End to End tracing in Ceph

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Problem

Ceph, an open-source distributed storage service has an Blkin tracing today. It is not continuously enabled and is fairly rudimentary (it does not capture concurrency, synchronization, or allow critical paths to be extracted), there is need to implement an “always-on,” sophisticated end-to-end tracing system within it.

Ceph Schema

What is Ceph?

#1 Ceph is an open source high performance distributed software storage platform.

#2 Ceph implements Object storage on a single distributed computer cluster and also provides interfaces for object, block and file level storage.

#3 A Ceph storage cluster requires at least one Ceph Monitor, Ceph Manager and Ceph OSD(Object Storage Device)

Solution

This project wishes to enable end-to-end tracing, from the request issue time till the time that is completed.

End-to-end tracing captures the detailed workflow of an activity within and among the components of a distributed system. For example, for a request-based distributed service, each individual trace would show the work done within and among the service's components to process a request

Currently, to generate traces using Blkin, we have an offline approach, we cannot get traces when we stop the session, we cannot get traces because we process it. This default tracing tool for ceph is considered as a naive one and is going to be replaced by Jaeger.

The effort is to better study the anomaly, steady-state problem, distributed profiling, and resource attribute within the system.

With this project, we plan to introduce Jaeger as a strong and open source tracing infrastructure for enabling end to end tracing and replace Blkin with Jaeger.

Blkin Tracing System

- Blkin is a library which follows the tracing semantics of Google’s Dapper.
- It allows us to trace applications using LTTng, an open source tracing framework for Linux.
- The major drawbacks of Blkin is its offline tracing (i.e. for tracing Ceph using Blkin, it should be started and then stopped and traces are collected for that specific time slot).
- Of course this way is not appropriate for one system (like Ceph) that is always running.
- In addition, Blkin is specified for Ceph, there is no specific open source community to work on it independently and improve it.
- So the solution can be replacing Blkin with other efficient and open source tracing tool like Jaeger.

Jaeger , Uber’s tracing Infrastructure

Open source software released by Uber Technologies.
Supported by an open source community and improved continuously.

It is a distributed tracing system inspired by Google’s Dapper and OpenZipKin.

It captures traces, processes them and finally visualizes them. It has its own interface for the same

On each node of the cloud, Jaegers agents should be installed and tracing point of the user application should be in Jaegers Syntax.

Team Formation

- Project Allocation
- Project Team Formation
- Project Scope and proposal

Release 1

01

Environment Setup

- Set the environment
- Deploy Ceph

Release 2

02

Traces using Blkin

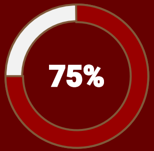
- Understanding architecture of Blkin and Ceph
- Showing traces using Blkin

Release 3

03

Blkin Traces

- Understanding and learning about Jaeger and try to replace Blkin with it

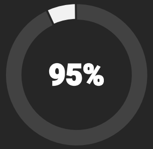


Release 4

04

Jaeger

- Capturing traces using Jaeger



Release 5

05

Final Demonstration

- System Integration
- Project Progress Review
- Final Presentation
- User documentation

Release 6

06

User Stories

TAIGA

Sprint 1

- As a product owner, I would like to compile a detailed and coherent project proposal so that, the stakeholders of the project have a clear understanding of our end goal and workflow.
- As an audience or stakeholder of the End to end tracing project in Ceph, I should have a clear understanding of the problem being addressed and the solution approach so that I understand the project
- As a product owner, I need to learn about Jaeger tracing tools so that I can add right information to the project proposal and learn how to use this system

Sprint 2

- As a product owner I should set up the environment on our machines collectively in a team so that we have a collective and better understanding of the tools
- As a product owner, I should learn to deploy Ceph on the environment, so that I can further collect traces using ceph and go on to understanding the existing tracing infrastructure
- As a product owner, I should compile a project presentation, so that the audience and stakeholders have a good understanding of the progress and workflow of our team

References

[1] B. H. Sigelman, L. A. Barroso, M. Burrows, P. Stephenson, M. Plakal, D. Beaver, S. Jaspan, and C. Shanbhag, “Dapper, a large-scale distributed sys-tems tracing infrastructure,” Google, Inc., Tech. Rep., 2010. [Online]. Available: https://research.google.com/archive/papers/dapper-2010-1.pdf

[2] Red Hat, Inc. (2017) Ceph homepage. [Online]. Available: https://ceph.com

[3] ——. (2016) Intro to Ceph Ceph Documentation. [Online]. Available: http://docs.ceph.com/docs/master/start/intro/

[4] Sage A. Weil, et al., “Ceph: a scalable, high-performance distributed file system,” OSDI 06 Proceedings of the 7th symposium on Operating systems design and implementation, 2006.

[5] Raja R. Sambasivan, et al., “So, you want to trace your distributed system? Key design insights from years of practical experience,” Carnegie Mellon University Parallel Data Lab Technical Report CMU-PDL-14-102, April, 2014.

[6] Red Hat, Inc. (2016) Tracing Ceph With BlkKin Ceph Documentation. [Online]. Available: http://docs.ceph.com/docs/master/dev/blkin/

Thank You!