Server sub-WG

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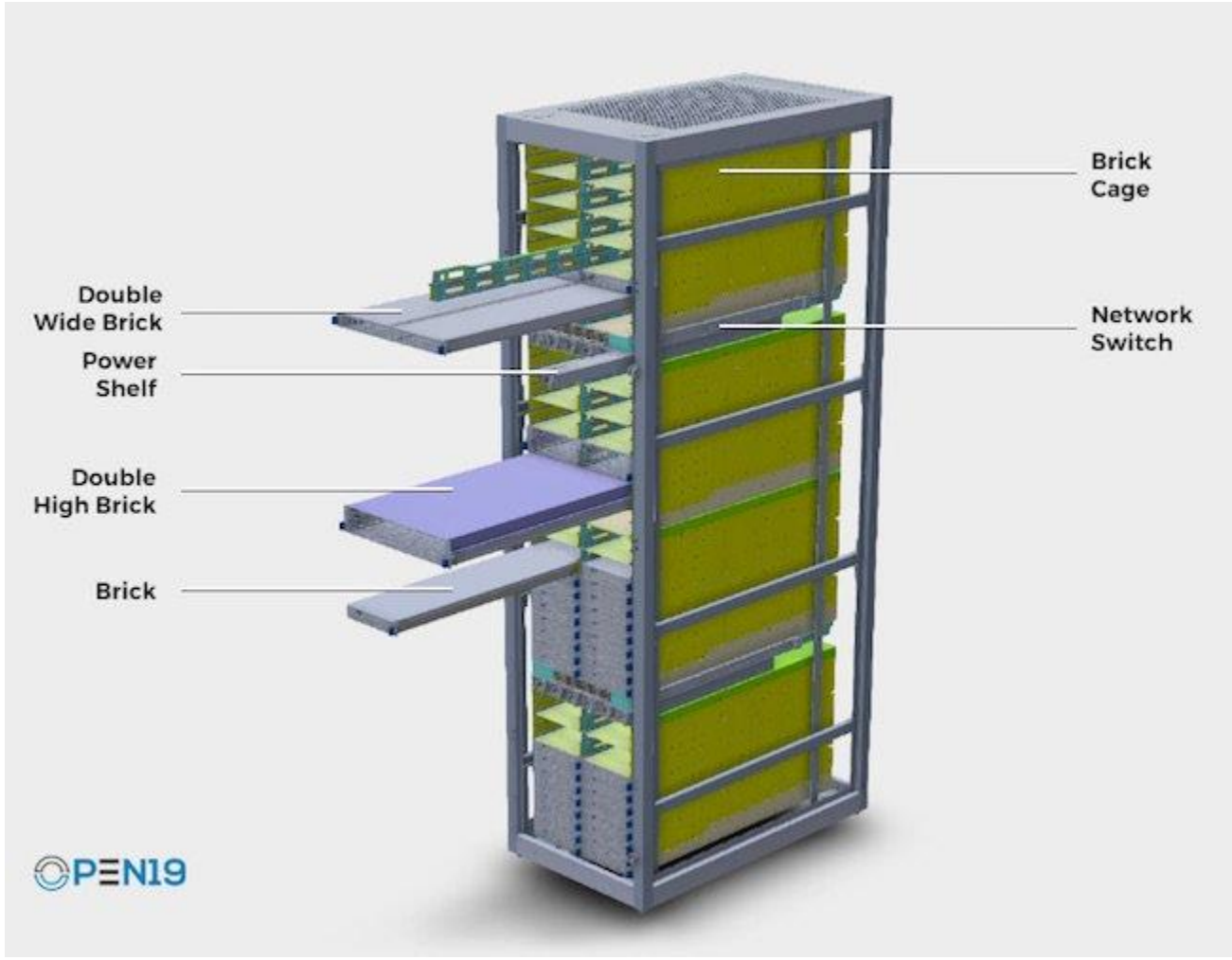
Open19

- Aims at support data center design, open, economical and customizable
- Similar to Facebook OCP Open Compute Project that is more address to major internet companies
- Open19 focused on optimizing data center of any size but also small edge paltforms
- Define a common server form factor, using rack, cages and pre-defined network and power

Open 19

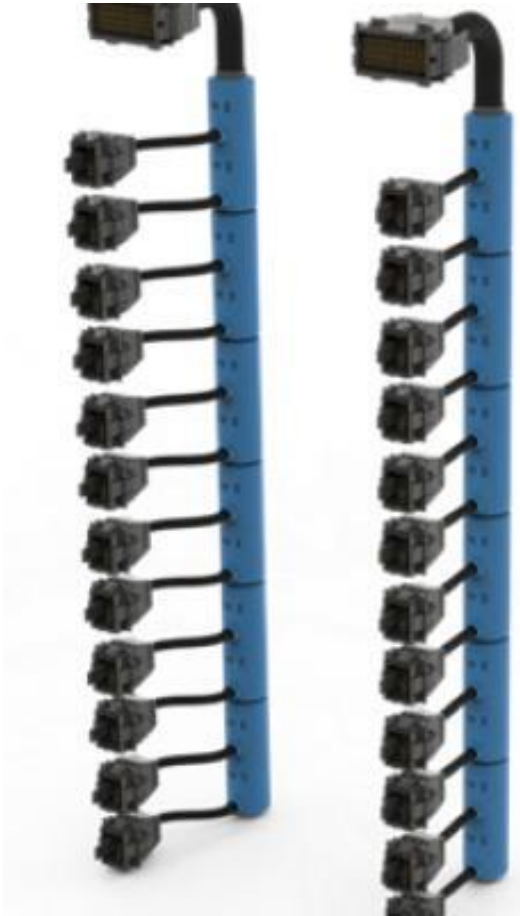
- Aim to establish a new OPEN standard for SERVER based on common form factor, but unlike OCP aim also to small edge platforms
- Standard 19” 4-post rack, Brick cage
- Brick (B), Double Wide Brick (DWB), Double High Brick (DHB), Double High & Wide Brick (DHWB)
- Power shelf: 12v distribution, OTS power modules with any AC or DC inputs
- Optional Battery Backup Unit (BBU)
- Networking switch (ToR)
- Snap-on power cables – up to 400w per brick, linear growth with size
- Snap-on data cables – up to 100G per brick, linear growth with size



Open19

- The goal of Open19 project is to build a data center that can fit in a variety of building, from data center to small building that currenty house cell towers.

- Actual building or containers in the middle of a field.
- Power constrained, size constrained, with different sources of power



Open Computing Project

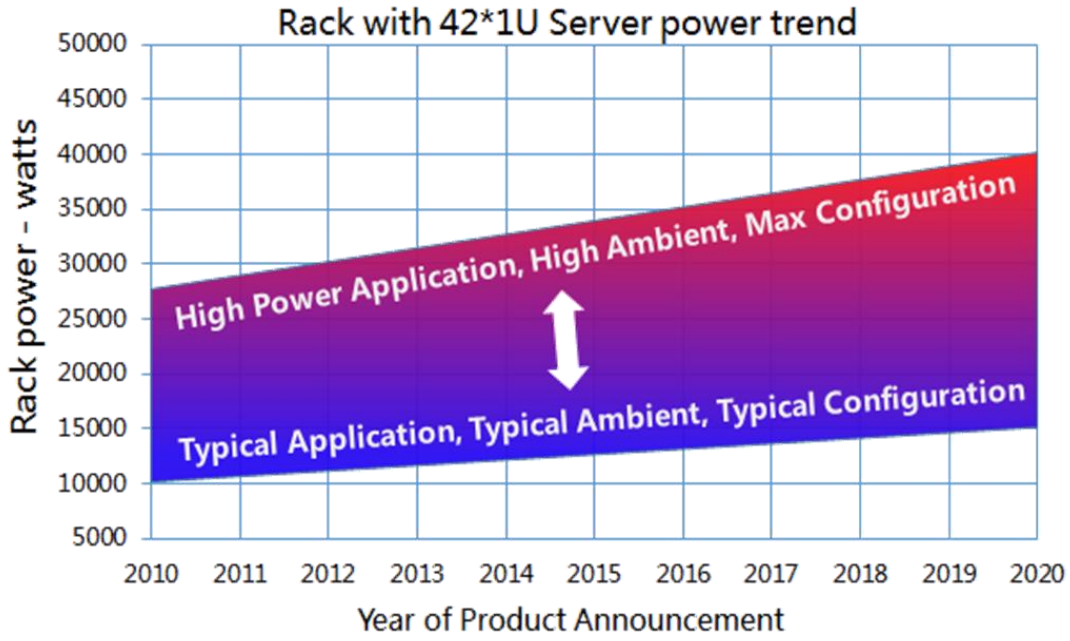
- Server compute node designs included one for Intel processors and one for AMD processors. In 2013, Calxeda contributed a design with ARM processors
- Several subprojects:
  - HPC: heterogeneous computing networking and fabric platform for multi-node processor
  - Networking: Network hardware and software
  - Rack and Tower: rack standards, integrating the DC infrastructure
  - Open System Firmware: OS Hw platform inizialization
  - Data Center Facility: maximizes mechanical performance and thermal and electrical efficiency

OCP examples

- On the left Open Compute V2 Server
- On the right Open Compute V2 Drive Tray, 2nd lower tray extended

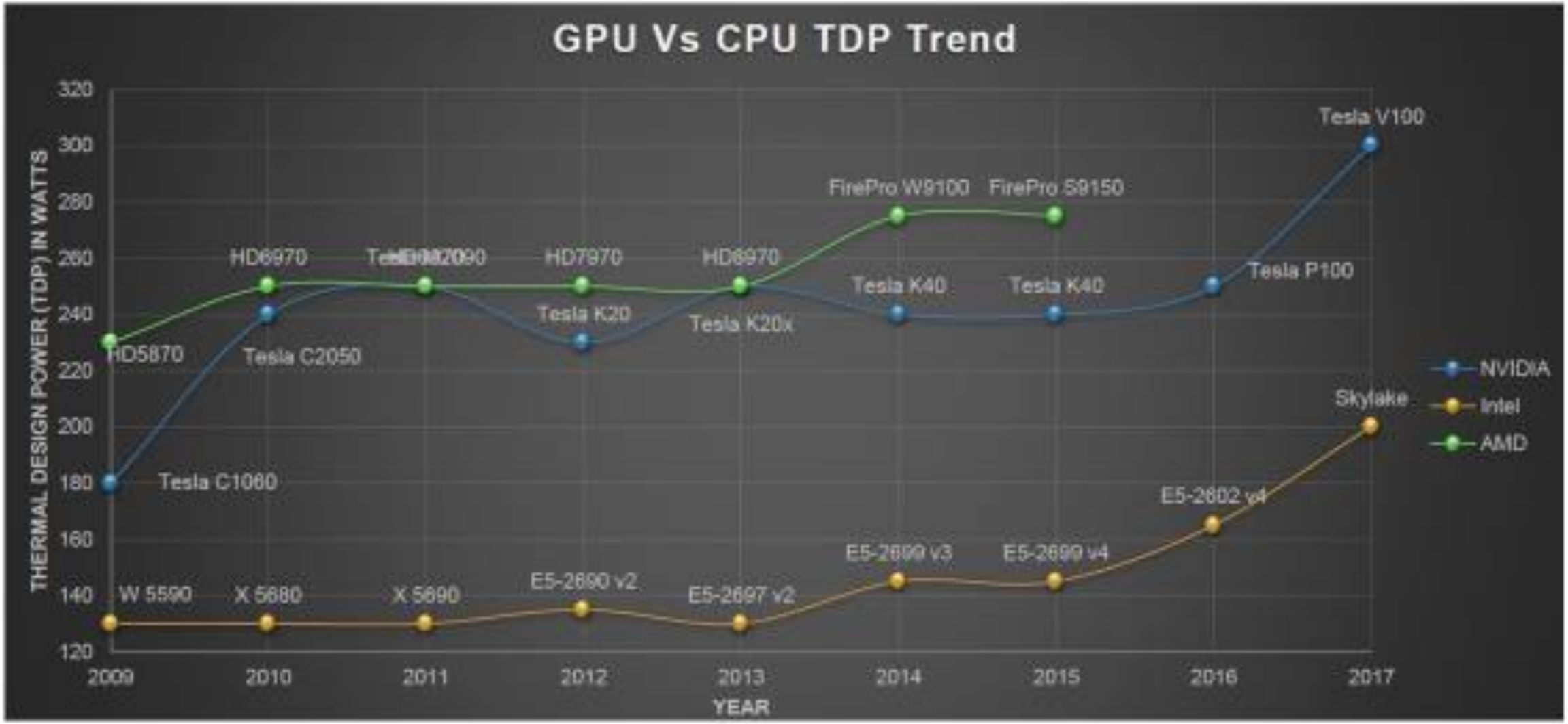
Cooling

- Common density 10-12 kW/rack max to 12-20 kW/rack
- Today a 42rack full of 2S nodes (80 server) can draw 40 kW
- Full air cooling is not enough



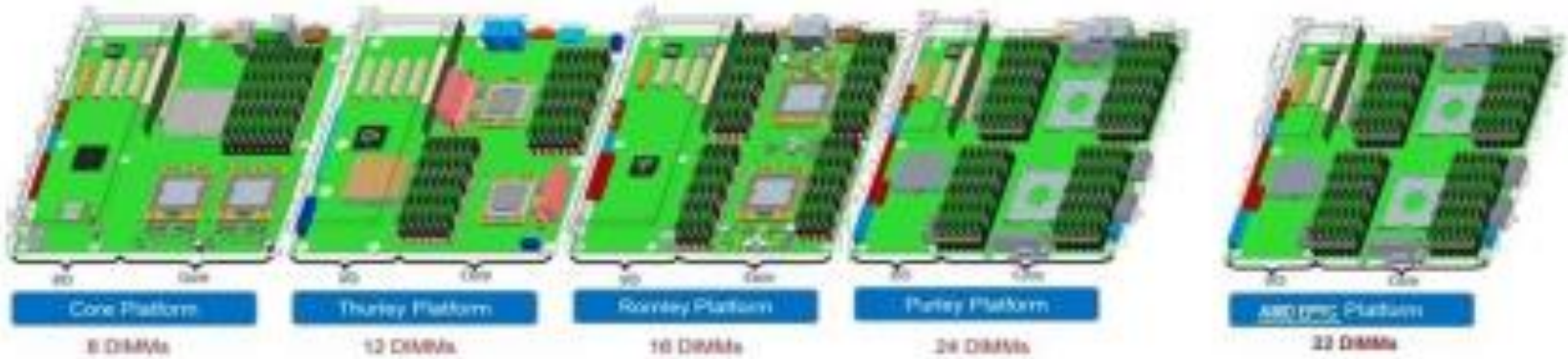
Datacom Equipment Power Trends and Cooling Applications --ASHRAE

TDP trends



Source : Alibaba.com – Immersion cooling for Green Computing -OCP2018

Technology trends



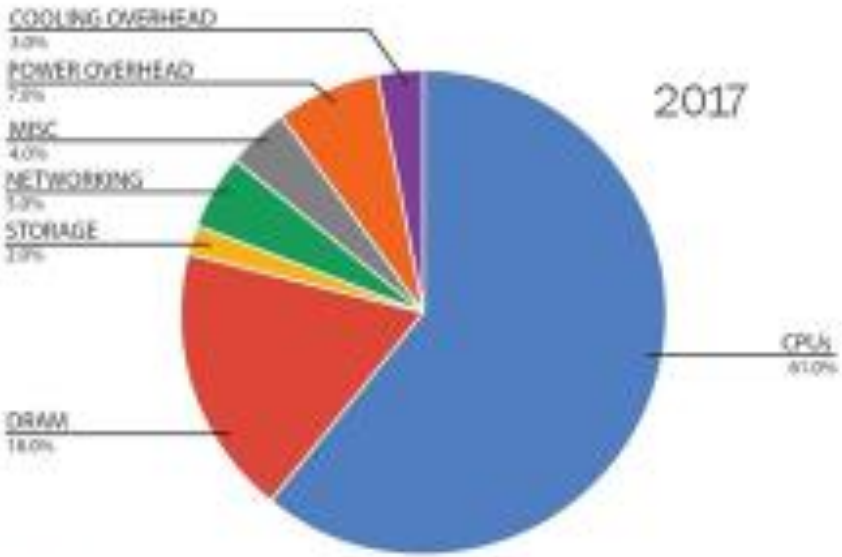
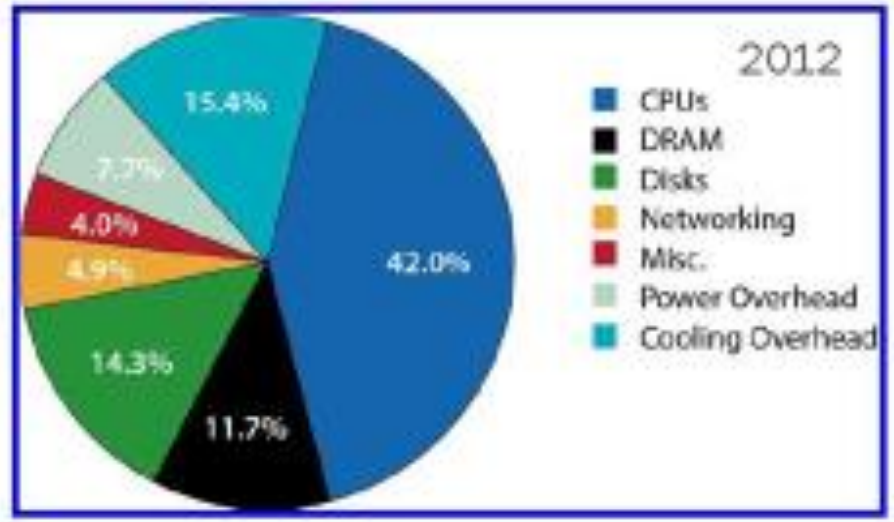


Figure 1.8: Approximate distribution of peak power usage by hardware subsystem in a modern data center using late 2017 generation servers. The figure assumes two-socket x86 servers and 12 DIMMs per server, and an average utilization of 80%.



Example breakdown of peak power usage of a datacenter using 2012 generation servers. Assumes two-socket x86 servers, 16 DIMMs and 8 disk drives per server, and an average utilization of 80%

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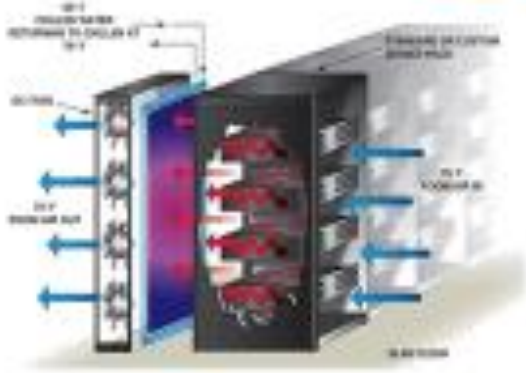
Source : Barroso, Hölzle, Ranganathan – The Datacenter as a Computer – M&C

Liquid Cooling Landscape

- **Close Coupled Cooling**
  - In-Row®, In-Rack, Rear Door Exchangers
- **DLC (Cold Plates)**
  - Positive Pressure, Negative Pressure
- **Immersion Cooling**
  - Single Phase, Two-Phase

Close Coupled
- Air is still the only mean to cool board/chip
- Limited by existing chip maximum temps
- Requires additional fans



Cold Plates
- Individual Heatsinks
- Board-Specific
- Individual Chip Fluid-cooling

Immersion
- Specialty fluids ($$$)
- Can Require separate Cooling Coil
- Orientation sensitive

References:

- https://www.theregister.co.uk/2017/05/24/open19_foundation_launch/
- https://www.datacenterknowledge.com/edge-computing/why-open19-being-designed-edge-data-center-standard
- https://www.opencompute.org/projects
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