/or controlling Limelight to infringe the '213 patent to deliver the Walmart '213 Services. For example, Walmart has directly infringed, and continues to directly infringe, claim 16 of the '213 patent under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, at least by directing and/or controlling Limelight (through at least contracting with Limelight and customizing the Limelight CDN) to infringe claim 16 by using a method of reducing latency in a network having a content server which hosts SM objects (such as videos) which comprise a plurality of time-ordered segments (such as HLS or MPEG-DASH segments) for distribution over said network through a plurality of HSs (such as Limelight cache or edge servers) to a plurality of clients (such as users of the Walmart '213 Services). Further:

a. Walmart directs and/or controls Limelight, at least via its contract with Limelight and/or its configuration and customization of Limelight's CDN, to receive a request for an SM object from one of said plurality of clients (such as a user of one of the Walmart '213 Services requesting to watch a hosted video) at one of said plurality of helper servers (such as by directing and/or controlling one of the Limelight cache or edge servers to receive such a request from a user of one of the Walmart '213 Services to watch a hosted video);

b. Walmart directs and/or controls Limelight, at least via its contract with Limelight and/or its configuration and customization of Limelight's CDN, to allocate a buffer at one of said plurality of HSs to cache at least a portion of said requested SM object (such as by directing and/or controlling Limelight to allocate a local buffer to store portions of the stream as HLS or MPEG-DASH segments at the Limelight cache or edge servers);

c. Walmart directs and/or controls Limelight, at least via its contract with Limelight and/or its configuration and customization of Limelight's CDN, to download said portion of said requested SM object to said requesting client, while concurrently retrieving a remaining portion of said requested SM object from one of another HS and said content server (such as by directing and/or controlling Limelight to cause the Limelight cache or edge server to pre-fetch the next segment of video content by requesting the next HLS or MPEG-DASH segments in the stream from the datacenter cache, and/or by directing and/or controlling Limelight to cause the Limelight cache or edge server to be capable of receiving a byte range request in order to download a segment of a requested video stream to a client while concurrently downloading the next segments from another server); and

d. Walmart directs and/or controls Limelight, at least via its contract with Limelight and/or its configuration and customization of Limelight's CDN and/or its provision of

content encoded at multiple bitrates, to adjust a data transfer rate at said one of said plurality of HSs for transferring data from said one of said plurality of helper servers to said one of said plurality of clients (such as by directing and/or controlling Limelight to provide alternate segments encoded at different data rates to the client to accommodate the current network conditions (e.g., the client's current bandwidth), such that providing the requested alternate segment results in an adjusted data rate).

139. In addition or in the alternative, Walmart has induced infringement, and continues to induce infringement, of one or more claims of the '213 patent under 35 U.S.C. § 271(b), literally and/or under the doctrine of equivalents. Walmart has actively, knowingly, and intentionally induced (and continues to induce) infringement of the '213 patent by making, using, offering for sale, selling, supplying, maintaining, and/or supporting the Walmart '213 Services; by contracting with the CDNs and customizing the CDNs with the specific intent to cause the CDNs to perform the steps claimed in the '213 patent to deliver video data, including the Walmart '213 Services, to Walmart's users, and with the knowledge that such actions infringe the '213 patent.

140. For example, at least through repeated correspondence from Sound View, Walmart knows that at least Akamai and Limelight perform the claimed methods of the '213 patent to deliver the Walmart '213 Services, and Walmart induces the infringement of each of those CDNs. (See Exhibit G, incorporated herein by reference.) Moreover, Walmart specifically intends that infringement, at least by continuing to contract with and utilize the Akamai and Limelight CDNs to offer the Walmart '213 Services; configuring the Akamai and Limelight CDNs to perform the claimed methods of the '213 patent; and by encouraging and facilitating their infringement through the use of the Walmart '213 Services by Walmart's users and/or the creation and dissemination of documentation related to the Walmart '213 Services, including by, for example, encouraging and

instructing its agents and contractors, such as Akamai and Limelight, to provide video to Walmart's users through the Walmart '213 Services, causing the performance of the claimed methods with the knowledge that such actions infringe the '213 patent.

141. For example, Walmart intends for and induces Akamai to infringe claim 16 to deliver the Walmart '213 Services by using a method of reducing latency in a network having a content server which hosts SM objects (such as videos) which comprise a plurality of time-ordered segments (such as HLS or MPEG-DASH segments) for distribution over said network through a plurality of HSs (such as Akamai cache or edge servers) to a plurality of clients (such as users of the Walmart '213 Services). Walmart further intends for and induces Akamai to:

a. receive a request for an SM object from one of said plurality of clients (such as a user of one of the Walmart '213 Services requesting to watch a hosted video) at one of said plurality of helper servers (such as one of the Akamai cache or edge servers, with knowledge that Akamai's cache or edge servers will receive such a request from a user of one of the Walmart '213 Services to watch a hosted video);

b. allocate a buffer at one of said plurality of HSs to cache at least a portion of said requested SM object (such as by inducing Akamai to allocate a local buffer to store portions of the stream as HLS or MPEG-DASH segments at the Akamai cache or edge servers, with knowledge that Akamai's CDN will allocate such a buffer at one of the Akamai cache or edge servers to store portions of the stream as HLS or MPEG-DASH segments);

c. download said portion of said requested SM object to said requesting client, while concurrently retrieving a remaining portion of said requested SM object from one of another HS and said content server (such as the Akamai cache or edge server pre-fetching the next segment of video content by requesting the next HLS or MPEG-DASH segments in the stream from the

datacenter cache, with knowledge that Akamai's cache or edge servers will pre-fetch the next segment of video by requesting the next HLS or MPEG-DASH segment in the stream from the datacenter cache, and/or the Akamai cache or edge server receiving a byte range request in order to download a segment of a requested video stream to a client while concurrently downloading the next segments from another server); and

d. adjust a data transfer rate at said one of said plurality of HSs for transferring data from said one of said plurality of helper servers to said one of said plurality of clients (such as providing alternate segments encoded at different data rates to the client to accommodate the current network conditions (e.g., the client's current bandwidth), and then providing the requested alternate segment resulting in an adjusted data rate, with knowledge that the Akamai CDN will provide alternate segments encoded at different data rates to the client).

142. As a further example, Walmart intends for and induces Limelight to infringe claim 16 to deliver the Walmart '213 Services by using a method of reducing latency in a network having a content server which hosts SM objects (such as videos) which comprise a plurality of time-ordered segments (such as HLS or MPEG-DASH segments) for distribution over said network through a plurality of HSs (such as Limelight cache or edge servers) to a plurality of clients (such as users of the Walmart '213 Services). Walmart further intends for and induces Limelight to:

a. receive a request for an SM object from one of said plurality of clients (such as a user of one of the Walmart '213 Services requesting to watch a hosted video) at one of said plurality of helper servers (such as one of the Limelight cache or edge servers, with knowledge that Limelight's cache or edge servers will receive such a request from a user of one of the Walmart '213 Services to watch a hosted video);

b. allocate a buffer at one of said plurality of HSs to cache at least a portion of said requested SM object (such as by inducing Limelight to allocate a local buffer to store portions of the stream as HLS or MPEG-DASH segments at the Limelight cache or edge servers, with knowledge that Limelight's CDN will allocate such a buffer at one of the Limelight cache or edge servers to store portions of the stream as HLS or MPEG-DASH segments);

c. download said portion of said requested SM object to said requesting client, while concurrently retrieving a remaining portion of said requested SM object from one of another HS and said content server (such as the Limelight cache or edge server pre-fetching the next segment of video content by requesting the next HLS or MPEG-DASH segments in the stream from the datacenter cache, with knowledge that Limelight's cache or edge servers will pre-fetch the next segment of video by requesting the next HLS or MPEG-DASH segment in the stream from the datacenter cache, and/or the Limelight cache or edge server receiving a byte range request in order to download a segment of a requested video stream to a client while concurrently downloading the next segments from another server); and

d. adjust a data transfer rate at said one of said plurality of HSs for transferring data from said one of said plurality of helper servers to said one of said plurality of clients (such as providing alternate segments encoded at different data rates to the client to accommodate the current network conditions (e.g., the client's current bandwidth), and then providing the requested alternate segment resulting in an adjusted data rate, with knowledge that the Limelight CDN will provide alternate segments encoded at different data rates to the client)

143. Sound View has been and continues to be damaged by Walmart's infringement of the '213 patent and is entitled to recover from Walmart the damages sustained by Sound View as a result of Walmart's wrongful acts in an amount adequate to compensate Sound View for

Walmart's infringement subject to proof at trial.

144. In committing these acts of infringement, Walmart committed egregious misconduct including, for example, acting despite knowing that its actions constituted infringement of a valid patent, or recklessly disregarding the fact that its actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

145. Walmart's infringement of the '213 patent was and is deliberate and willful, entitling Sound View to increased damages under 35 U.S.C. § 284 and to attorney fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

COUNT FIVE
INFRINGEMENT OF THE '456 PATENT

146. Sound View incorporates by reference the preceding paragraphs as if fully set forth herein.

147. The '456 patent is valid and enforceable.

148. Walmart has used software known as Apache Hadoop YARN ("Yarn") in its data systems. For example, Walmart's use of Yarn has been openly advertised by Walmart and its employees, and includes, without limitation, usage on the Big Fast Data team at Walmart Labs (the "Walmart Yarn Services").

149. Yarn is the architectural center of Hadoop that allows multiple data processing engines such as interactive SQL, real-time streaming, data science and batch processing to handle data stored in a single platform. Yarn provides resource management and a central platform to deliver consistent operations, security, and data governance tools across Hadoop clusters.

150. The fundamental idea of Yarn is to split up the functionalities of resource management and job scheduling into separate daemons, by having a global ResourceManager ("RM") and per-application ApplicationMaster ("AM"). The RM is the ultimate authority that

arbitrates resources among all the applications in the system. The per-application AM is, in effect, a framework specific library and is tasked with negotiating resources from the RM and working with the NodeManager(s) to execute and monitor the tasks. Yarn provides the ability to preempt certain applications in order to make room for other more time-sensitive or higher priority applications.

151. Within Yarn, the fundamental unit of scheduling is a queue. The capacity of each queue specifies the percentage of cluster resources that are available for applications submitted to the queue. Yarn uses a hierarchy of queues wherein each leaf (child) queue is tied to a single parent queue. Parent queues contain more parent queues or leaf queues but do not themselves accept any application submissions directly. Child queues live under a parent queue and accept applications.

152. A user may launch an application on Yarn using the YarnClient and ContainerLaunchContext APIs. New clients define all the information needed by the RM to launch the AM, which includes the application id, name, queue, and priority information. ContainerLaunchContext is used to define the container in which the AM will be launched and run. It defines all required information needed to run the application, including resources and environmental settings. ContainerLaunchContext includes resource requirements such as memory and vCores. Moreover, helper APIs convert values obtained from the environment into objects.

153. Additionally, Yarn's Cluster Reservation Submit API can be used to submit reservations. When the reservation is made, the user can use the reservation-id used to submit the reservation to get access to the resources by specifying it as part of Cluster Submit Applications API. The Cluster Submit Applications Object includes a resource object, which includes memory and vCore requirements for each container.

154. Yarn's RM includes a Fair Scheduler and Capacity Scheduler, which allow assigning guaranteed minimum shares to queues. When an API submits a reservation, it is validated by the RM, which returns a reservation ID and creates reservable queues. RM's schedulers then provide containers, giving a user guaranteed access to the required resources, as identified by objects, in accordance with capacity and fairness sharing protocols.

155. Yarn's Fair Scheduler and Capacity Scheduler guarantee minimum resource reservations, e.g., memory and/or vCores, to queues. If a queue's minimum share is not satisfied, it will be offered available resources before any other queue under the same parent. Fair Scheduler uses hierarchical queues, such that queues are sibling queues when they have the same parent. Associated with each queue is a weight, which determines the amount of resources a queue deserves in relation to its sibling queues. This amount is known as Steady FairShare, which is calculated at the queue level. For the root queue, the Steady FairShare is equal to all the cluster's resources. The Steady FairShare is calculated such that the minimum amount of resources associated with the parent queue is at least equal to the sum of the minimum resources associated with each of the parent's children.

156. Walmart infringes and has infringed one or more claims of the '456 patent under 35 U.S.C. § 271(a), literally and/or under the doctrine of equivalents, by making, using, selling, and/or offering for sale in the United States, and/or importing into the United States, products and/or methods encompassed by those claims, including for example, by making, using, selling, offering for sale, and/or importing systems and platforms that include or use the Walmart Yarn Services.

157. On April 5, 2019, Sound View informed Walmart that its systems and applications infringe the '456 patent. However, Walmart did not stop infringing.

158. For example, Walmart infringes at least claim 13 by using a method of ensuring a particular quality of service for an application in a computer system, the method comprising the steps of:

a. utilizing an application programming interface of an operating system to establish one or more quality of service guarantees that correspond to a reference to an object (such as the YarnClient, ContainerLaunchContext, and/or Cluster Reservation Submit APIs) ; and

b. providing a particular quality of service to a request in accordance with the one or more quality of service guarantees that correspond to one or more object references used in the request (such as through use of Yarn's Fair Scheduler and/or Capacity Scheduler); and

c. wherein the quality of service guarantees comprise resource reservations, each specifying a portion of a resource set aside for exclusive use by one or more processes (such as memory, vCores, and/or queues); and

d. wherein the resource reservations are organized hierarchically such that each resource reservation r may have at most one parent and one or more siblings and children, and associated with r is a weight that specifies how r shares the resources of r 's parent with r 's siblings (such as the hierarchical queues used by Yarn's Fair Scheduler and Capacity Scheduler); and

e. wherein associated with each resource reservation r is a minimum amount of resources that r receives from its parent p , such that the minimum amount of resources associated with p is at least equal to the sum of the minimum amount of resources associated with each of p 's children (such as the Steady FairShare of resources).

159. Sound View has been damaged by Walmart's infringement of the '456 patent and is entitled to recover from Walmart the damages sustained by Sound View as a result of Walmart's

wrongful acts in an amount adequate to compensate Sound View for Walmart's infringement subject to proof at trial.

160. In committing these acts of infringement, Walmart committed egregious misconduct including, for example, acting despite knowing that its actions constituted infringement of a valid patent, or recklessly disregarding the fact that its actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

161. Walmart's infringement of the '456 patent was and is deliberate and willful, entitling Sound View to increased damages under 35 U.S.C. § 284 and to attorney fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

RELIEF REQUESTED

Wherefore, Sound View respectfully requests that this Court enter judgment against Walmart as follows:

- a) that Walmart has infringed each of the Patents-in-Suit;
- b) that Walmart's infringement of the '715, '133, '213, and '456 patents is and/or has been willful;
- c) that Sound View be awarded damages in accordance with 35 U.S.C. § 284, including treble damages and, if necessary to adequately compensate Sound View for Walmart's infringement, an accounting;
- d) that this case is exceptional under 35 U.S.C. § 285;
- e) that Sound View be awarded the attorney's fees, costs, and expenses that it incurs in prosecuting this action; and
- f) that Sound View be awarded further relief at law or in equity as the Court deems just and proper.

DEMAND FOR JURY TRIAL

Sound View demands a trial by jury on all claims and issues so triable.

Dated: April 9, 2019

By: /s/ John C. Phillips, Jr.

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