WLCG report

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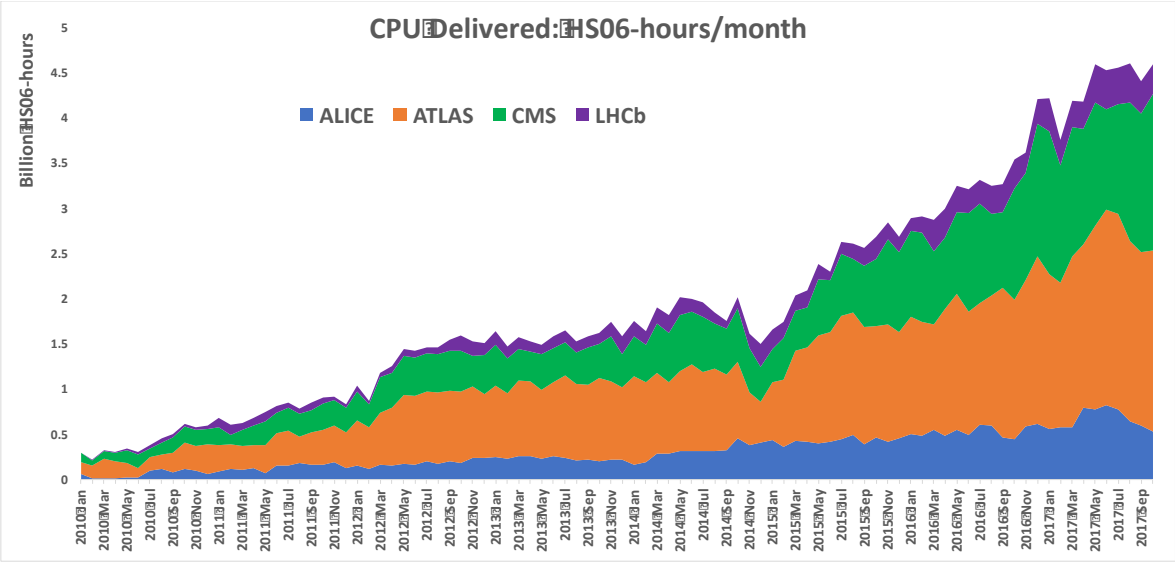
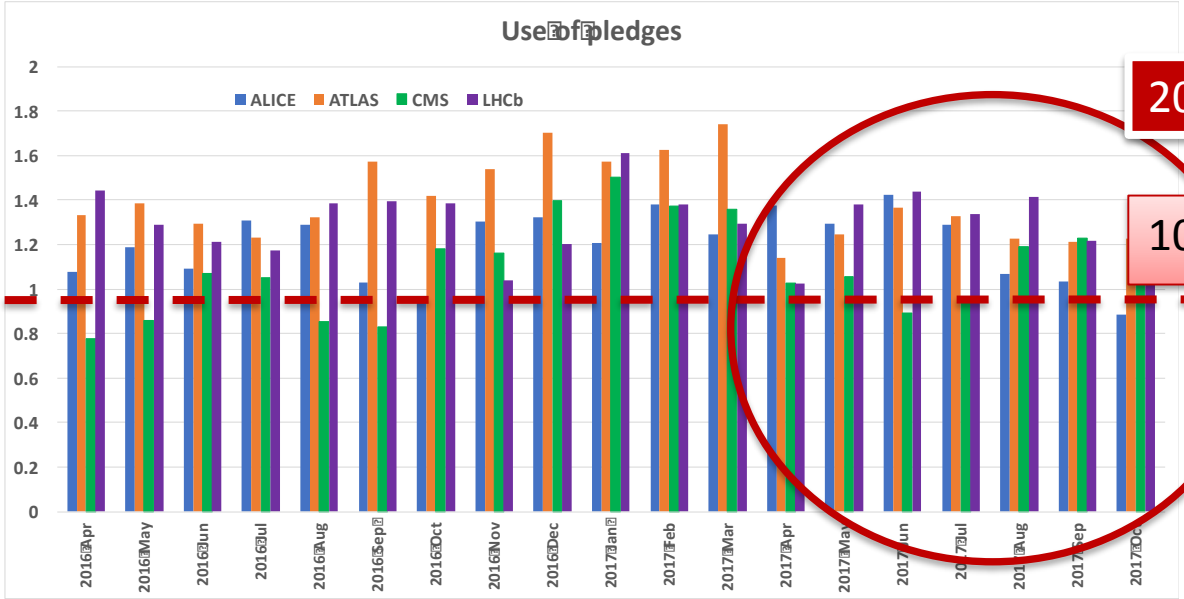
Outline

- WLCG resources: status and usage
- Preparing for Run-3
- The HSF Community White Paper
- The WLCG strategy document for HL-LHC





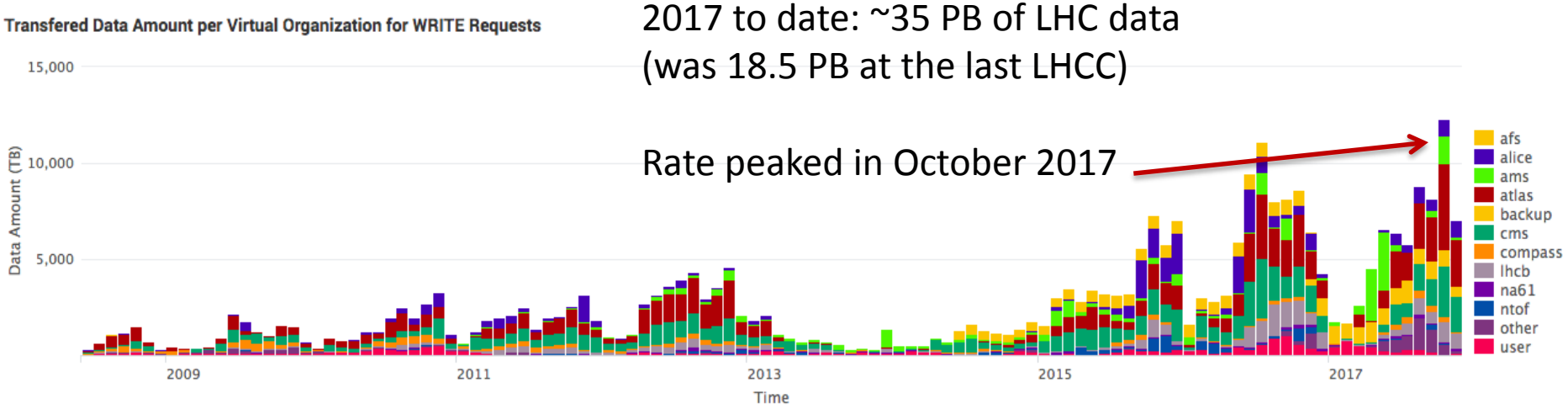
CPU utilization keeps increasing

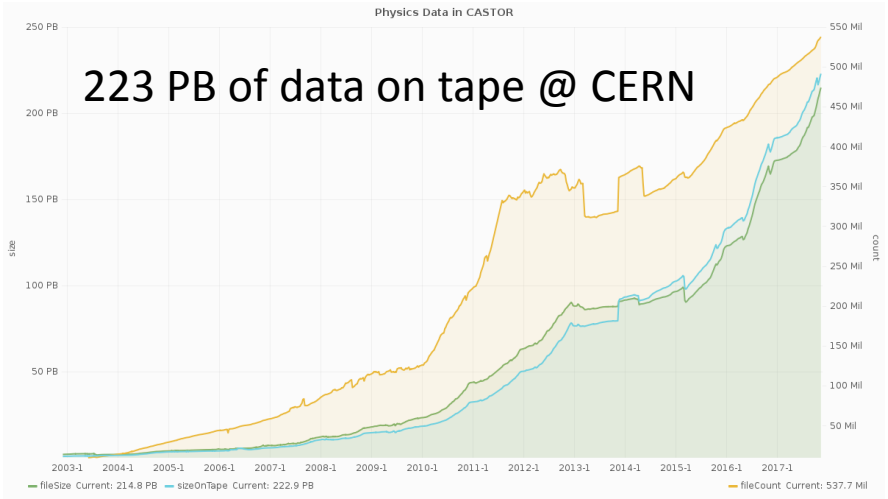
Does not include non grid resources (HPCs, clouds, volunteer computing)

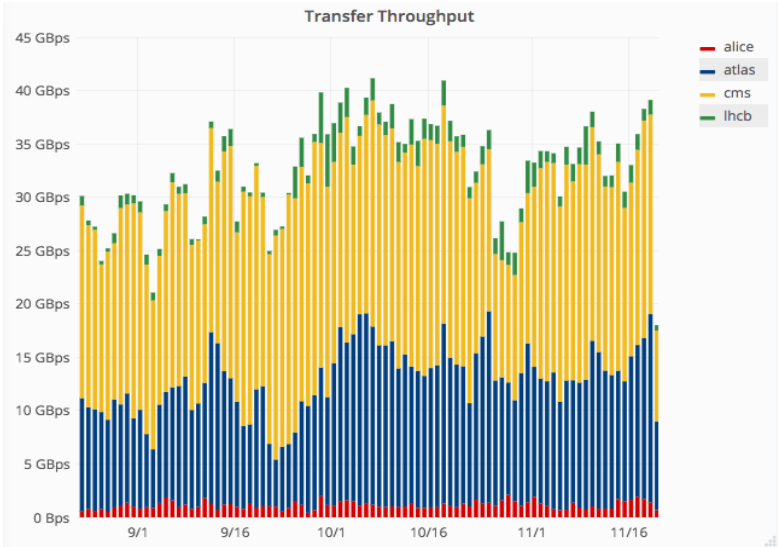
Pledged resources fully used, by all experiments

2017 to date: ~35 PB of LHC data
(was 18.5 PB at the last LHCC)

Rate peaked in October 2017







Steady transfer rate in WLCG

Preparing for Run-3

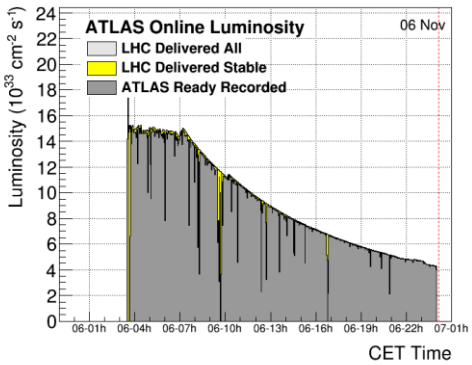
- WLCG started a process to understand the resource needs for Run-3 (ballpark estimates)
- There are a lot of uncertainties and with the help of the LHCC we would like to conservatively define the expectations for the main input parameters driving the needs. We need guidance to resolve those uncertainties

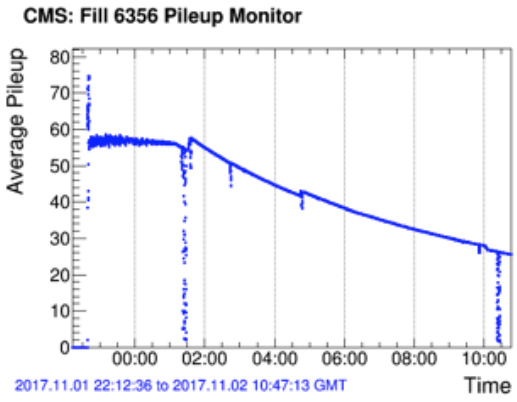
1) Run-3 integrated luminosity
   - We expect at least 150 fm-1 of pp (=Run1+Run2) spread across 2021-2023. Is 150 realistic? How uniform across 2021-2023? HI runs?
   - How many seconds of data taking in one year we expect? Current estimate around 7M.

2) Run-3 instantaneous luminosity and pileup
   - Goal luminosity is 2.5*10**34. What is the expected pileup profile? How long is expected to be a fill in average?
   - At which point ATLAS and CMS would level?

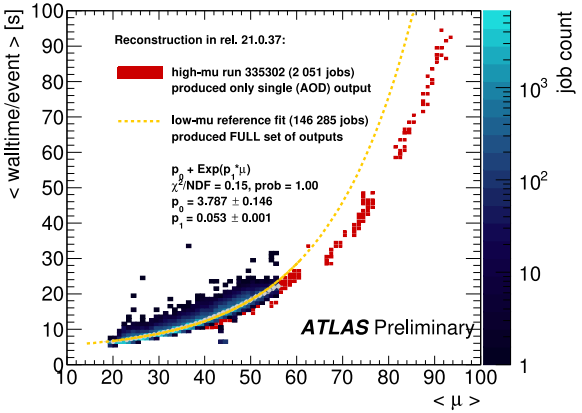
3) Trigger rates
   - What are the expected trigger rates and what is the impact of leveling?

Some implications of Run-3 parameters based on Run-2 experience

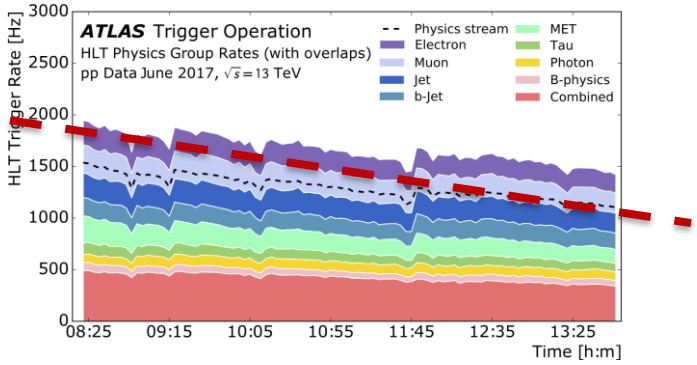




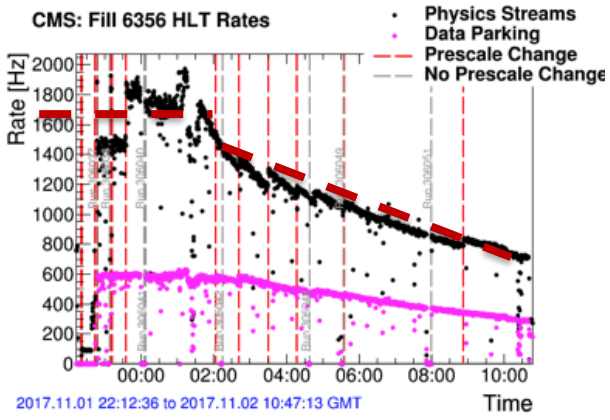
CMS and ATLAS level at similar thresholds now,
Approximately at pileup ~55 for up to 4 hours.



Reconstruction time can increase
up to x2 between mu=40 and mu=55



A run in June: mu~40 and no leveling:
1kHz average of HLT output rate



A run in
October:
mu~55 with
leveling:
> 1kHz average
of HLT output
rate

The HSF Community White Paper

- The HSF Community White Paper defines a roadmap for HEP software and computing R&Ds for the 2020s
  - For WLCG this is crucial in preparation for HL-LHC
  - Other research communities with computing needs at the level of WLCG will coexist on the same infrastructure
- The CWP consists of 13 work packages, each one defining a set of R&Ds
- The summary document is in finalization phase (cosmetic) and will be ready by the end of the year
- Individual work package documents will also be available in xarchive

The WLCG Strategy Document

- The HL-LHC computing challenge: provide the computing capacity needed for the LHC physics program, managing the cost
- We assume yearly hardware increase, inline with flat budget, for the next 10 years: +20% more CPU/year, +15% more storage/year
- The WLCG strategy document is a specific view of the CWP, prioritizing R&Ds relevant to the HL-LHC computing challenge
- The prototyped solutions will be the foundation of the WLCG TDR for HL-LHC, planned for 2020
- We plan to present a draft of the strategy document at the February 2018 LHCC

The strategy document will elaborate the following aspects and define R&D programs with timelines

- Build a cost model (hardware, operations, people)
- Improve software performance and efficiency
  - Cutting across all aspects of event processing
- Reduce data volume
  - Triggers and selection, data formats. Data replication, caching
- Reduce processing cost
  - Improved algorithms. Fast Simulation. Role of machine learning
- Reduce infrastructure and operation cost
  - Storage consolidation and harmonization. Common solutions and services at infrastructure and higher layers
- Ensure sustainability
  - Data reproducibility. Data preservation. Again, common solutions and services