

Why servers and storage are so expensive, and does it have to be so?



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1. Intro
2. OCP Server and Storage Market share and Polish DC market overview
3. OCP Server solutions
4. OCP Storage solutions
5. OCP Rack and 19" rack adoption
6. Open Edge Compute
7. Q&A



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Co mają umysły wspólnego ze spadochronami?

... działają lepiej, gdy są otwarte



Google Express



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BUT WHAT EXACTLY IS IT?



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In
2009

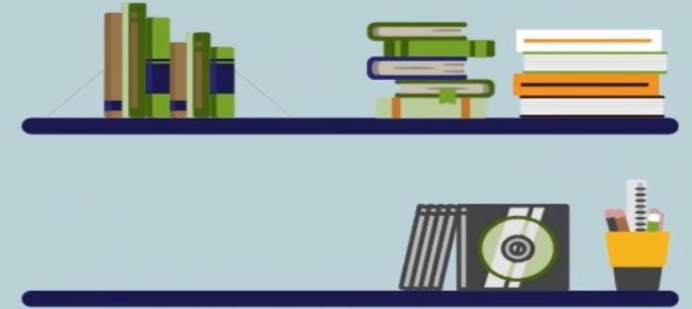




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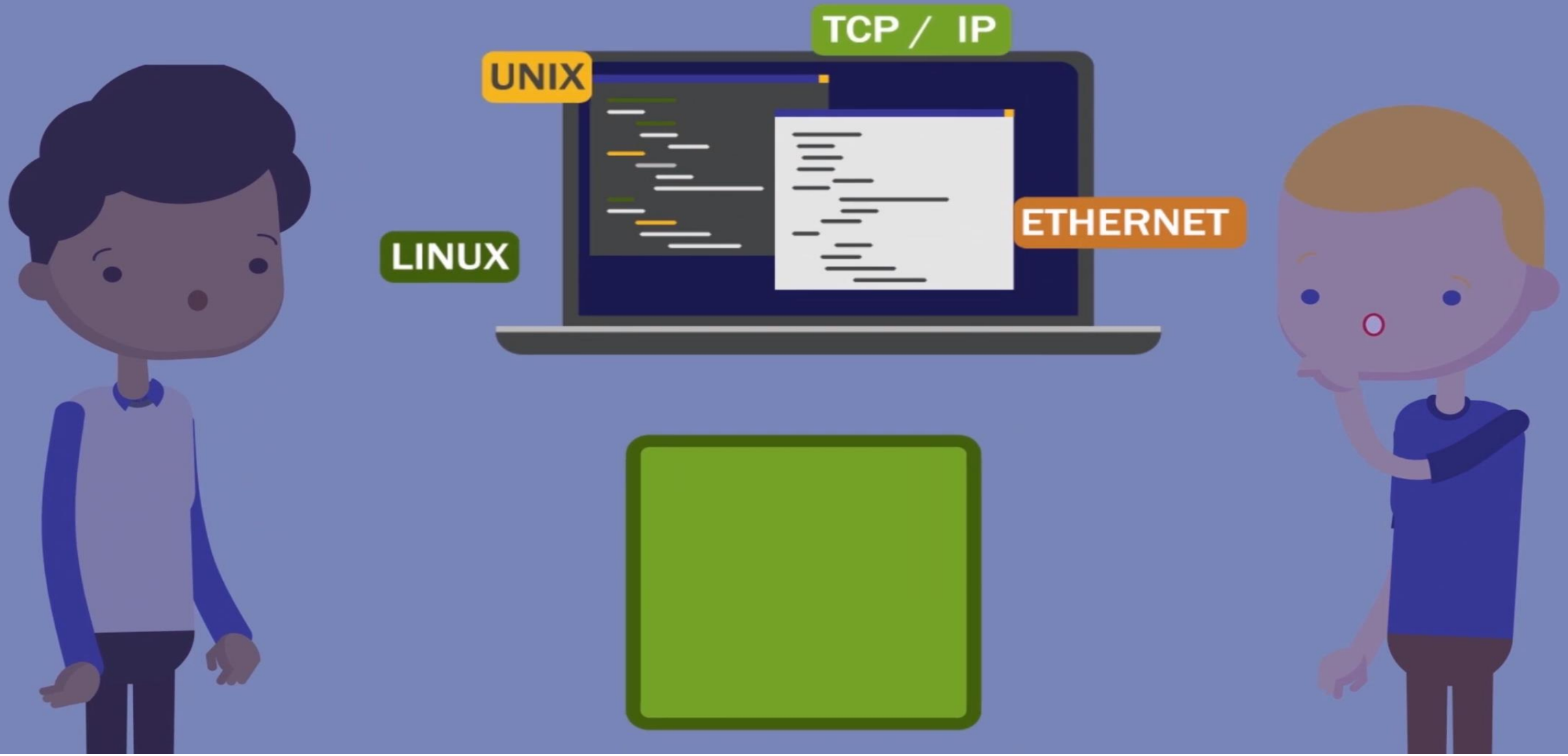
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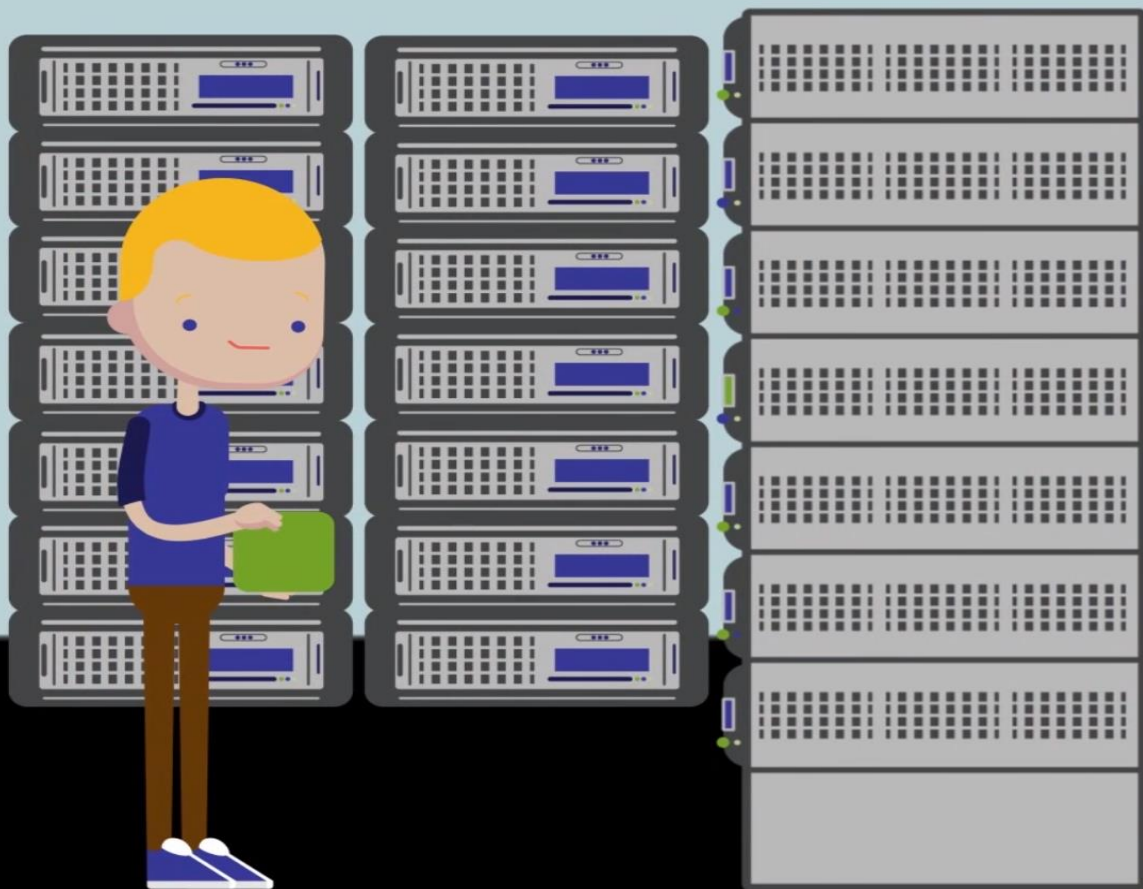




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ANDY
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HOSTING



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Mission

The Open Compute Project Foundation is a rapidly growing, global community whose mission is to design, use, and enable mainstream delivery of the most efficient designs for scalable computing.

Misja

Open Compute Project Foundation to dynamicznie rozwijająca się globalna społeczność, której misją jest projektowanie, używanie i umożliwianie dostarczania najbardziej wydajnych projektów dla komputerowych systemów skalowanych.

The OCP Foundation is a not for profit organisation which has been creating a “hidden revolution” in the Data Centre industry since it was formed in 2011

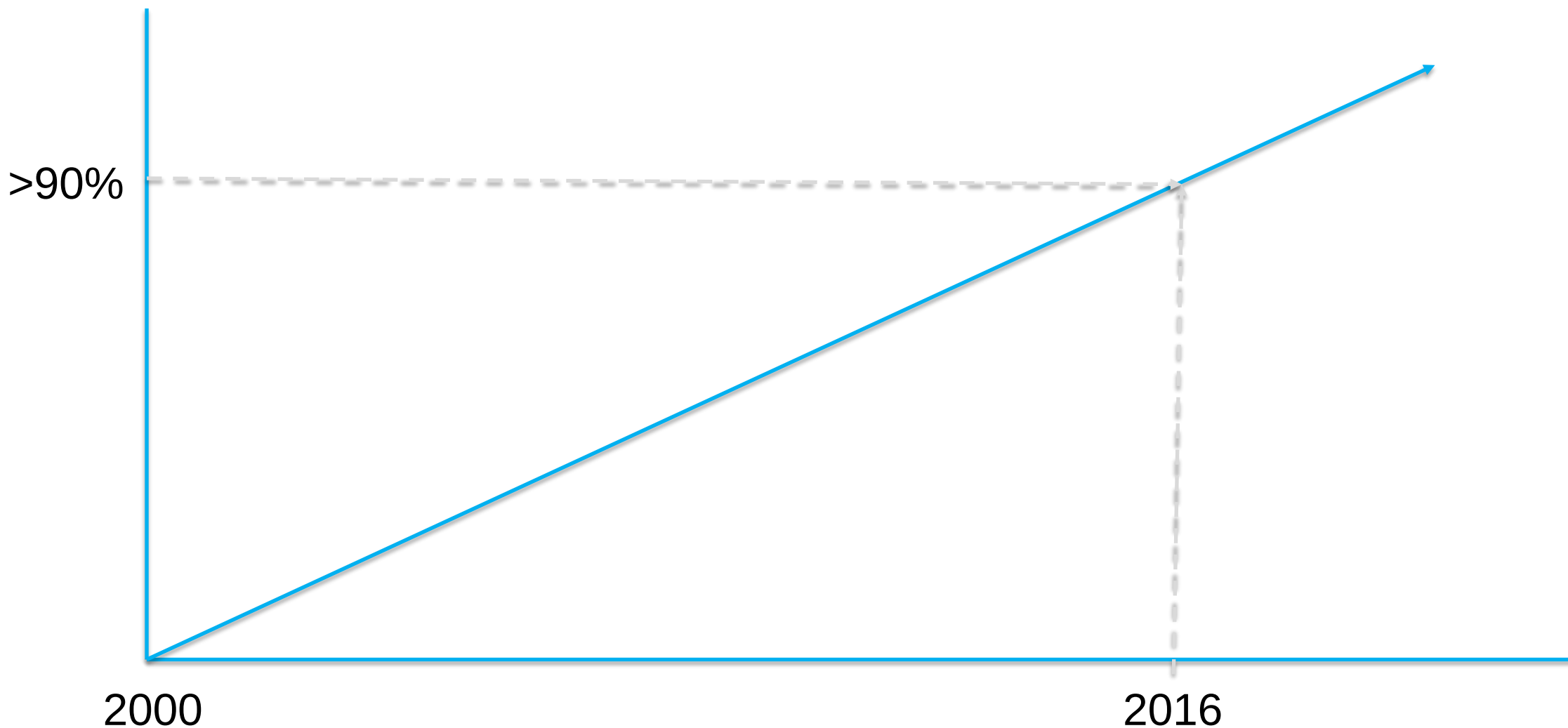
www.opencompute.org



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Linux Foundation & Data Centre Software Adoption

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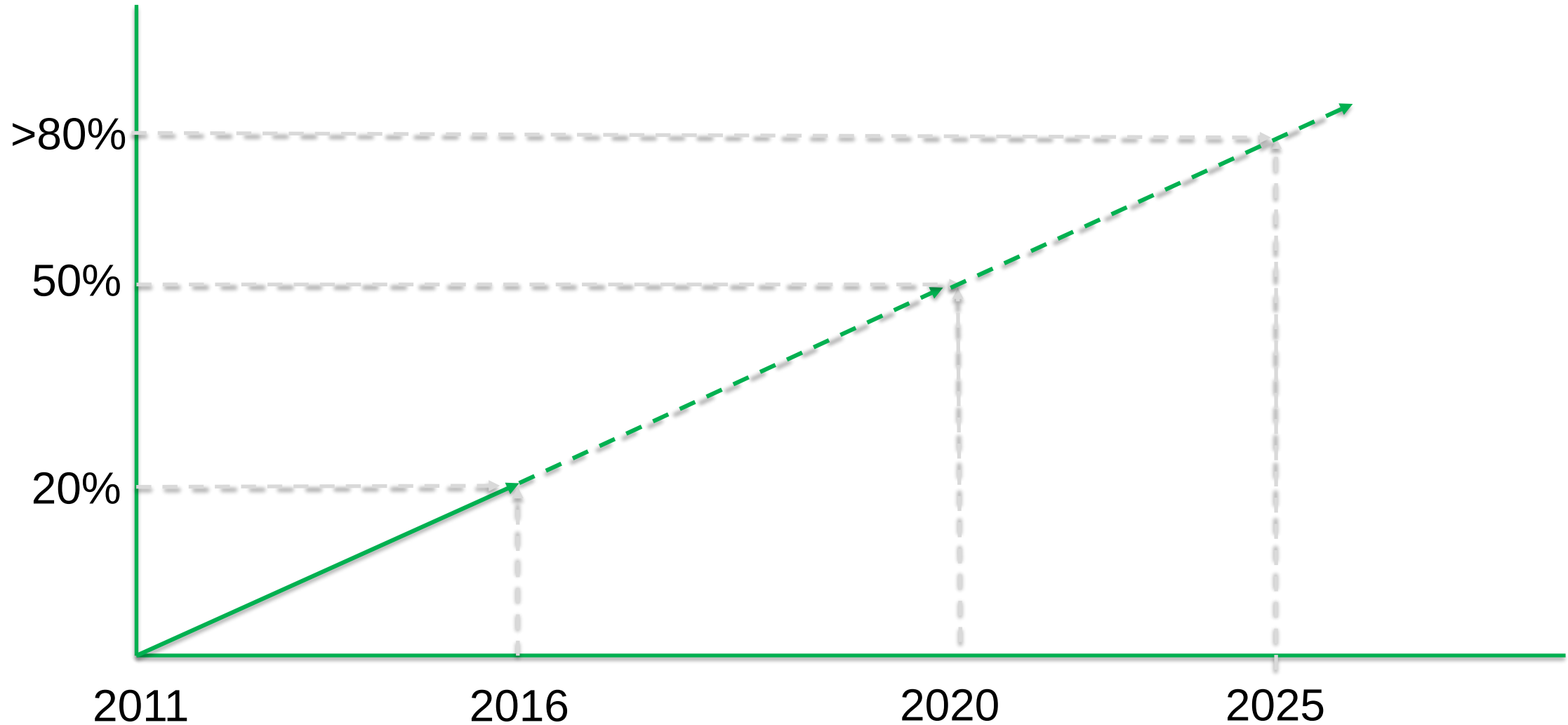




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OCP Foundation & Data Centre Hardware Adoption

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Spółeczność OCP

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Platinum

2crsi (since 2018)	3M (since 2018)	Alibaba (since 2017)	AMD (since 2012)
Arista Networks (since 2019)	ARM (since 2018)	ASUS (since 2019)	AT&T (since 2015)
Baidu (since 2019)	Cumulus Networks (since 2013)	Delta Electronics (since 2016)	Deutsche Telekom (since 2016)
Edgecore Networks (since 2016)	Facebook (since 2011)	Flex (since 2016)	Goldman Sachs (since 2011)
Google (since 2016)	HPE (since 2016)	Huawei (since 2018)	Hyve Solutions (since 2012)
IBM (since 2013)	Inspur (since 2016)	Intel (since 2011)	JD.com (since 2018)
Lenovo (since 2016)	LinkedIn (since 2018)	Mellanox (since 2012)	Microsoft (since 2014)

Gold

Big Switch Networks (since 2019)	ITOCHU Techno-Solutions Corporation (since 2014)	Rittal (since 2017)	Seagate (since 2017)
ZT Systems (since 2019)			

Silver

Circle B (since 2016)	Cisco (since 2014)	Inventec (since 2014)	Samsung (since 2019)

MITAC (since 2017)	Nokia (since 2015)	Penguin Computing (since 2012)	Quanta Cloud Technology (since 2012)
Rackspace (since 2011)	Schneider (since 2014)	Silicom (since 2018)	STORDIS (since 2019)
Tencent (since 2018)	Western Digital (since 2017)	Wiwynn (since 2014)	

ABB Integrated DC Power	Cloud & Heat Technologies	Keysight Technologies	ScaleFlux
Accelink Technologies	CNEX Labs	KinnexA	Senao Networks
ACES Electronics	Comsys AB	KPN	Senko Advanced Components
Achronix Semiconductor Corp.	CoolDC	Lanner Electronics	SGL Korea
ADLINK Technology	CoolIT Systems	Lattice Semiconductor	Silicon Motion
ADTRAN, Inc.	Coromatic	Lite-ON Technology	Solarflare
ADVA Optical	CPC	Luxshare	Sony
Advantech	Dell Inc.	Man Zai Industrial	Southco, Inc.
AIC Inc.	Delta Solutions	Marvell	Spectra Logic
Alpha Networks	Dropbox	Microchip	Stäubli Electrical Connectors
American Megatrends International Llc	e-shelter	Molex	Submer Immersion Cooling
Ampere Computing	Eaton	Murata Electronics	Supermicro
Amphenol	Edgetic	Nephos Inc	Swedish Modules
Analog Devices	Eltek A/S	NETINT Technologies	Swegon
Applied Optoelectronics	EmbedWay Technologies	Netronome Systems	Switch Datacenters
Apstra	Enflame Technology	Netscout Systems	Taiyo Yuden
Aquantia (Marvell)	Eoptolink	Nexedi	TDK Corporation
Arizona State University	EPS Global	NLB Services	TE Connectivity
	Ericsson	NorthForge	Tektronix

Artesyn Embedded Technologies

ASPEED Technology

Asperitas

ASRock Rack

Astera Labs

Atlancis Technologies

Avera

Beijing E7Research & E7Academy

Bel Power Solutions & Protection

Bloomberg

Booking.com

Broadcom

Burlywood

Cambricon Technologies

Cambridge Industries USA

CBTS Technology Solutions

CEJN

Celeris Informatique

Celestica

Centec Networks

Cheval

EZSVS Technology

Finisar

Fujifilm

Fujitsu

Giga Data Centers

Gigabyte Technology

Global Switch

Graphcore

Green Revolution Cooling

H3C

Habana Labs

Harting

Hydro66

Iceotope Technologies

Ingrasys

Inventus Power

IP Infusion

ITRenew

Kamelon Security

Kao Data

Nuvoton Technology

nVent

NXP

ON Semiconductor

Opengear

Orange

OVH

Packet

Parallel Wireless

PCX

Pegatron

PennEngineering

Phoenix Contact

Positronic

Qualcomm

Radisys

Red Hat

RISE Research Institute

Salesforce

Samtec

Teratec

Toshiba

TransPak

Trinity College Dublin

Ufi Space

UNH-IOL

University of East London

University of Michigan

Vertiv

Vesper Technologies

Viking Enterprise Solutions

Weka IO

Wistron NeWeb Corporation

XCloud Networks

Xilinx

Yahoo! Japan

zGlue

Zollner Electronics

ZPE Systems



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TROCHĘ WIĘCEJ O IDEOLOGII

- Dlaczego 19-calowe stojaki? (standard sprzed prawie 100 lat!)
- Po co instalować interfejsy z tyłu serwerów?
- Po co budować techniczną podłogę w pomieszczeniach serwerowych?
- Dlaczego kontrolujemy ściśle wilgotność względną? (obecny sprzęt IT wymaga 8%-90%)
- Dlaczego kontrolujemy ściśle temperaturę? (obecny sprzęt IT wymaga 10°C-35°C na wlocie)
- Dlaczego budujemy scentralizowane UPS wraz z bateriami i mechaniczne skomplikowane chłodzenie?
- Dlaczego oczekujemy szybkiej naprawy i redundancji sprzętowej?



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Dlaczego 19-calowe stojaki ...
... nie są takie „święte”

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Rack 19”



Rack OCP



Prawie 100 lat temu, w 1922 departament techniki firmy AT&T wprowadził w życie 19-calowe szafy, z podstawową jednostkową zajętością powierzchni równą $1 \frac{3}{4}$ cala (czyli 1U 44,45 mm).



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Jeden z powodów dlaczego otwartość wygrywa

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Producenci serwerów
/ruterów/switch'y
sprzedają wkładki SFP
wraz z urządzeniami
aktywnymi

**Wkładki SFP sprzedawane przez niezależnych
producentów są ok. 80% tańsze**



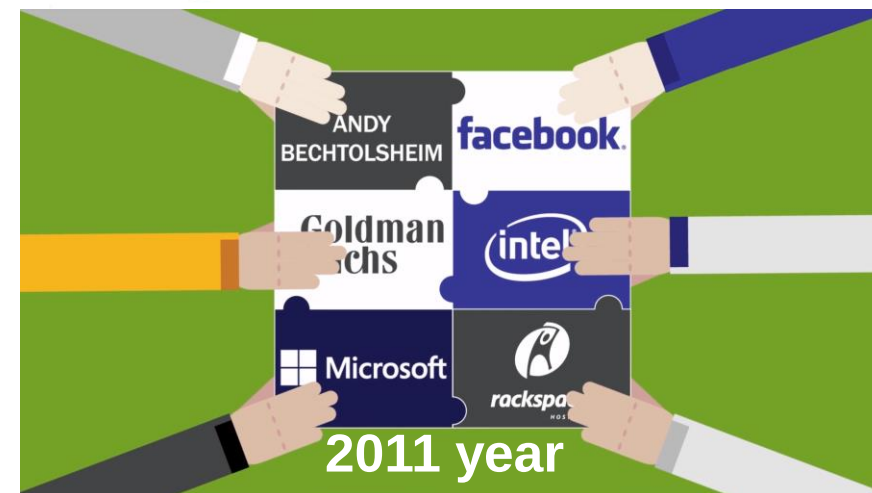
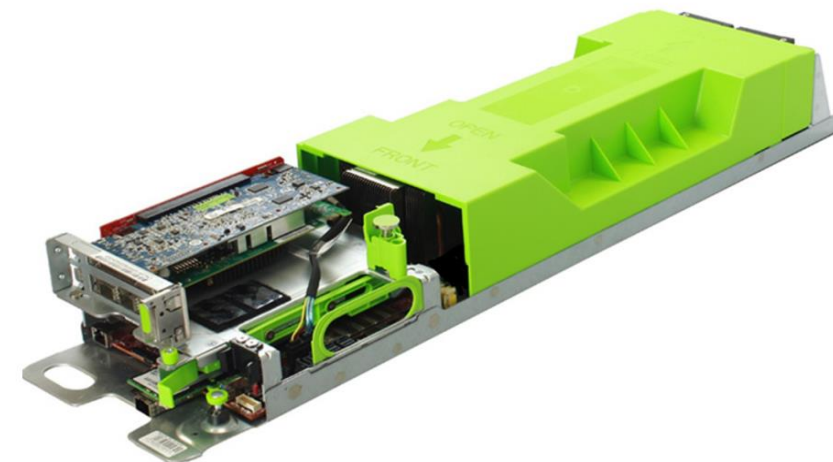
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Open Compute Project (OCP) Rewolucja w transformacji Data Center

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Główne zalety rozwiązania:

- mniejszy pobór energii (PUE na poziomie $1.07 <$ zamiast 1,40-1,90)
- brak konieczności instalowania podłogi podniesionej
- brak klimatyzacji (chłodzenie adiabatyczne)
- większe upakowanie w stojaku od 48 do 192 serwerów
- szybszy i prostszy serwis – brak narzędzi, śrubokrętów interfejsy z przodu stojaka
- bardzo konkurencyjna cena (brak obudowy, brak szyn prowadzących, mniej zasilaczy, mniej wentylatorów). 30%-40% niższa cena niż tradycyjnych serwerów zbudowanych na tych samych komponentach.
- serwery refurbished z nowymi dyskami SSD i roczną gwarancją 75% tańsze niż nowe serwery.
- prawie 50% serwerów w 2019 roku na świecie zostało dostarczanych w standardzie OCP
- w Polsce oczekiwany jest boom na OCP w perspektywie 1-2 lat





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Servers & Storages



• Server Shipments and Market Share Q4

Top 5 Companies, Worldwide Server Unit Shipments, Market Share, and Growth, Fourth Quarter of 2019

Company	4Q19 Unit Shipments	4Q19 Market Share	4Q18 Unit Shipments	4Q18 Market Share	4Q19/4Q18 Unit Growth
1. Dell Technologies	549,488	16.1%	580,579	19.4%	-5.4%
2. HPE/New H3C Group ^a	507,228	14.9%	484,668	16.2%	4.7%
3. Inspur/Inspur Power Systems ^b	270,567	8.0%	247,600	8.3%	9.3%
T4. Lenovo*	233,896	6.9%	190,721	6.4%	22.6%
T4. Huawei*	216,734	6.4%	211,618	7.1%	2.4%
ODM Direct	1,054,743	31.0%	689,394	23.1%	53.0%
Rest of Market	570,667	16.8%	582,070	19.5%	-2.0%
Total	3,403,323	100%	2,986,651	100%	14.0%

Source: IDC Worldwide Quarterly Server Tracker, March 12, 2020

Non-Board OCP revenue expected to top \$11B in 2023

Racks & power need DC building changes & getting denser, resulting in slower growth

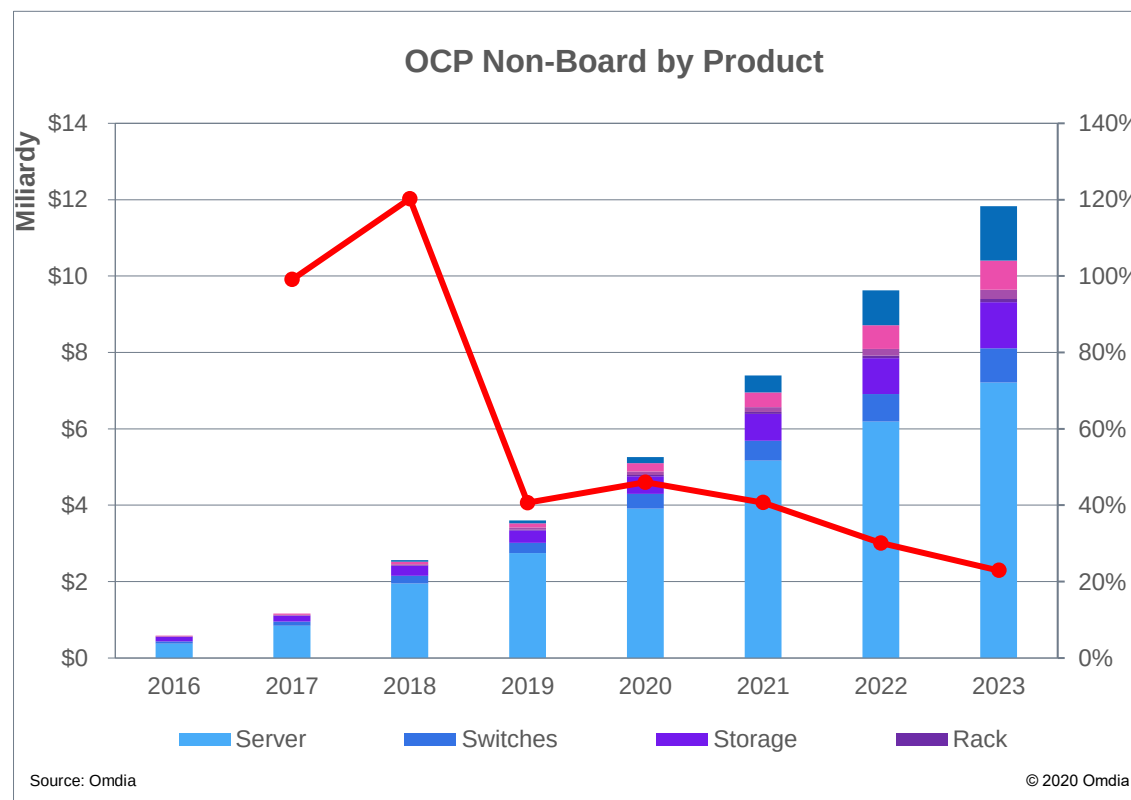
2020 YoY Growth 46%

5 Year CAGR of 36%

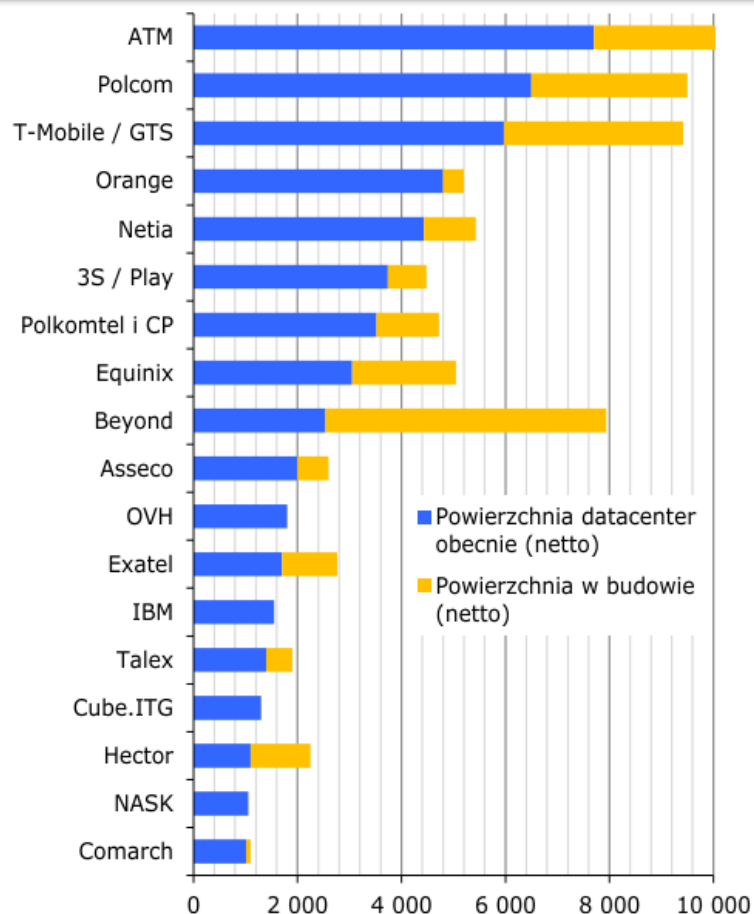
ODM Direct Server Market Share 28% +

Open Networking \$1.35B in 2023

(Non Hyperscale) – CAGR 33%



Powierzchnia kolokacyjna największych dostawców na rynku polskim w maju 2020 [m²]



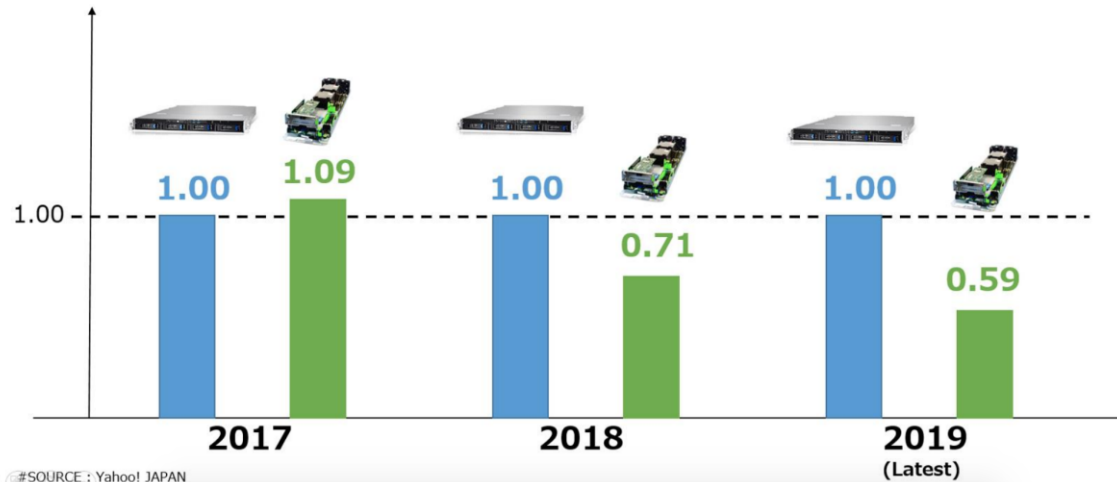
Source: Audytel



Connect. Collaborate. Accelerate.

Cost Performance (Server Unit)

Price Scale
(Based on EIA19 as 1.00)



#SOURCE: Yahoo! JAPAN

Cost Performance (Rack Level = L11 Cost)

Price Scale
(Based on EIA19 as 1.00)



Rack(L11 Cost) is including below



(+ Server Unit Cost)



* All necessary components are installed by rack level without network equipment

YAHOO!
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What can we remove from the system?

Can we raise operating temperatures and have the servers survive

Can we increase relative humidity operational ranges to make the system much more efficient?

Do we need a centralized power supplies?



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Open Rack Unit Innovations - Server Fans “Cube Law”

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40 mm
Fans



EIA
“U”

80 mm
Fans



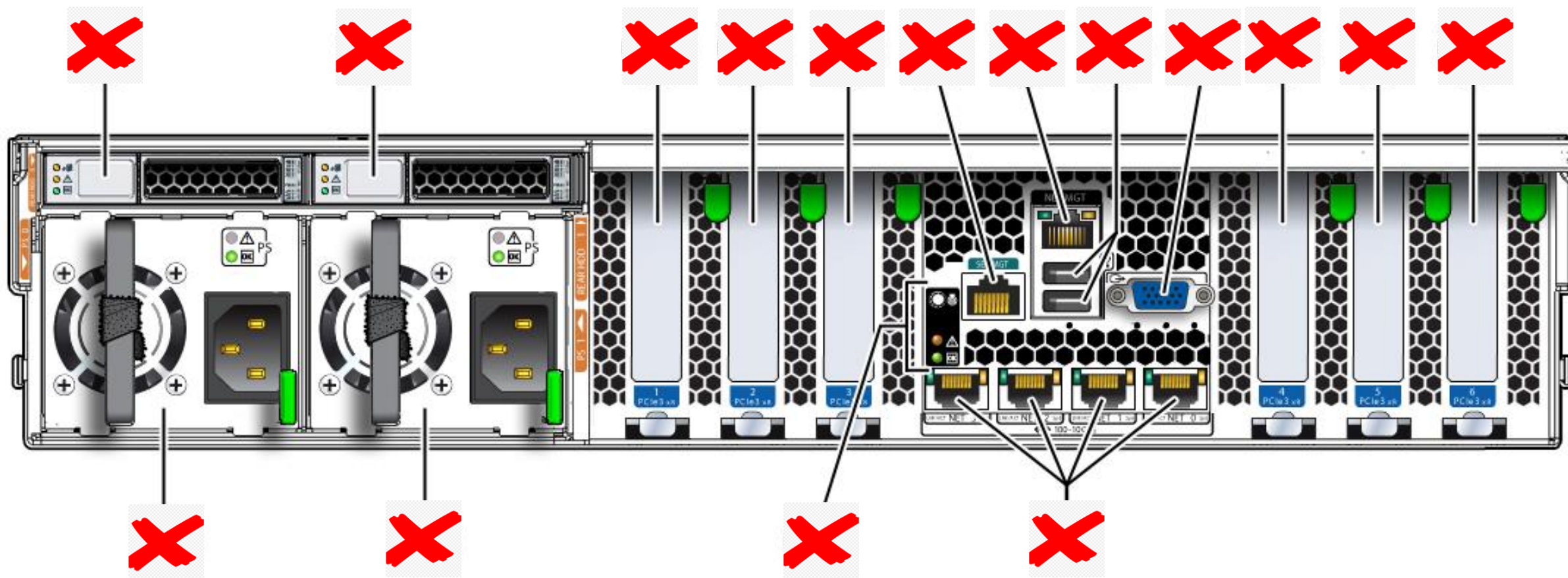
OCP
“OU”

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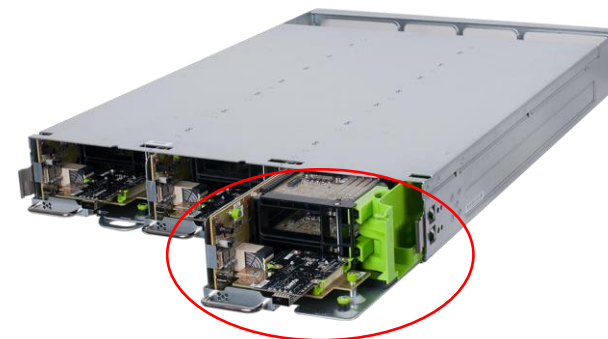
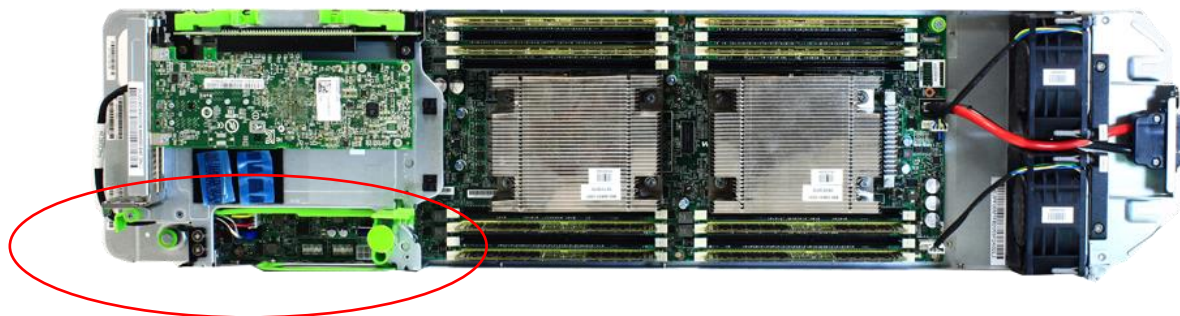
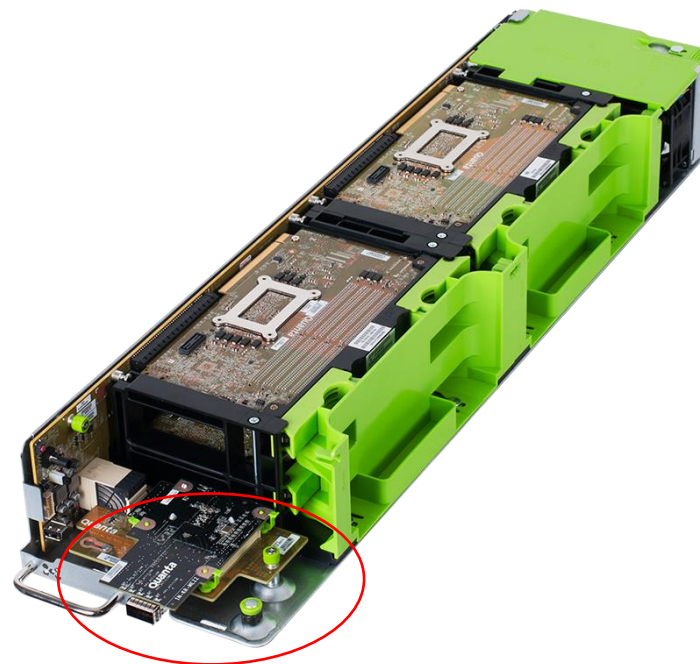
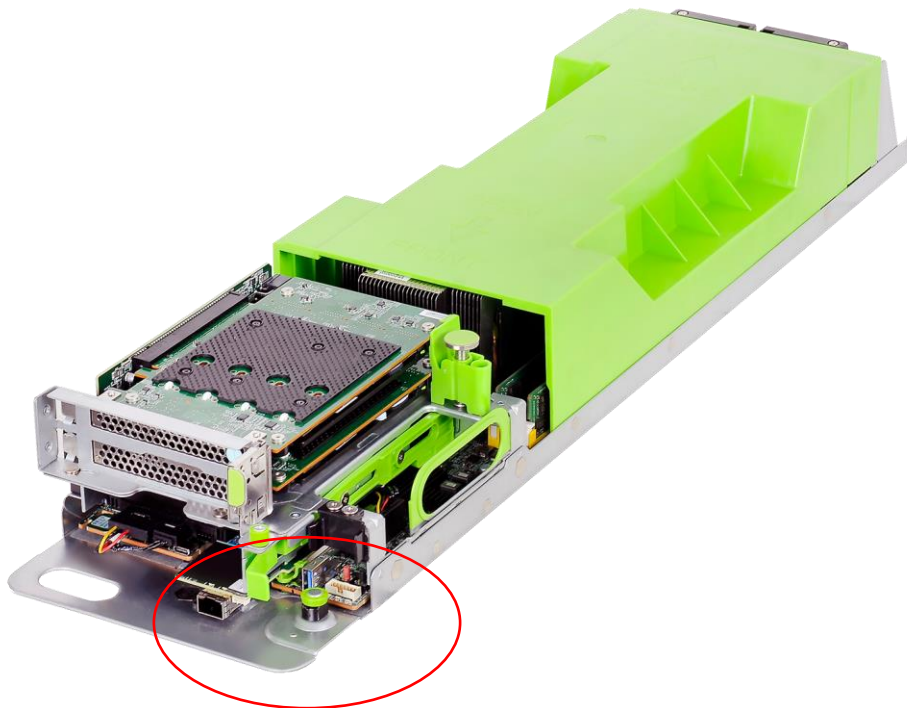
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Tool less OCP vanity free open source cubby servers

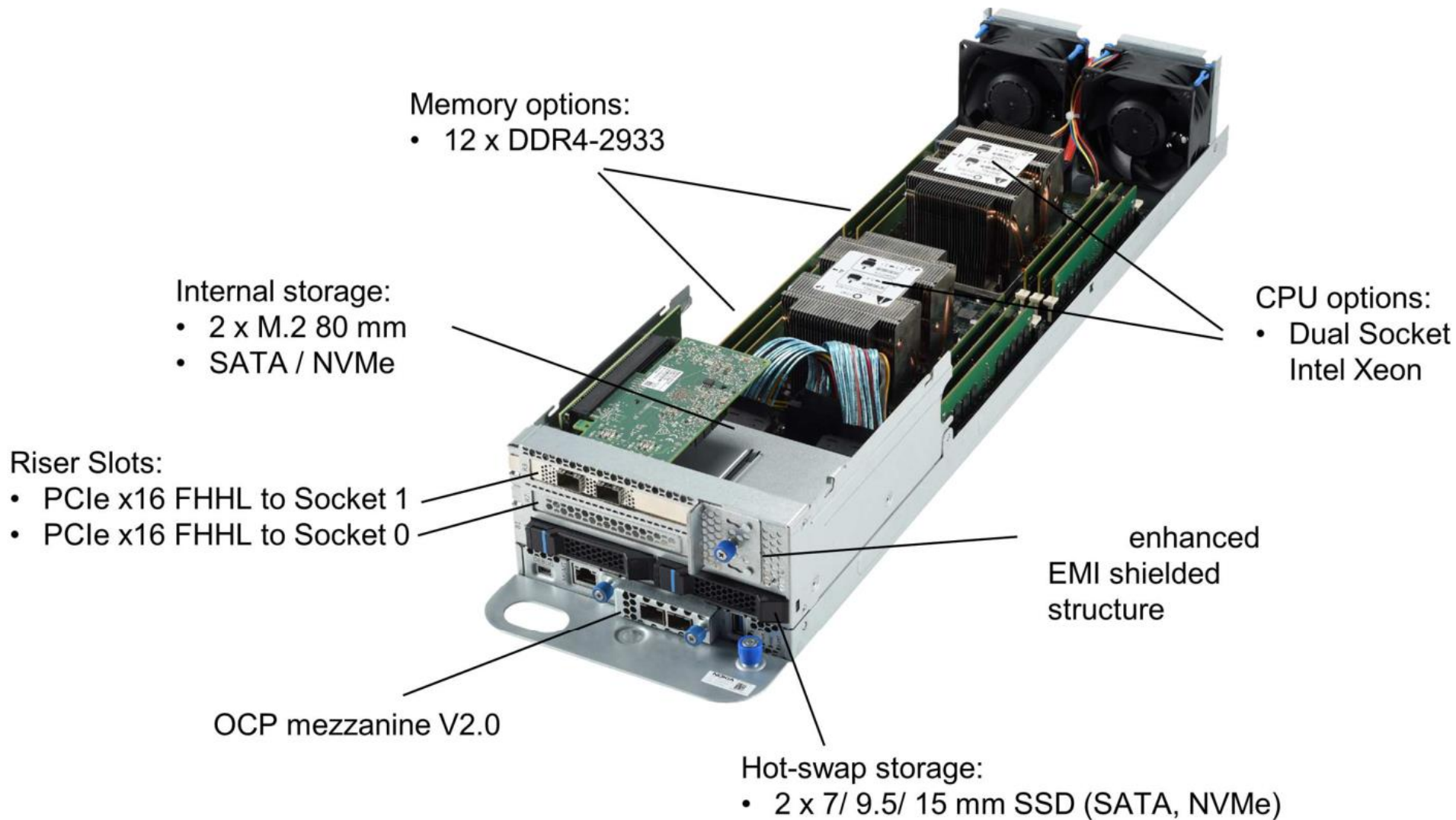
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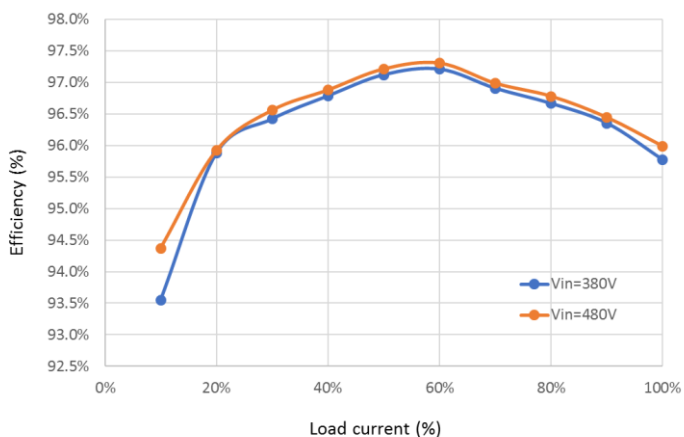
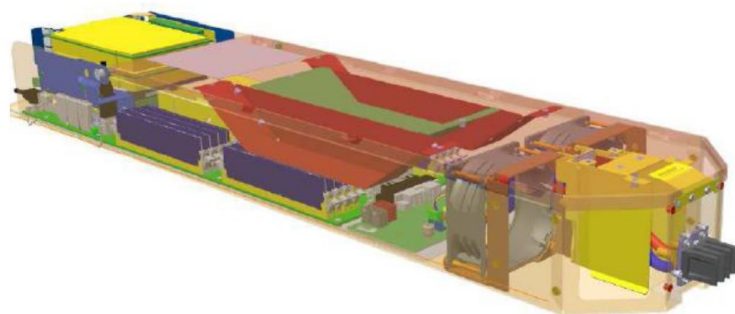


Open rack server sled configuration



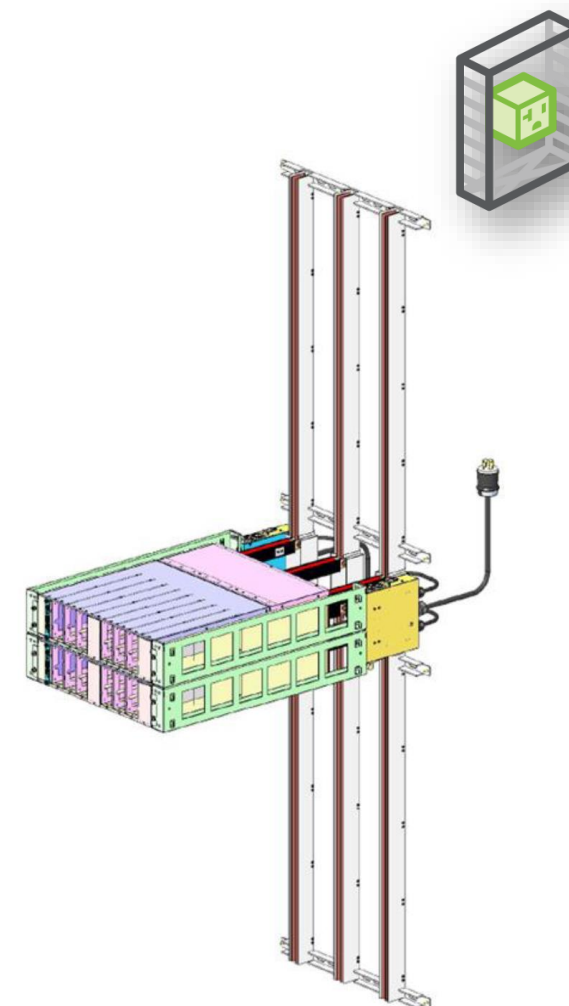
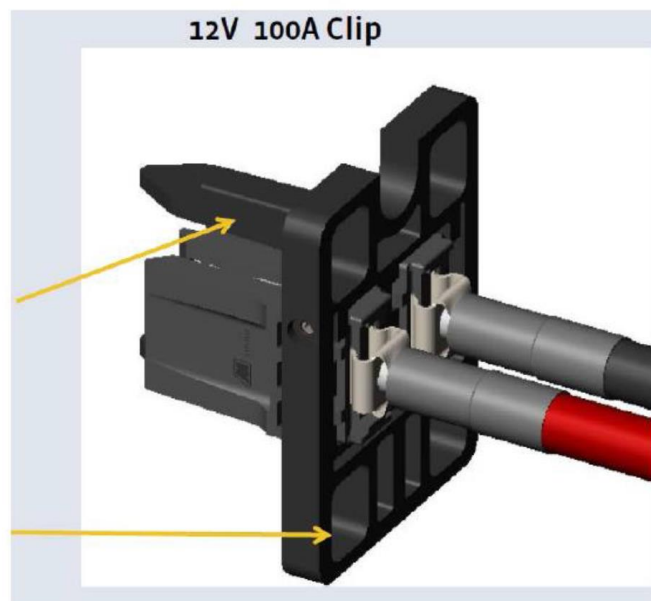


Innovative cable less - Shared 12v DC power system



Alignment Pin catches
between the busbar

Float +/- 4mm horizontal
Float +/- 3mm vertical



CERN did a comparative study of OCP against proprietary enterprise servers. At 80% utilisation in a HPC cluster they found that OCP servers used 29% less energy. CERN acquired a few OCP servers in order to compare performance and power consumption with standard hardware. The conclusions were that there are sufficient savings to motivate an attempt to procure a large scale installation.

ATLANCIS Technologies • 1 度
We are an ISO:9001 certified provider of Open I...
3 週前 • @

#LetsTalkOpenly

Fascinating power benchmarking results OCP v OEM compute server using the same specifications (CPU, RAM, SSD, NIC):

- Standard server uses 479 Watts at 80%
- The OCP server uses 337 Watts at 80%
- 6 KWh saving across the platform @ 80% load
- \$57,000 saving (KPLC rates) on just 42 nodes over 5 years

Lower Carbon footprint, lower OpEx, lower CapEx. Welcome to the new world.

#atlancis #africaisopen #atlancisccloud #hyperscalers #datacentre

翻譯年糕





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Open servers – Tioga Pass

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Standard



Advanced

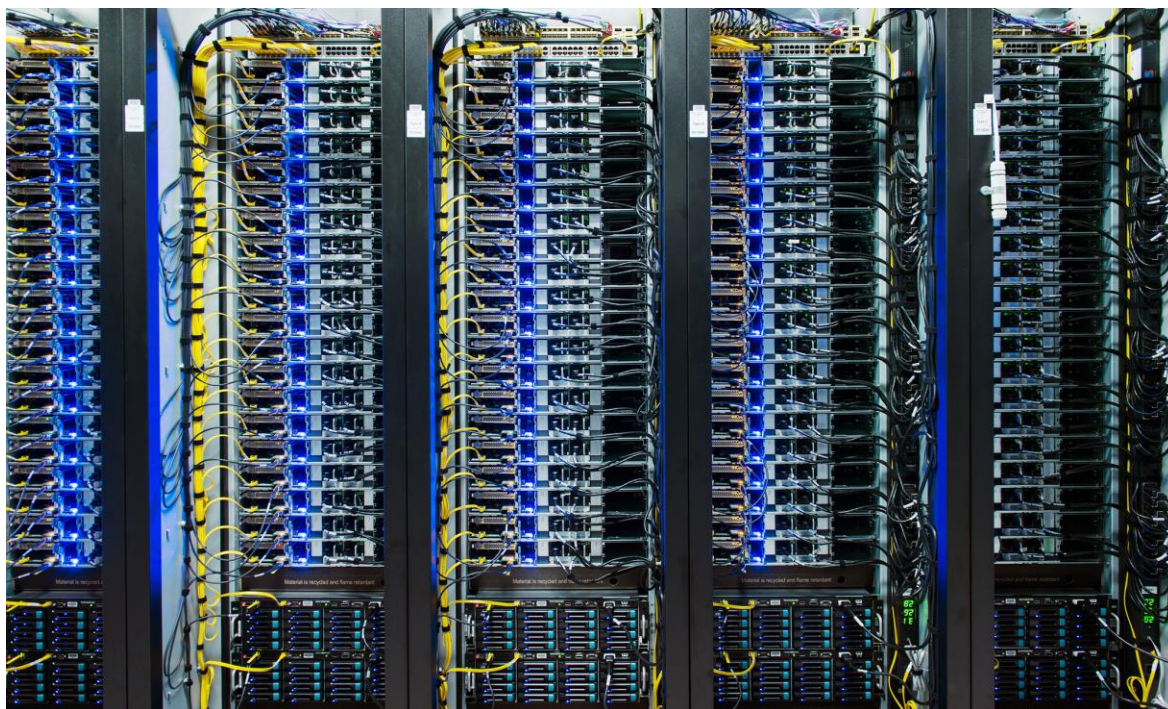


Ultra



(Tioga Pass) Skylake/Cascade Lake, 20U3N

12 x DDR4 DIMMs, AEP, 1 x M.2, 2 PCIe 3.0, 1 x OCP NIC Mezz; AMI BIOS/BMC
1 x 3.5" HDD, or 4 x 2.5" HDD/SSD, or 6 x 2.5" SSD, ORv2 rack compatible



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Dual Socket



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Open servers – Capri

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Single Socket

**AMD
EPYC**



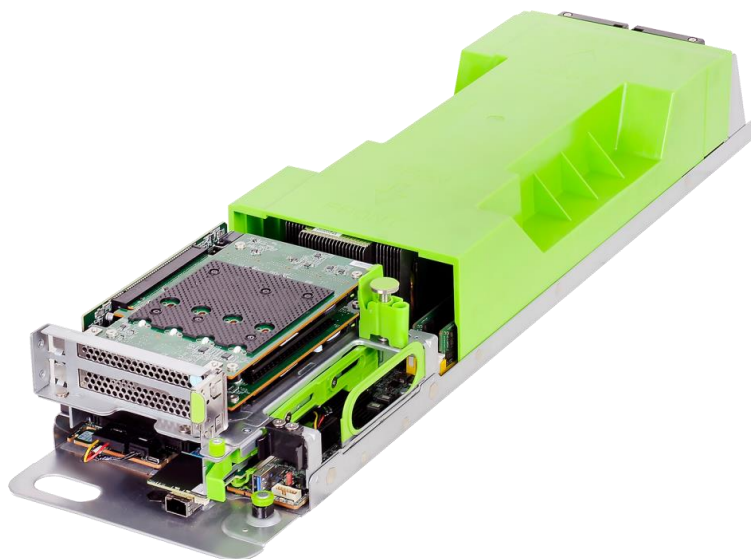
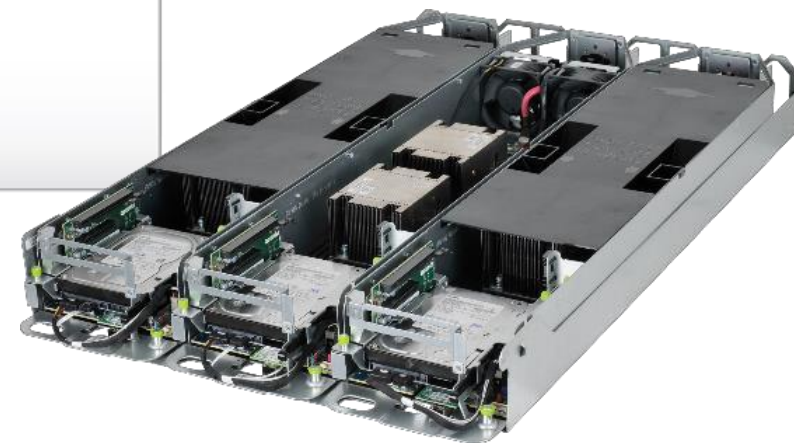
Advanced



Ultra

Capri 7002 Rome/ 7003 Milan, 20U3N

8 x DDR4 DIMMs, AEP, 1 x M.2, 2 PCIe 3.0, 1 x OCP NIC Mezz;
4 x 2.5" SSD, or 6 x 2.5" SSD, or 12 x 2.5" SSD, ORv2 rack compatible



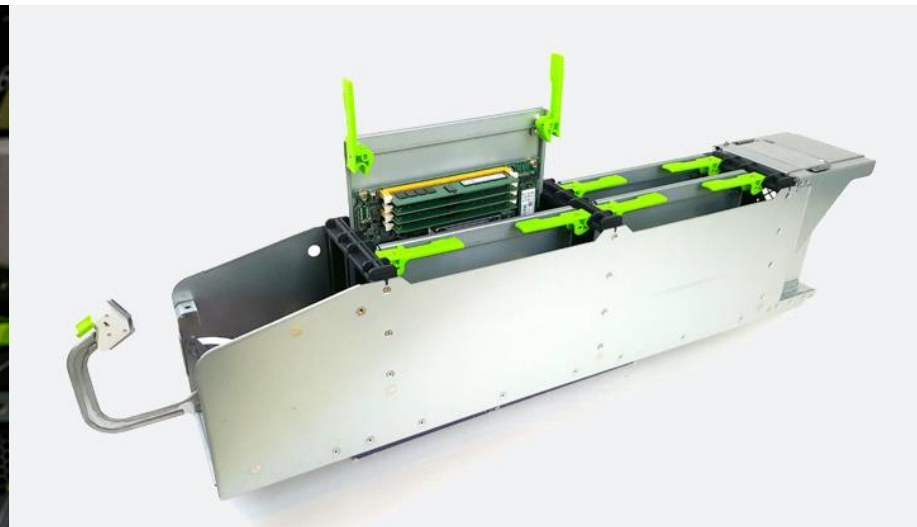
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Single Socket

Capri Intel Xeon-D , 40U4N
8 x DDR4 DIMMs, 4 xNVMe, ORv2 rack compatible

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Open storage – different variants

enclosure	drives	8TB	12TB	18TB	speed	hosts
knox	30x	240 TB	360 TB	---	3G/6G	2x
short canyon	60x	480 TB	720 TB	1.1 PB	12G	6x
bryce canyon	70x	560 TB	840 TB	1.3 PB	12G	2x
grand canyon	100x	800 TB	1.2 PB	1.8 PB	12G	6x



networked flash –
connectivity via ethernet



fast canyon



bryce canyon

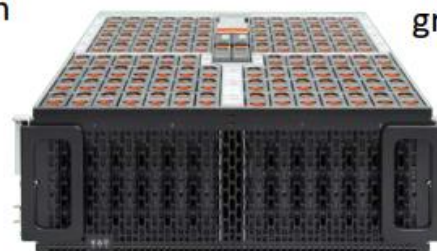
40U

72x HDD + dual connect (40U)



short canyon

60x HDD + six-host connect (4U)



grand canyon

102x HDD + six-host connect (4U)



2/3 OU

flash server	drives	interface	form	960GB	7.68TB	speed
fast canyon	16x	NVMe	U.2	15 TB	122 TB	25G, 100G

Open Rack – different variants



New form factor to fit in « standard »
environnement

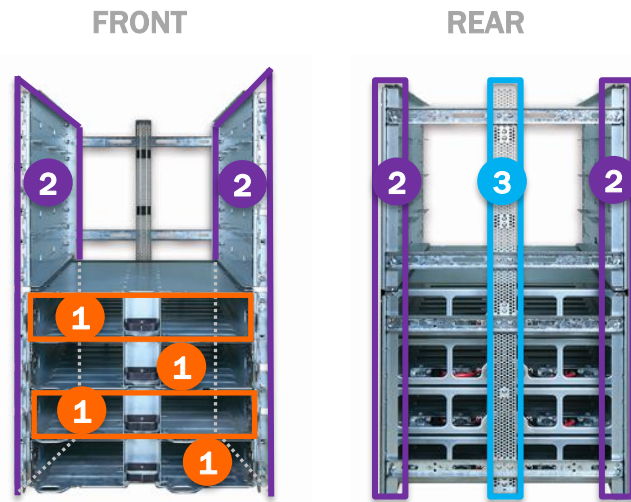
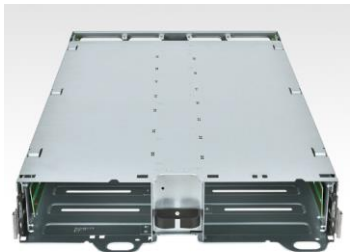


New form factor to fit in « standard »
environnement



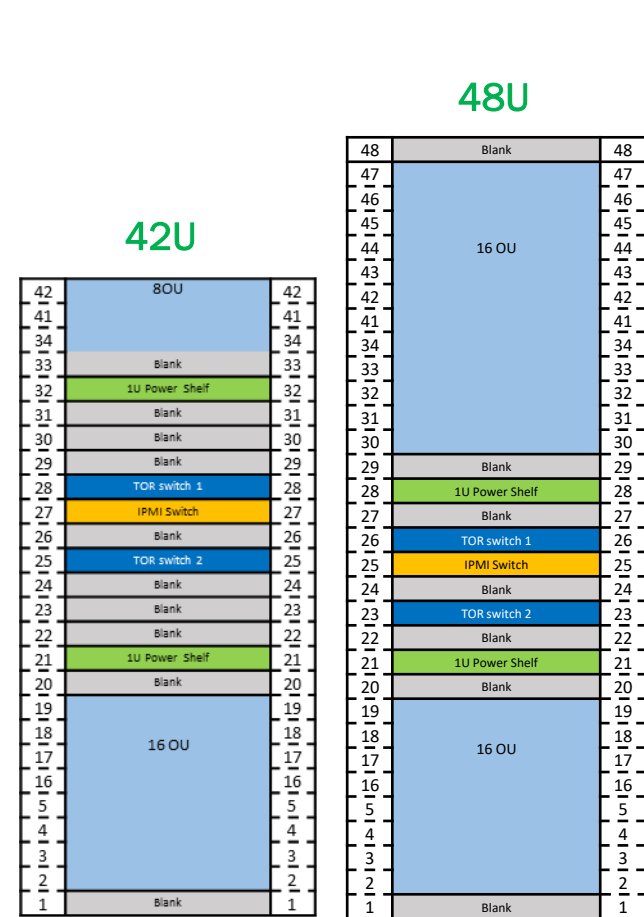
New form factor to fit in « standard »
environnement

Open Rack – different variants



- 1 19" SHELF
- 2 ESA RAIL KIT
- 3 BUS BAR

Assembly time: Less than **15min**





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Technology ecosystem

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Software Platforms



Networking Platforms



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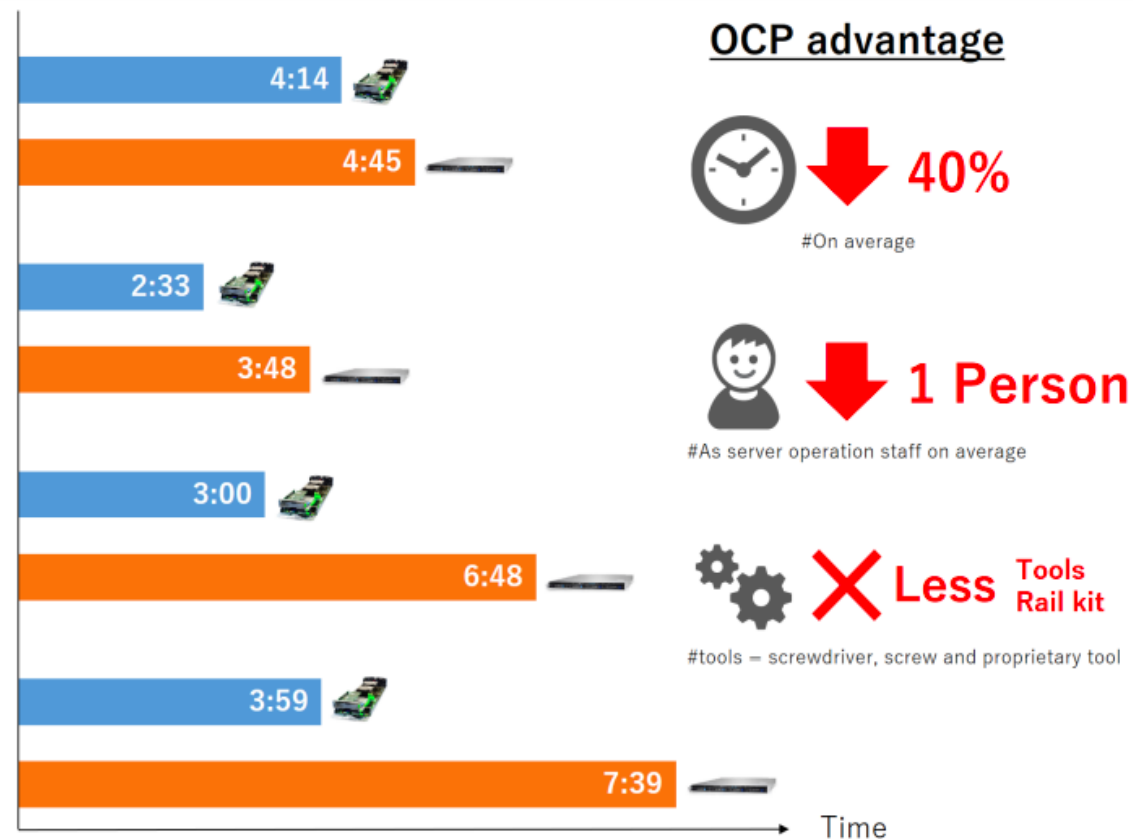


Unracking Server Node

Racking Server Node

Remove FRU

Install FRU



Traditional

OCP

YAHOO!
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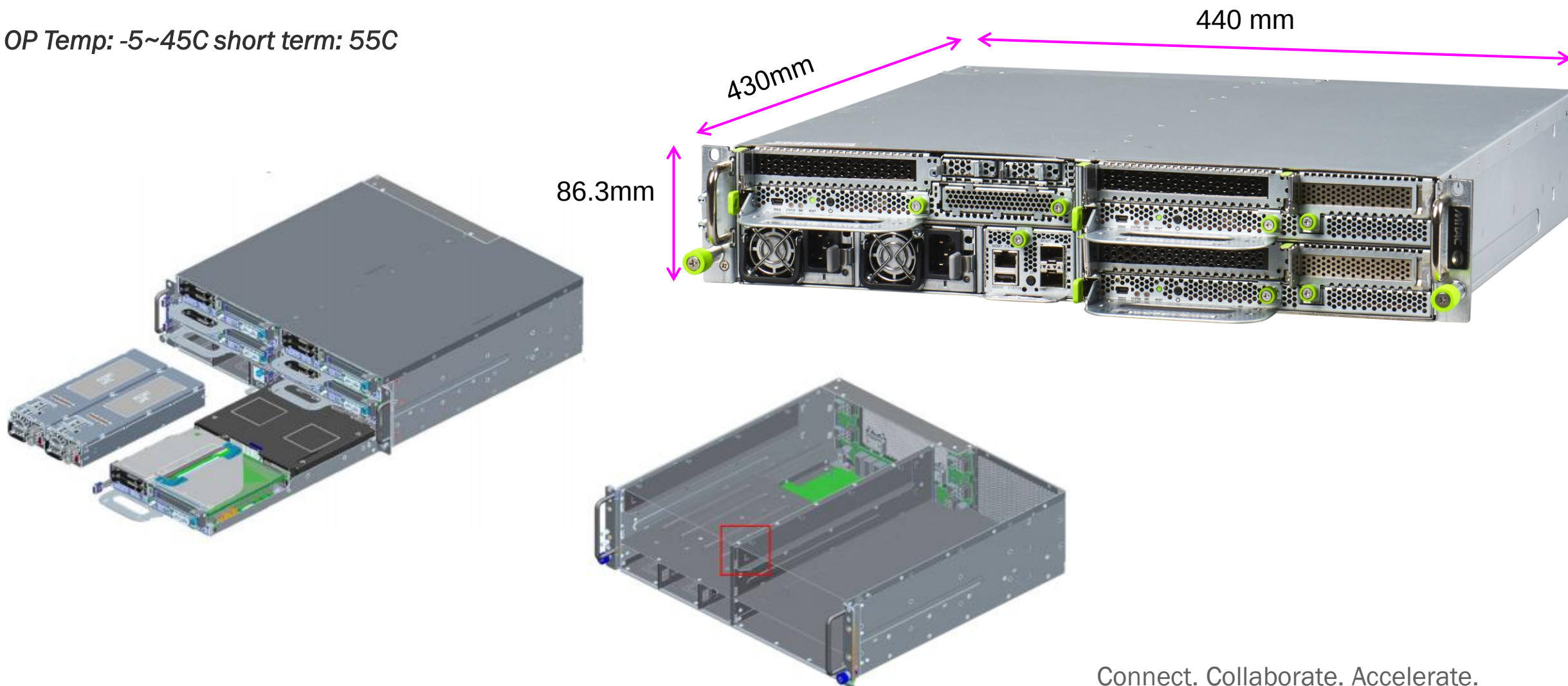


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Open Edge Compute

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OP Temp: -5~45C short term: 55C



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EDGE

**Compliant
with Nokia
Open Edge
Chassis
Specification
v1.4**

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Regional
Community

Questions?





UPCOMING WEBINARS



OCP Open Networking



OCP for Telco Providers



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Connect. Collaborate. Accelerate.

Thank you

