



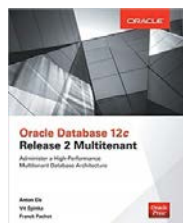


# Who am I?

## Franck Pachot

### Database Engineer at CERN

- Twitter [@FranckPachot](https://twitter.com/FranckPachot)
- Medium: <https://medium.com/@FranckPachot>



**ORACLE**  
ACE Director



**ORACLE**  
Certified Master  
Oracle Database 12c  
Administrator



# CERN

CERN - European Laboratory for Particle Physics

Founded in 1954 by 12 Countries for fundamental physics research in the post-war Europe

Today 22 member states and world-wide collaborations

- About ~1100 MCHF yearly budget
- 2'300 CERN personnel
- 10'000 users from 110 countries



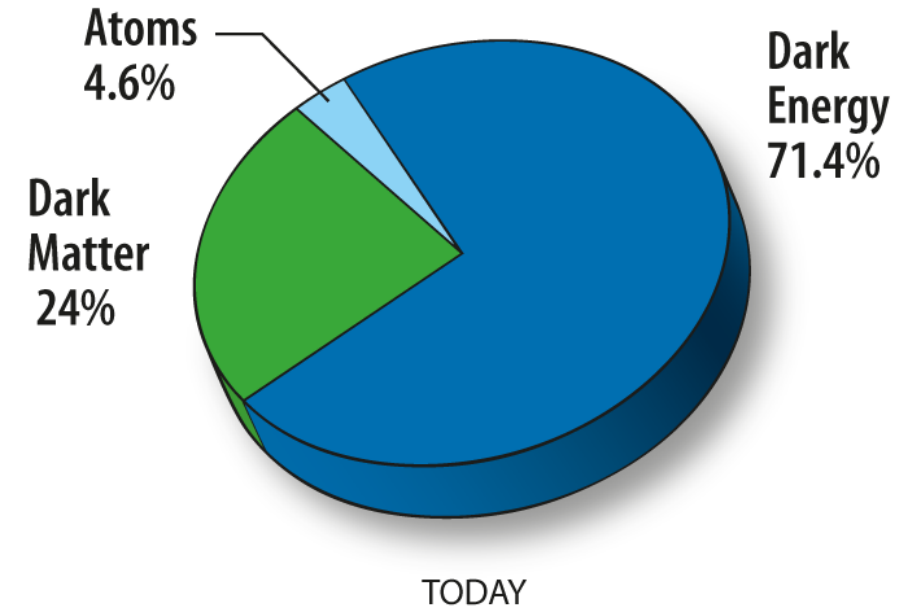
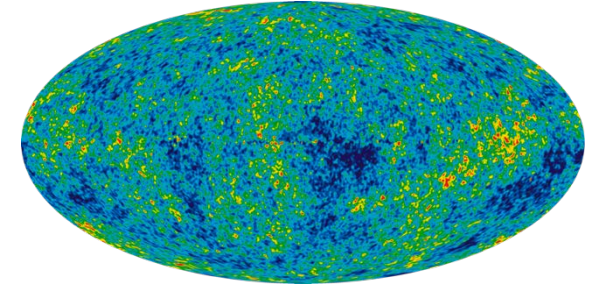
# Fundamental Research

What is 95% of the Universe made of?

Why do particles have mass?

Why is there no antimatter left in the Universe?

What was the Universe like, just after the "Big Bang"?



# The Large Hadron Collider (LHC)



**Largest machine** in the world

27km, 6000+ superconducting magnets

**Fastest racetrack** on Earth

Protons circulate 11245 times/s (99.9999991% the speed of light)

**Emptiest** place in the solar system

High vacuum inside the magnets

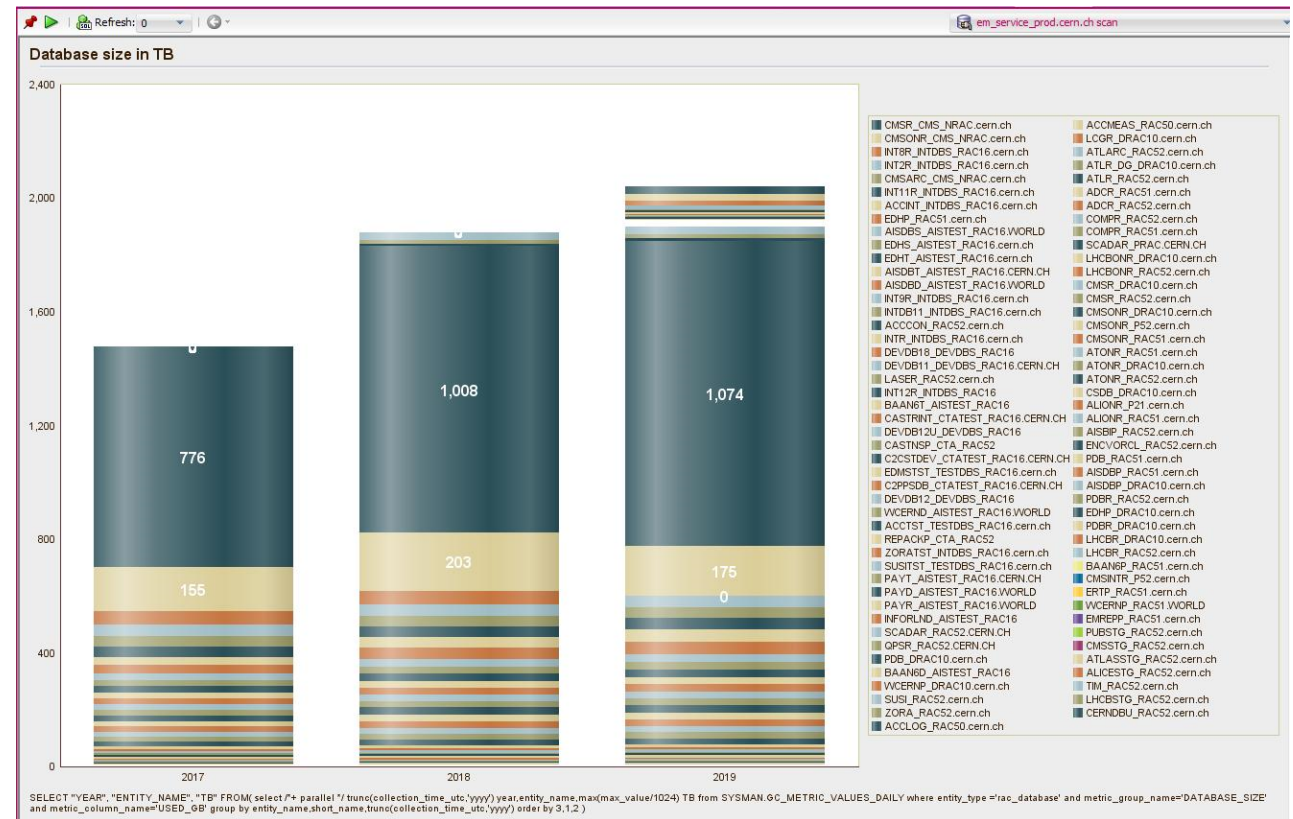
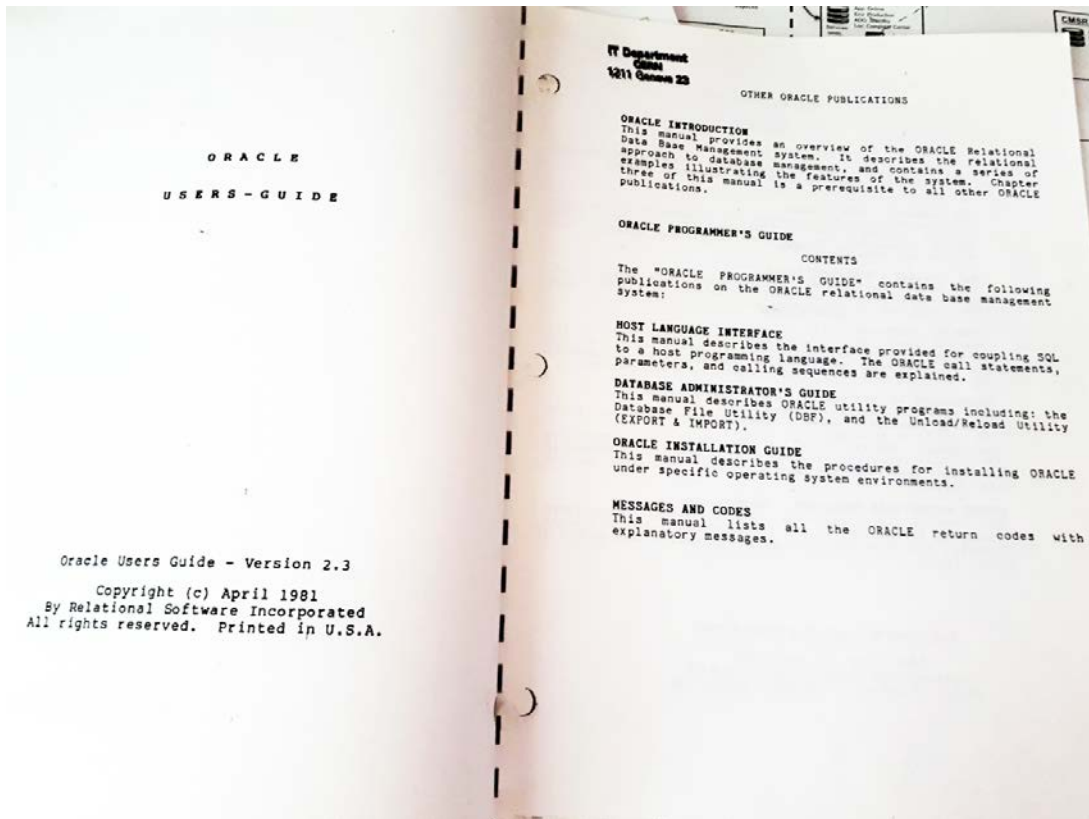
**Hottest spot** in the galaxy

During Lead ion collisions create temperatures 100 000x hotter than the heart of the sun

# Oracle at CERN

1982, benchmark on version 2.3

Today: 2PB, all productions in MAA



SELECT 'YEAR', 'ENTITY\_NAME', 'TB' FROM (select /\*+ parallel \*/ trunc(collection\_time\_utc/yyyy) year, entity\_name, max(max\_value/1024) TB from SYSMAN.GC\_METRIC\_VALUES\_DAILY where entity\_type='rac\_database' and metric\_group\_name='DATABASE\_SIZE' and metric\_column\_name='USED\_GB' group by entity\_name, short\_name, trunc(collection\_time\_utc/yyyy) order by 3,1,2)

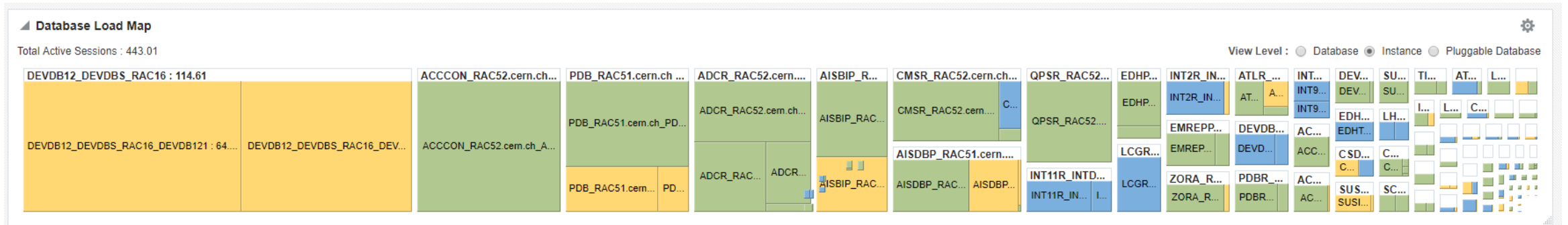
# Databases at CERN

Physics databases, for each LHC experiment we have:

- "Online": highly critical for data ingestion
- "Offline": critical for data distribution and analysis (WLCG)

Administrative databases:

- like a 60yo company with 2000 employees and 10000 users worldwide



# Active Data Guard at CERN

## 1. For Disaster Recovery

- Primary in Meyrin
- Standby in Wigner
- 3x100 Gbit/s fiber (30ms)

## 2. For offloading backups

## 3. For security

- Read/write (primary) on isolated technical network only, read-only ADG on general network





# Our to-do 2019-20 (LHC shutdown)

## Upgrades to 19c

- Test upgrade duration with snapshot standby

## Move DR from Wigner to Preveessin (5km)

- Using Role transition
- Running in SYNC Mode

## Data Guard broker configuration for all databases

- FSFO observe-only mode

## Extend Transparent Failover to more applications

- Connection Manager (CMAN) Traffic Director

