



Welcome

to the
2nd EOS workshop
CERN, 5th + 6th February 2018



EOS Open Storage

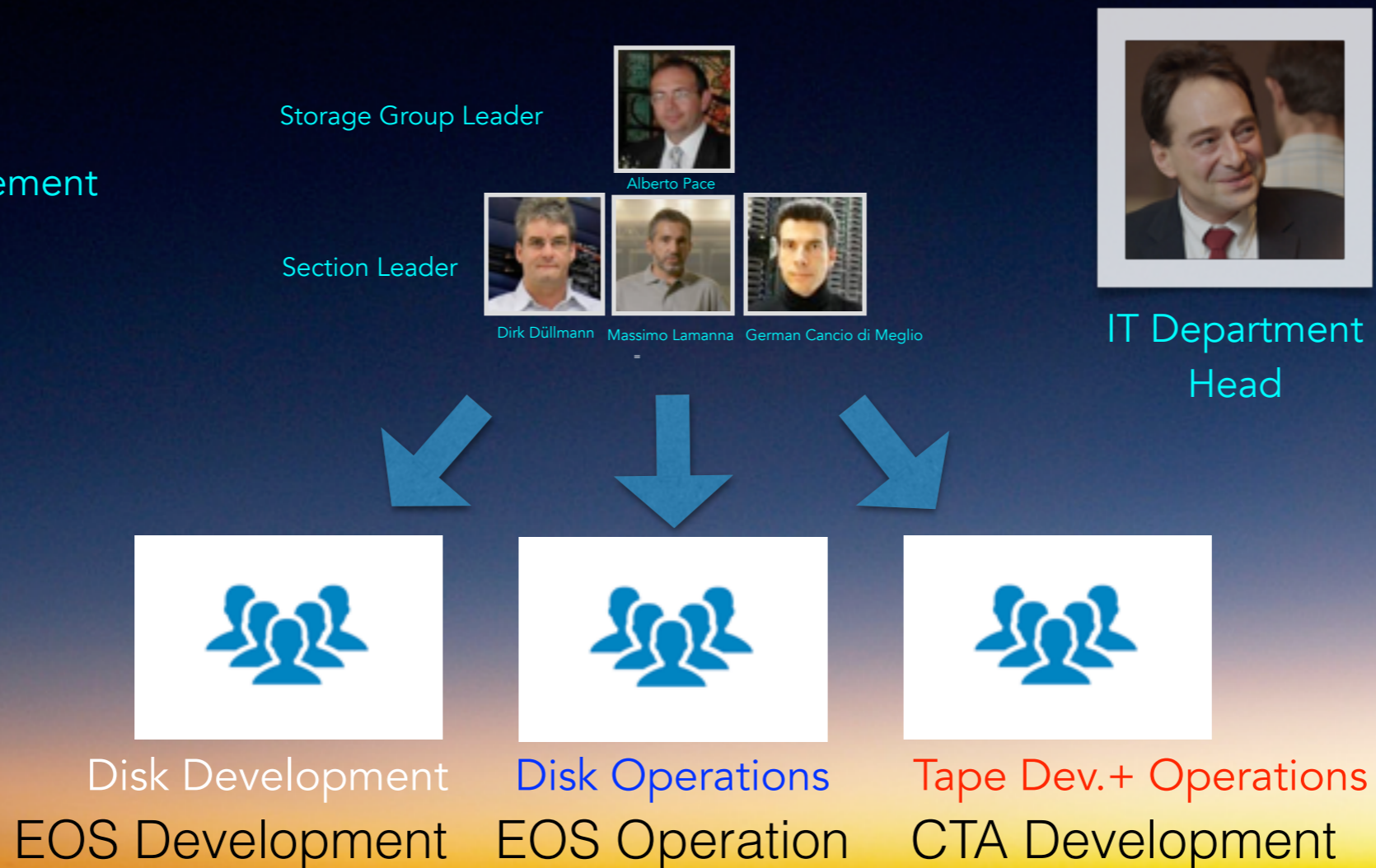
CERN storage technology
used at the Large Hadron Collider (LHC)

Who is here?



EOS is a development project originated at the CERN Storage Group

Storage Group Management



team members from all sections will present during the workshop



EOS benefits from external usage & contributions

Workshop Participants

4 AARNet
1 ASGC TW
1 Accenture AG
36 CERN
3 CESNET
2 CNRS / IN2P3 / IPNL
2 Chinese Academy of Sciences (CN)
3 Comtrade
1 European Commission – Joint Research Centre
2 Fermi National Accelerator Lab. (US)
1 IBM
1 IEPSAS–Kosice
1 IFIN–HH(RO)
1 IHEP
2 JRC
1 Johann–Wolfgang–Goethe Univ. (DE)
5 Joint Institute for Nuclear Research (RU)
1 National Academy of Sciences of Ukraine (UA)
1 Oak Ridge National Laboratory – (US)
1 Petersburg Nuclear Physics Institut (RU)
1 Poznan Supercomputing and Networking Center
1 SPbSU
1 Slovak Academy of Sciences (SK)
1 Technical University of Kosice (SK)
1 Tribhuvan University
1 Universidad de Oviedo (ES)
1 Universidad de los Andes (CO)
1 Università e INFN, Bologna (IT)
1 University of California Irvine (US)
1 University of Washington (US)

80 registered participants
from 30 different institutions



Workshop Location

Acknowledgements

A big thank you to the CERN IT department and our department head allowing us to host a free workshop for two days in the IT auditorium with offered free coffee breaks!

Thanks to all who are helping to make this workshop a success!

Thank you for your participation!

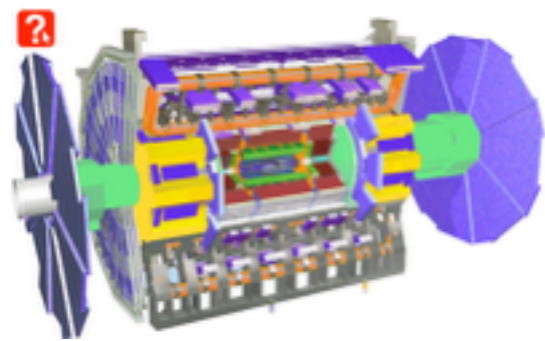


How is it used?

CERN's mainstream use case

tape archive **CASTOR**
CERN Advanced STORAGE manager

LHC Detector



O(GB/s)



5-10 GB/s

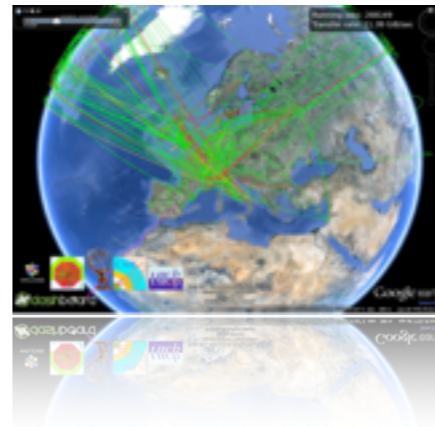
5-10 GB/s

peak 100 GB/s

local batch cluster
O(10⁵ cores)



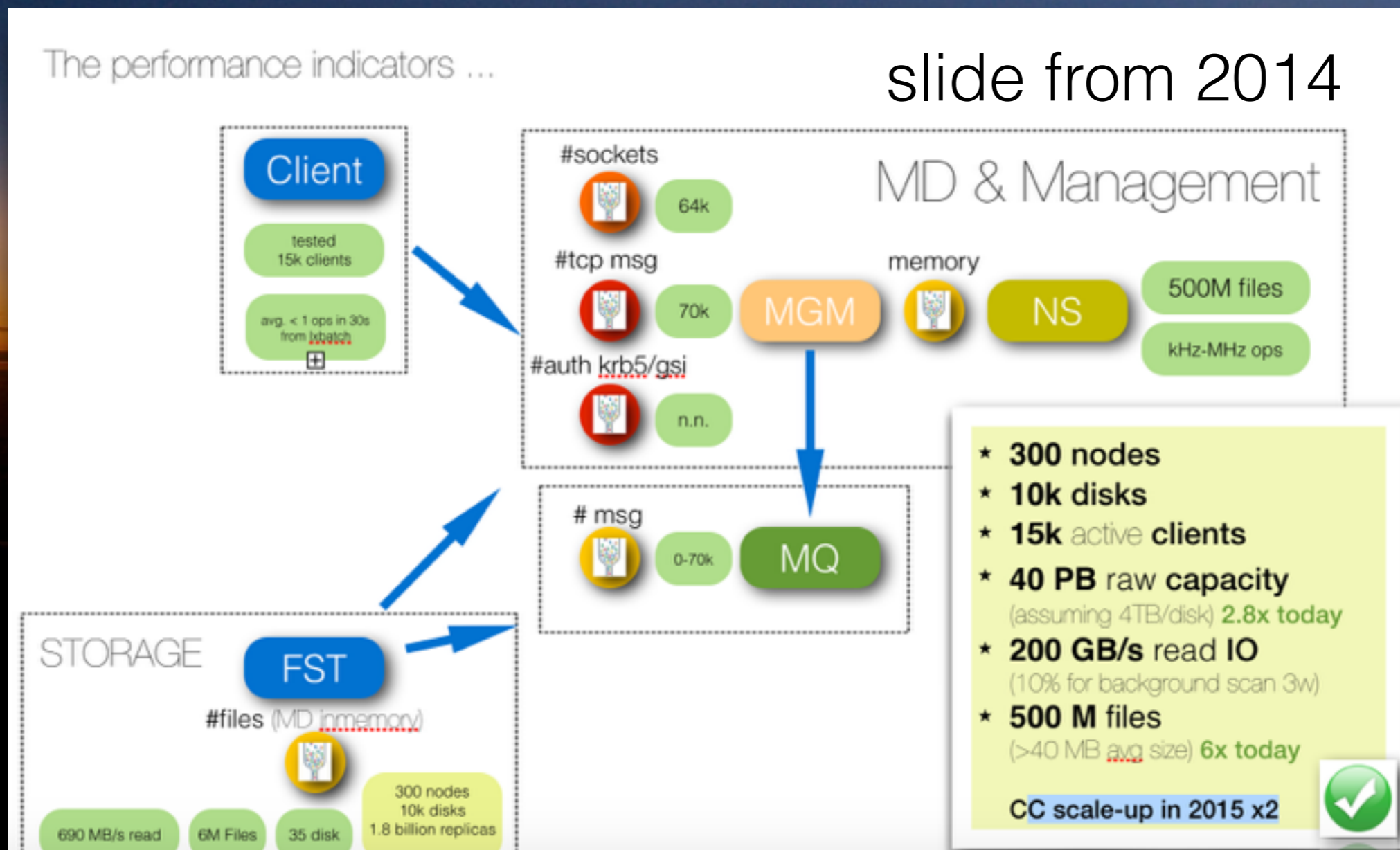
Data Export to Worldwide Computing Grid





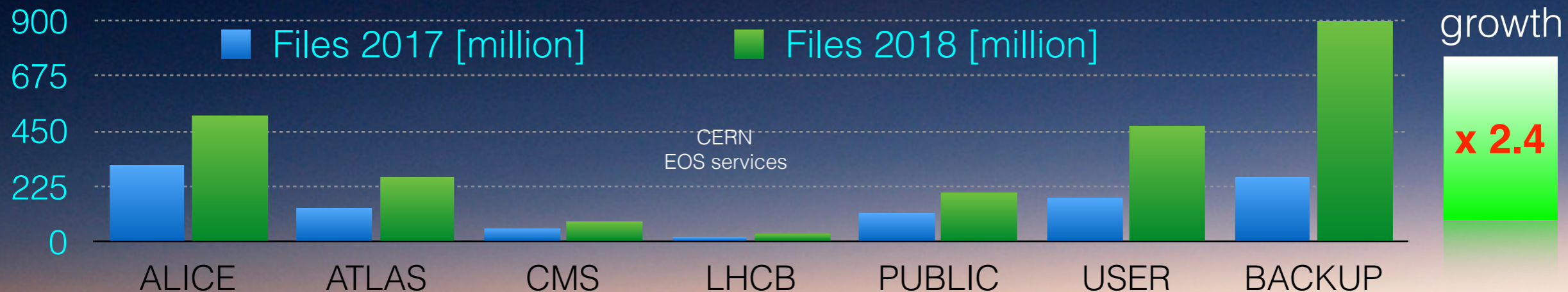
What happened since the last workshop

EOS architecture limits have been hit at CERN



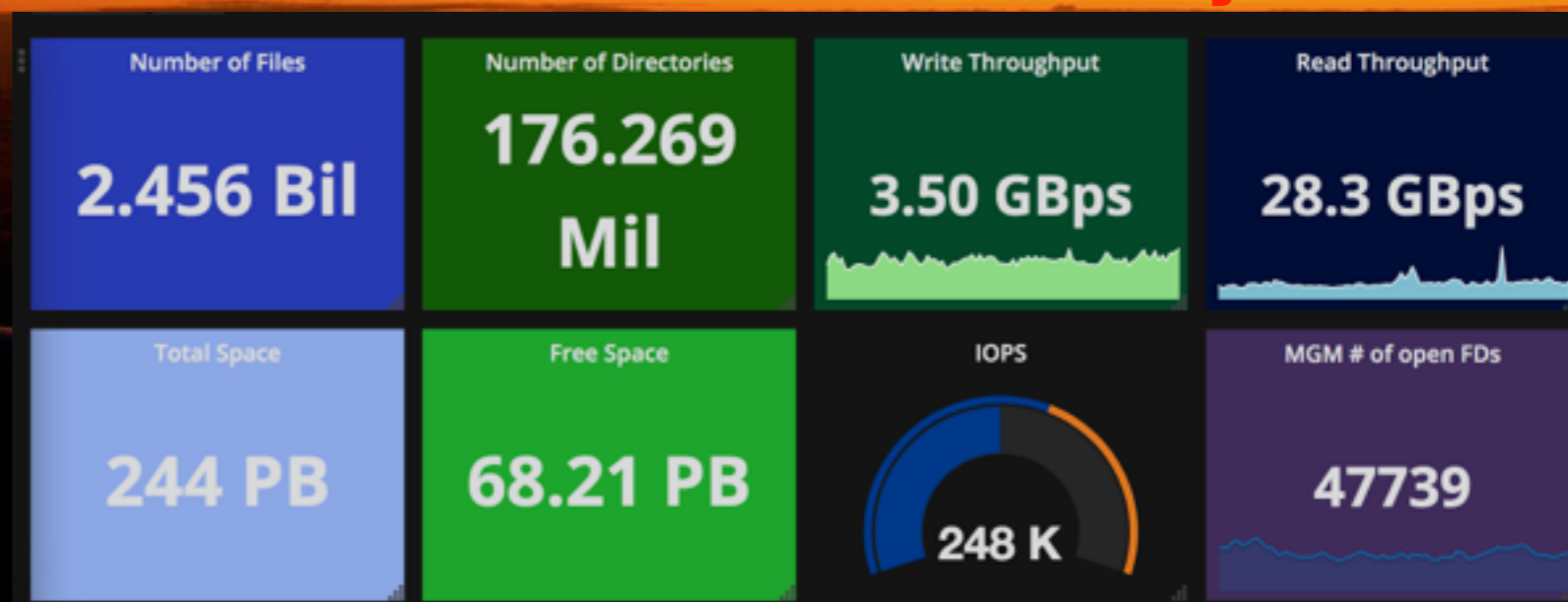


What happened since the last workshop



CERN Service today

In-memory ns reaching limitations





What happened since the last workshop

shown at 2017 workshop

EOS Architectural Evolution

2017



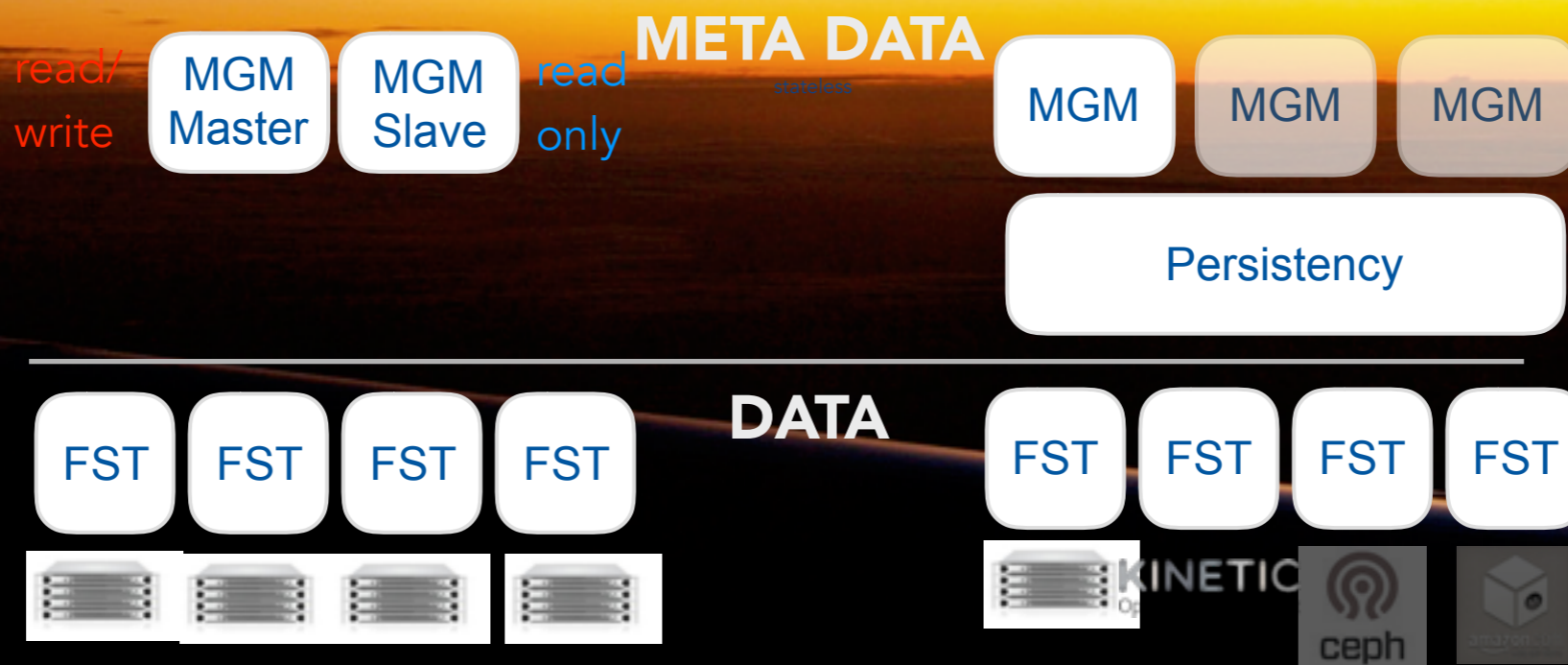
Beryl Aquamarine
V 0.3.268



2018



Citrine
V 4.2.12





What happened since the last workshop

EOS Architectural Evolution



still introduced optimisations in Aquamarine version

- parallel ns boot
- new hash implementation
- failover fixes



2017 transition to CITRINE in production

a lot of new tools added to reduce risk of software updates, however doing many changes reflected in service availability & stability

bugs escape rate



new LOC in release

... there is light at the end of the tunnel ...



... there is light at the end of the tunnel ...

- 7 out of 8 CERN instances are running with CITRINE



... there is light at the end of the tunnel ...

- 7 out of 8 CERN instances are running with CITRINE
- experimenting in pre-production system with > 2 billion files



... there is light at the end of the tunnel ...

- 7 out of 9 CERN instances are running with CITRINE
- experimenting in pre-production system with > 2 billion files

```
EOS Console [root://localhost] |/> ns
# -----
# Namespace Statistics
# -----
ALL      Files          2378942379 [booted] (9s)
ALL      Directories    150365177
# -----
```

```
# -----
VFF      DIL6CfOLT62   J20302J11
VFF      VFF           021000000 0001 /001
```



QuarkDB



2nd EOS workshop

focus is on CITRINE status, developments & use case driven extensions



2nd EOS workshop Agenda

Time	Activity	Location
10:00	Developing EOS & CO: Kickoff Session	
	Developments	
	31-3-004 - IT Amphitheatre, CERN	09:45 - 12:00
12:00	Lunch Break	
	31-3-004 - IT Amphitheatre, CERN	12:00 - 13:45
14:00	Using EOS: Use Cases	
	31-3-004 - IT Amphitheatre, CERN	13:45 - 14:40
	Using EOS: CERN Operations	
	31-3-004 - IT Amphitheatre, CERN	14:40 - 15:05
15:00	Using EOS: Site Reports/Operations	
	31-3-004 - IT Amphitheatre, CERN	15:05 - 15:25
	Coffee Break	
	31-3-004 - IT Amphitheatre, CERN	15:25 - 15:45
	Using EOS: Site Reports/Operations	
	Projects & Reports	
	31-3-004 - IT Amphitheatre, CERN	15:45 - 17:05
17:00		

Day 1

Time	Activity	Location
09:00	Developing EOS & CO: Development Session	
	Developments	
	31-3-004 - IT Amphitheatre, CERN	09:00 - 10:00
10:00	Coffee Break	
	31-3-004 - IT Amphitheatre, CERN	10:00 - 10:30
	Using EOS: Deployment, Configuration, Testing, Hands-on	
	Practicalities	
	31-3-004 - IT Amphitheatre, CERN	10:30 - 12:00
12:00	Lunch Break	
	31-3-004 - IT Amphitheatre, CERN	12:00 - 14:00
14:00	Using EOS: Storage Tiering	
	31-3-004 - IT Amphitheatre, CERN	14:00 - 14:55
15:00	Using EOS: Frontend Services	
	Projects & Reports	
	31-3-004 - IT Amphitheatre, CERN	14:55 - 16:00
16:00	Final Session: QA, Open Discussion & Workshop Wrap-up	
	31-3-004 - IT Amphitheatre, CERN	16:00 - 17:00

Day 2



2nd EOS workshop QA Survey

If you have a particular problem, idea or question, which didn't get covered during the presentations or during coffee breaks, you can add this to an online survey on the workshop INDICO page.

The QA session is planned at the end of the workshop.

Survey

EOS Workshop QA

We will finish the workshop with a QA session. Here you can ask questions or ask for a show case demonstration of a field of particular interest.

Operational Questions

If you have a particular question about EOS operation ...

Development Questions

If you have a particular question about EOS developments

Online Demonstration

If you would like to get a quick demonstration/short tutorial about a particular aspect of running/using EOS

AOB

If you have any other proposal, question or comment

Your answers will be submitted anonymously.

<https://indico.cern.ch/event/656157/surveys/688>



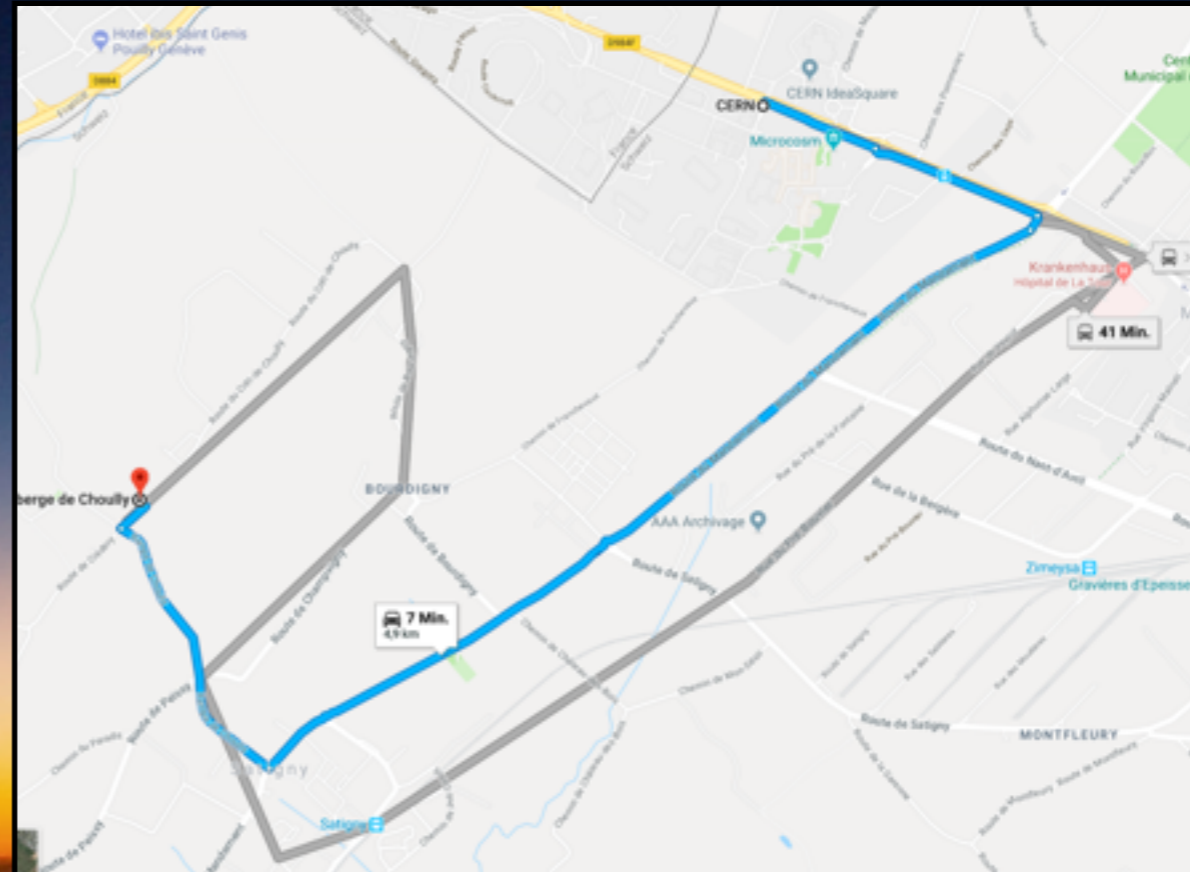
2nd EOS workshop Social Dinner

Auberge de Chouilly

Le Chef Pierre-Louis Descloux se réjouit de vous recevoir
et de vous concocter les mets raffinés qui sauront surprendre votre palais,
arrosés de nectars d'ici et d'ailleurs pour la joie du coeur !



Meetings Point
18:45 Entrance Gate A
19:00 Chouilly
Route du Crêt-de-Chouilly 19, 1242
Chouilly, Switzerland





Enjoy the

Workshop



TIME TO LISTEN



TALK TO EACH OTHER



**CELL PHONES
MAKE YOU
STUPID**



**KEEP
CALM
AND
CLOSE YOUR
LAPTOP**