facebook

The Open Compute Project

Amir Michael
Facebook
Manager, System Engineering

Schedule

1:30 - Project motivation and high level system design
Amir Michael (manager, system engineering)

2:30 - Storage design
Eran Tal (hardware engineer)

3:00 - Break

3:30 - Motherboard design
Harry Li (hardware engineer)

4:00 - Power supply design
Pierluigi Sarti (technical lead, power)

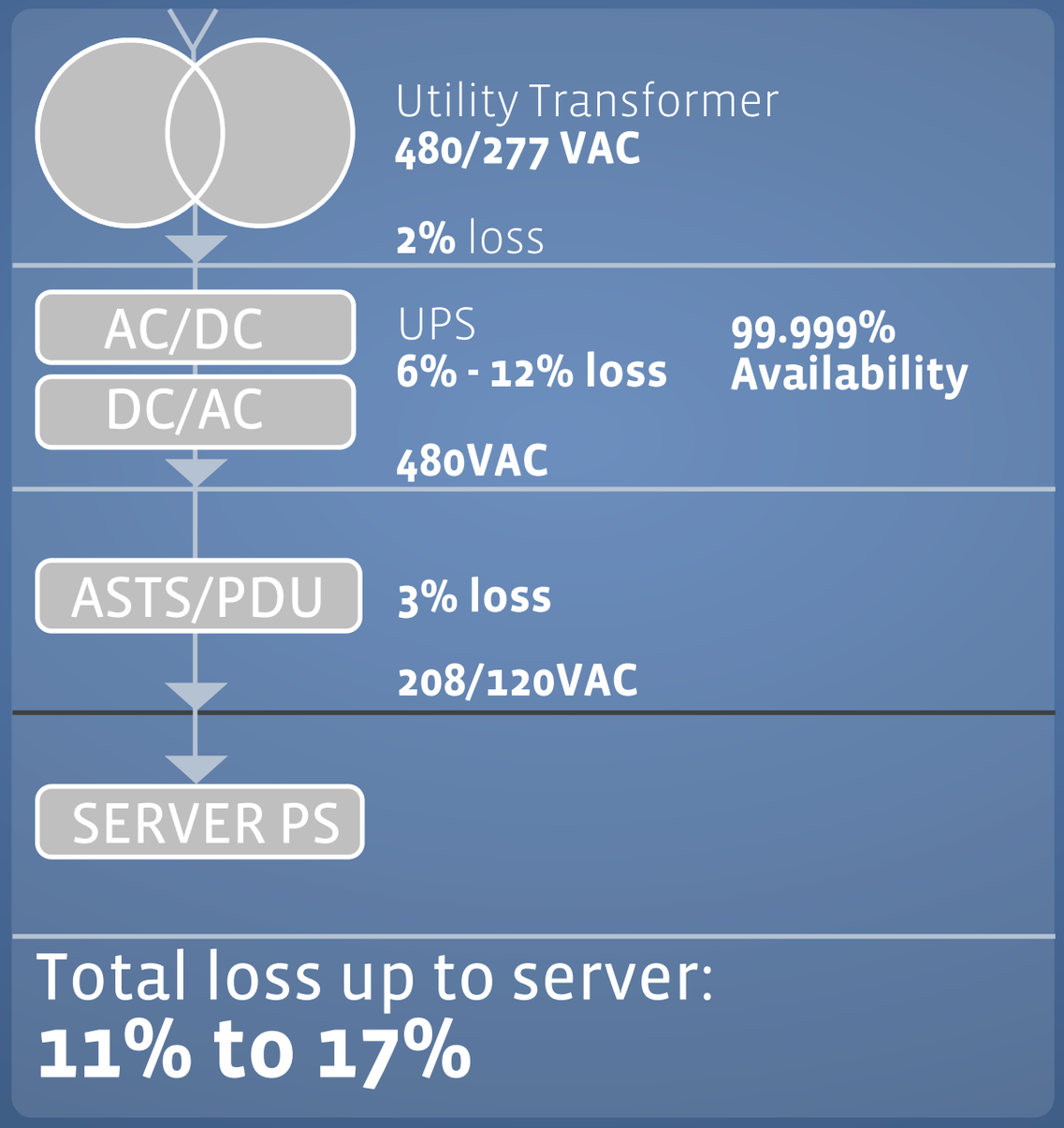
4:30 - Open source and challenges
David Recordon (open source manager)

Look familiar?

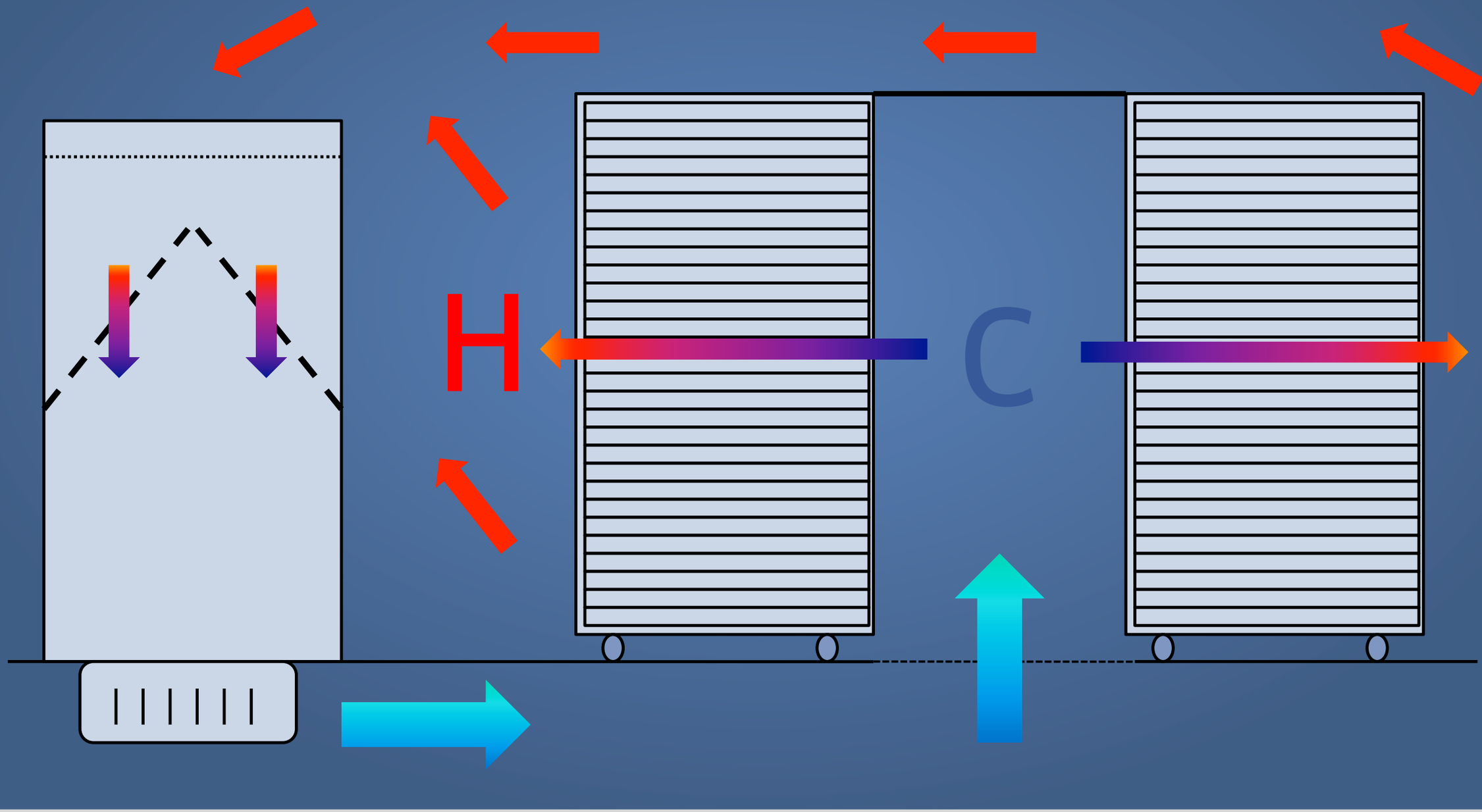
Opportunities for improvement

- TCO
  - acquisition cost (CapEx)
    - design
    - features
  - operation cost (OpEx)
    - power
    - cooling
    - service
  - performance

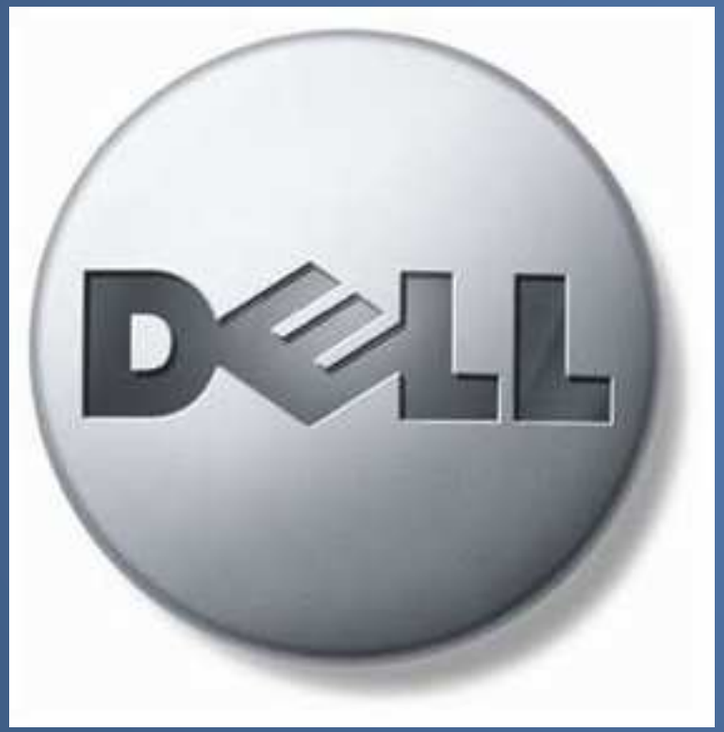
Typical Power



Traditional Data Center



Acquisition Cost



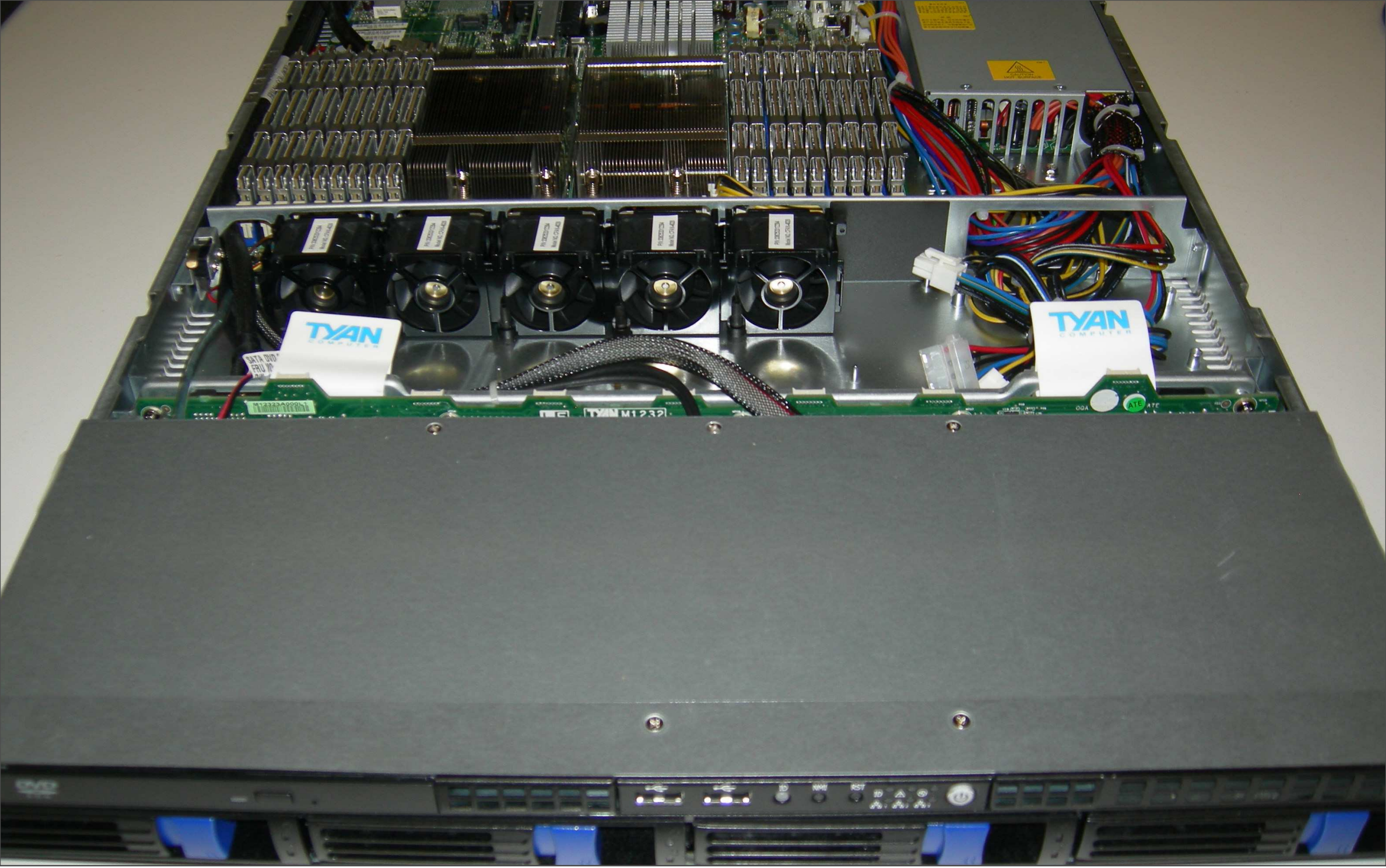
vs.

Design

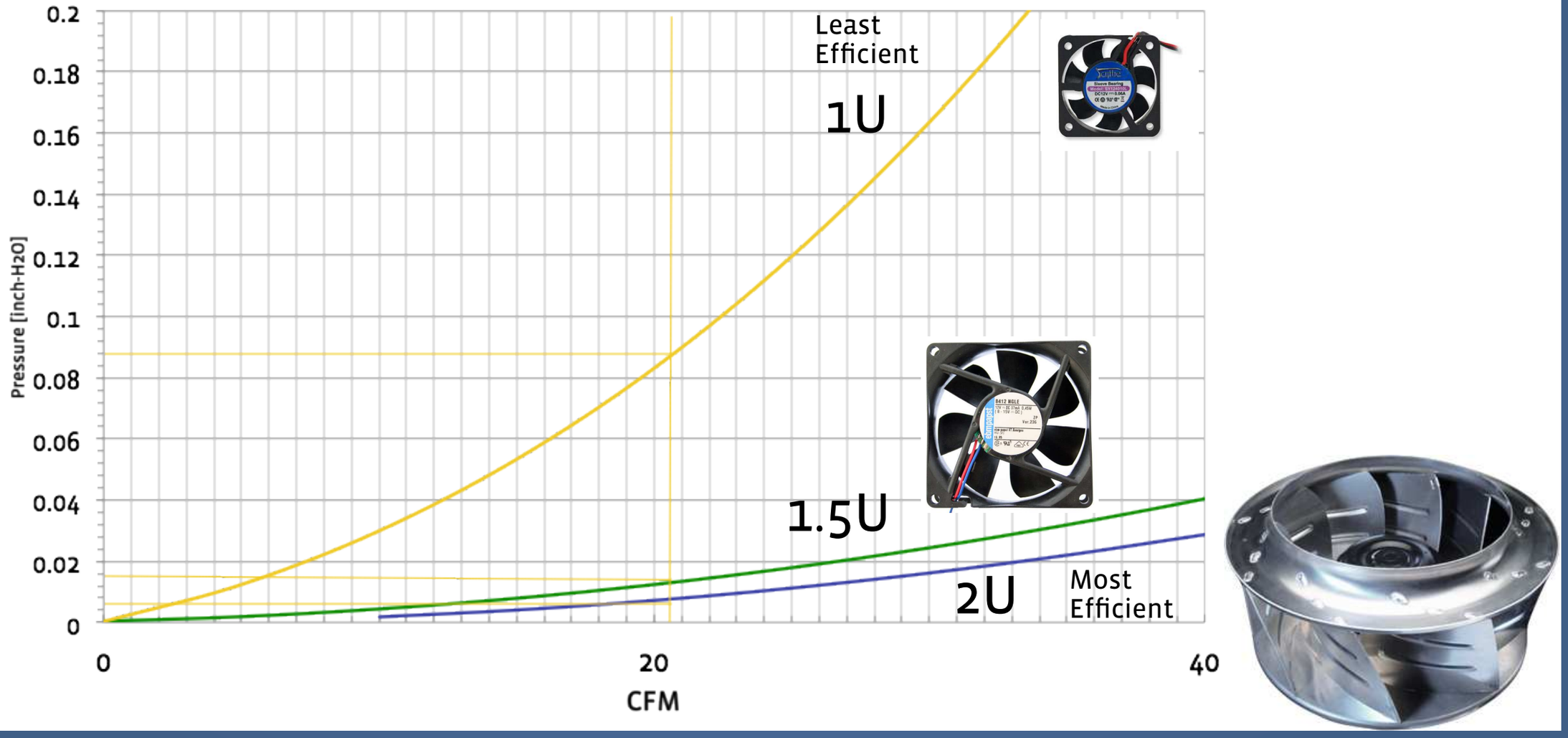
Power

- UPS
- Transformers
- Power supplies
- Voltage regulators
- Components

Short vs. Tall


TYAN
TYAN
TYAN M1232

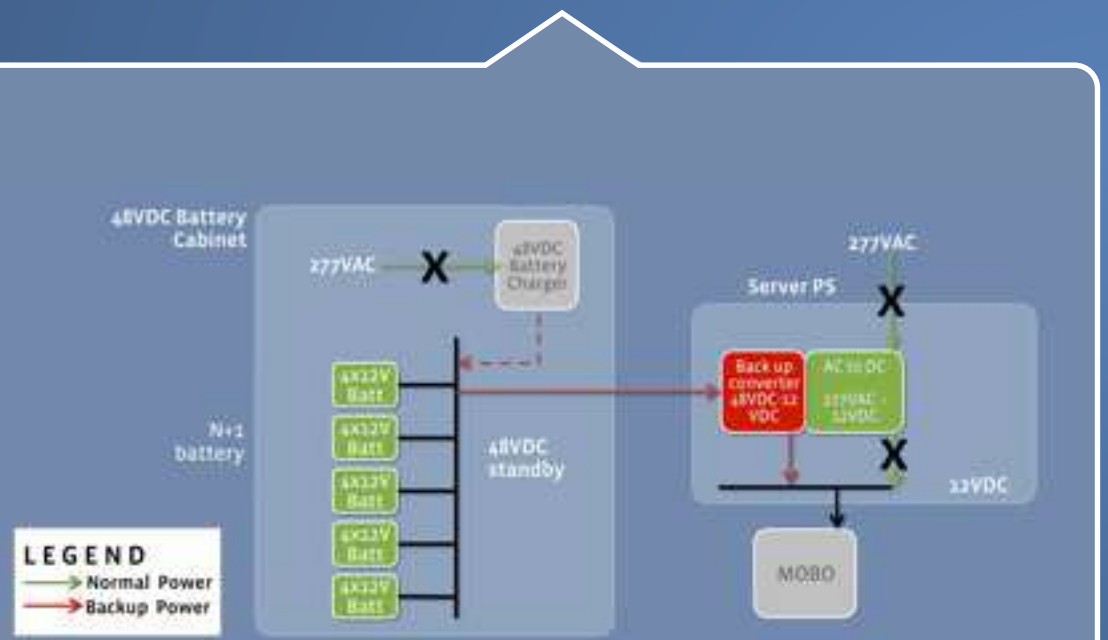
Big or Small?


Least
Efficient
1U
1.5U
2U
Most
Efficient
Pressure [inch-H2O]
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
20
40
CFM

WEAR
SAFETY GLASSES
H
A
C
K
CCOR-O-VAN

Raising the bar

1 Custom Data Center



2 Custom Hardware

Typical Data Center Power

Utility Transformer
480/277 VAC

2% loss

AC/DC
DC/AC

UPS
6% - 12%

99.999% Availability

480VAC

ASTS/PDU

3% loss

208/120VAC

SERVER PS

Total loss up to server:
11% to 17%

Prineville Data Center Power

Utility Transformer
480/277 VAC

2% loss

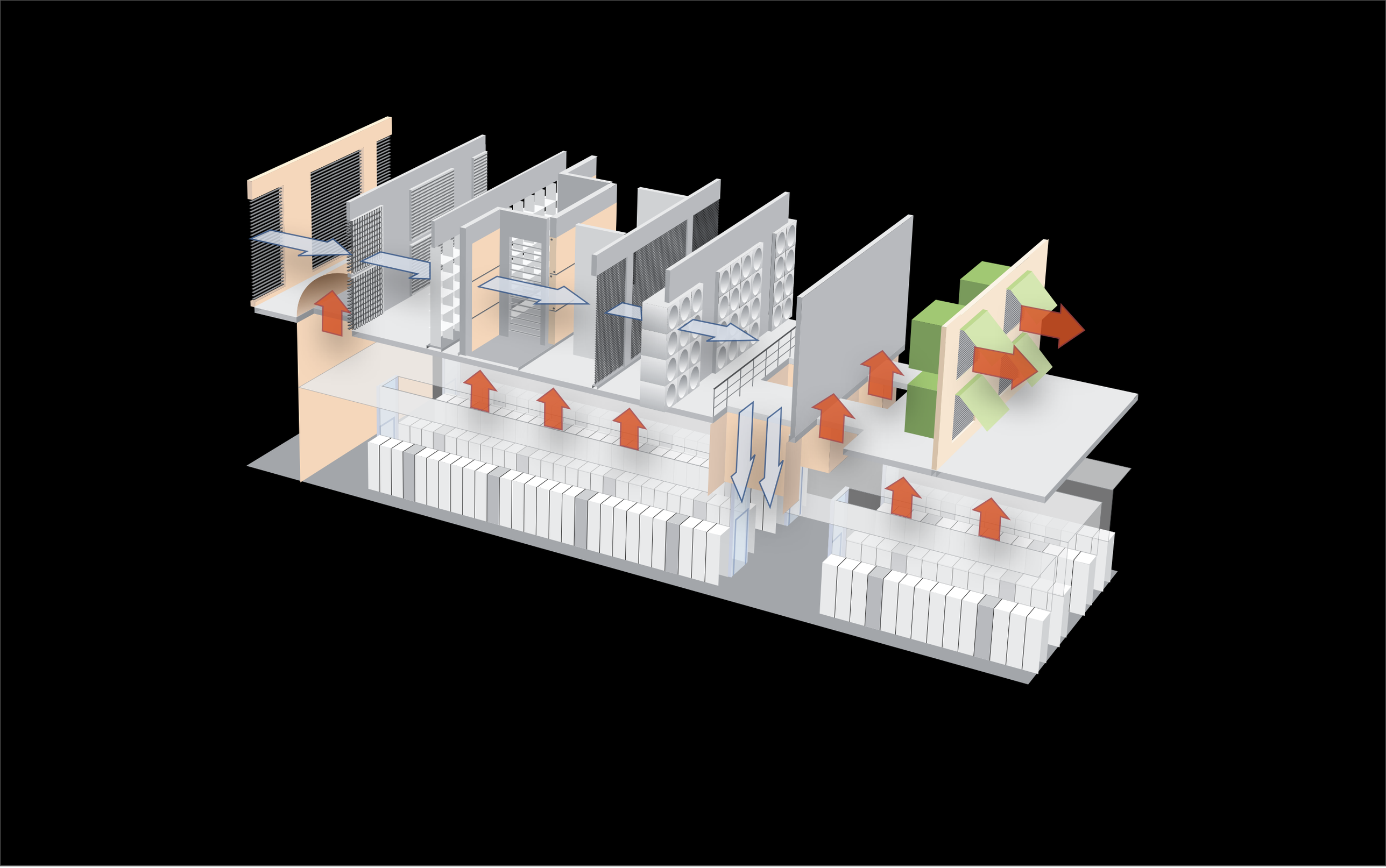
99.9999% Availability

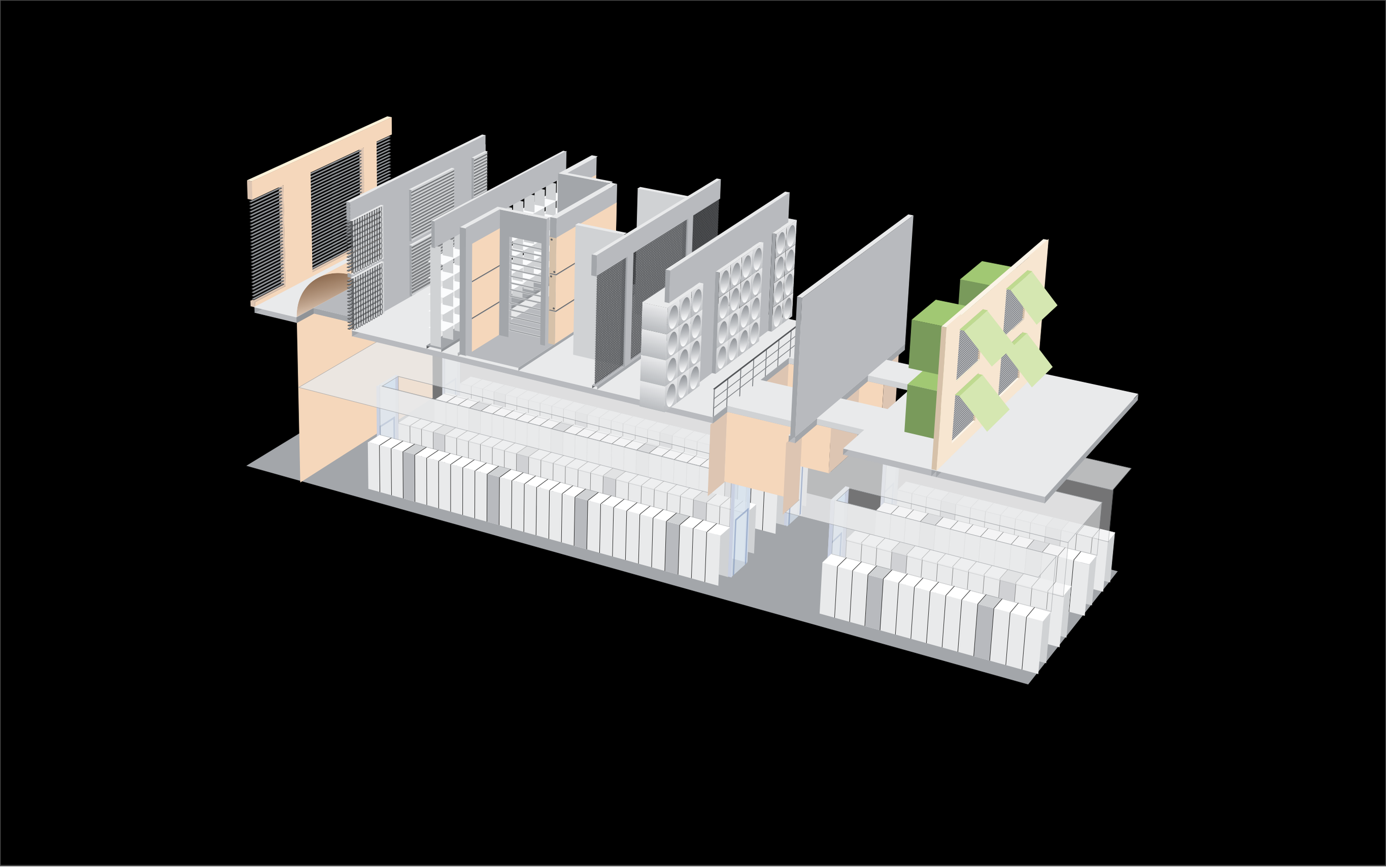
480/277VAC

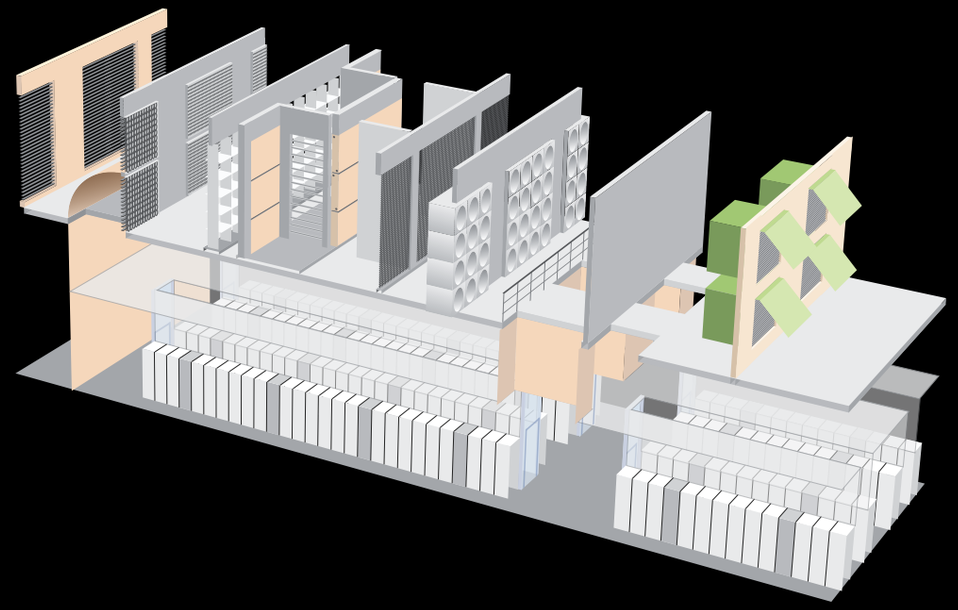
FB SERVER PS

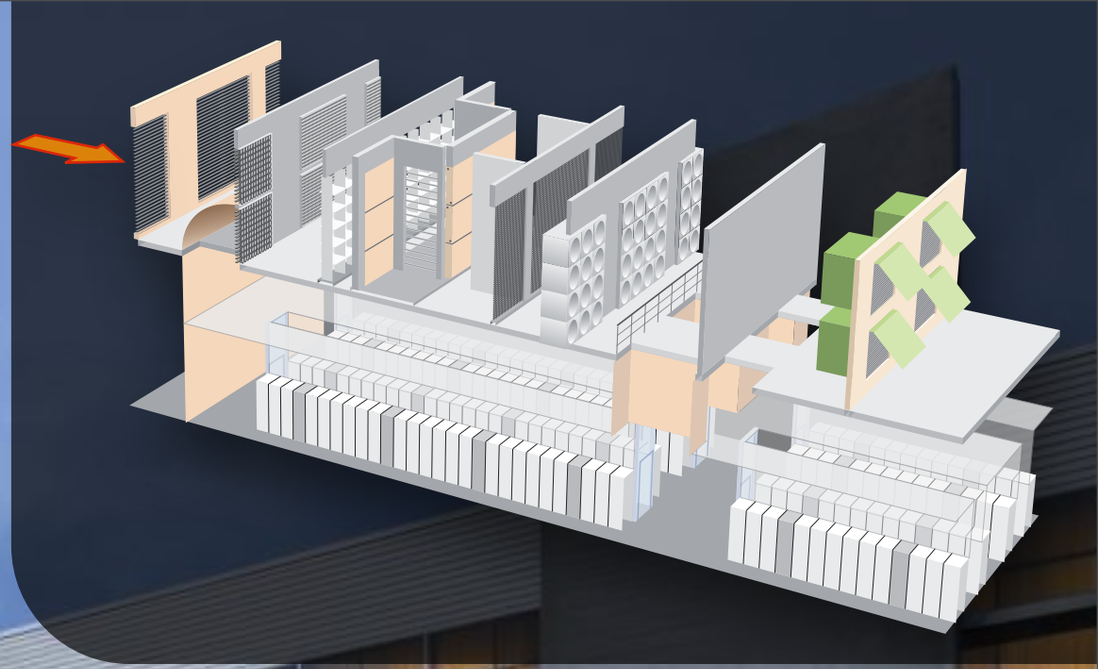
48VDC DC UPS
(Stand-by)

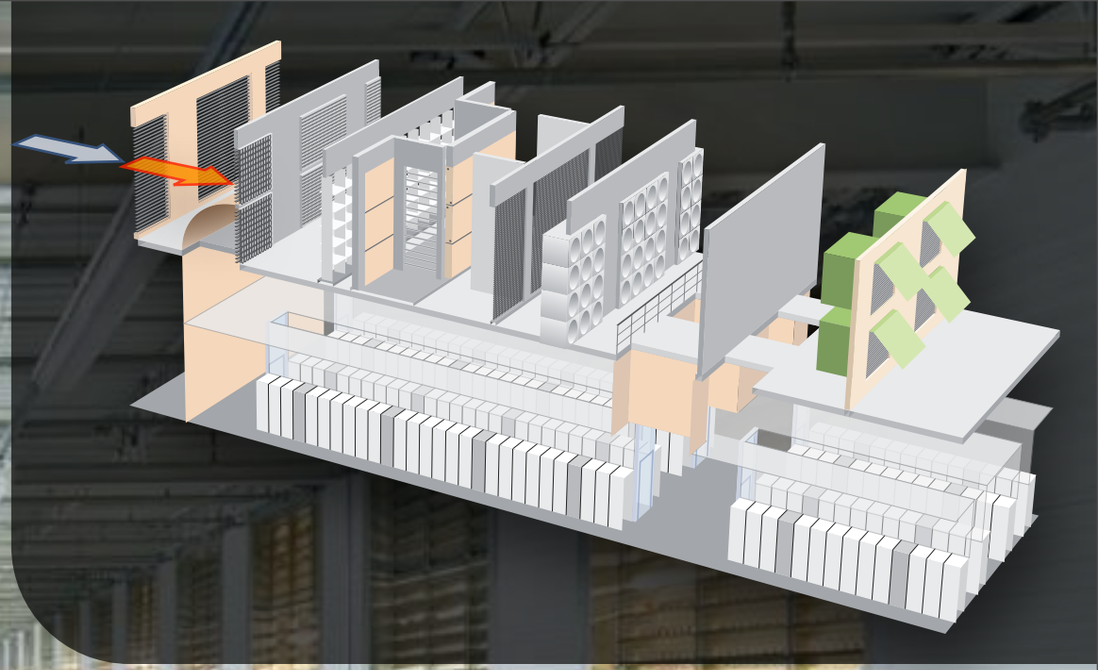
Total loss up to server:
2%

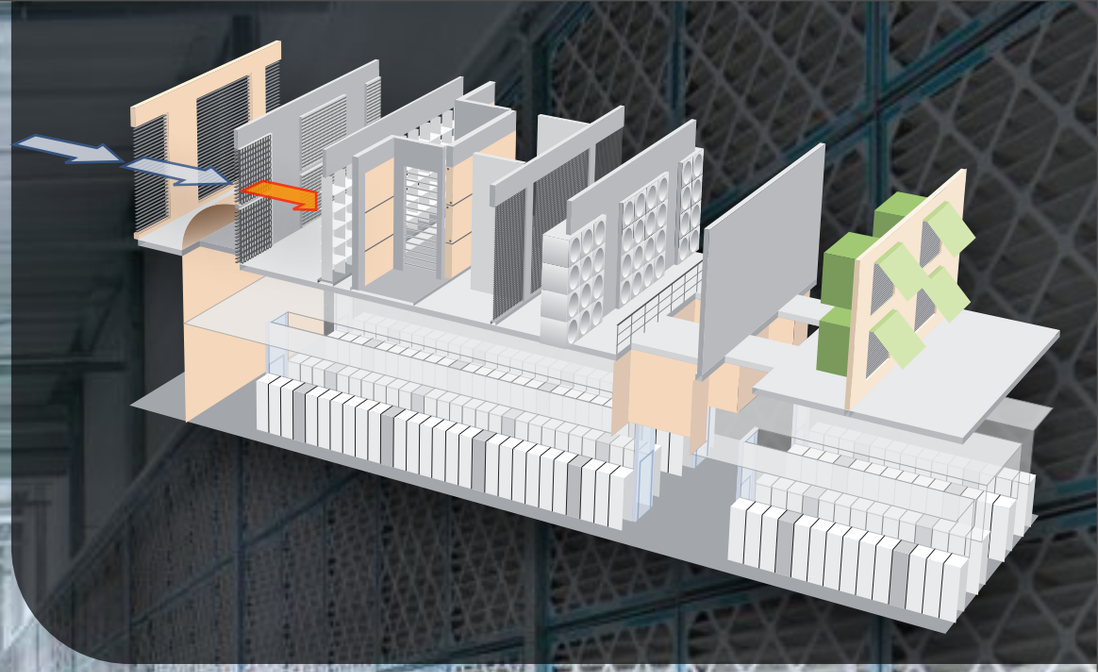


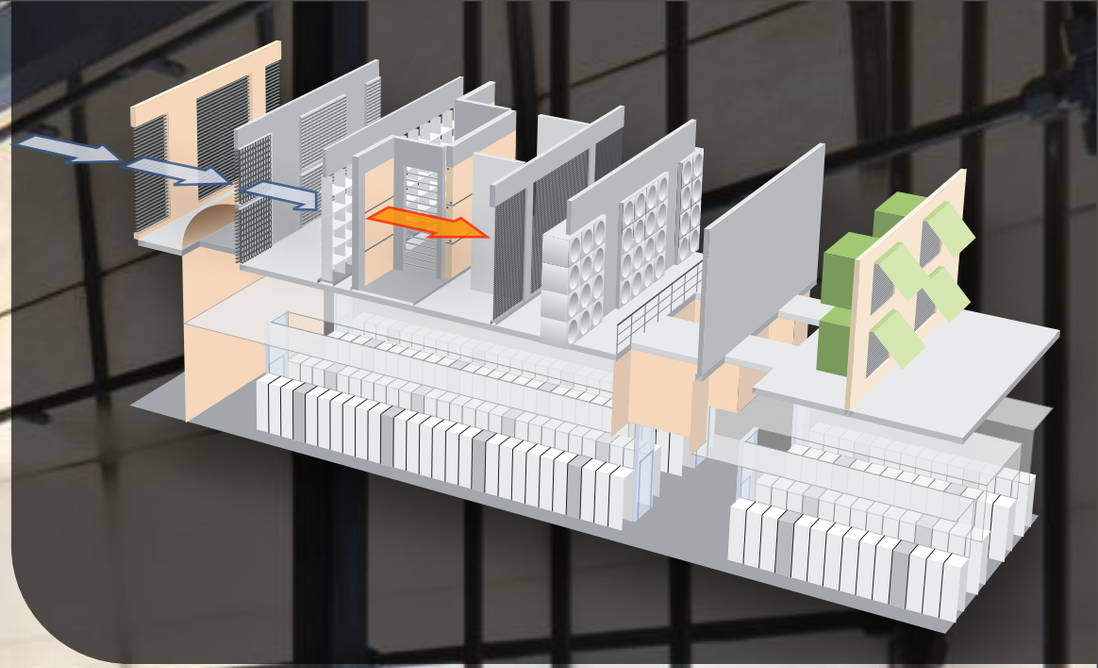


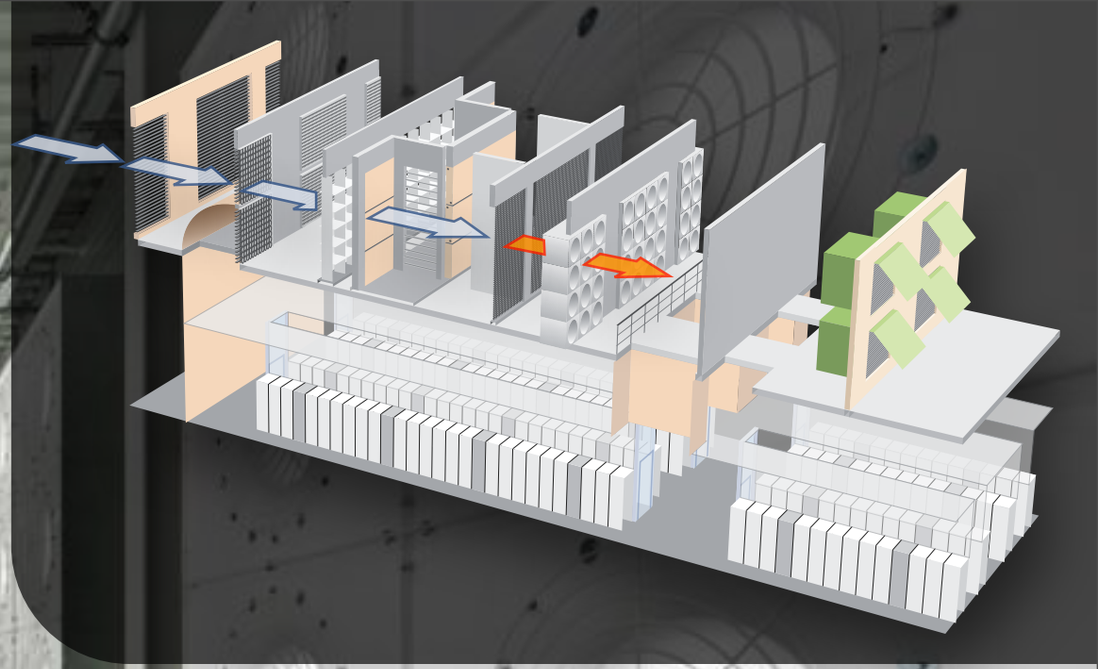


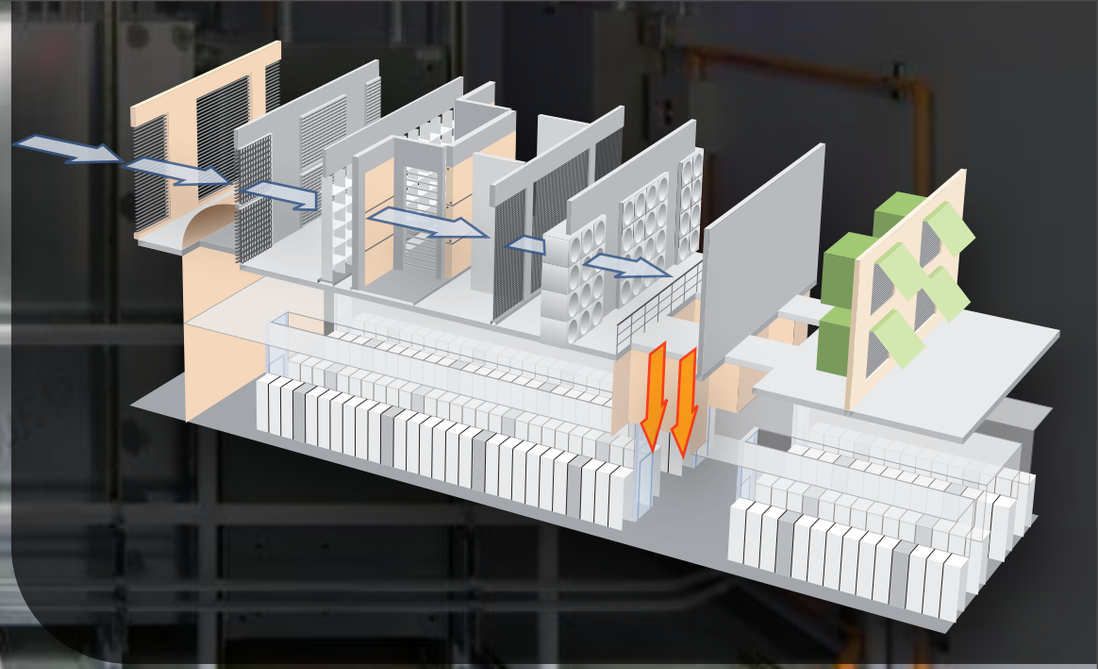


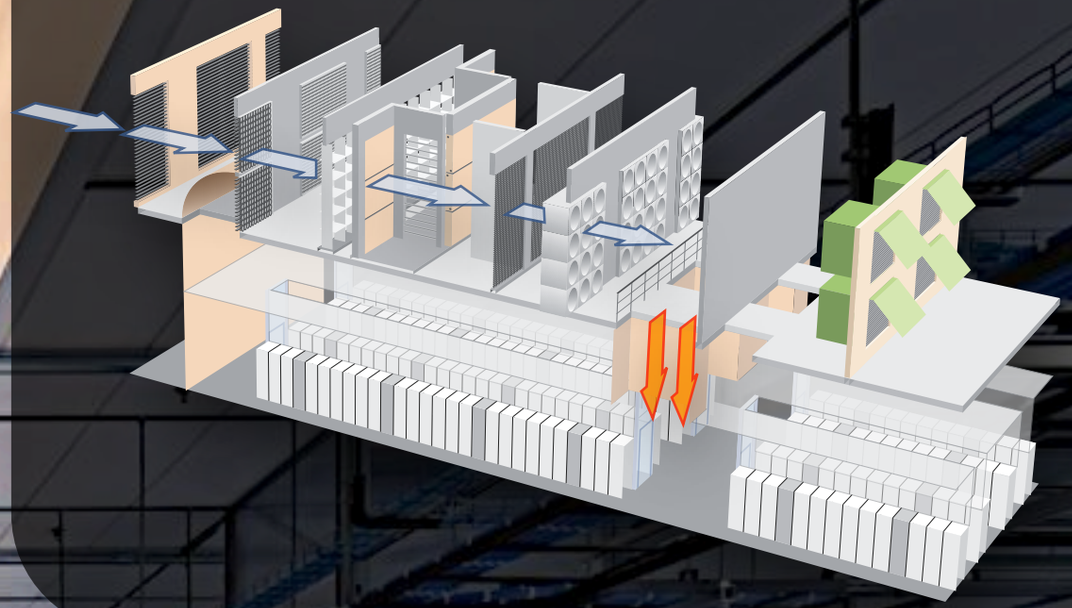


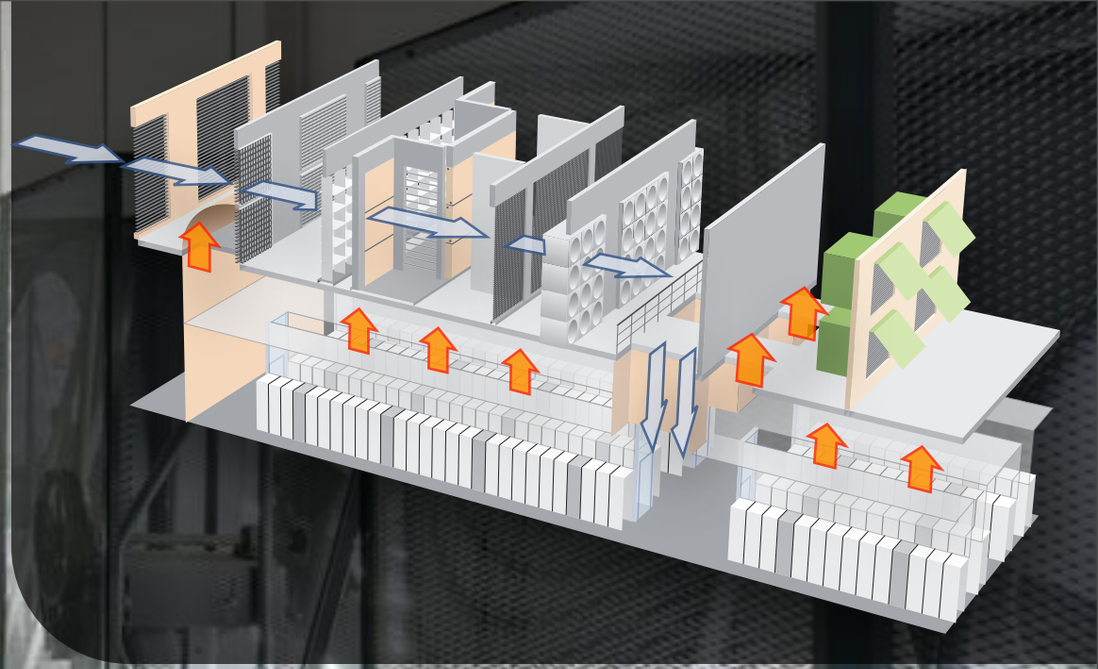


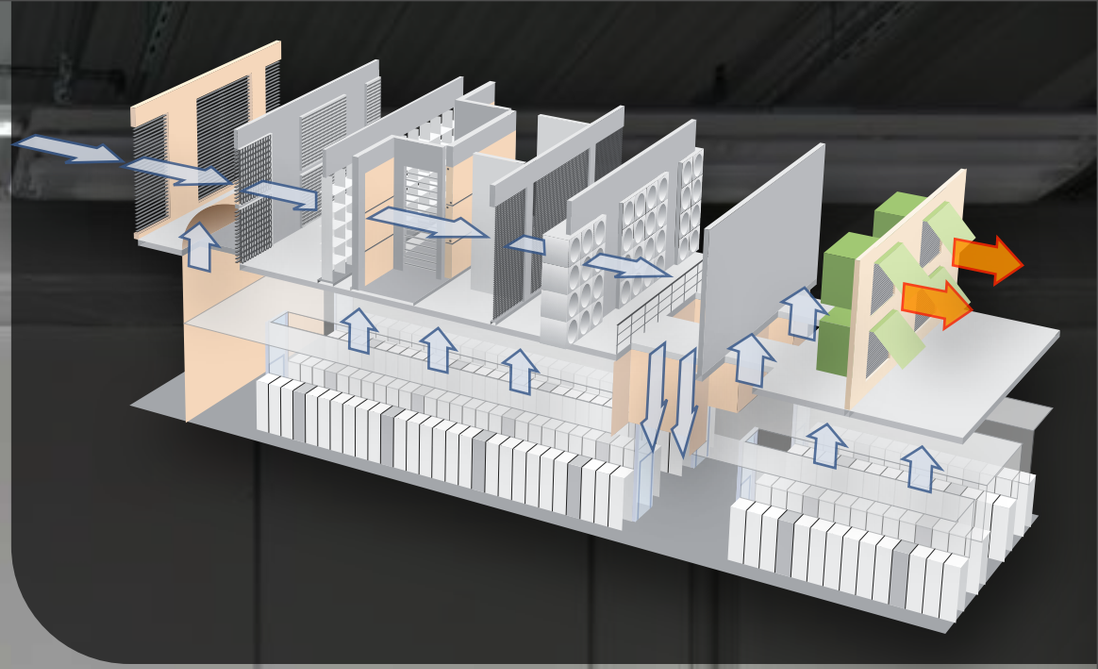


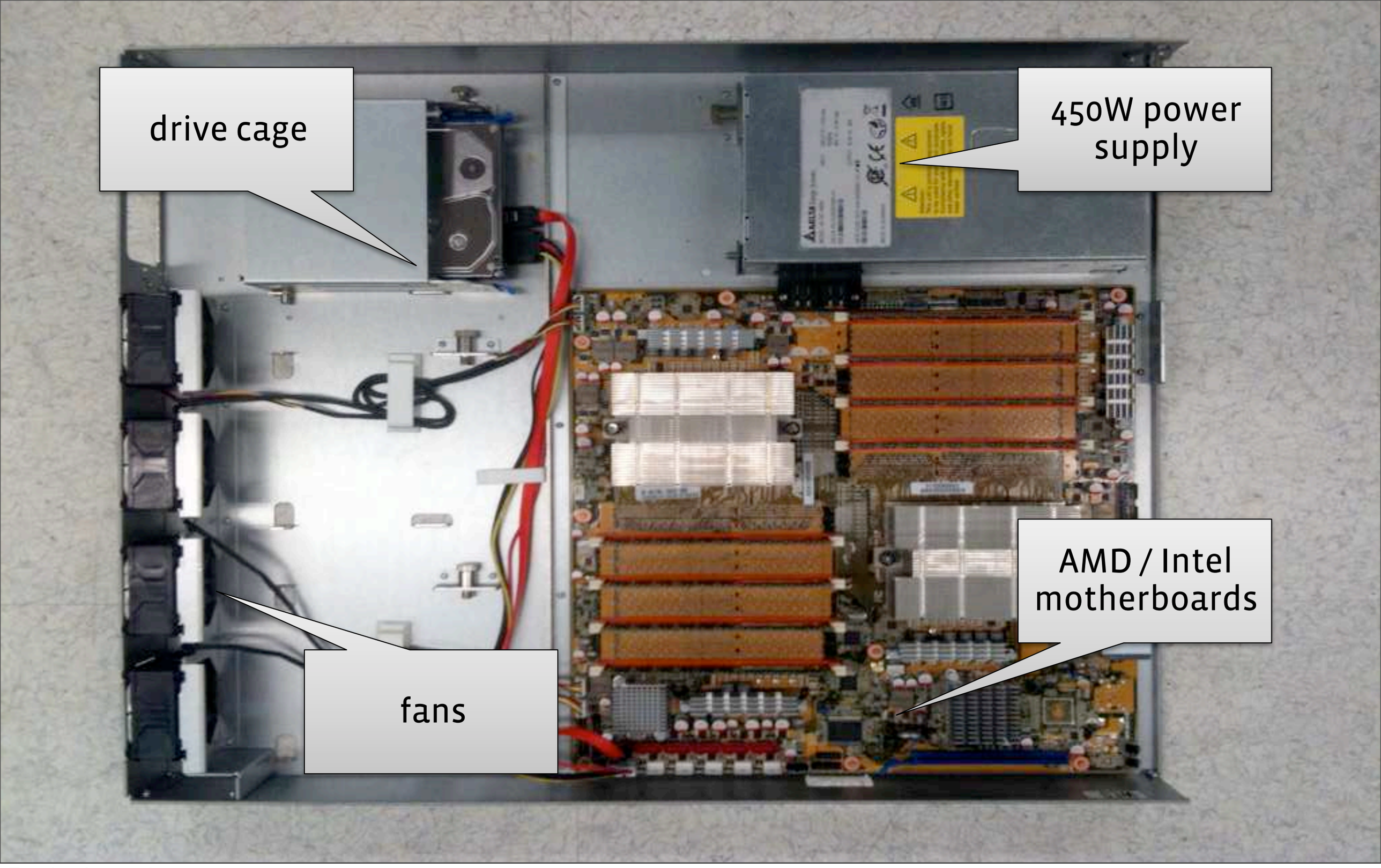


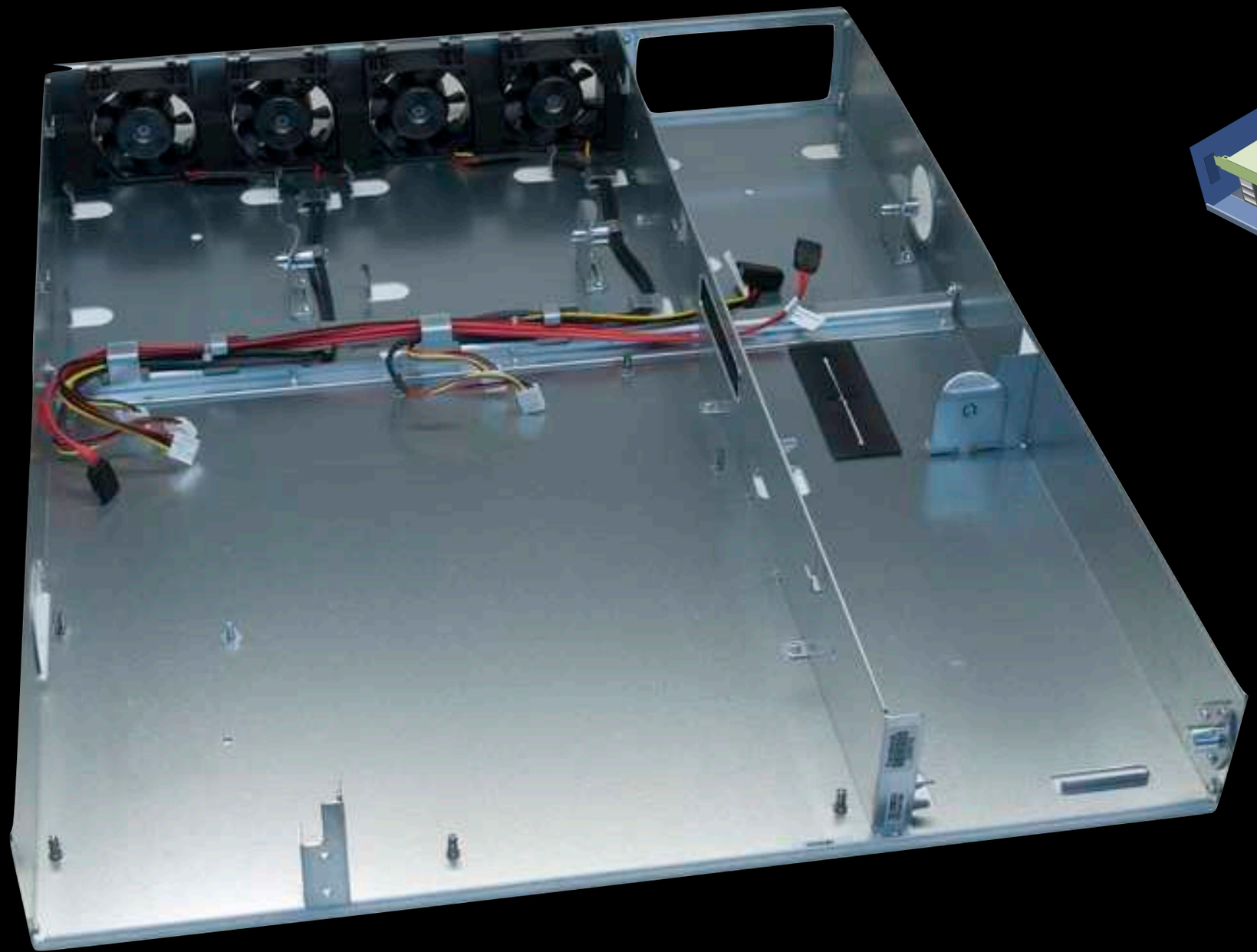


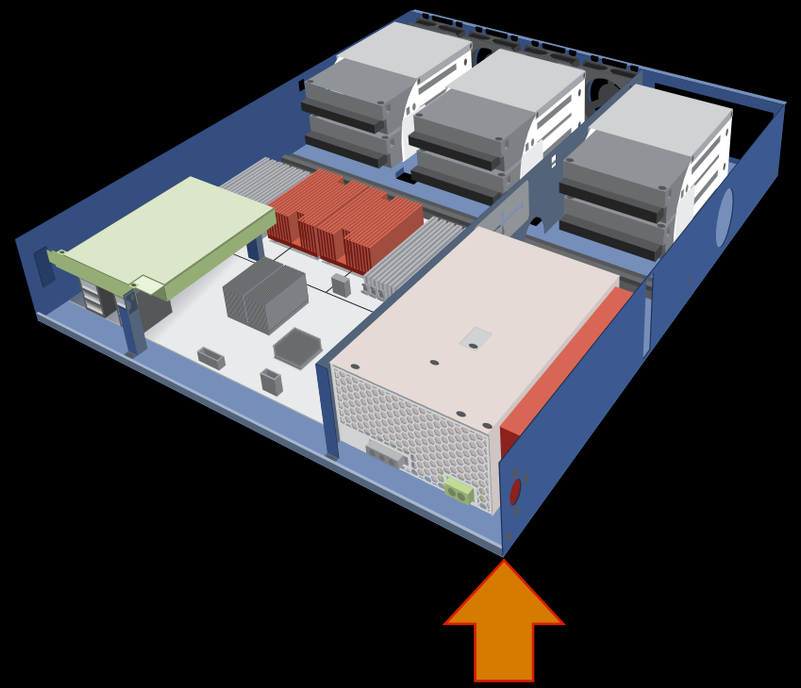




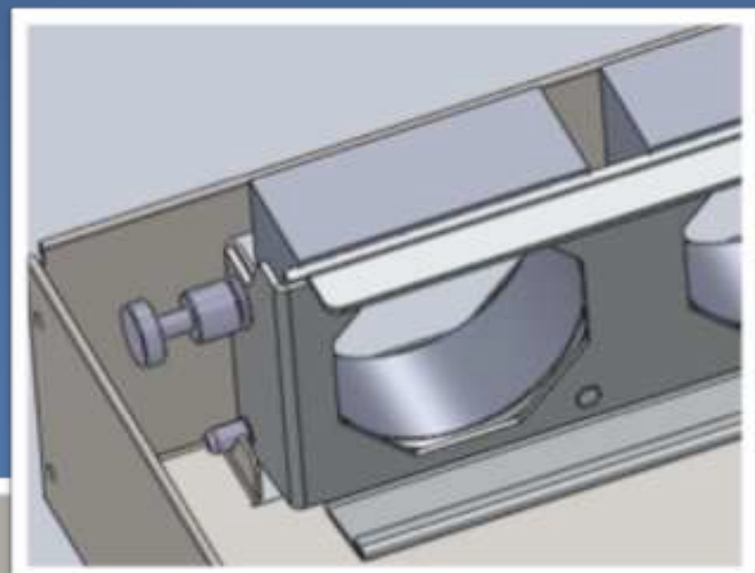


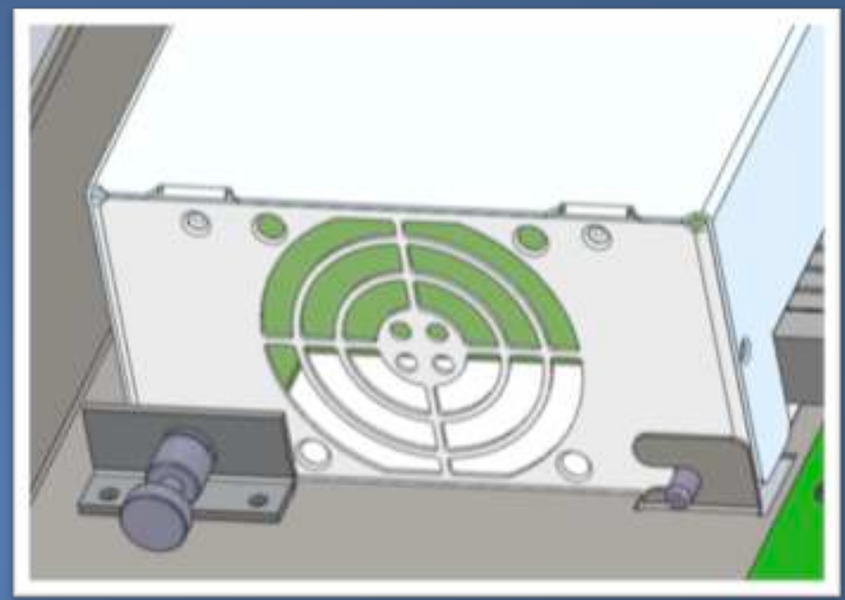

drive cage
450W power supply
fans
AMD / Intel motherboards

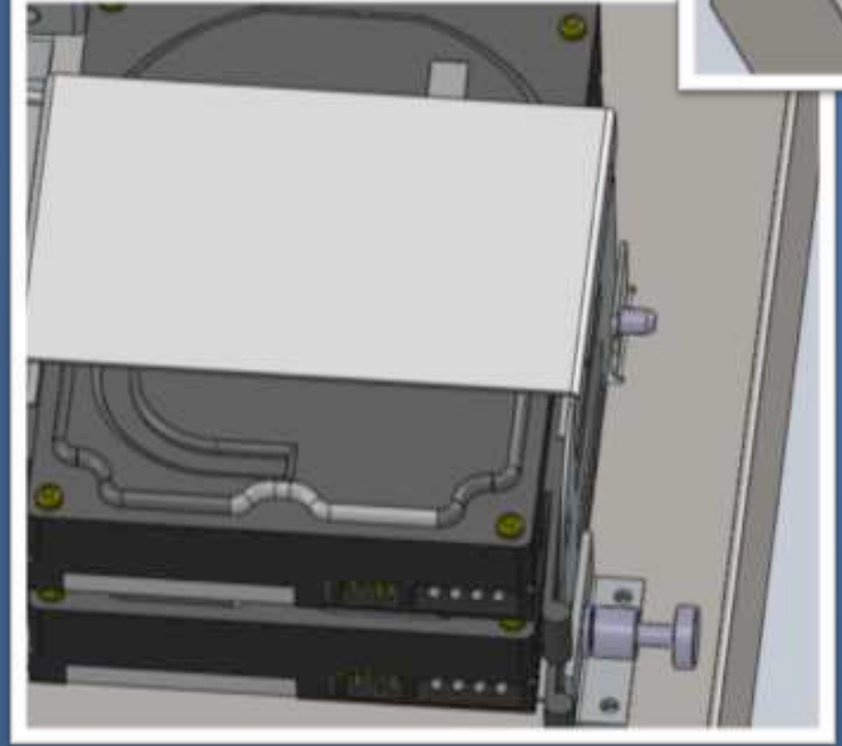


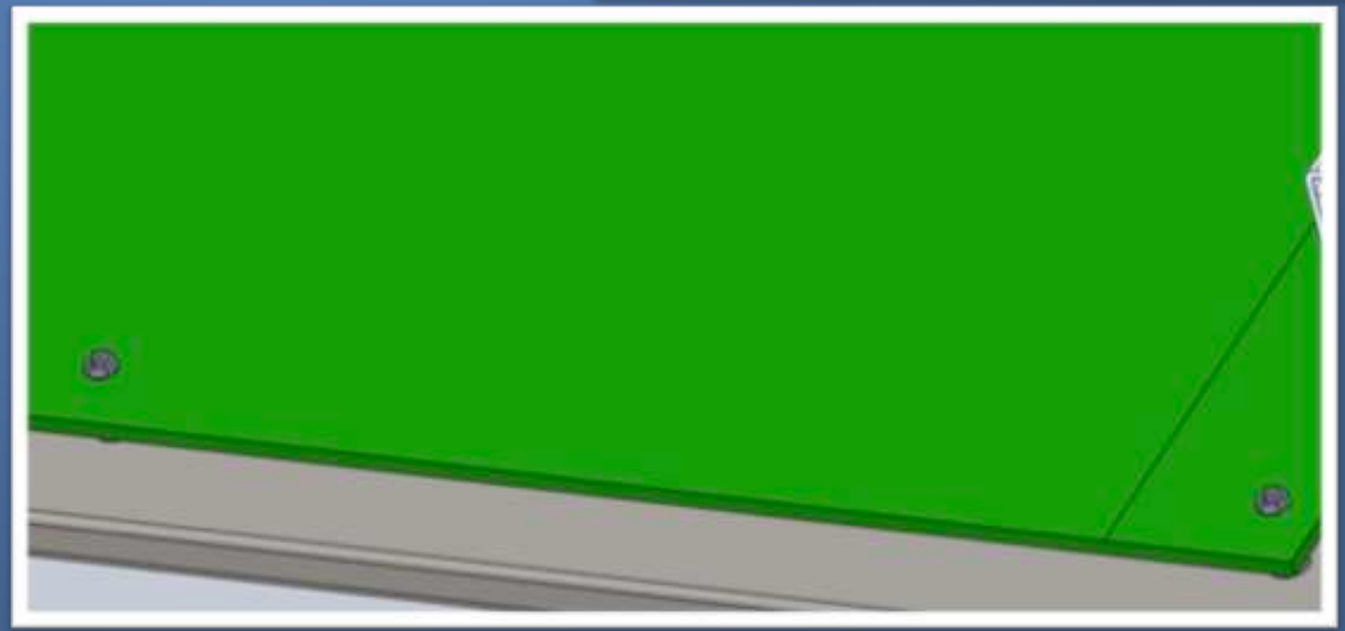


Service

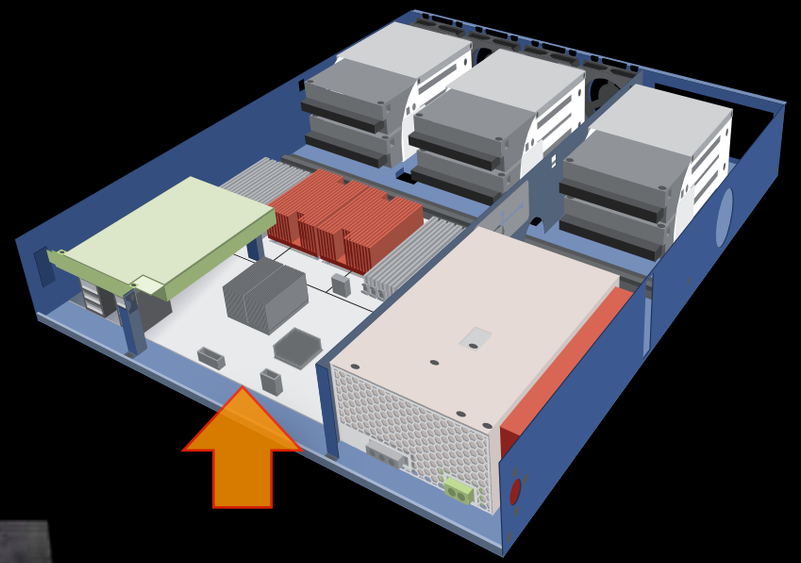


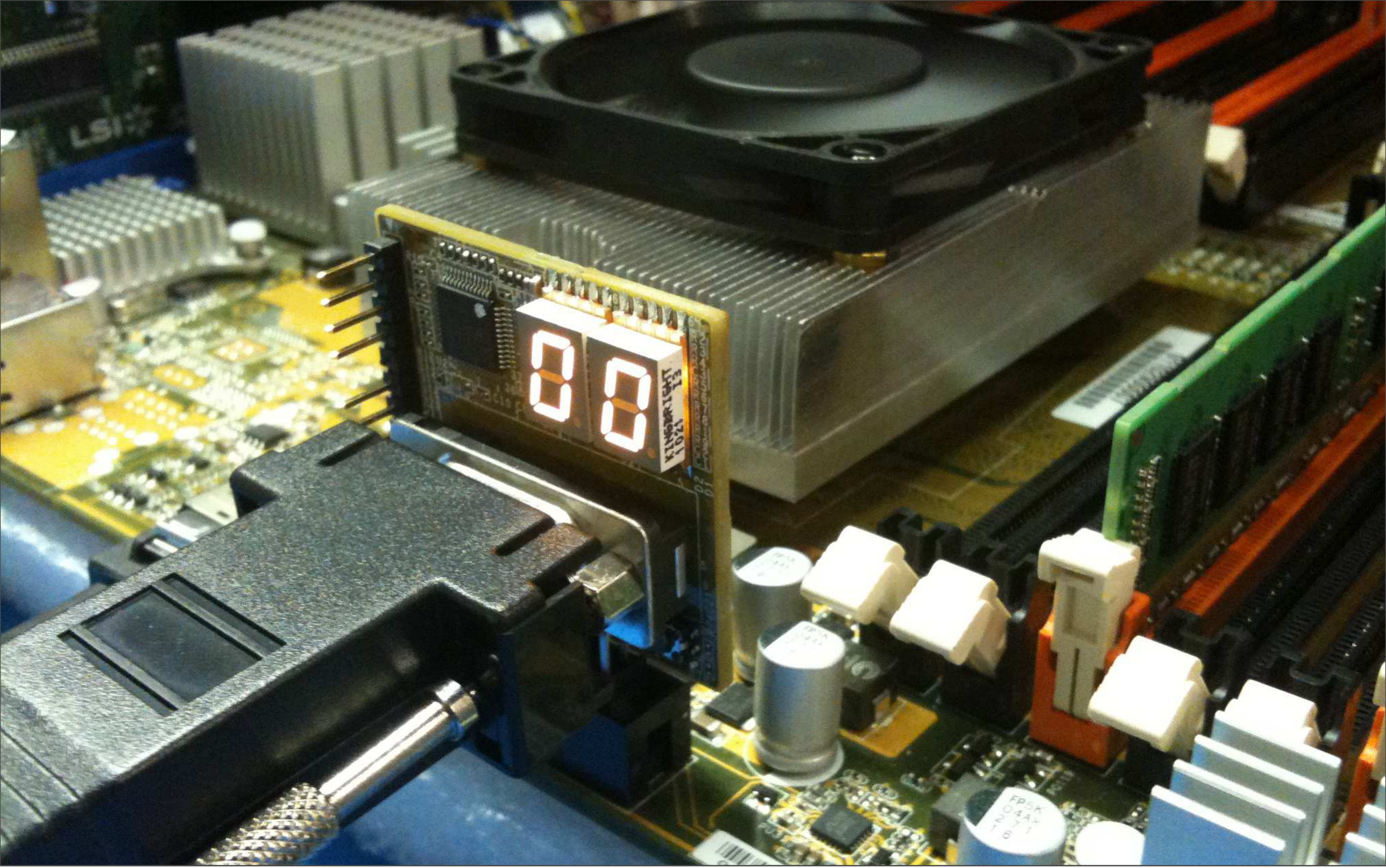






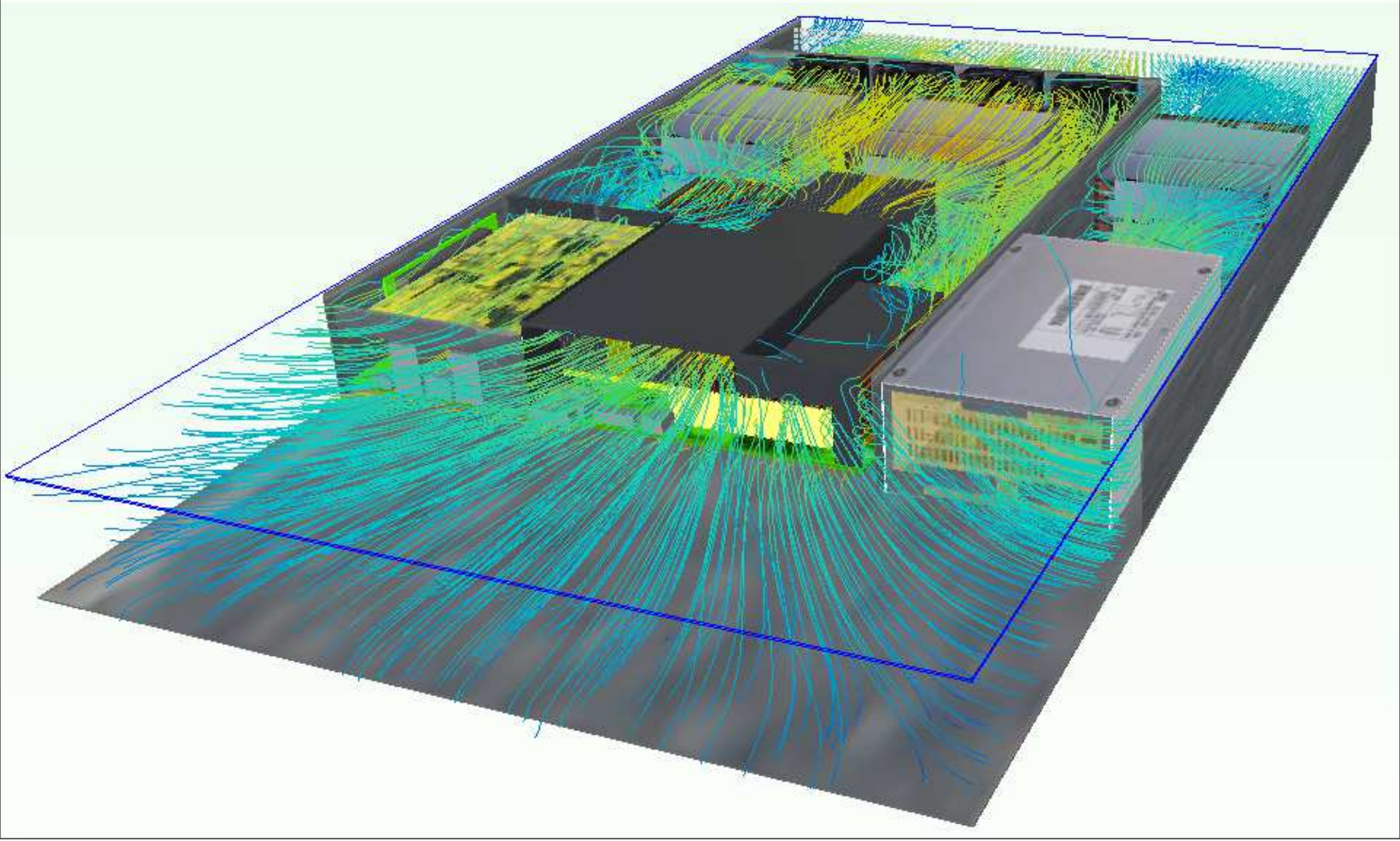
intel





Tuesday, August 16, 11

PWR OK
FAIL



38%

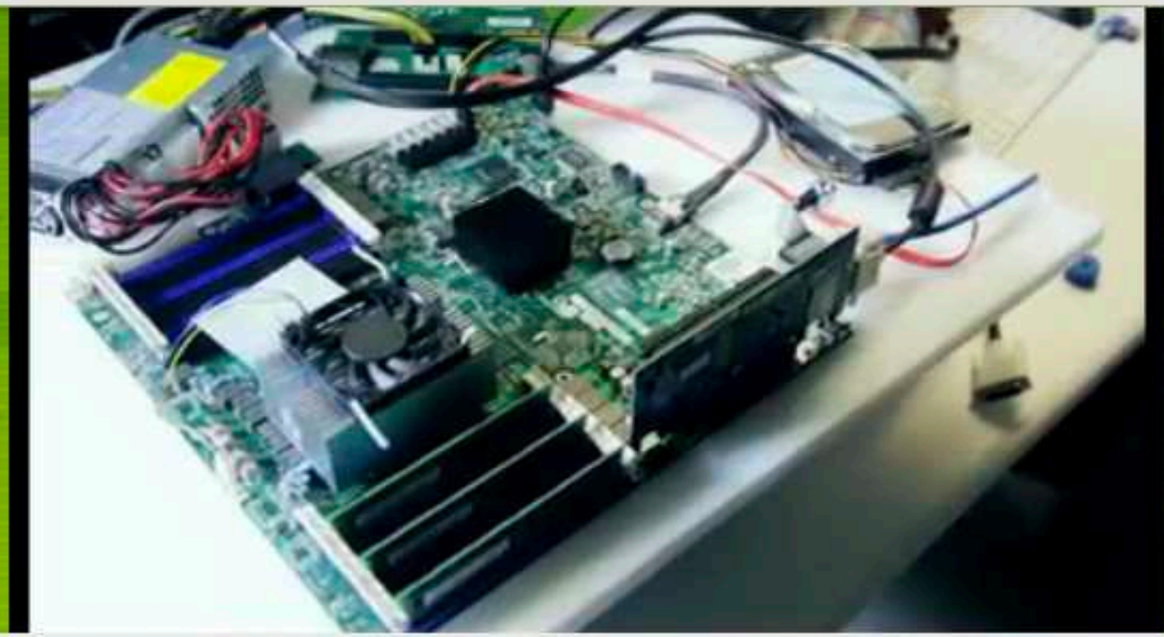
energy efficiency gained

24%

cost savings

Hacking Conventional Computing Infrastructure

We started a project at Facebook a little over a year ago with a pretty big goal: to build one of the most efficient computing infrastructures at the lowest possible cost. We decided to honor our hacker roots and challenge convention by custom designing and building our software, servers and data centers from the ground up - and then share these technologies as they evolve.



The result is a data center full of vanity free servers which is 38% more efficient and 24% less expensive to build and run than other state-of-the-art data centers.

By releasing Open Compute Project technologies as open hardware, our goal is to develop servers and data centers following the model traditionally associated with open source software projects. That's where you come in.

Like Amir Michael, Prithvi Rai and 13,165 others like this.

The Open Compute Project was first released by **Facebook** in 2011. Read our requisite **legal stuff**. Major thanks to the **OSU OSL** for hosting.

Questions?

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