



CERN's DATA CENTER

Storage, CERNBox and web services

OVERVIEW



UTILITY

All services, such as scientific data management, email, videoconferencing, web services or databases, use equipment based there.



SERVERS

It's possible to count up to 470 000 processors and 100 000 hard disks, all running 24/7



SERVERS' statistics

<http://cern.ch/go/datacentrebynumbers>

Servers

9.1 K

Cores

420.3 K

Disks

100.6 K

Tape Drives

163

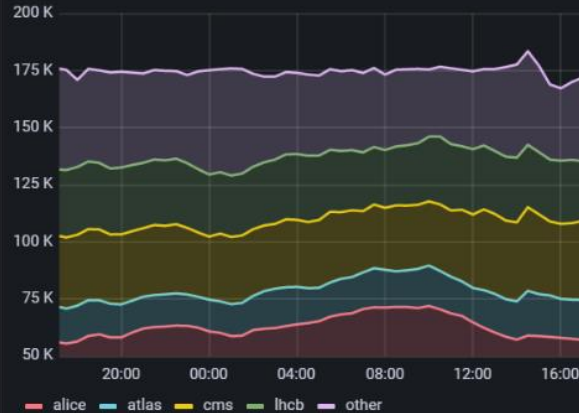
Routers

295

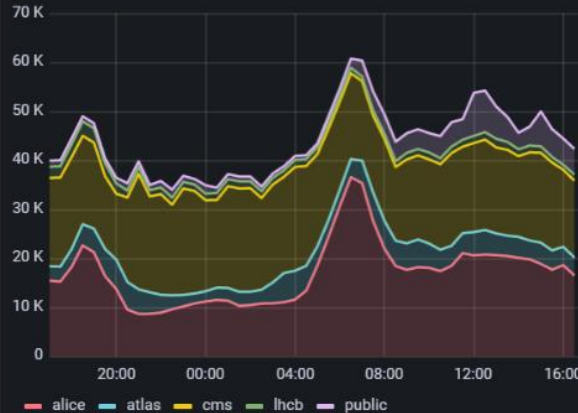
Wifi Points

4.9 K

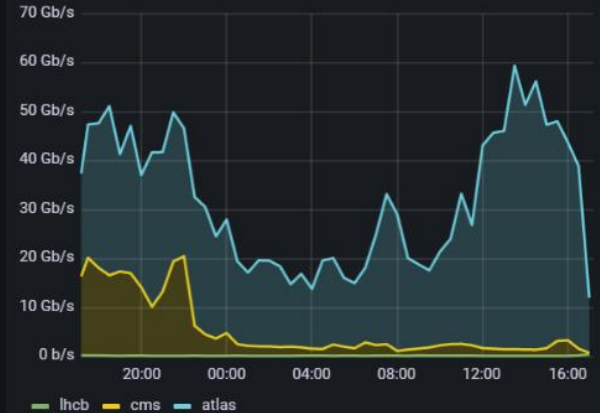
Batch Jobs Running



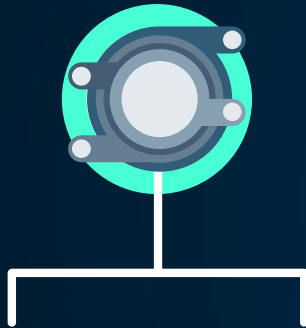
EOS Active Data Transfers



File Transfer Throughput



OVERVIEW



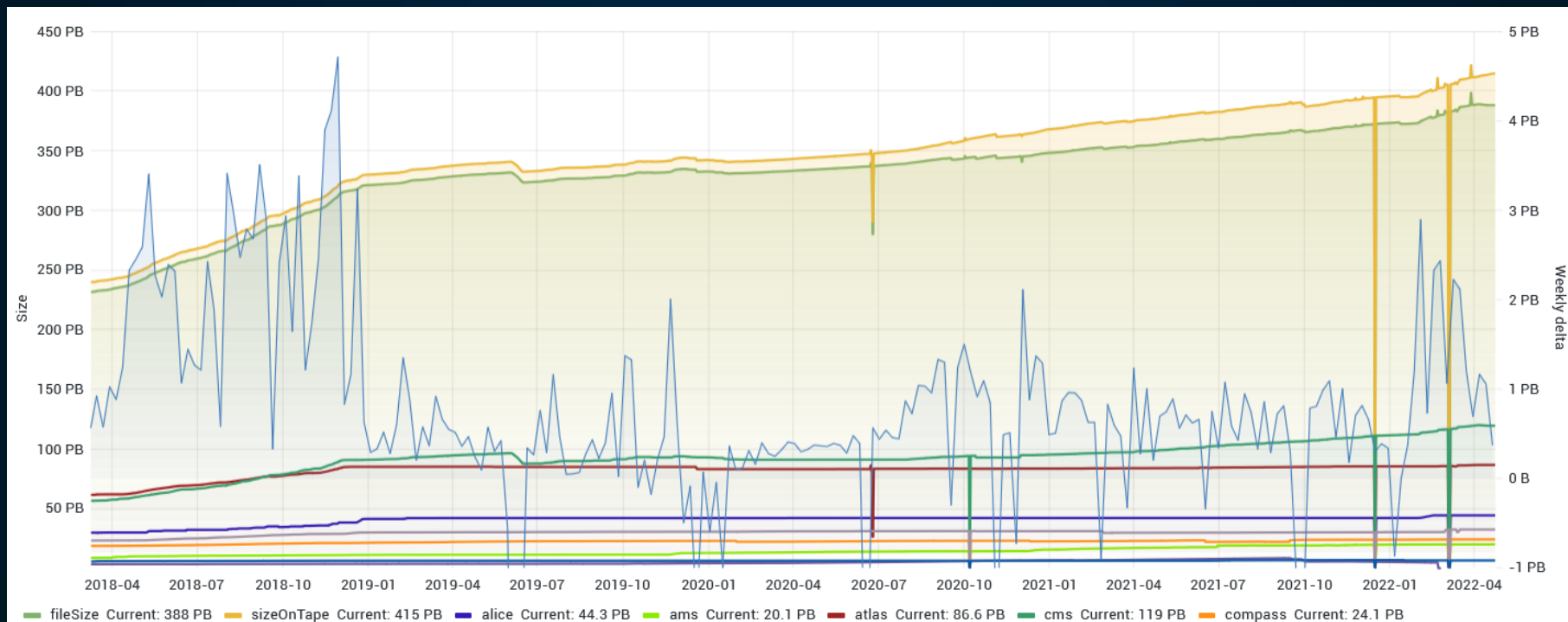
DATA

Experiments send over 10PB of data per month. In 2018, the data center received 115PB of data (record year so far)

These are 115PB worth of 32GB SD cards stacked on top of each other beside mount Everest!



AMOUNT OF DATA PRODUCED SINCE 2018





WHAT IS CERNBOX?

CERNBox is CERN's web storage hub. It allows synchronizing and sharing files on all major desktop and mobile platforms aiming to provide universal access and offline availability to any data stored in the CERN infrastructure.

WHAT DOES CERNBOX OFFER?



SECURITY

CERNBox has a dedicated security team working on it so you can trust the service without any doubt



ACCESSIBILITY

You can access CERNBox wherever you want and from whatever device you prefer



COLLABORATION

Projects and folders in CERNBox can be shared and worked on with your colleagues

COOL FACTS ABOUT CERNBox

IT OFFERS 1TB OF SPACE
TO EVERYONE AT CERN

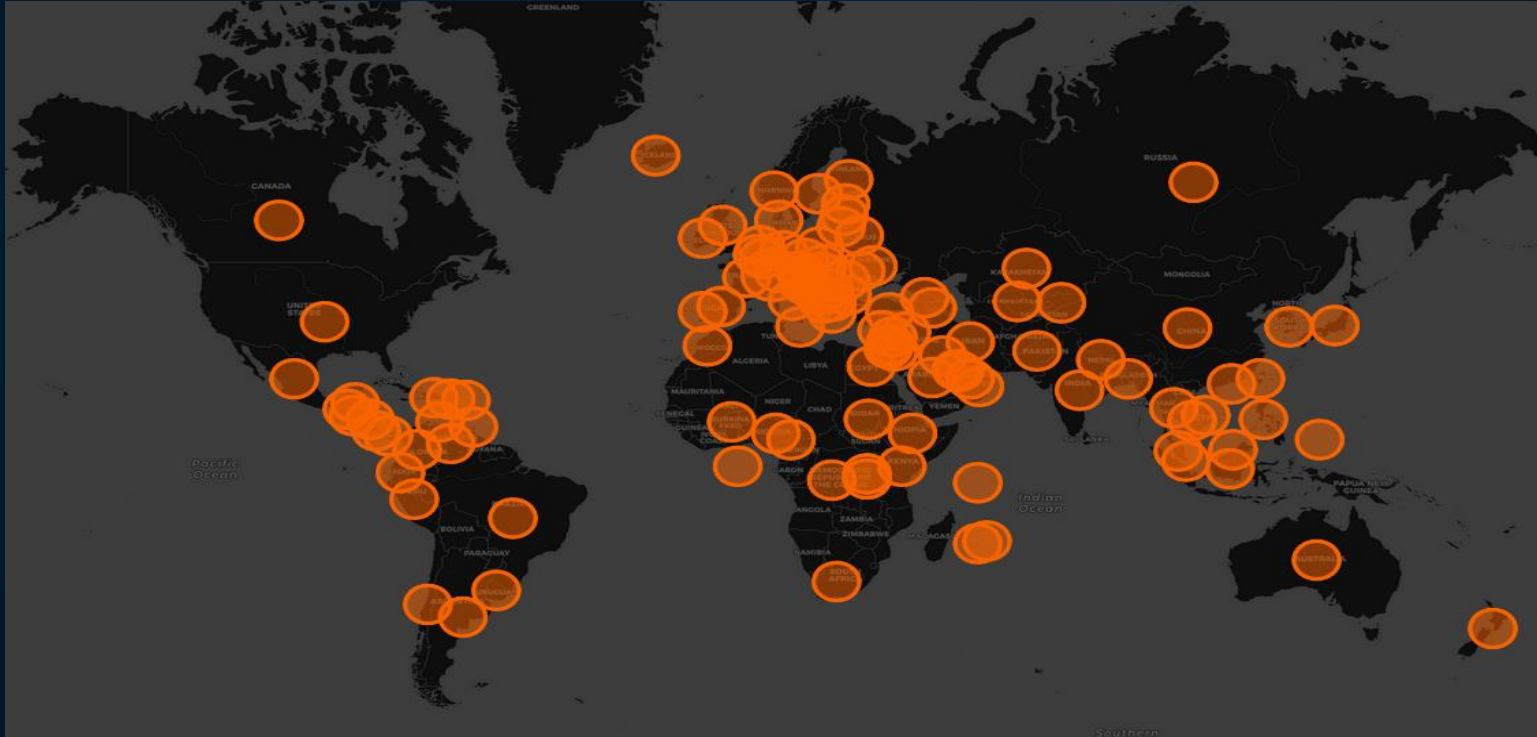
CERNBox SERVERS ARE
ALL AT CERN'S DATA
CENTER



CERNBox IS OPERATED BY A
TEAM OF 4 STAFF AND 8
COLLABORATORS

IT HAS 6000
MONTHLY USERS

CERNBox WORLDWIDE USAGE



THE MONTE CARLO METHOD

In the majority of the lectures we attended during these two weeks, we talked about the “Monte Carlo” method, used to foresee possible results of experiments without actually doing them.

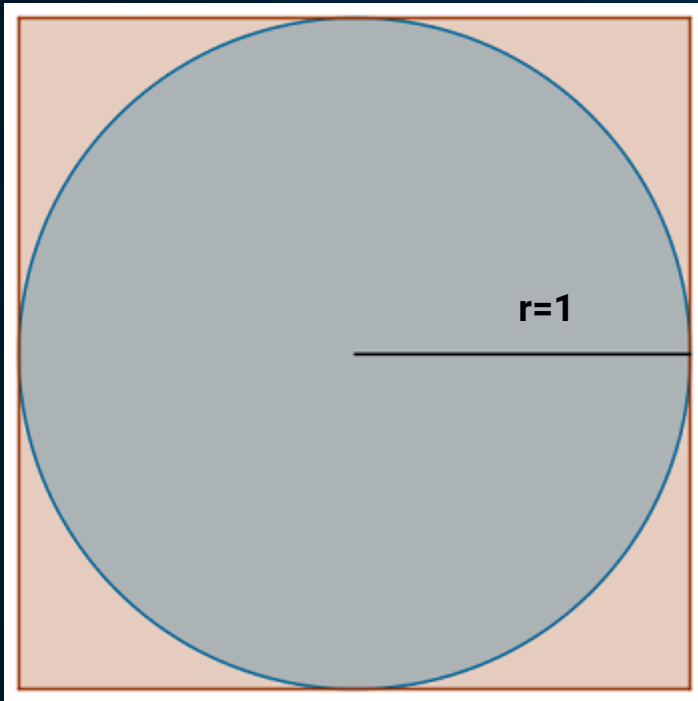
As we'll clarify in the next minutes, it isn't that precise, but it helps a lot in terms of understanding the range of logical possibilities.



HOW DOES IT WORK?

Let's apply it to estimate π !

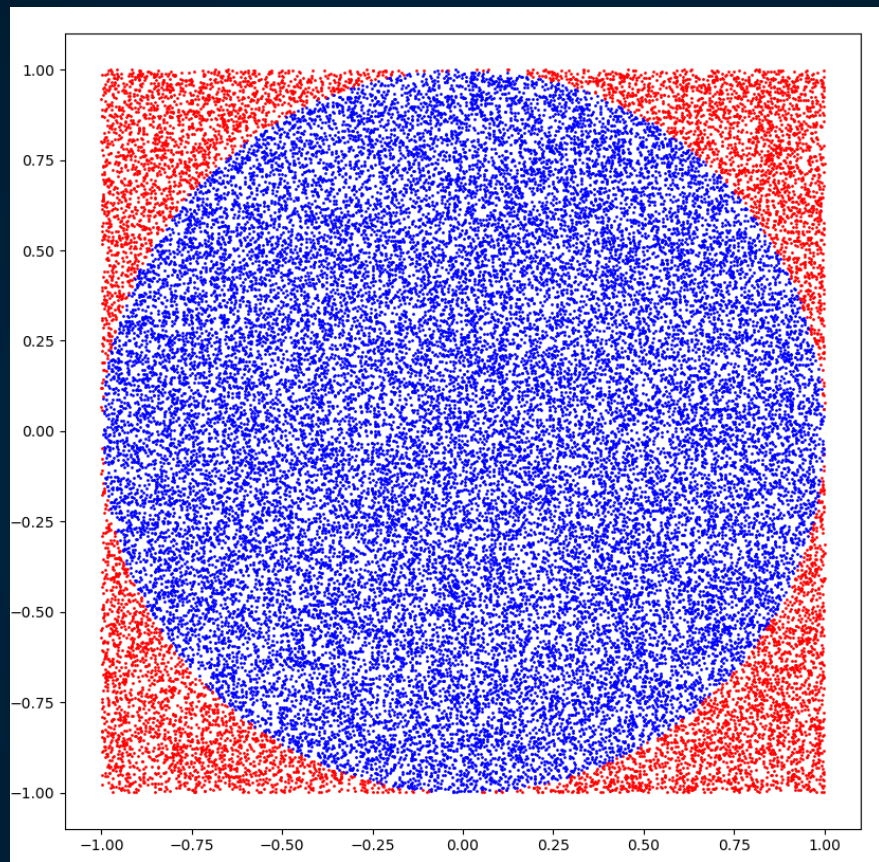
$$l=2r=2$$



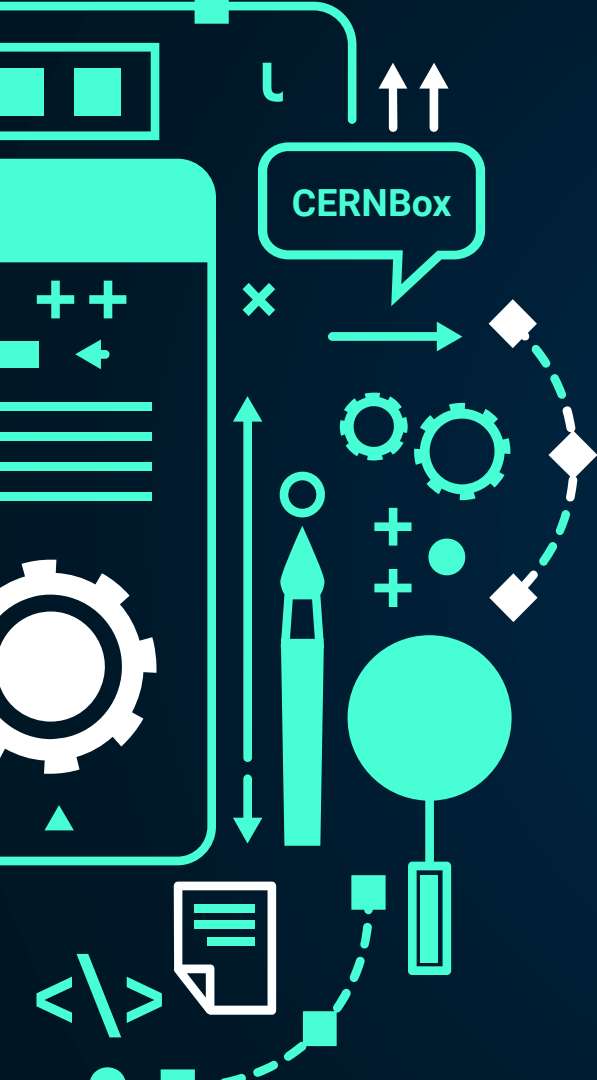
The probability of hitting the circle with a small point, called “event”, is simply a consequence of the direct application of the definition of “probability” itself: the number of favorable cases divided for the number of possible cases. The denominator is the whole square, while the numerator is the circle. From here we can solve the equation and find π .

$$p = \frac{\text{favorable cases}}{\text{possible cases}} = \frac{\text{circle's surface}}{\text{square's surface}} = \frac{\pi r^2}{l^2} = \frac{\pi r^2}{(2r)^2} = \frac{\pi r^2}{4r^2} = \frac{\pi}{4}$$

$$\pi = 4p = 4 \frac{\text{events in the circle}}{\text{events in the square}}$$



Monte Carlo visualized (with 10 000 points)



THANK YOU!

CREDITS:

Supervisor: Giuseppe Lo Presti

Data storage: CERNBox

Software platform: Service for Web based ANalysis (SWAN)

Math editor: MathType

Programming language: Python