# Data Placement Activity

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US ATLAS Computing Facilities Face-to-Face at SLAC 2022/12/01

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# Charge for Dynamic Data Working activity

- Mandate

  - "The working group will study and tune ATLAS data flows, most importantly placement of new data, rebalancing between data centres, deletion of obsolete and unused data, as well as data replication both for production and analysis. The ultimate goal is to reduce workload execution time, reduce data access time and make better use of available storage through improved placement, movement, addition, and deletion of replicas of our data, under the hard constraint of limited storage space."

- The first primary task is to clearly describe the current data flow and its deficiencies.

  - Various sub tasks including the site perspective which I am involved.

- The initial meeting was Oct 2022.  The 2nd meeting will be hold during TIM in Dec 2022.

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# Data located at BNL

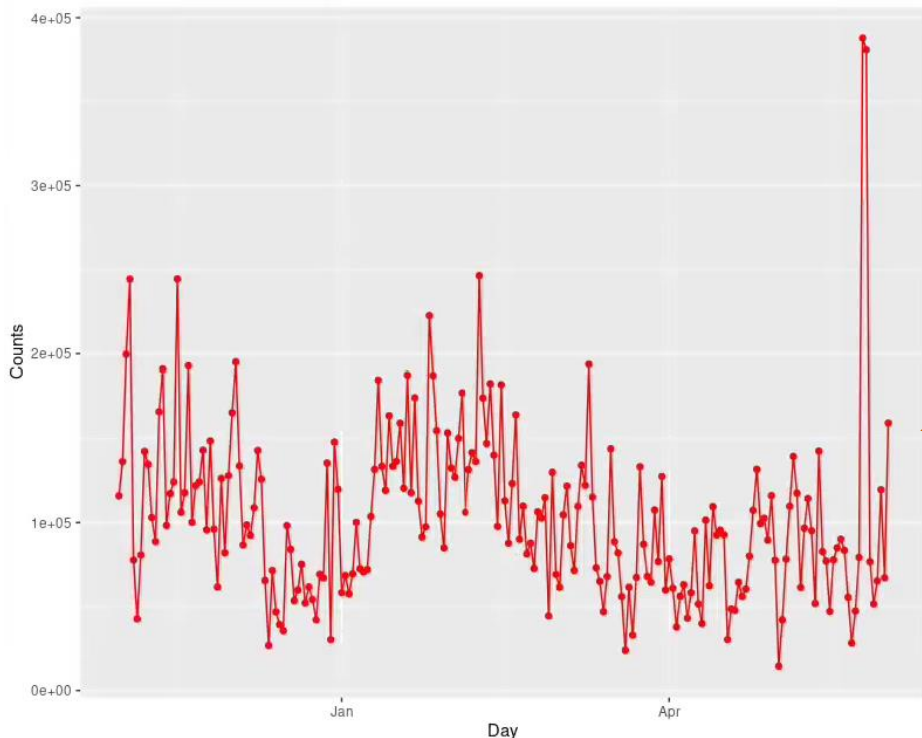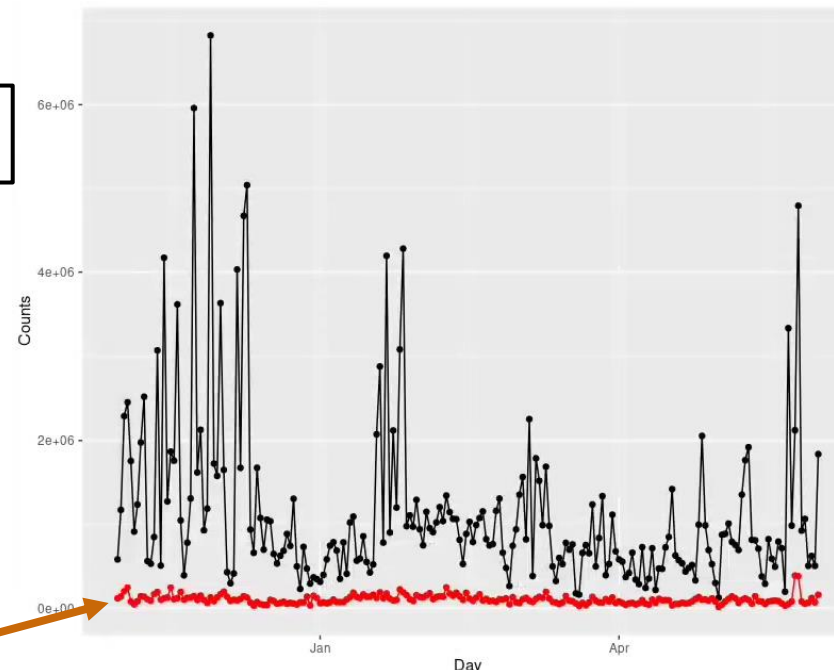By RSE

~60M files

By Datatype
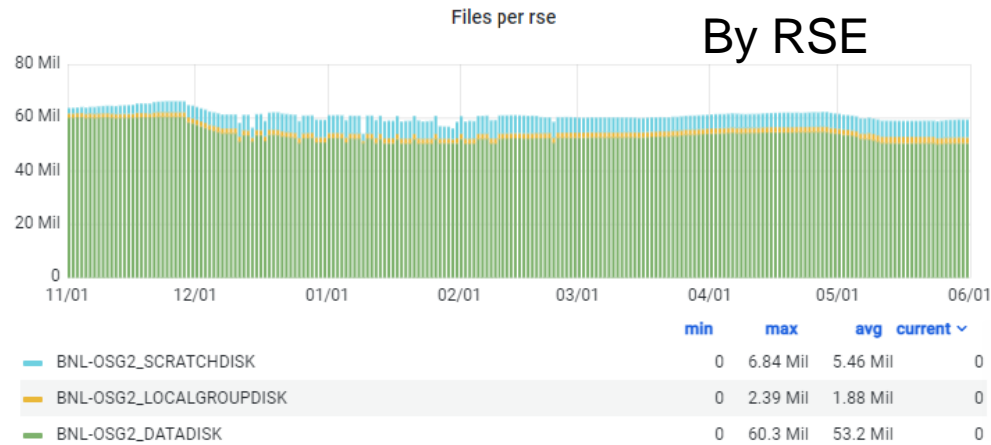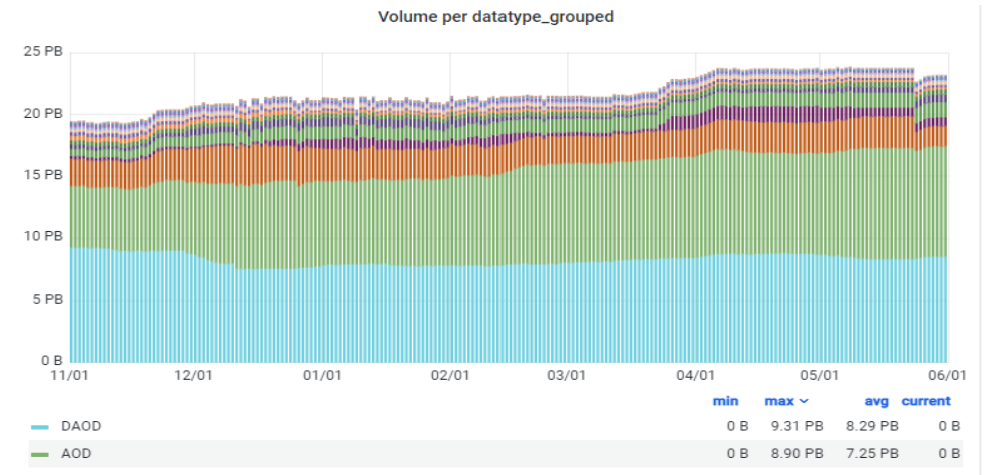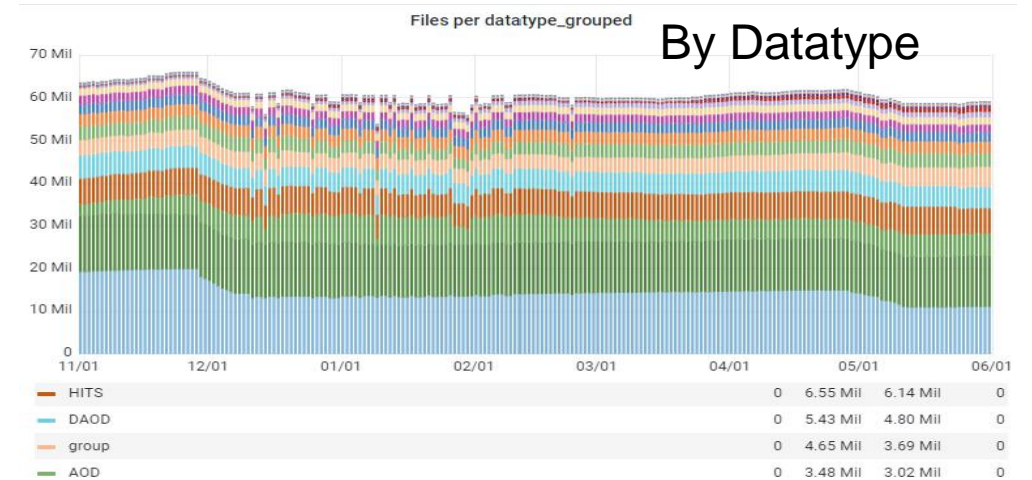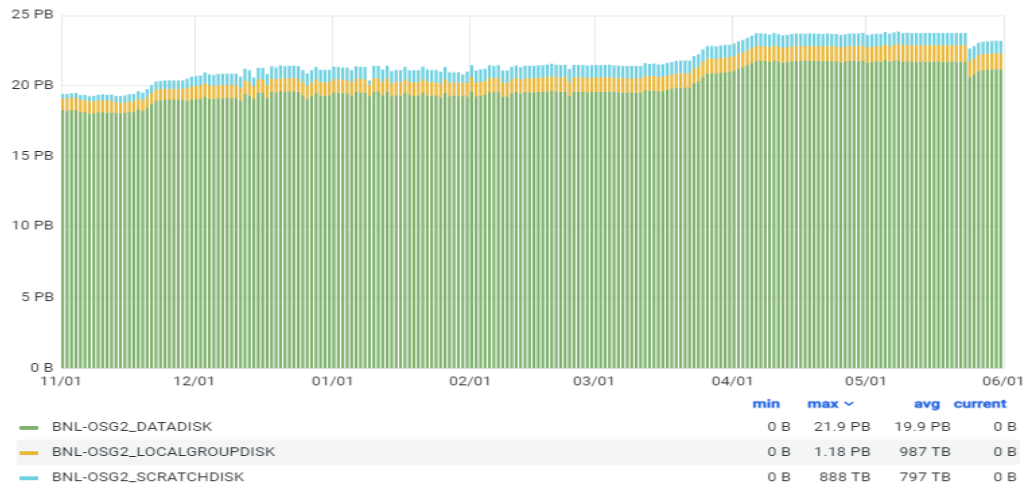
~21PB

# Daily Usage of files by jobs at BNL

BNL uses ~ 0.2% of total number of files per day

Total number of unique used files per day ~ 100K

BNL has
~60M files
~21PB

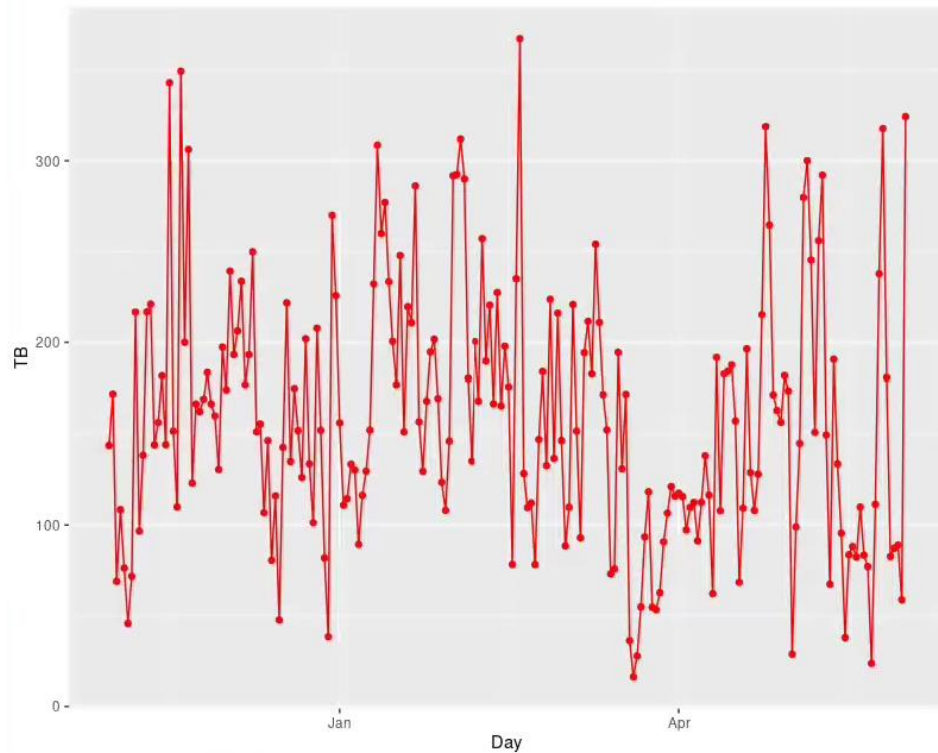Total number of used files per day ~ 1M

One job will access the same files multiple times in short time.
 Similar jobs will access the same files multiple times in short time.

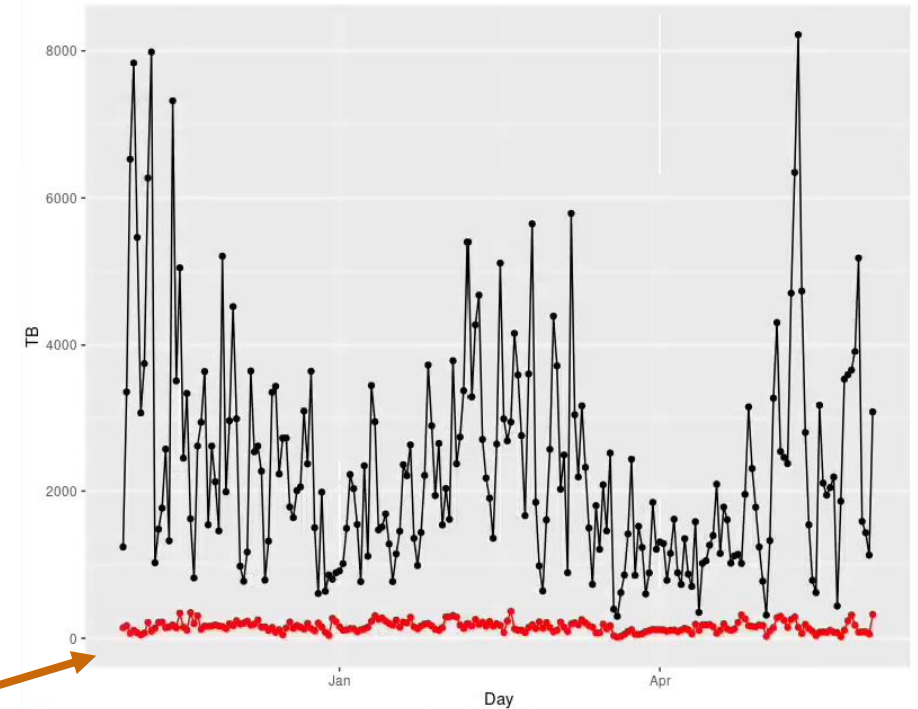Note: it does not include the data out from BNL to the other sites.

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# Daily Data Usage by jobs at BNL

BNL uses ~ 0.8% of total data size per day

Total size of unique used files per day ~ 150TB



BNL has
~60M files
~21PB

Total size of used files per day ~ 2PB

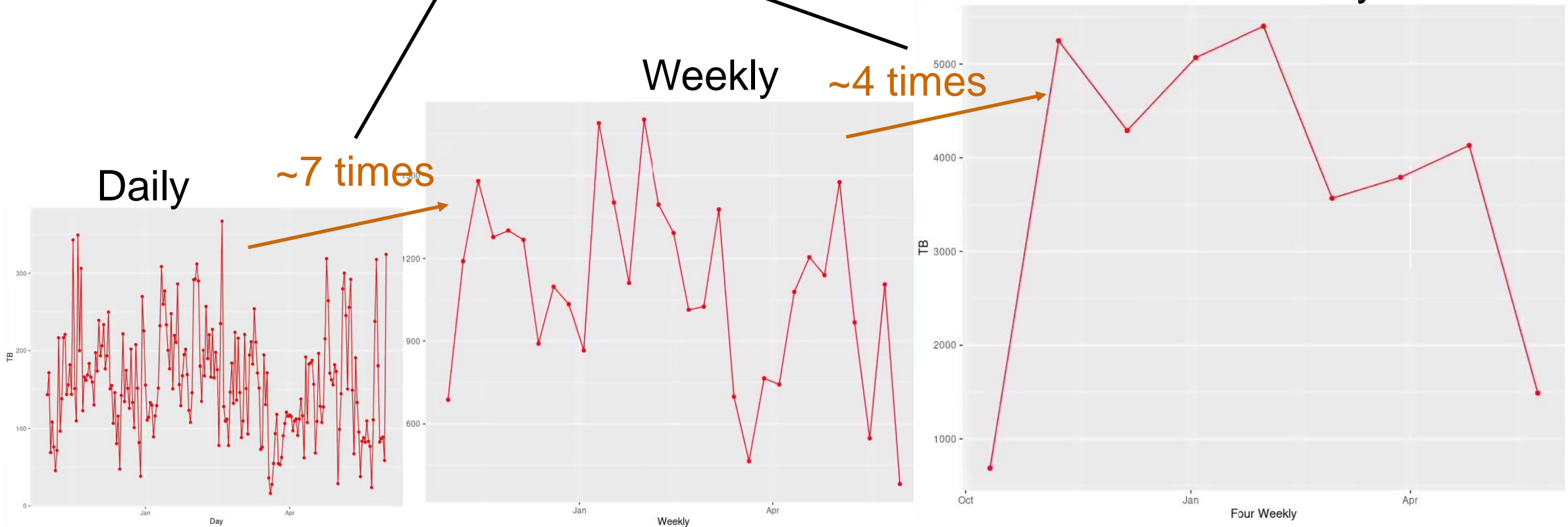Note: it does not include the data out from BNL to the other sites.

# Weekly and Monthly Unique Data Usage by jobs at BNL

BNL has
~60M files
~21PB

Scale with period → Not too many reuse
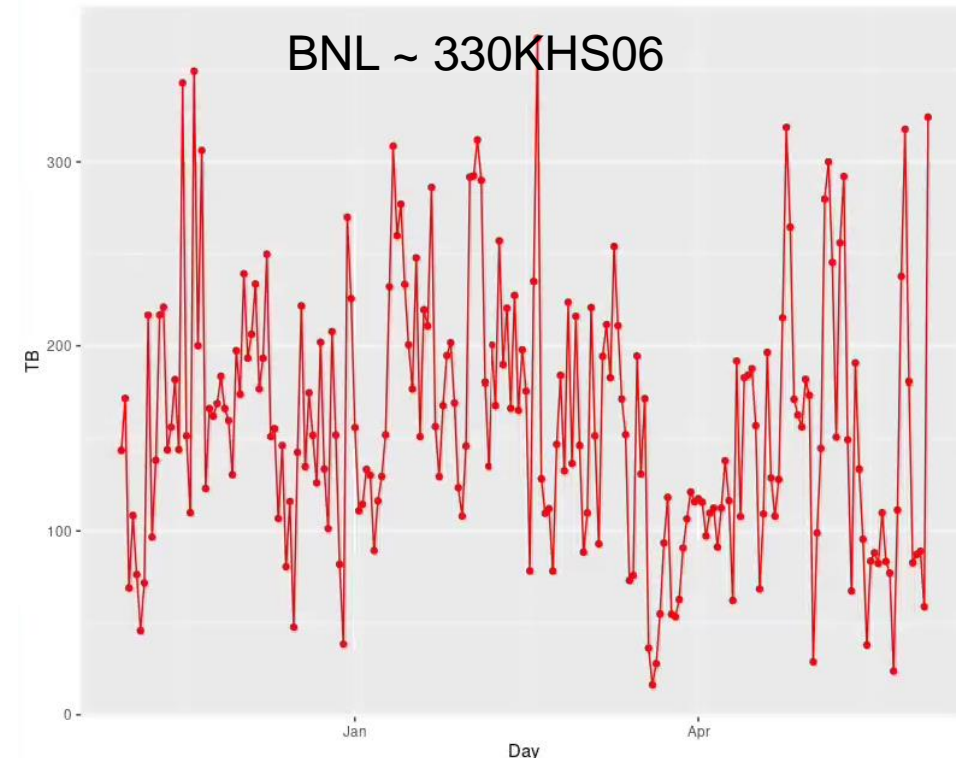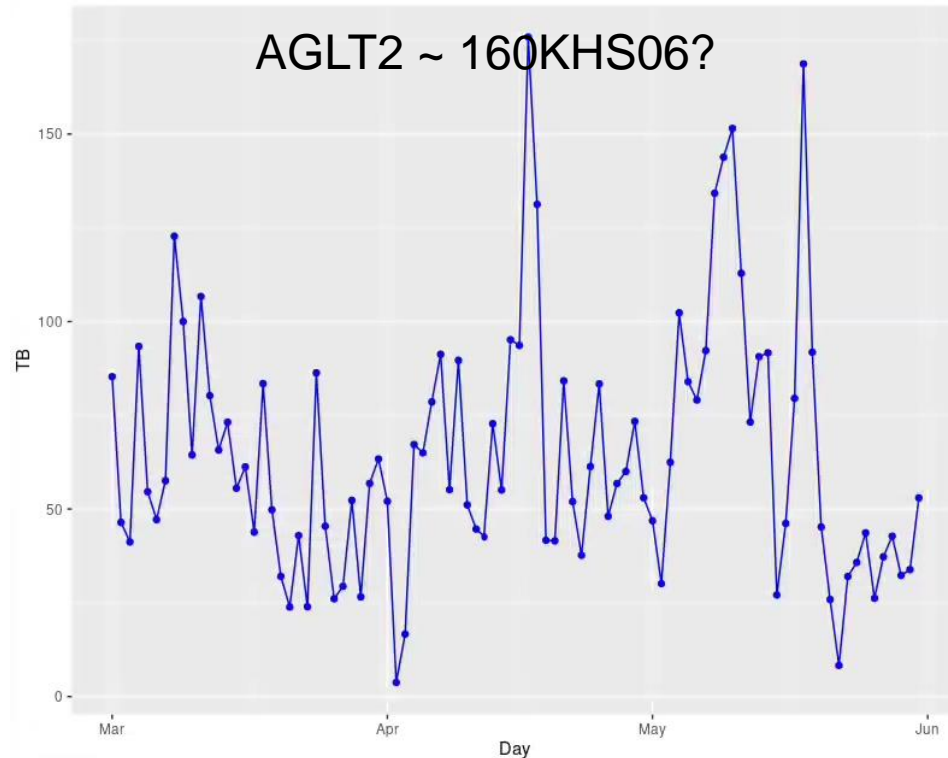
~5PB per month is enough

Monthly

Weekly    ~4 times

Daily

~7 times

NOTE:  Ignore the first and last bins for weekly and monthly plots

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# Comparing Unique Data Usage at AGLT2 and BNL

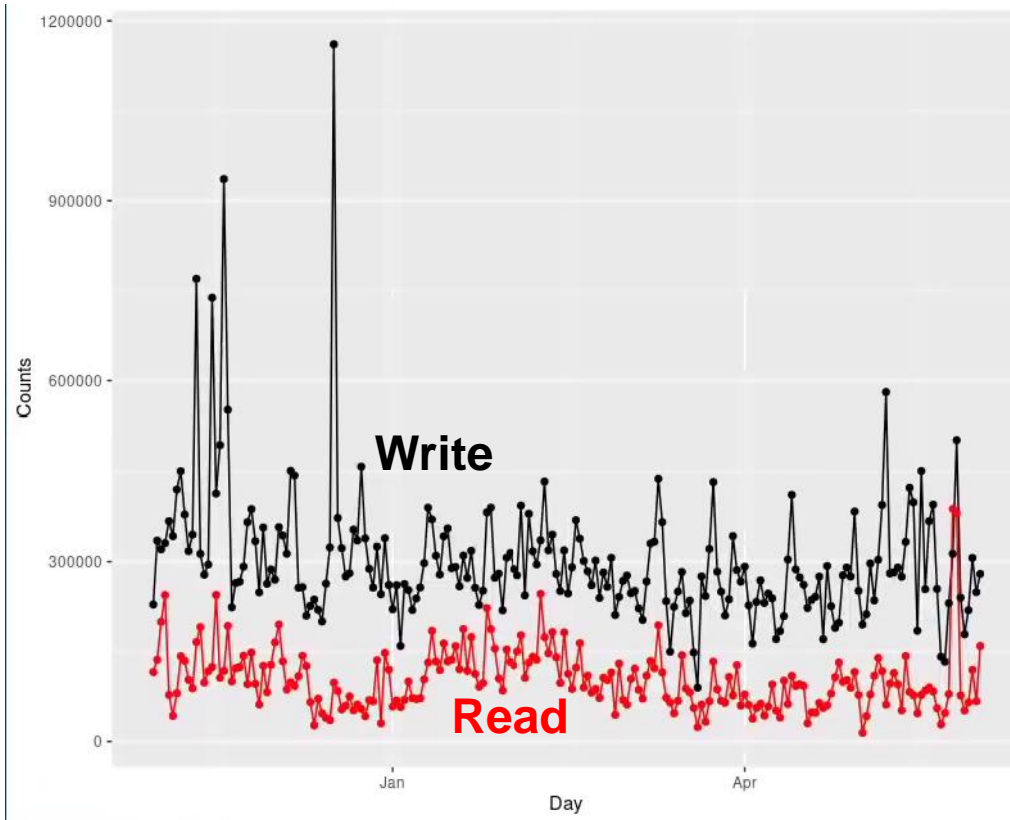~0.7% of total data size at AGLT2. Very similar to BNL

Proportional with Site HS06
~ 0.4TB/day/KHS06

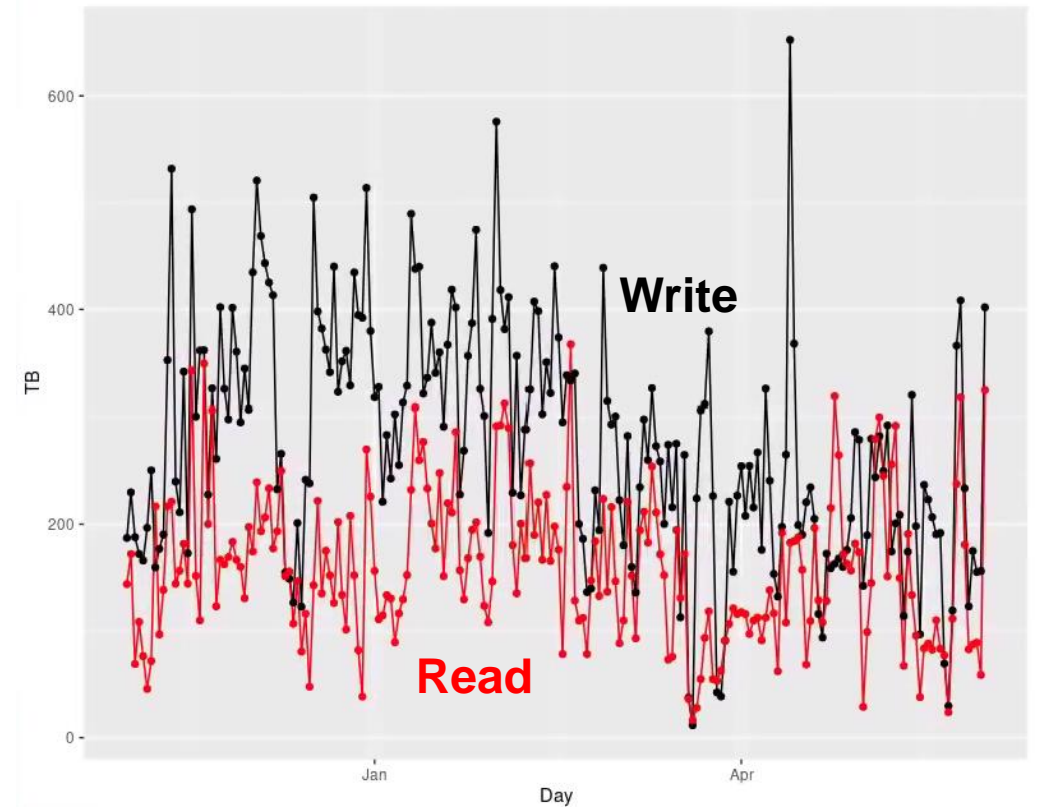

AGLT2 ~ 160KHS06?



BNL ~ 330KHS06

# Comparing Write and Read at BNL

Large fractions of number of written files are not read. (e.g. logs)

Large fractions of written data are not read either (~40%?) . But, its fraction is larger than those of the number of files.
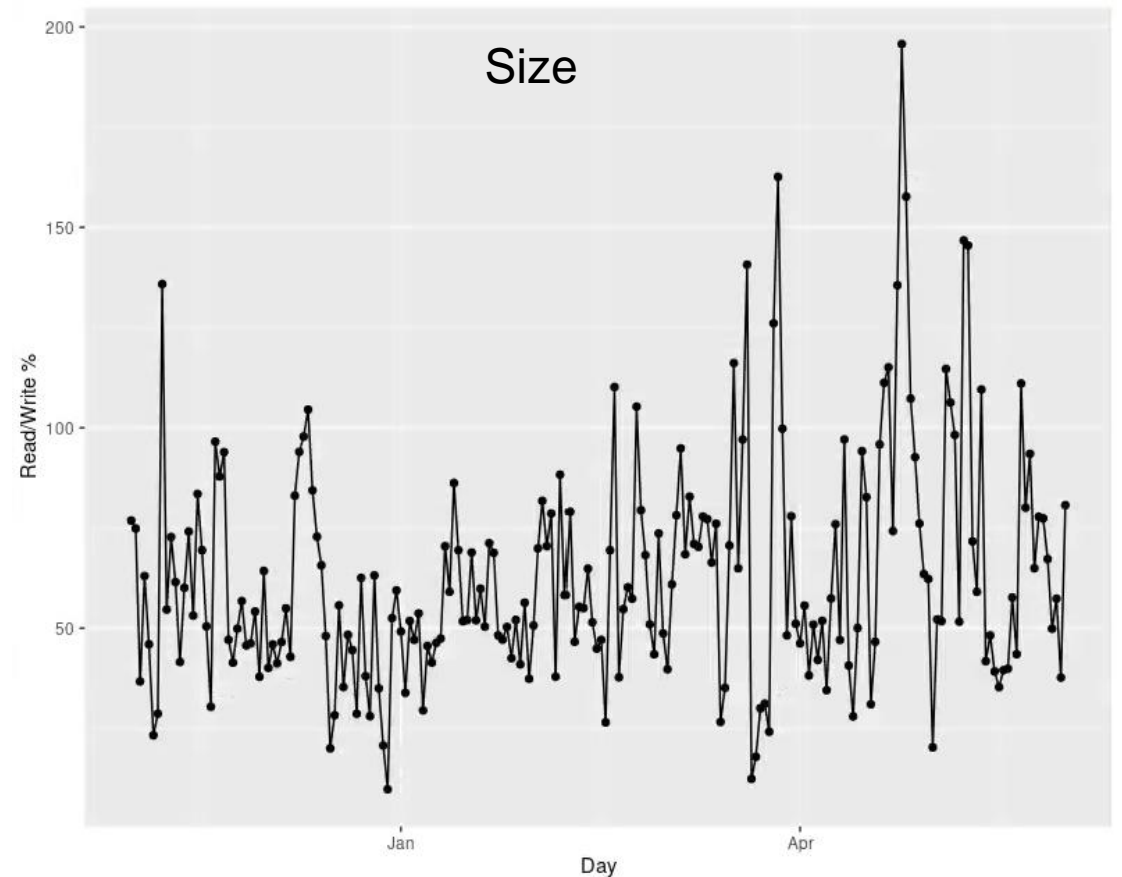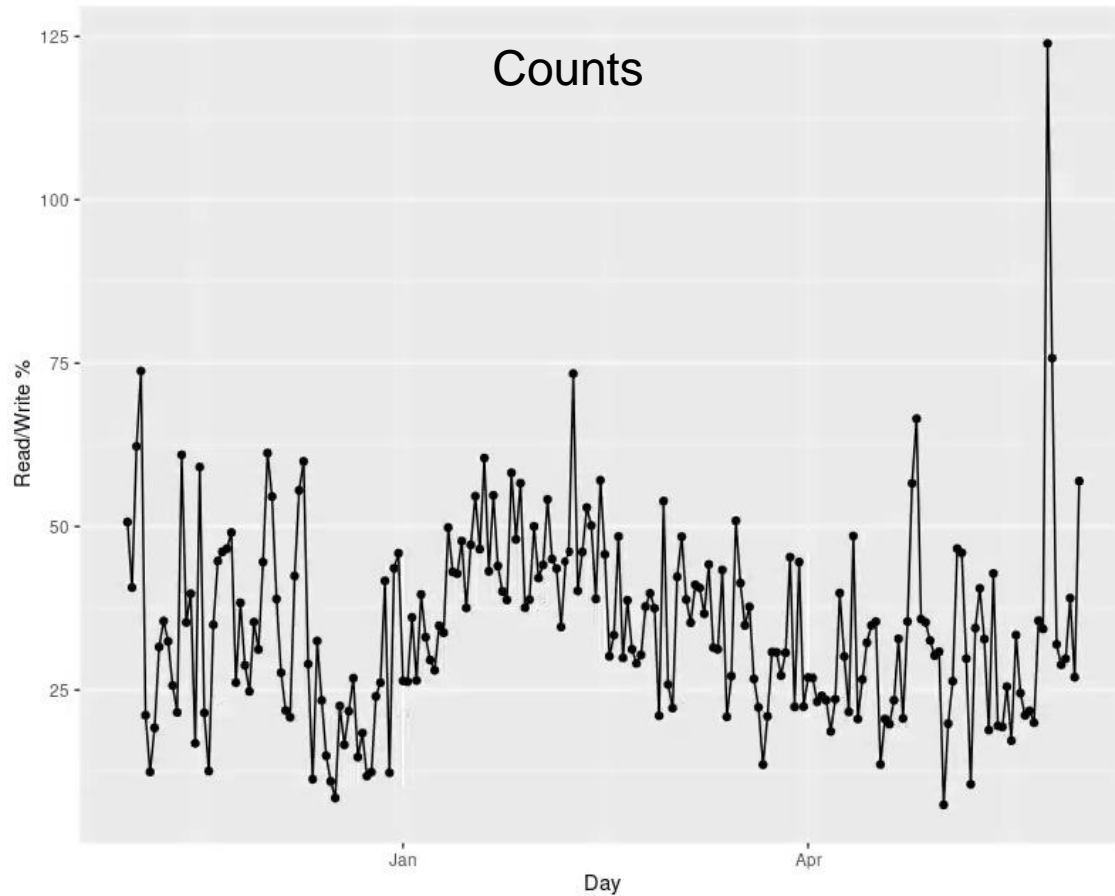


NOTE: Files that are read are not always written that day. Quite often written very different days.

# Comparing Write and Read at BNL

Divide the plots from the previous slide

# Conclusion

- A few more status will be looked at.
  - Duration between the write and the first use.
  - Duration between the last use and delete.
  - Frequency of reuse.
- Site use
  - Less than 1% of the data reside on the site storage is used per day
  - Site needs 0.4TB per kHS06 per day for jobs
    - DDM, Data Carousel and/or Data Lake needs to provide this rate to satisfy the needs of jobs at a site.
  - Large fraction of smaller files are never read.
  - A bit more than half of larger files are read.
  - Repeated use over the span of months are not frequent.

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