Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules

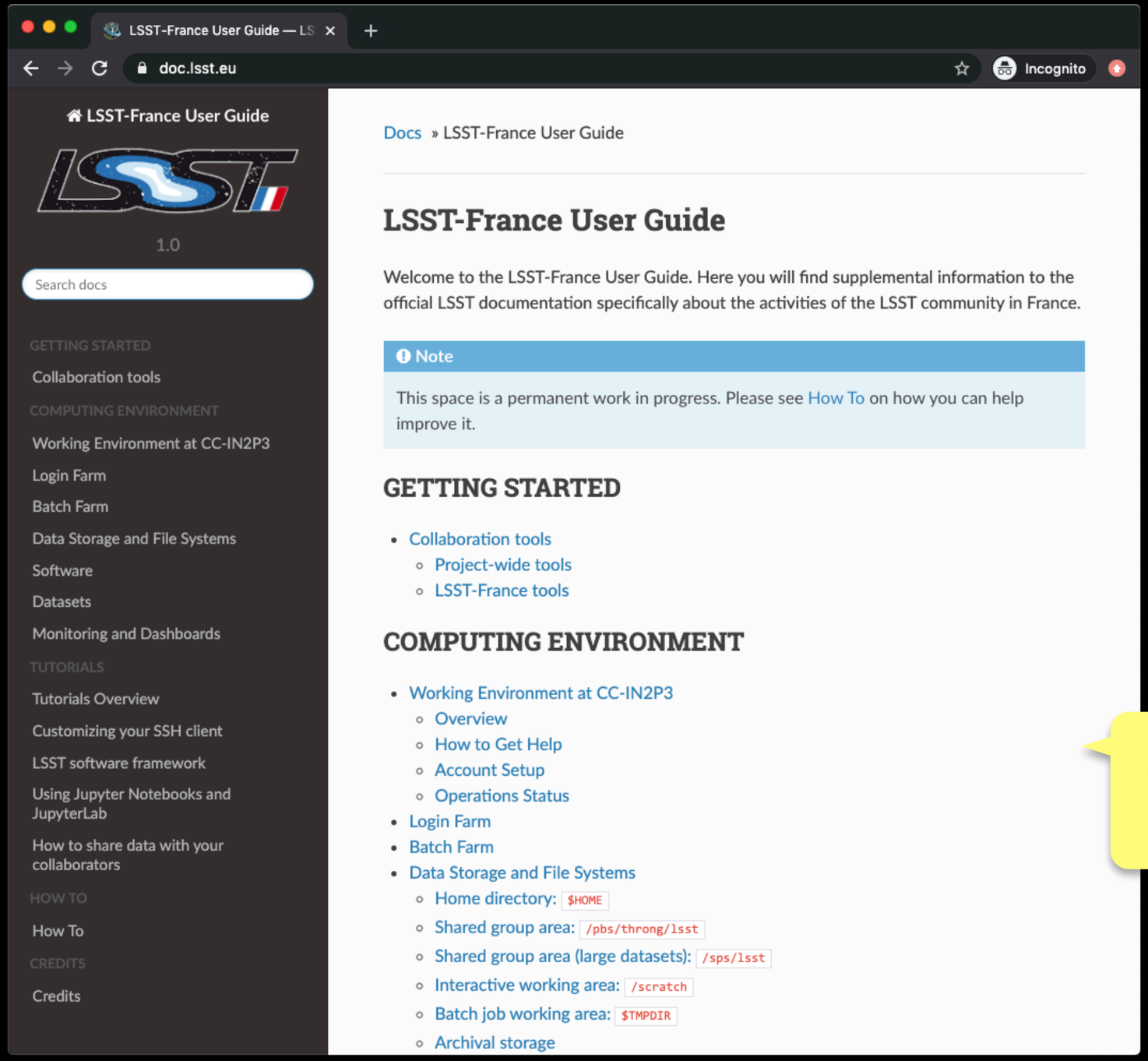
LSST data release processing at CC-IN2P3

status and perspectives

fabio hernandez

Journées LSST-France, Orsay, February 5th, 2020

doc.lsst.eu



good place to start for newcomers

You are kindly invited to subscribe to this Slack channel
(please click on the link below)

#in2p3

There are other channels of potential
interest for LSST-France members.
All of them start by `#in2p3-*`

RESOURCE UTILISATION

- The last quarter every year, every project informs CC-IN2P3 the computing resources required for the upcoming year

  in terms of CPU and GPU time, disk storage, tape storage, other services

  granularity: quarter of a year

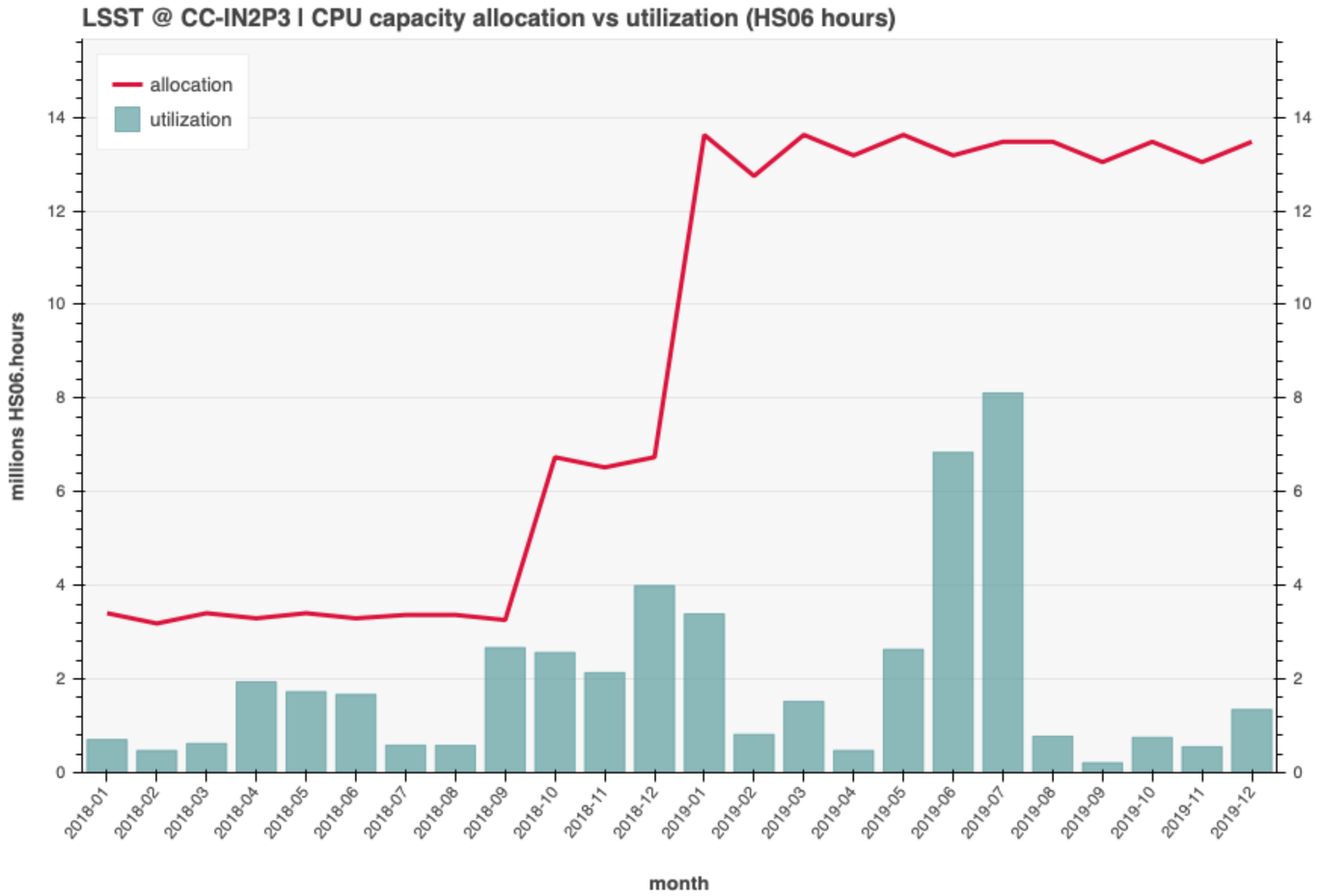
- IN2P3 top management allocates computing resources to each project

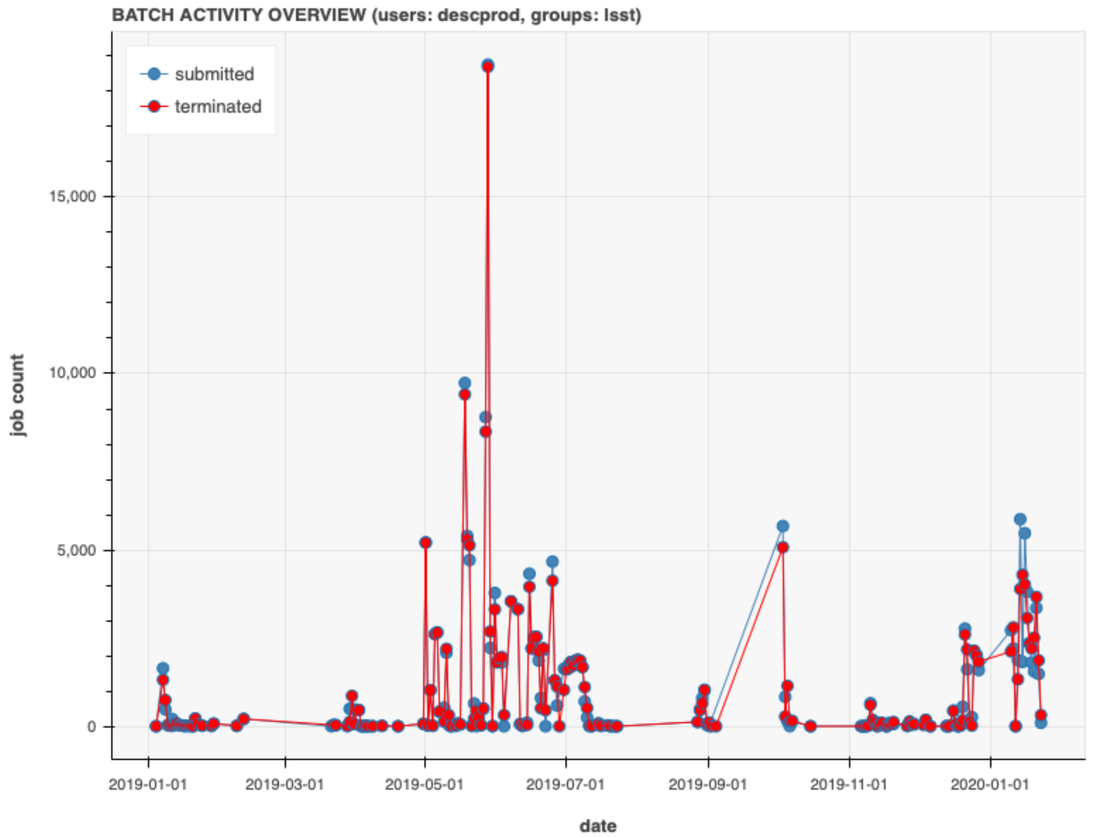
- We have established a multi-year plan of resource requirements for the whole duration of the LSST project

  that plan is revisited and updated on a yearly basis

  the annual expression of requirements sent to CC-IN2P3 is based on that master plan

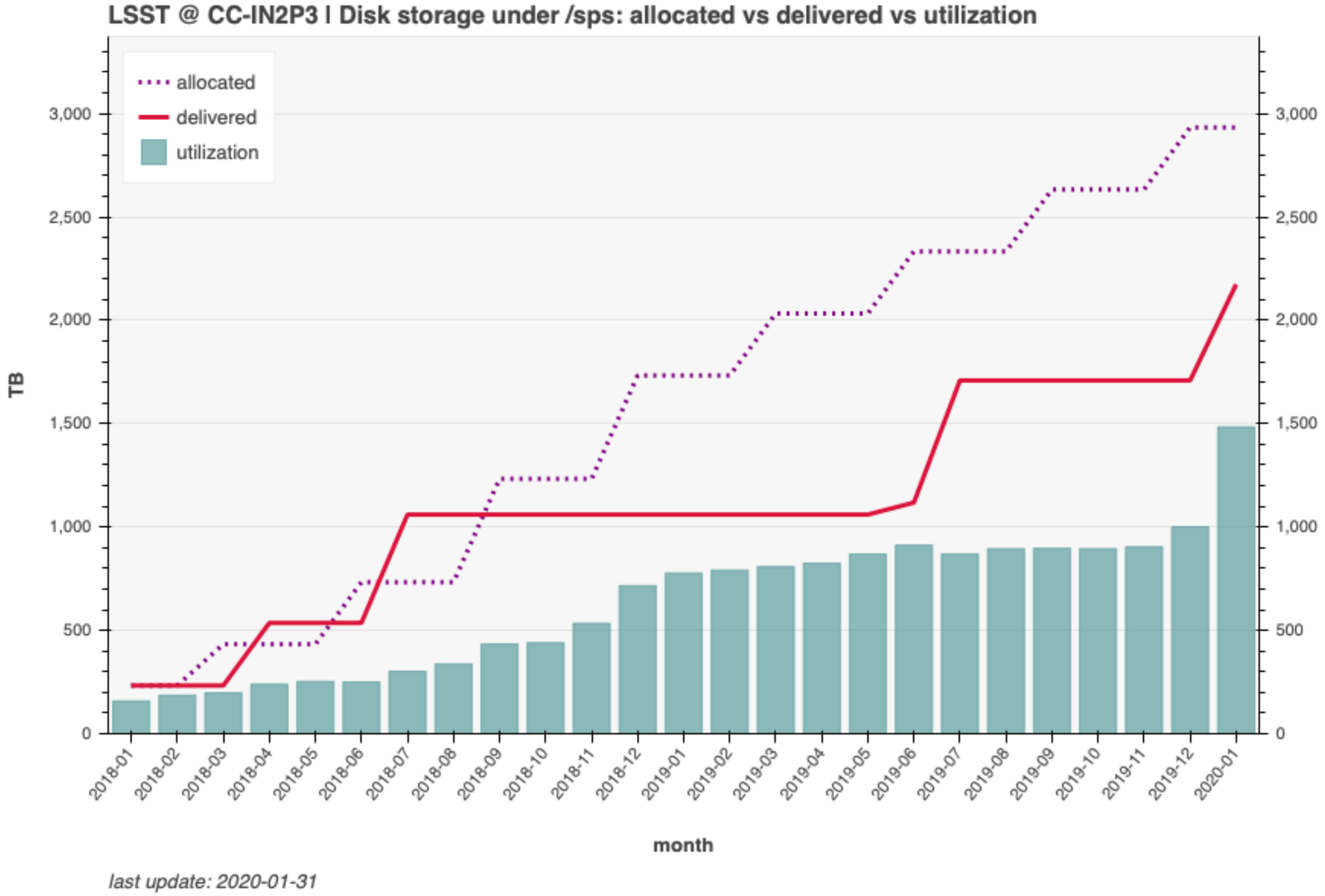
RESOURCE UTILISATION (CONT.)





Allocated CPU capacity largely enough for current needs. The activity is understandably spiky over the year

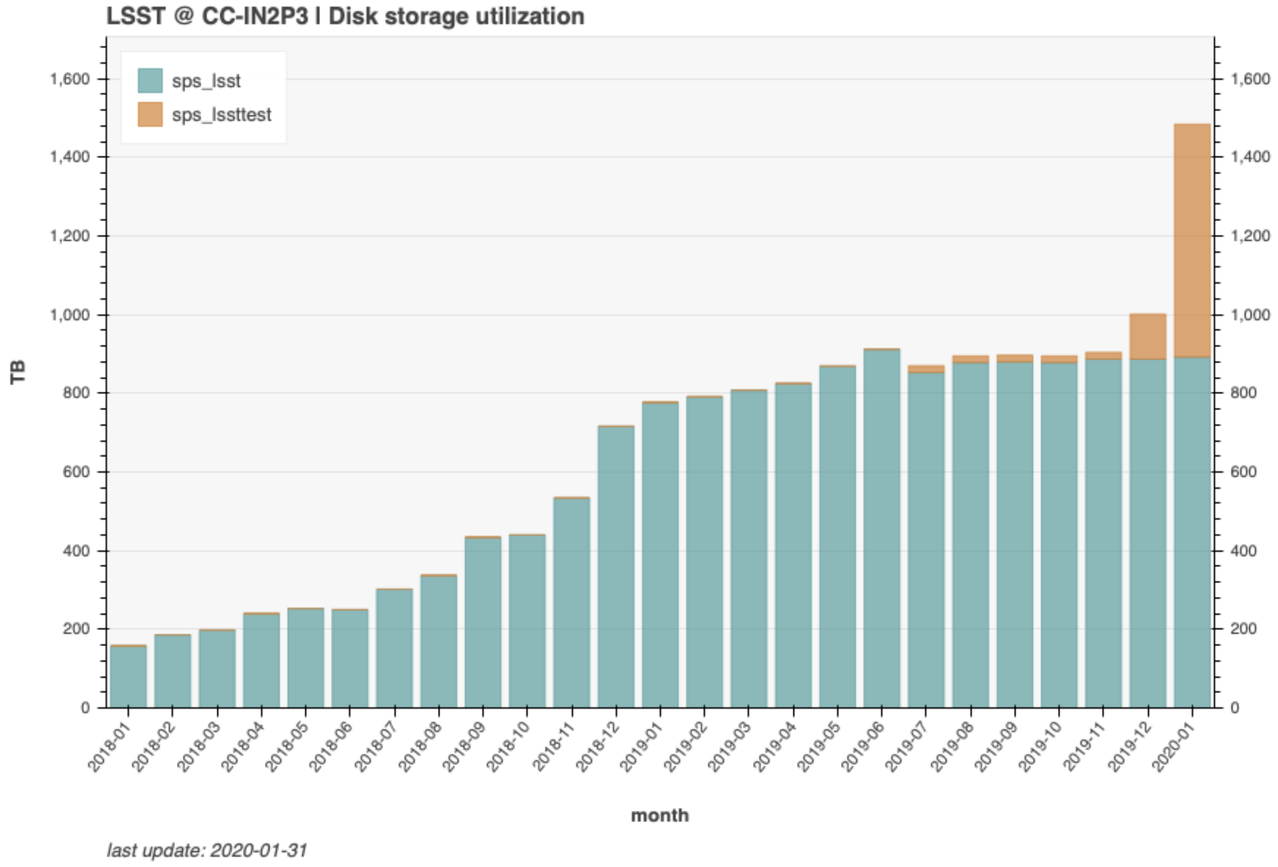
RESOURCE UTILISATION (CONT.)

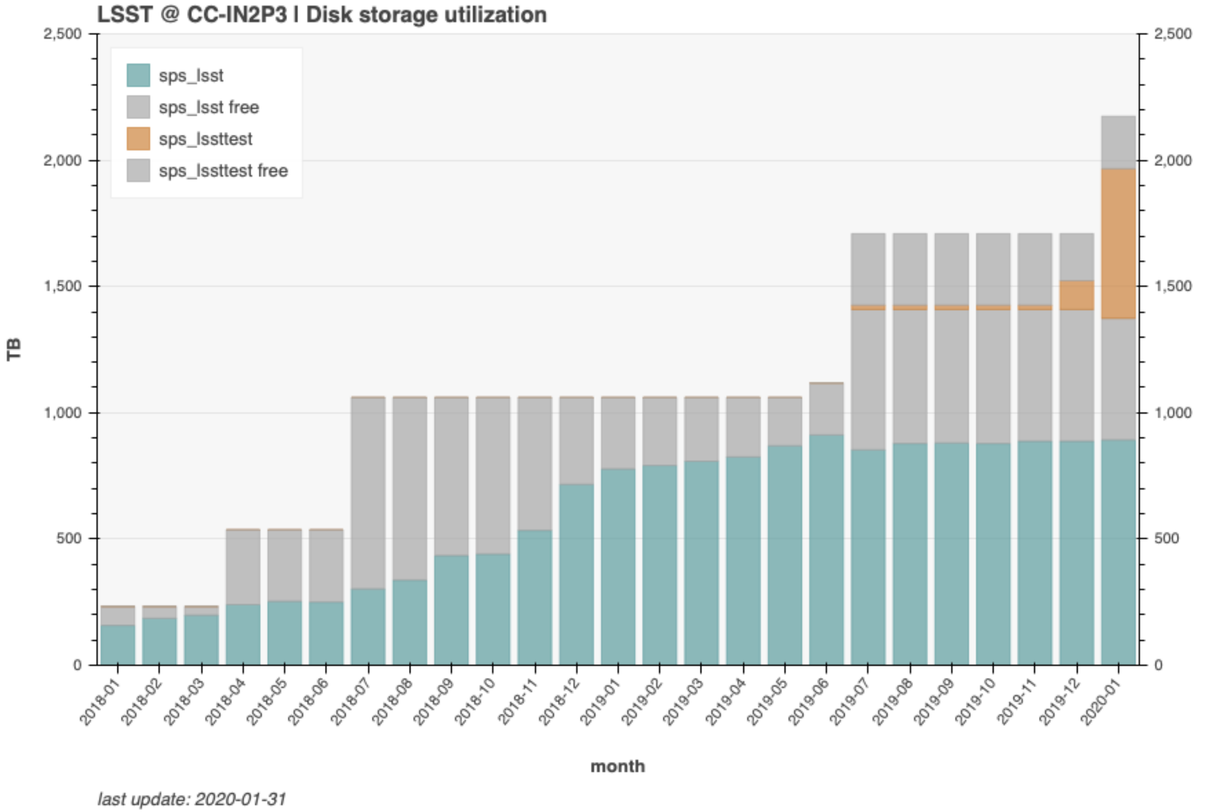


Delivery of disk storage behind schedule.

Experimenting with storage technologies to find the most suitable for our needs, both technically and economically.

RESOURCE UTILISATION (CONT.)





Data Release Processing (DRP)

- Data release production (DRP)

  *once per year, produce a **data release**: a self-consistent, immutable dataset, composed of data products (both images and catalog) derived from data collected **since the beginning of the survey***

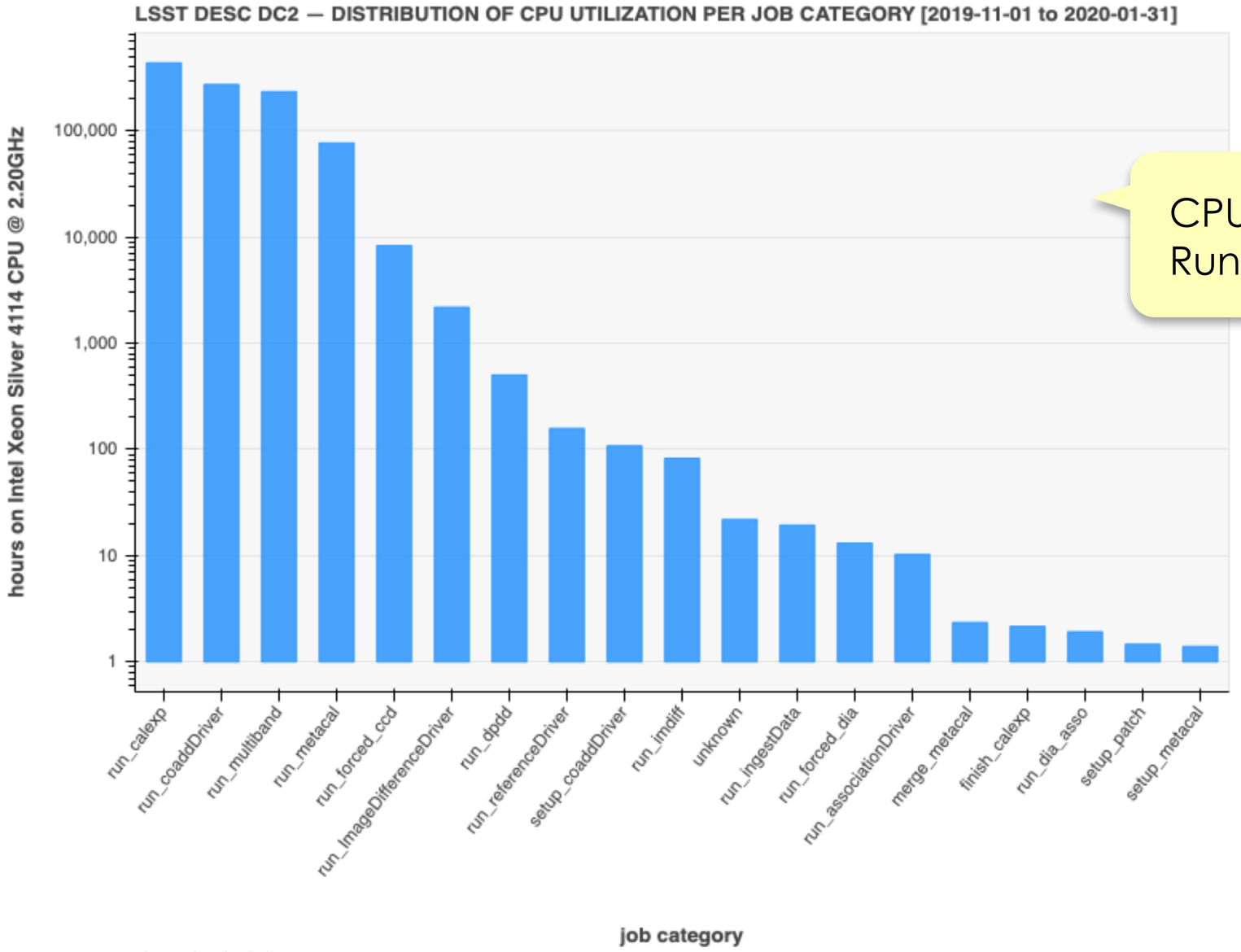
- Realistic exercises of image processing of the LSST science pipelines

  using recent versions of the LSST science pipelines to process LSST DESC simulated images

- A lot of experience gained

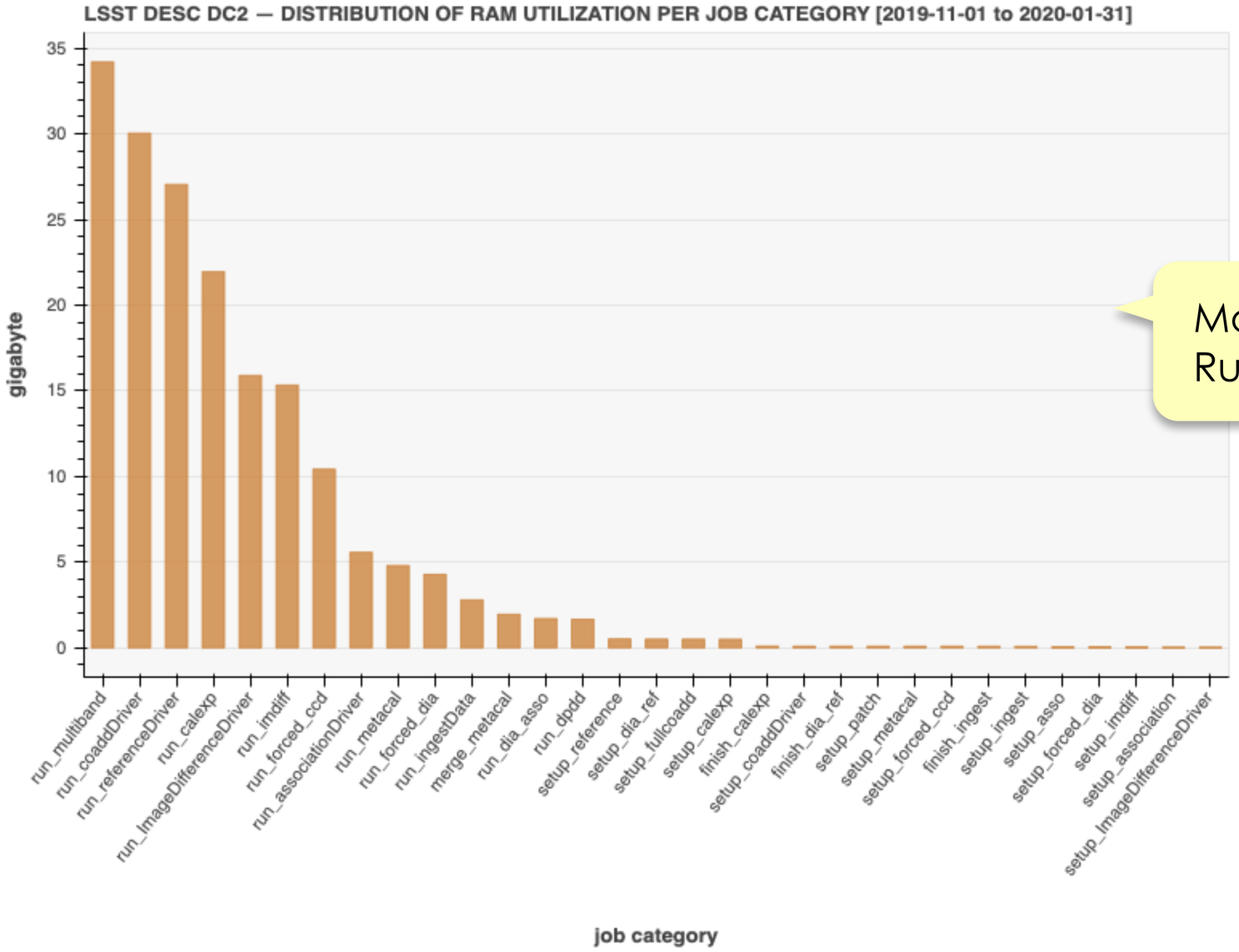
  on the software itself, on what we need to run it at scale, hardware and infrastructure requirements, etc.

DATA RELEASE PROCESSING (CONT.)



CPU time consumed by LSST DESC DC2 Run2.2i image processing jobs.

DATA RELEASE PROCESSING (CONT.)



Maximum RSS used by LSST DESC DC2 Run2.2i jobs, per job category.

DATA RELEASE PROCESSING (CONT.)

CPU vs RAM used by LSST DESC DC2 Run2.2i jobs, per job category.

LSST DESC IMAGE SIMULATION

- Experimented an event-driven approach for data handling

  dCache-based grid storage element at CC-IN2P3 used to collect outputs of simulation jobs

  developed tool to automatically trigger file copy from dCache to `/sps/lsst` *as soon as new files are uploaded*

  leverages dCache storage events infrastructure

  see this meeting for additional information

UPGRADE OF HARDWARE FOR CATALOG DB

- Imminent upgrade of hardware for catalog database (Qserv)

  foundation of the catalog database for first years of data taking

role	count	RAM [GB]	disk [TB]
workers	**20**	**256**	**64**
masters	**2**	**256**	**15**
kubernetes	**3**	**64**	**1**

INTERNATIONAL CONNECTIVITY

PLANNED EVOLUTION

- **Usable network bandwidth** for LSST needs

  CC-IN2P3 ↔ StarLight (Chicago)

now	**20 Gbps**
2020 Q1	**40 Gbps**
2021 Q1	**100 Gbps**

Evolution plan agreed with RENATER

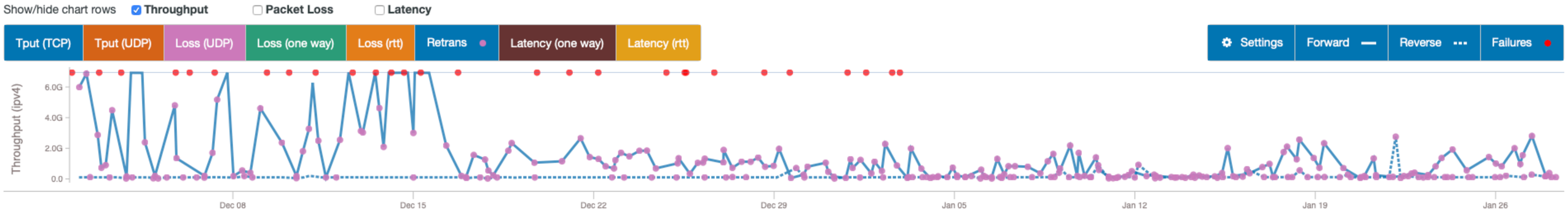
Slide presented at **LSST global networking workshop** Sep. 2019

INTERNATIONAL CONNECTIVITY (CONT.)

- Chronic issue with the stability and capacity of the 20 Gbps link between CC-IN2P3 and NCSA

  issue in the segment connecting CC-IN2P3 to GEANT routers, within France

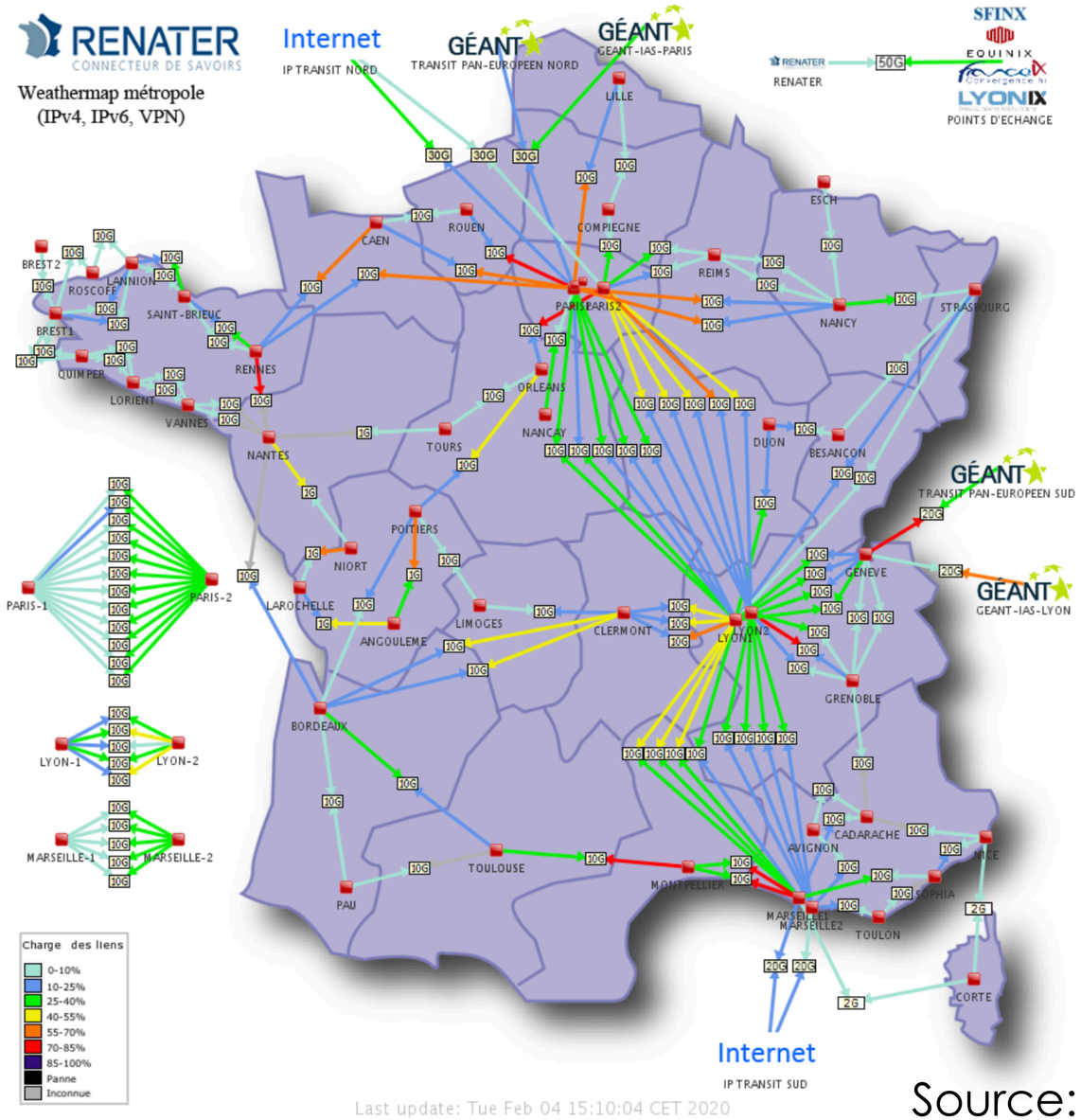
  the persistence of this issue is a source of great concern



Measured throughput in Gbps from 2019-12-01 to 2020-01-28 between `ccperfsonar1.in2p3.fr` and `psb-bw-100g.ncsa.illinois.edu`

Source: CC-IN2P3's perfSONAR

INTERNATIONAL CONNECTIVITY (CONT.)



Source: RENATER

IMAGE STORAGE INFRASTRUCTURE TESTS

- Since 2019Q3 we have been testing an alternative infrastructure for image storage

  big filer, accessible via NFS

  image processing for DESC DC2 Run2.2i uses this storage area since Nov. 2019

  no major technical issues found

SHARING (SMALL) DATASETS

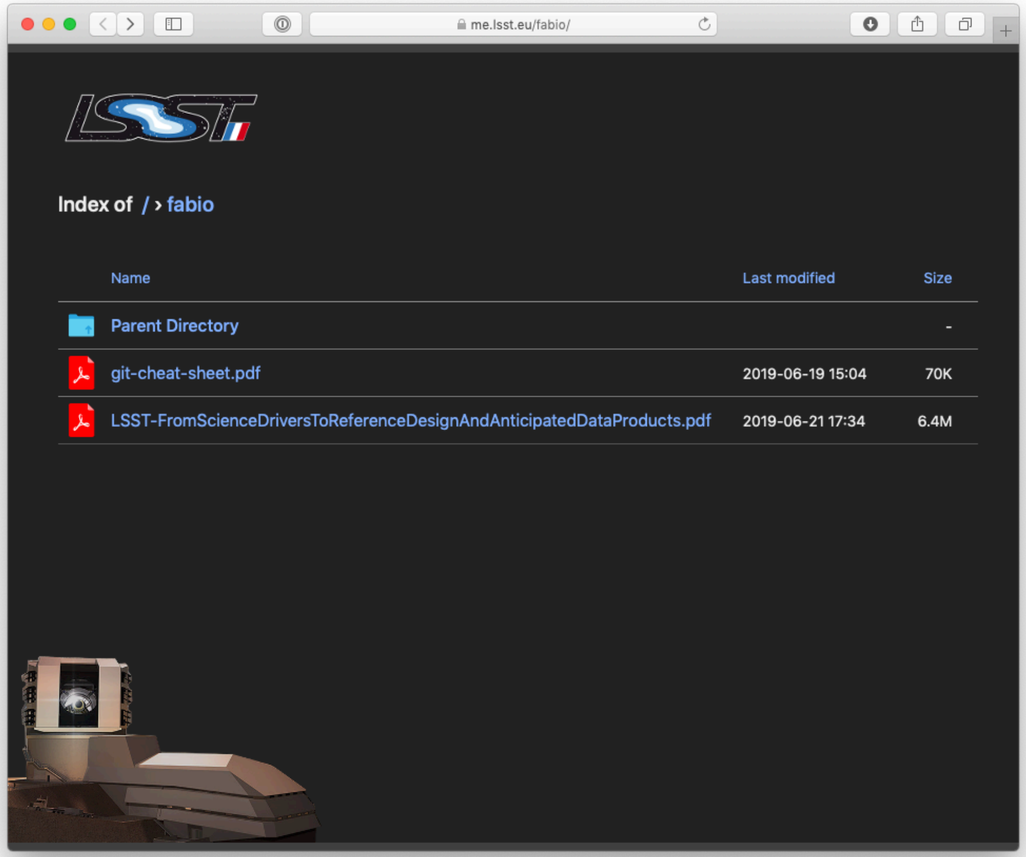
- You can easily share small datasets

  store the files you want to share under `/sps/lsst/users/yourlogin/web`

  your files will be publicly accessible *via https://me.lsst.eu/yourlogin*

  ideal for logs, plots, notebooks, etc.

  there are constraints: make sure your read the documentation



JOB PROFILING

- Instrumentation of jobs for collecting and analysing coarse-grained job profiling data

  see Bastien's presentation later this morning

Ongoing work

- Last stage of preparation of a Jupyter Hub platform

  will make easier launching Jupyter notebooks at CC-IN2P3

  customisable for individual needs (e.g. what release of the stack to use, what Python interpreter to use, etc.)

  allows for keeping a work session alive, even if you disconnect your laptop from the network

  login with your individual credentials

  elastic backend will allow to easily grow as need arises

  `stackyter` *won't be needed any longer, but will continue to work*

WHAT IS NEXT

- Improve our situation regarding international connectivity

  actions already taken, but no concrete results so far

- Annual revisit of our sizing work

  check assumptions compared to the just released DMNT-135 "DM Sizing Model and Purchase Plan"

- Evaluate other storage platforms

  both POSIX and S3-based, ***compatible with what Butler Gen3 expects***

- Improve usability of inter-site data transfer tools

Questions & Comments