

PERFORMANCE MONITORING IN A DISTRIBUTED STORAGE SYSTEM

BACKGROUND

[0001] This specification generally relates to monitoring performance in a distributed storage system.

[0002] In distributed systems, various performance metrics may be tracked to determine the overall health of the system. For example, the amount of time it takes the system to respond to a client request (i.e., latency) may be monitored to ensure the system is responding in a timely manner.

SUMMARY

[0003] In general, one aspect of the subject matter described in this specification may be embodied in systems, and methods performed by data processing apparatuses that include

- identifying requests sent by clients to the distributed storage system, each request including request parameter values for request parameters including a request target;

- generating probe requests based on the identified requests, the probe requests including probe request parameter values for probe request parameter values, representing a statistical sample of the request parameters included in the identified requests;

- sending the generated probe requests to the distributed storage system over a network with an indication that the probe requests are not sent by a client, wherein the distributed storage system is configured to:

 - in response to receiving the probe requests, perform preparations for servicing each probe request that would also be performed for servicing a corresponding request that is received from a client, and

 - based on the indications that the probe requests are not sent by a client, instead of accessing data indicated by the request target, accessing data specifically allocated for a prober;

receiving responses to the probe requests from the distributed storage system; and

outputting at least one performance metric value measuring a current performance state of the distributed storage system based on the received responses.

[0004] Details of one or more implementations of the subject matter described in this specification are set forth in the accompanying drawings and the description below. Other features, aspects, and potential advantages of the subject matter will become apparent from the description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a diagram of an example environment for monitoring performance in a distributed storage system.

[0006] FIG. 2 is a swim lane diagram of an example process for processing a client request in a distributed storage system.

CLAIMS

What is claimed is:

1. A computer-implemented method executed by one or more processors for measuring performance metrics in a distributed storage system, the method comprising:

identifying requests sent by clients to the distributed storage system, each request including request parameter values for request parameters including a request target;

generating probe requests based on the identified requests, the probe requests including probe request parameter values for probe request parameter values, representing a statistical sample of the request parameters included in the identified requests;

sending the generated probe requests to the distributed storage system over a network with an indication that the probe requests are not sent by a client,

wherein the distributed storage system is configured to:

in response to receiving the probe requests, perform preparations for servicing each probe request that would also be performed for servicing a corresponding request that is received from a client, and

based on the indications that the probe requests are not sent by a client, instead of accessing data indicated by the request target, accessing data specifically allocated for a prober;

receiving responses to the probe requests from the distributed storage system; and

outputting at least one performance metric value measuring a current performance state of the distributed storage system based on the received responses.

2. The method of claim 1, wherein generating the probe requests includes generating a number of probe requests less than the number of identified requests.

3. The method of claim 1, wherein the request parameters include a request type, concurrency parameters, and a request target indicating data within the distributed storage system to which the request pertains.

4. The method of claim 3, wherein generating the probe requests includes generating a number of probe requests including a particular request type, particular concurrency parameters, and a particular request target that is proportional to a number of identified requests including the particular request type, the particular concurrency parameters, and the particular request target.
5. The method of claim 3, wherein outputting the at least one performance metric includes outputting a weighted average of the at least one performance metric for a particular data group of the distributed storage system based on responses to probe requests including request targets identifying data in the particular data group.
6. The method of claim 1, wherein the at least one performance metric includes at least one of: availability, disk latency, queue latency, request preparation latency, or internal network latency.
7. The method of claim 1, wherein the distributed storage system is configured not to read or write any data accessible to the clients when performing the preparations for servicing each probe request in response to receiving the probe request.
8. The method of claim 7, wherein the data in the distributed storage system includes a probe field that is not accessible to the clients, and wherein the distributed storage system is configured to access the probe field associated with a request target in a probe request in response receiving the probe request.
9. The method of claim 1, further comprising comparing the at least one performance metric to a service level objective (SLO) including a target value for the at least one performance metric for the distributed storage system.
10. The method of claim 9, further comprising:
 - determining that the at least one performance metric does not meet the target value; and
 - outputting an indication that the at least one performance metric does not meet the target value.

11. The method of claim 9, wherein the service level objective is included within a service level agreement (SLA) for the distributed storage system.

12. The method of claim 1, wherein the probe requests are a statistical representation of the identified requests.

13. A non-transitory, computer-readable medium storing instructions operable when executed to cause at least one processor to perform operations for measuring performance metrics in a distributed storage system, the operations comprising:

- identifying requests sent by clients to the distributed storage system, each request including request parameter values for request parameters including a request target;

- generating probe requests based on the identified requests, the probe requests including probe request parameter values for probe request parameter values, representing a statistical sample of the request parameters included in the identified requests;

- sending the generated probe requests to the distributed storage system over a network with an indication that the probe requests are not sent by a client,

- wherein the distributed storage system is configured to:

- in response to receiving the probe requests, perform preparations for servicing each probe request that would also be performed for servicing a corresponding request that is received from a client , and

- based on the indications that the probe requests are not sent by a client, instead of accessing data indicated by the request target, accessing data specifically allocated for a prober;

- receiving responses to the probe requests from the distributed storage system; and

- outputting at least one performance metric value measuring a current performance state of the distributed storage system based on the received responses.

14. The computer-readable medium of claim 13, wherein generating the probe requests includes generating a number of probe requests less than the number of identified requests.

15. The computer-readable medium of claim 13, wherein the request parameters include a request type, concurrency parameters, and a request target indicating data within the distributed storage system to which the request pertains.

16. The computer-readable medium of claim 15, wherein generating the probe requests includes generating a number of probe requests including a particular request type, particular concurrency parameters, and a particular request target that is proportional to a number of identified requests including the particular request type, the particular concurrency parameters, and the particular request target.

17. The computer-readable medium of claim 15, wherein outputting the at least one performance metric includes outputting a weighted average of the at least one performance metric for a particular data group of the distributed storage system based on responses to probe requests including request targets identifying data in the particular data group.

18. A system for measuring performance metrics in a distributed storage system comprising:

memory for storing data; and

one or more processors operable to access the memory and perform operations comprising:

identifying requests sent by clients to the distributed storage system, each request including request parameter values for request parameters including a request target;

generating probe requests based on the identified requests, the probe requests including probe request parameter values for probe request parameter values, representing a statistical sample of the request parameters included in the identified requests;

sending the generated probe requests to the distributed storage system over a network with an indication that the probe requests are not sent by a client,

wherein the distributed storage system is configured to:

in response to receiving the probe requests, perform preparations for servicing each probe request that would also be performed for servicing a corresponding request that is received from a client , and

based on the indications that the probe requests are not sent by a client, instead of accessing data indicated by the request target, accessing data specifically allocated for a prober;

receiving responses to the probe requests from the distributed storage system; and
outputting at least one performance metric value measuring a current performance
state of the distributed storage system based on the received responses.

19. The method of claim 1, wherein perform preparations for servicing each probe request that
would also be performed for servicing a corresponding request that both includes the probe request
target as a request target and is received from a client comprises:

perform:

parsing, by the distributed storage system, the probe request;

determining, by the distributed storage system, a particular server that stores the data
corresponding to the probe request;

sending, by the distributed storage system, the probe request to the particular server;

and

generating, by the distributed storage system, an execution plan for the probe request.