OSG Xrootd Monitoring

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Introduction

The OSG’s goal is to **retire** the GLED XRootD collector, replacing it with the new OSG collector (python).

And, provide **trust** in the collector’s measurements through a series of verifications.

Introduction

With the objective of providing trust in the XRootD transfer accounting we carried out 2 validations of the pipeline of the monitoring data:

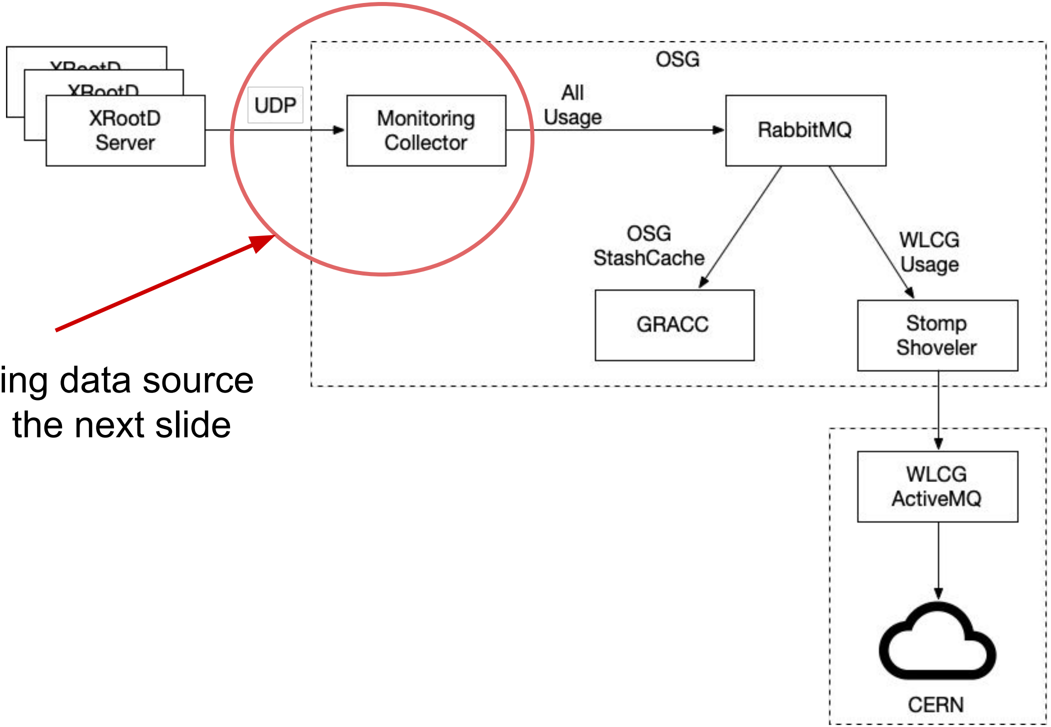
1. **XrootD Monitoring Validation**. Verify the correctness of the components along the pipeline

   https://zenodo.org/record/3981359

2. **XRootD Monitoring Scale Validation**. Find scale related issues

   https://zenodo.org/record/4688624#.YIBS1UhKi3c

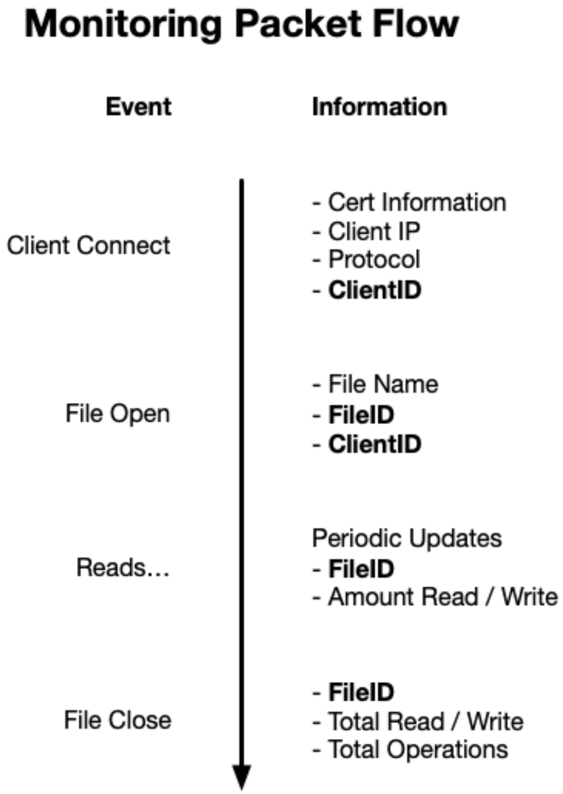
XRootD monitoring data pipeline



Details of monitoring data source and processing in the next slide

Why XRootD Detailed Monitoring is Hard - Format

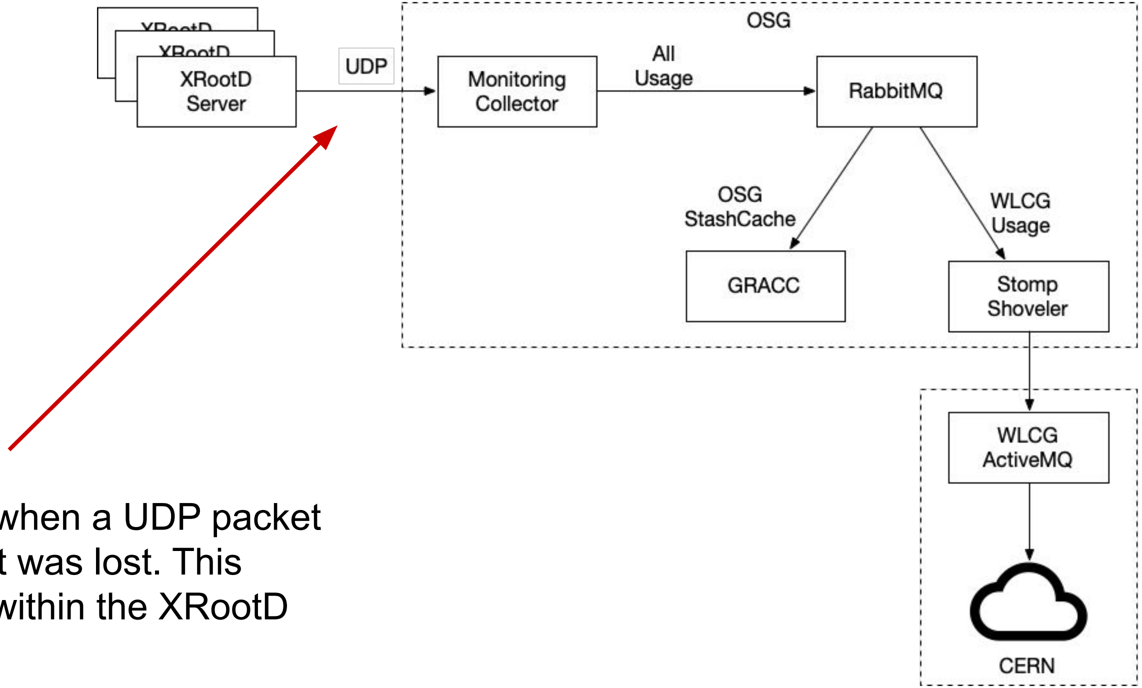
- Collector has to keep a lot of state
- Potential for packet loss means we have to place TTL on state
- Time between client connect and file close can be **hours**
- Must “join” different messages, but may lose packets
- For example, if you get a file close without the corresponding file open, then no idea what file was read.



Monitoring Packet Flow

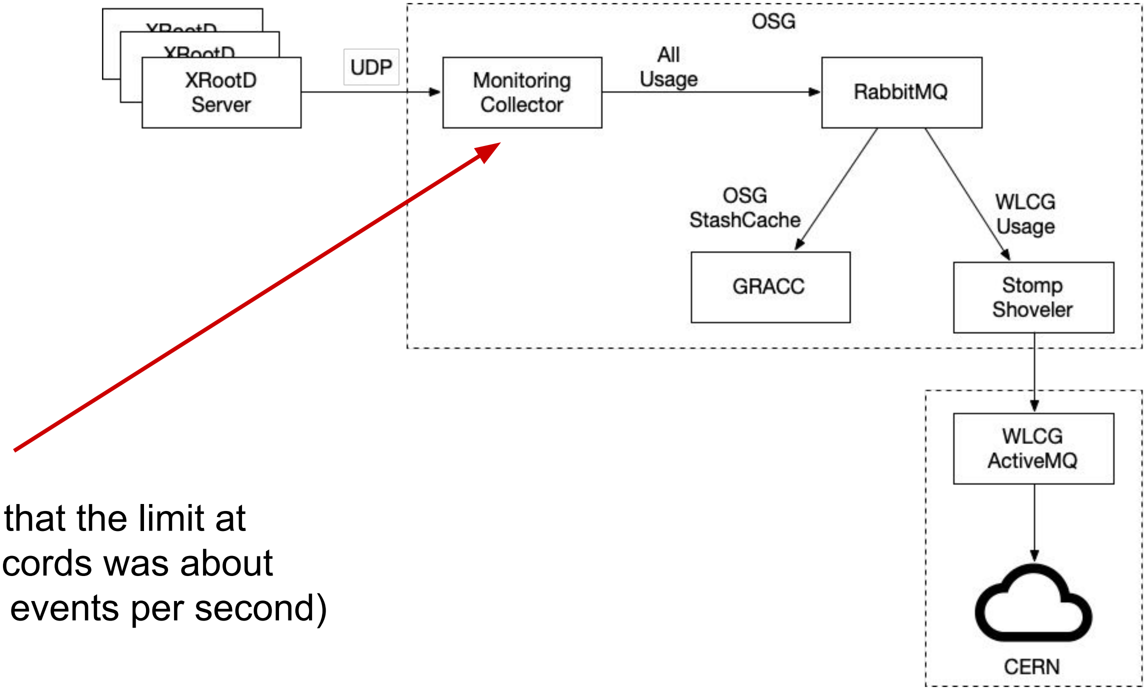
Event	Information
Client Connect	- Cert Information - Client IP - Protocol - **ClientID**
File Open	- File Name - **FileID** - **ClientID**
Reads...	Periodic Updates - **FileID** - Amount Read / Write
File Close	- **FileID** - Total Read / Write - Total Operations

XRootD monitoring data pipeline - first validation



In the first validation, we found that when a UDP packet was larger than the MTU, the packet was lost. This happens when many events occur, within the XRootD server, within a flush window.

XRootD monitoring data pipeline - second validation



On the second validation, we found that the limit at which the collector could process records was about 100 per second, (i.e. 100 *File Close* events per second)

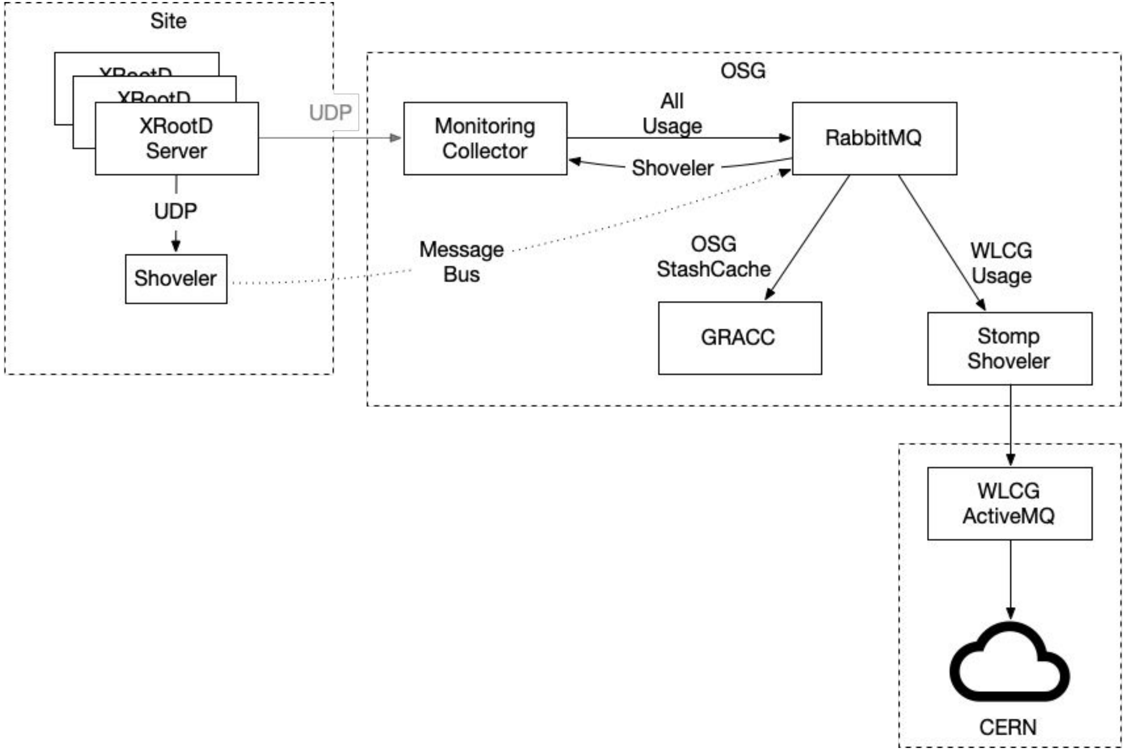
Next steps

- Design and develop a “shoveler” from the UDP format to a resilient transport mechanism (Message Bus)
  - Message bus is preferred since it allows the client and server to be independent
- Redesign the collector to increase the scale
  - State only needs to be kept for a single server.
  - Route messages from servers between processes

- Our goal is to complete these changes by Q3 of this year

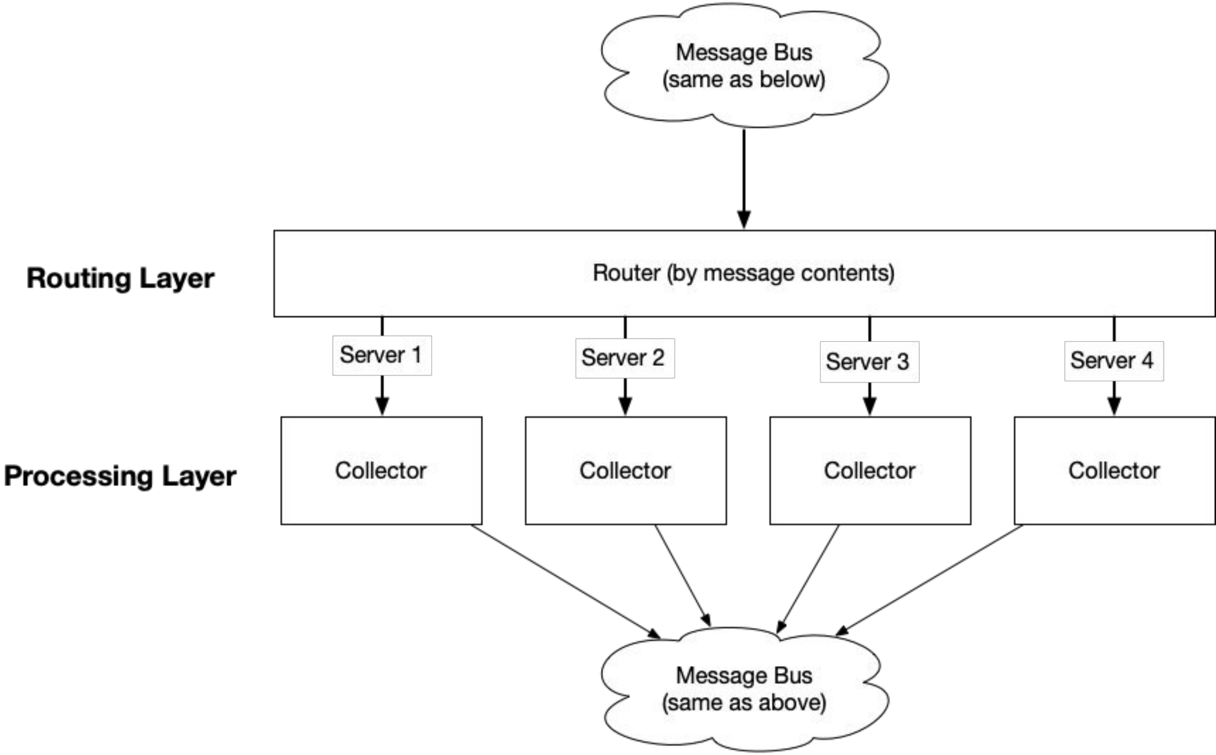
Shoveler

- A lightweight shoveler from UDP to a resilient transfer method
- Connection to RabbitMQ
- Shoveler messages are routed back to the collector for parsing
- Shoveler will use JWT to authenticate to message bus.



Collector Scaling

- Collector scaled by splitting processing
- Each server (or group of servers) has its own collector



Acknowledgments

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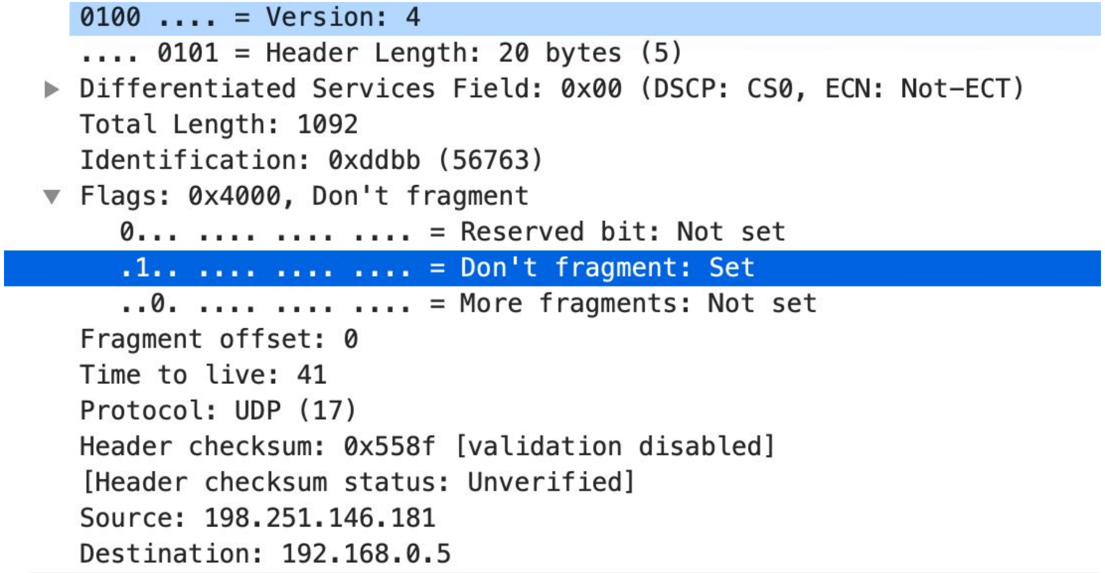
Backup slides

UDP Fragmentation

- UDP Fragmentation is a known problem: https://blog.cloudflare.com/ip-fragmentation-is-broken/
- The very Zoom meeting you are on uses UDP packets:



```
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 1092
  Identification: 0xddbb (56763)
▼ Flags: 0x4000, Don't fragment
    0... .... .... .... = Reserved bit: Not set
    .1.. .... .... .... = Don't fragment: Set
    ..0. .... .... .... = More fragments: Not set
  Fragment offset: 0
  Time to live: 41
  Protocol: UDP (17)
  Header checksum: 0x558f [validation disabled]
  [Header checksum status: Unverified]
  Source: 198.251.146.181
  Destination: 192.168.0.5
```