WIGNER Datacenter – Introduction
HEPIX 2014, Annecy

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WIGNER

DATACENTER


cern@wigner
Prezi


1. CERN & LHC
2. Grid & Tier-0
3. WDC & CERN@WIGNER
Prezi

1. CERN & LHC

FACTS

- European Organization for Nuclear Research
- 20 member states and 5 associates / candidates
- 1.2 billion CHF yearly budget
- One of the largest scientific research institutes in the world
- [illegible] permanent staff and over 10,000 visiting scientists
- World Wide Web was born at CERN in 1990
- Goal: ultimate understanding of matter and the origin of the Universe

1. CERN

FACTS

- European Organization for Nuclear Research
- 20 member states and 5 associates / candidates
- 1.2 billion CHF yearly budget
- One of the largest scientific research institutes in the world
- ca. 4000 permanent staff and over 10,000 visiting scientists
- World Wide Web was born at CERN in 1990
- Goal: ultimate understanding of matter and the origin of the Universe

LHC

FACTS

- 27 km particle accelerator ring
- 1600 superconducting magnets, 27 tons each
- ultrahigh vacuum: emptier than interplanetary space
- cost 4.5 billion EUR to build, 20 million EUR yearly electricity bill
- over 300 trillion protons circulate 11,000 times a second
- ca. 1 billion proton-proton collisions every second
- 4 large detectors record the collisions: ALICE, ATLAS, CMS and LHCb
- detectors are like gigantic digital cameras: ~500 Megapixels, 2000 fps

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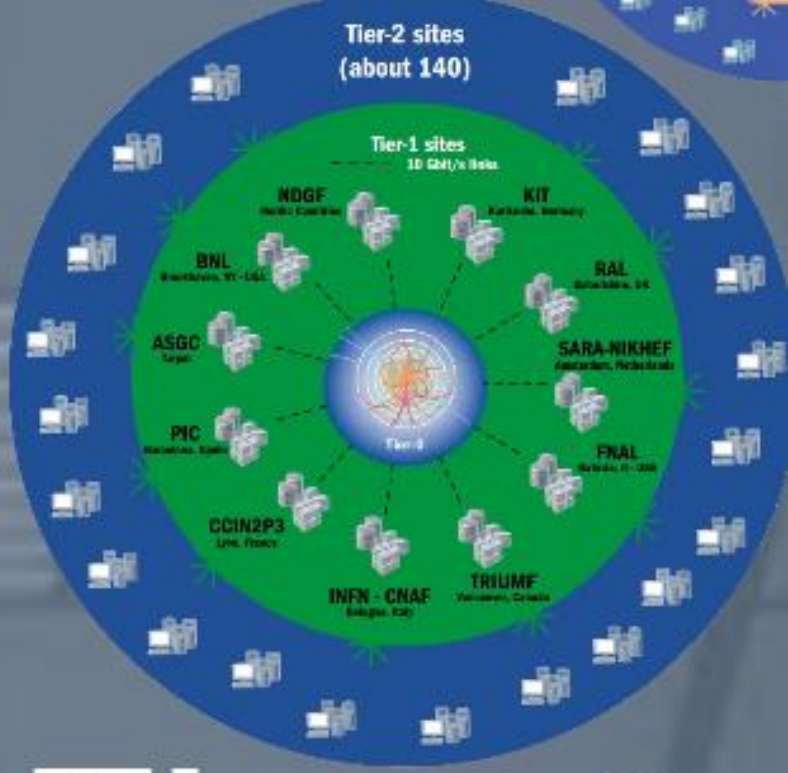

Tier-2 sites
(about 140)
Tier-1 sites
10 Gbit/s links
NDGF
KIT
BNL
RAL
ASGC
SARA-NIKHEF
PIC
FNAL
CCIN2P3
INFN - CNAF
TRIUMF

2. Grid & Tier-0

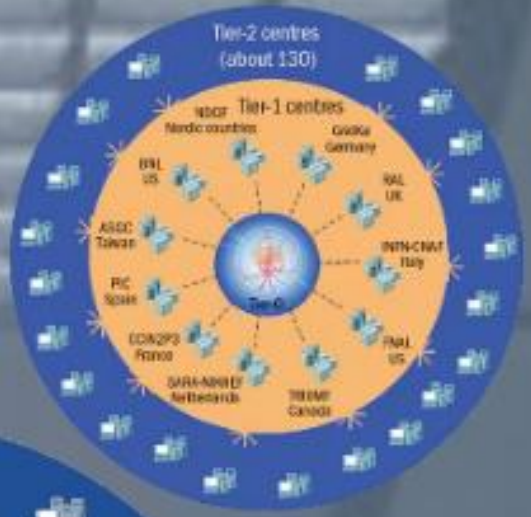
FACTS

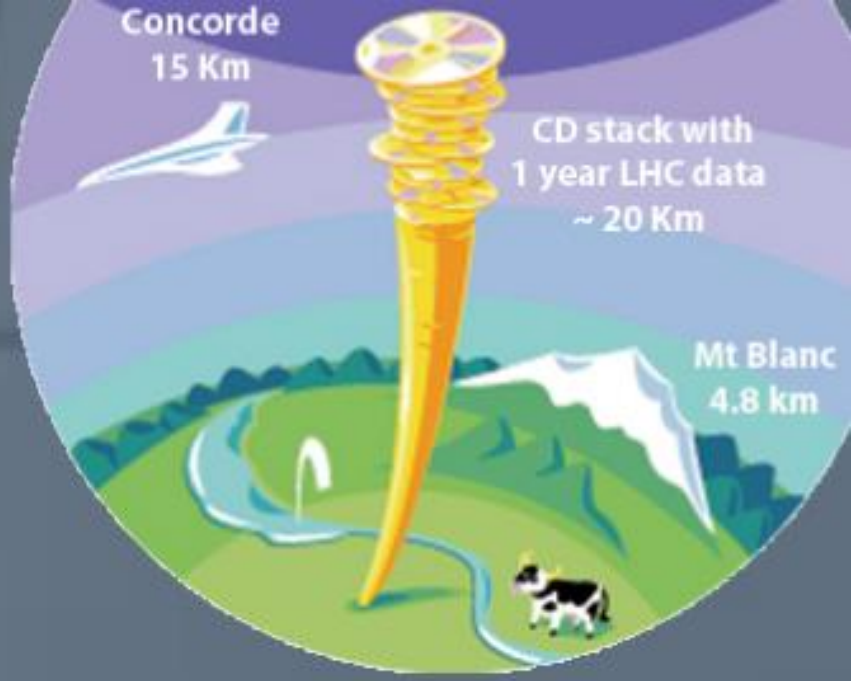
- total detector data bandwidth: ca. 300 GB/sec
- filtered raw detector data: ca. 300 MB/sec (recorded)
- total daily data produced: ca. 40 TB
- total data produced: ca. 15-20 PB / year (CDs stacked 20 km high)
- analyzed by a distributed global computing network: LHC Computing Grid
- Grid resources: ca. 200,000 cores and 150 PB storage total in 35 countries
- top of the hierarchy: Tier-0 centre

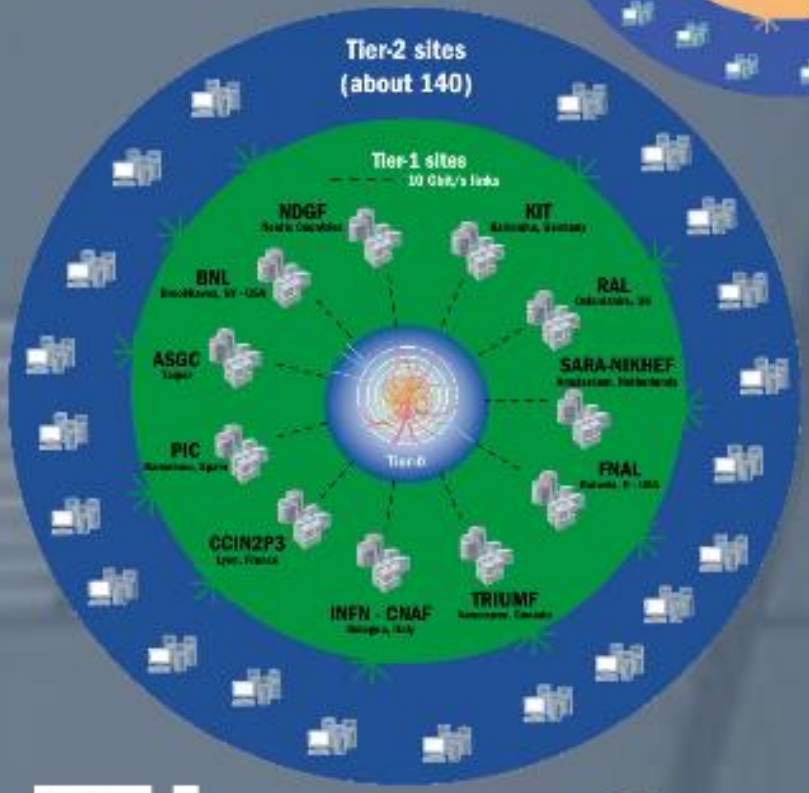
2. Grid

FACTS

- total detector data bandwidth: ca. 300 GB/sec
- filtered raw detector data: ca. 300 MB/sec (recorded)
- total daily data produced: ca. 40 TB
- total data produced: ca. 15-20 PB / year (CDs stacked 20 km high)
- analyzed by a distributed global computing network: LHC Computing Grid
- Grid resources: ca. 200,000 cores and 150 PB storage total in 35 countries
- top of the hierarchy: Tier-0 centre







FACTS

- critical importance: Tier-0 records & distributes all LHC data
- If Tier-0 is down, invaluable LHC data is lost and / or unreachable
- Tier-0 capacity: ca. 50,000 cores and 50 PB disk storage
- Tier-0 availability: ca. 99.99% ('four 9s')
- Tier-0 connectivity: ca. 100 Gbps

Tier-0

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3. WDC & CERN@WIGNER

Wigner Data Center

Prezi

FACTS

-WIGNER RCP: strong computing involvement since 2000
- LHC Grid Tier-2 centre since 2004
- Supercomputing since 2008 (GENAGRID)
- [illegible] since 2009
- [illegible] sustainable, high capacity/density datacentre
- 2011 design for CERN Tier-0 hosting tender criteria

3. WDC

Wigner Data Center

FACTS

-WIGNER RCP: strong computing involvement since 2000
- LHC Grid Tier-2 centre since 2004
- Supercomputing since 2008 (GENAGRID)
- GPU computing since 2009
- 2010 concept: sustainable, high capacity/density datacentre
- 2011 design for CERN Tier-0 hosting tender criteria

CERN@WIGNER

FACTS

- CERN computing centre has limited capacity (ca. 3 MW)
- Insufficient for Tier-0 needs from 2014
- No possibility to raise electrical input
- Hosting tender for Tier-0 in November 2011
- High-security, high-availability infrastructure
- 100Gbps WAN connectivity
- Value-added hosting model
- WIGNER awarded contract in May 2012 (out of 16 bids from 30 invited)
- WDC inaugurated on 13th June 2013

has two hearts, one in Switzerland and now one in Budapest'
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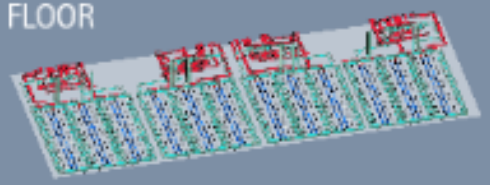
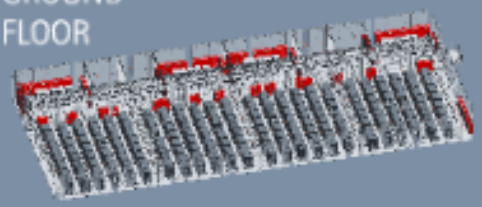
'CERN has two hearts, one in Switzerland and now one in Budapest'
(Rolf-Dieter Heuer, General Director of CERN)

DATA CENTER

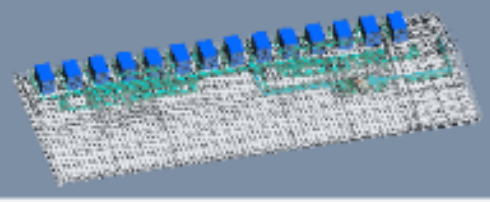
DOUBLE FLOOR



GROUND FLOOR



ROOF



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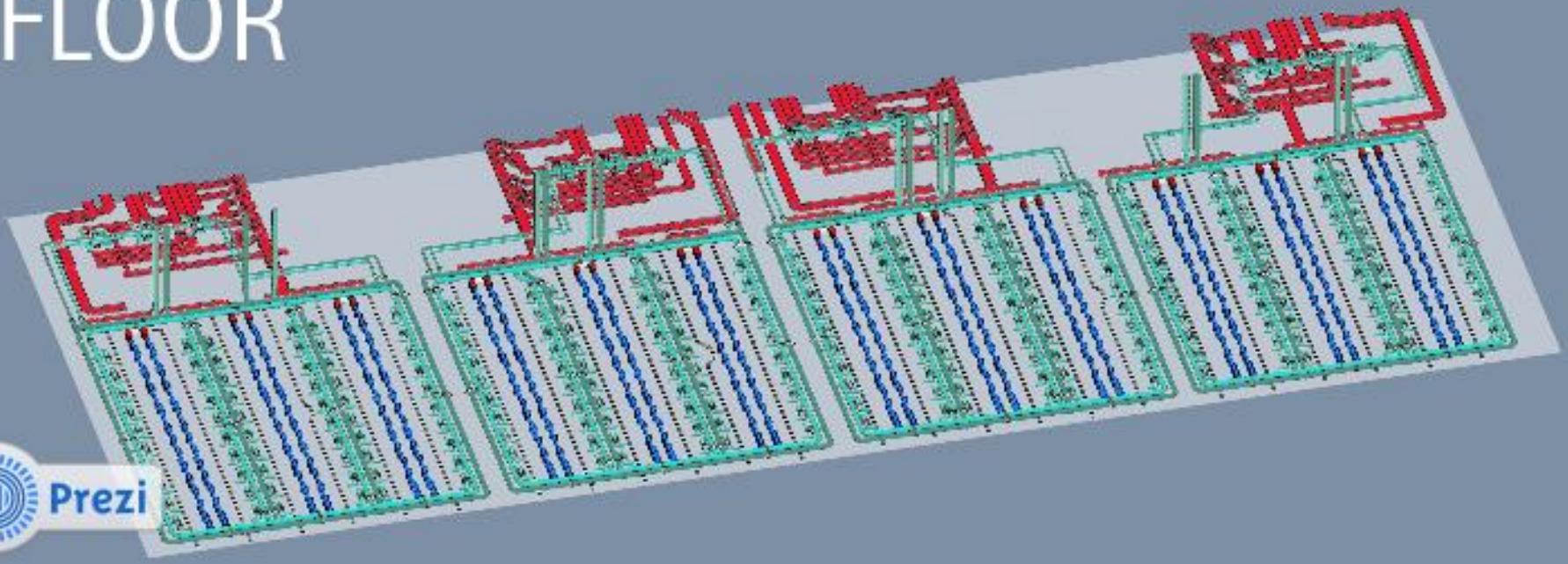

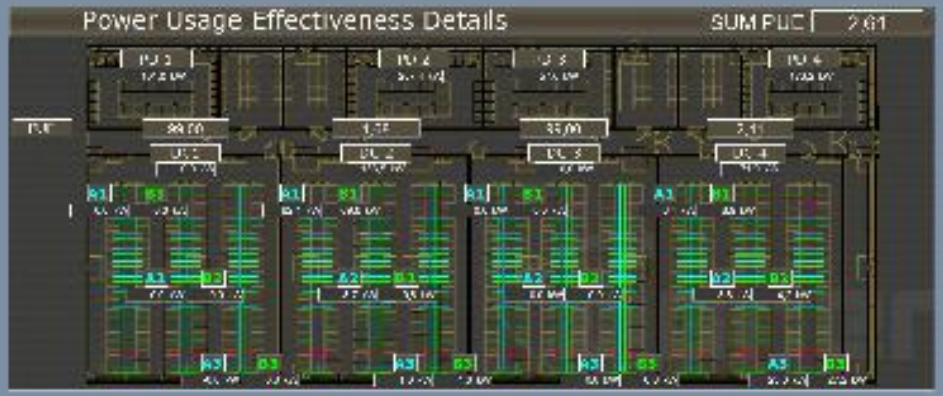

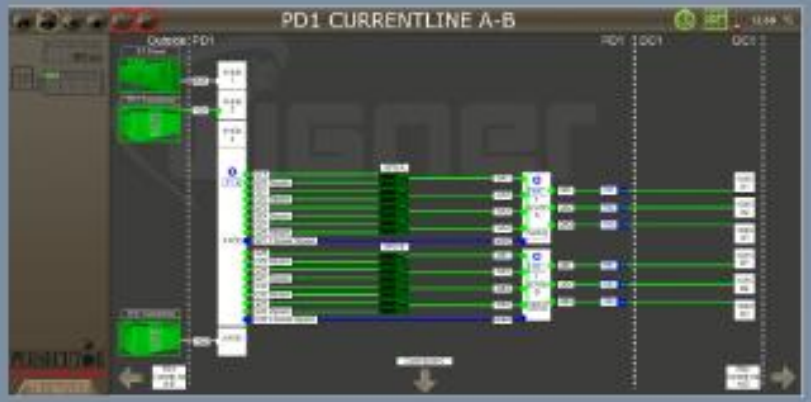

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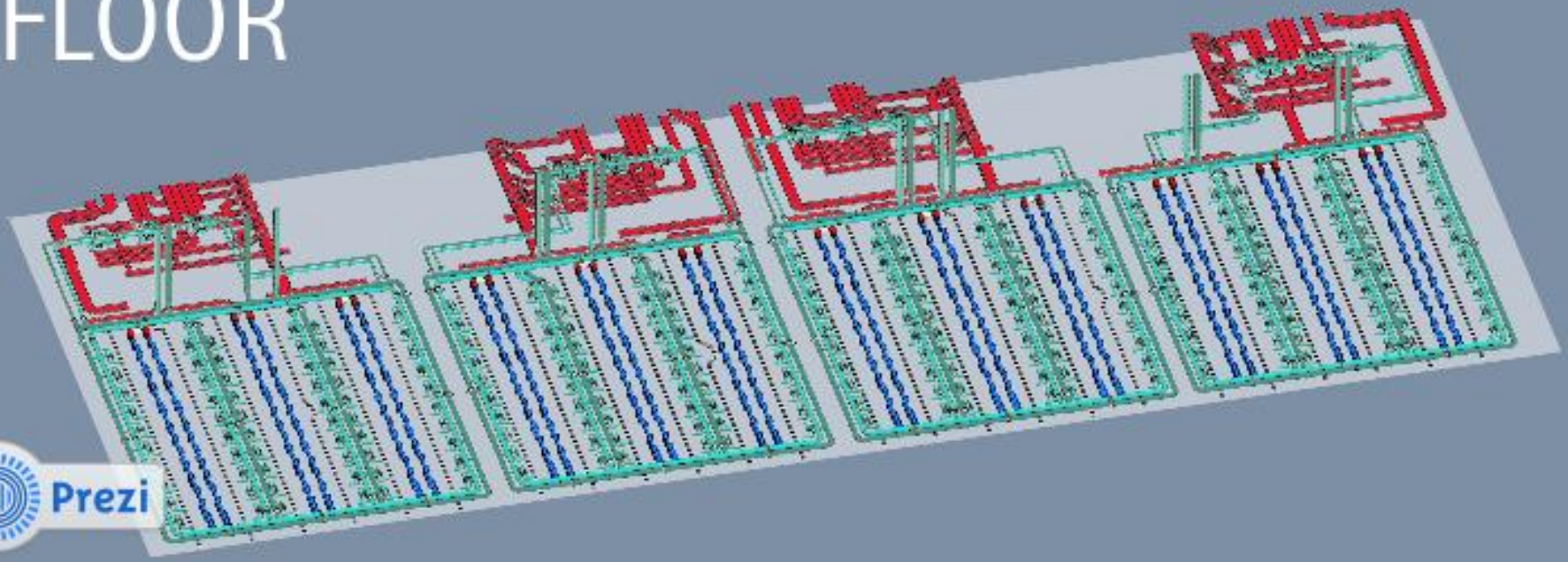

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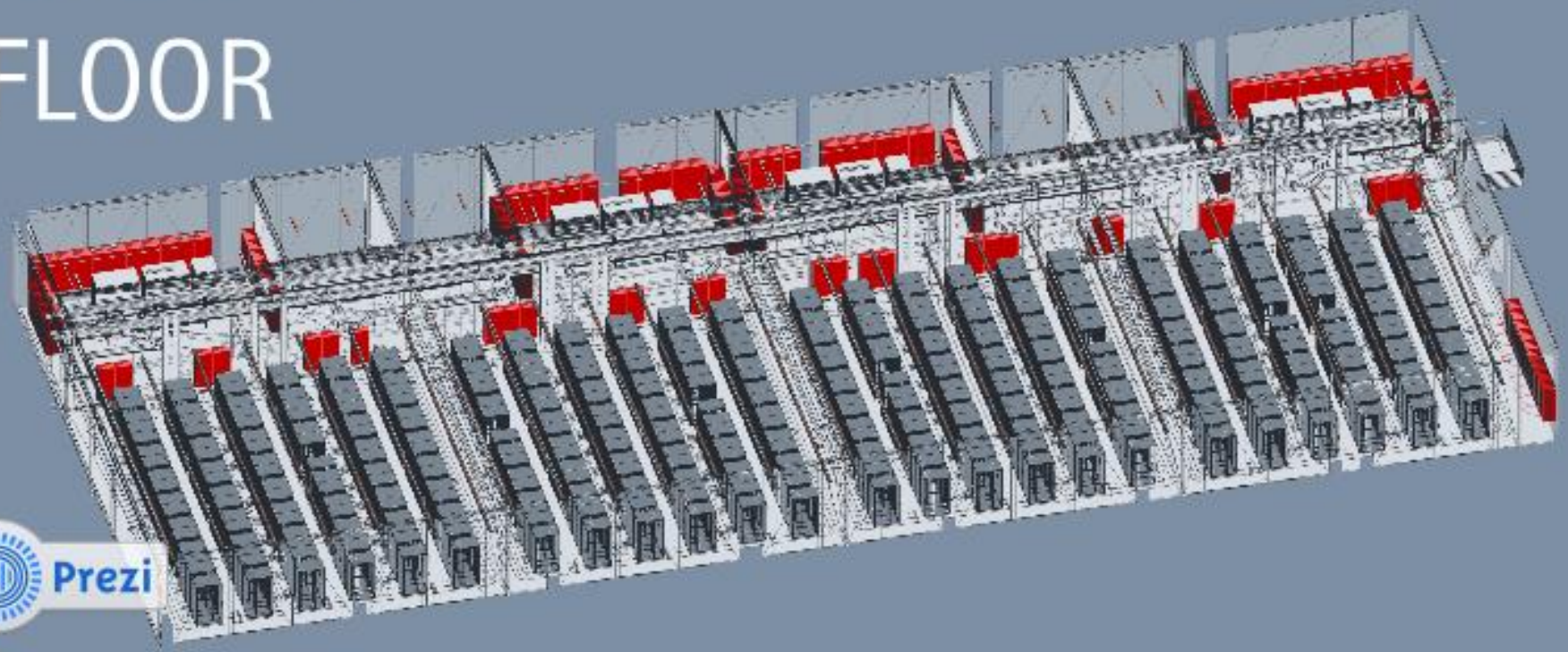

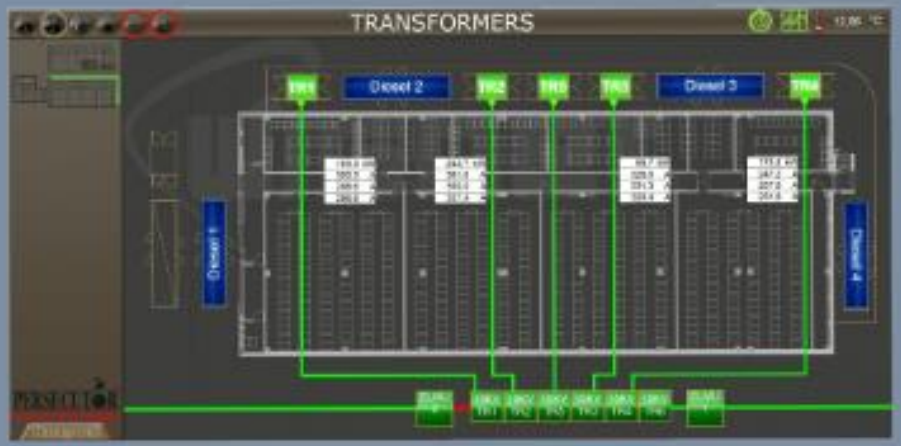

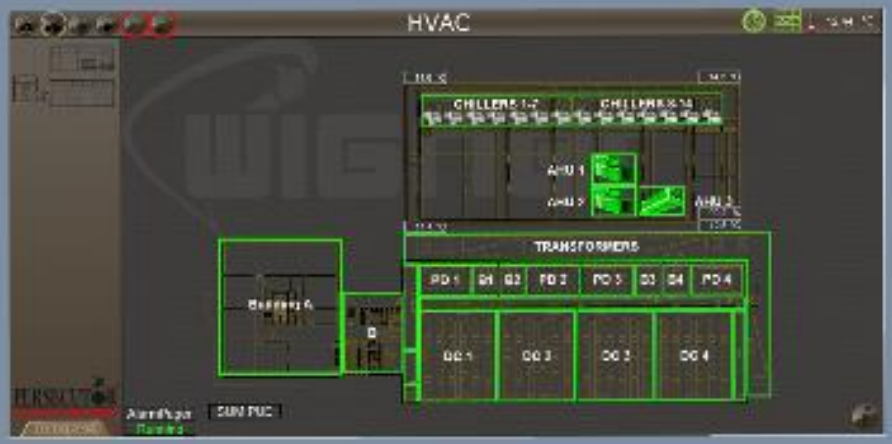

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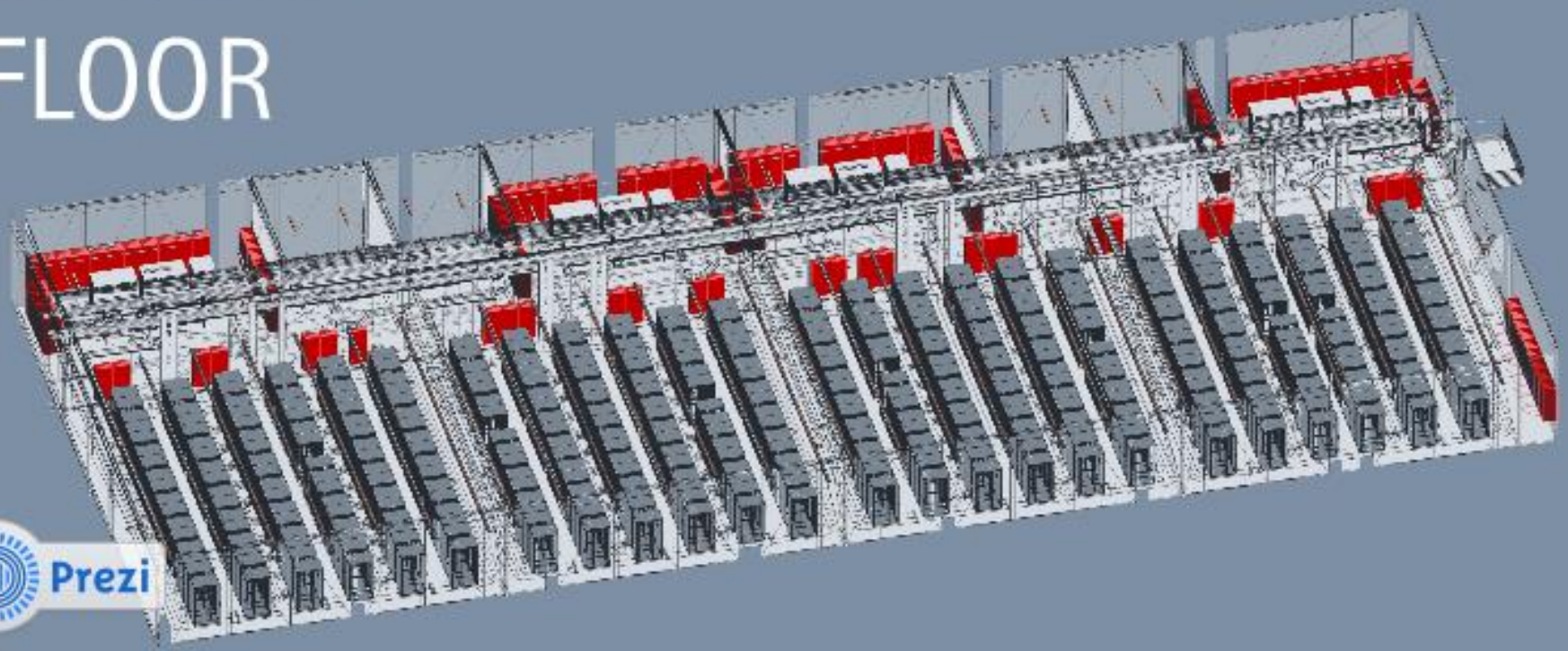

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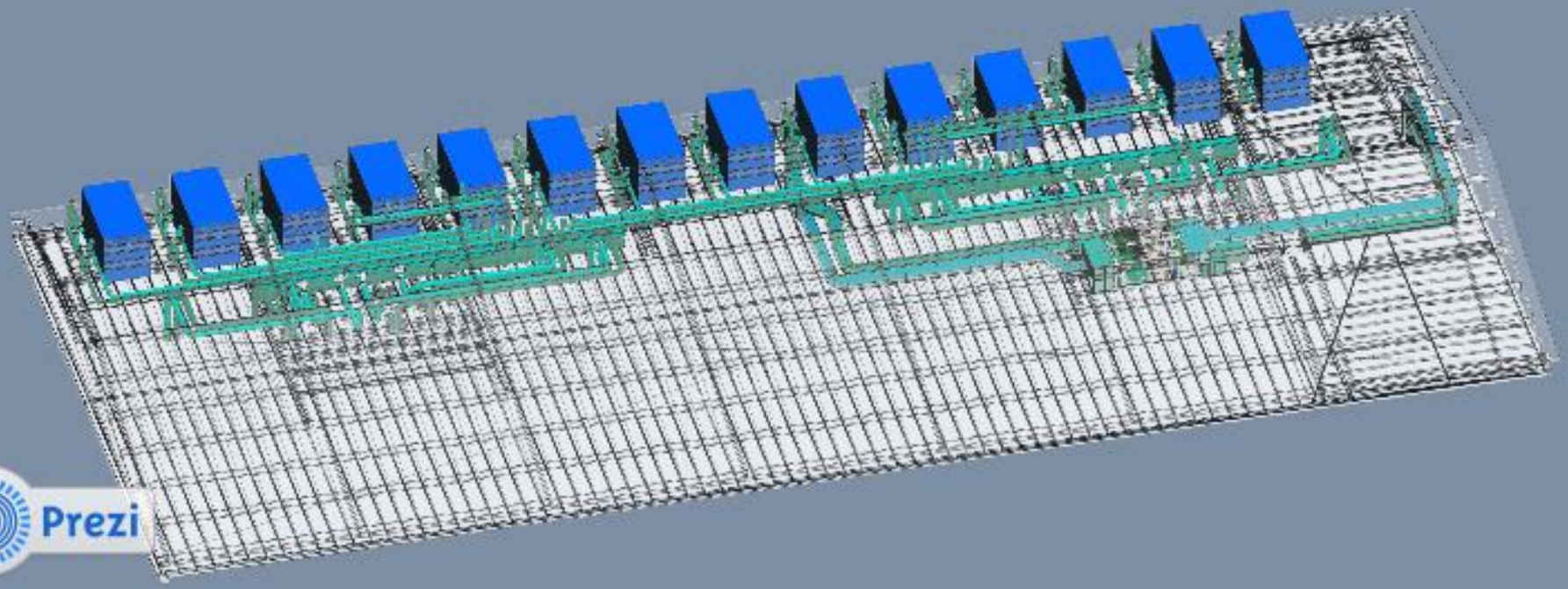
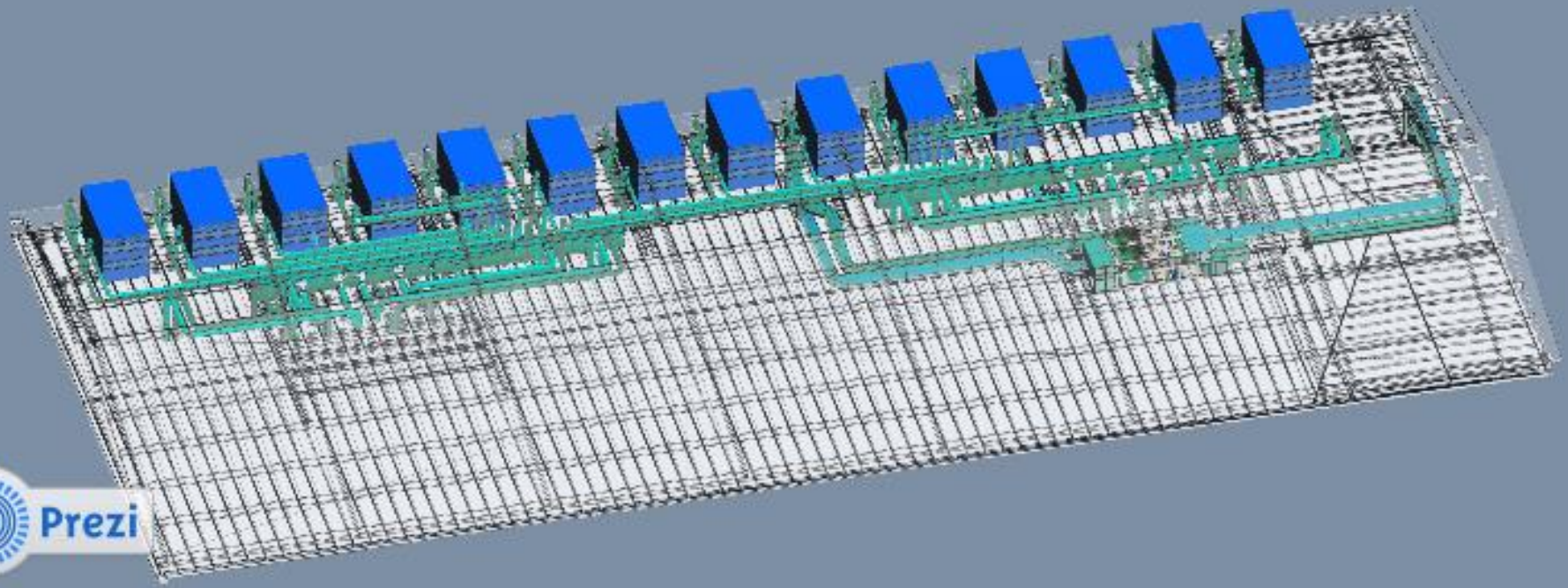


ROOF


Chillers 1-7
Water Cooling
Temperatures
Pipe Heating
AHU 1
AHU 2
DataCenter 1
1. Ring
Pipeline
DataCenter 1
2. Ring
Pipeline
Optika2
DataCenter 2
1. Ring
Pipeline
DataCenter 2
2. Ring
Pipeline
PERSECUTOR



DATA CENTER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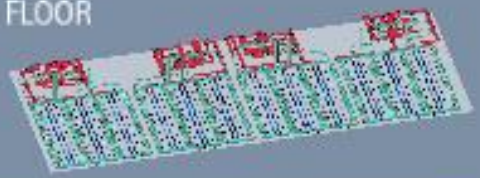

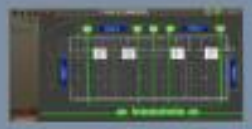


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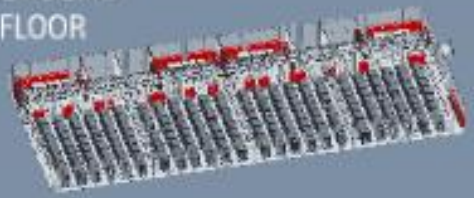

ROOF