


IBM Power Systems POWER9 Enterprise Model E950 First Look


Version 7

**This is an unofficial document
It is not IBM approved or IBM reviewed**


POWER Advanced Technology Support EMEA (UKI)





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Introduction

- Pictures are from an Early Ship Program (ESP) Server
 - Arrived in the ATS, London, UK → 18th May 2018
 - Yours might be slightly different
- A heads-up on what to expect with POWER9 Enterprise
- **POWER9 E950 is customer install
but built to Enterprise standards**

Unpacking

- It arrived upright



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Open the box



Including:

- Rails
- Cables to external I/O Drawer
- Unexpected Power cables type
- Six metal handles for lifting the server to the rails

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The Server nicely wrapped up



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Unwrapped & the super nice handles added



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Weight warnings & it is heavy



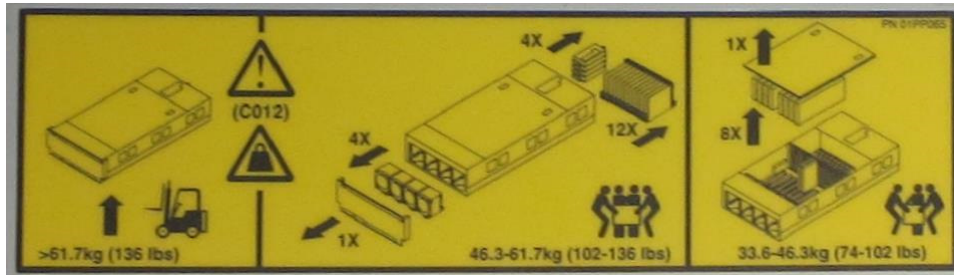
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Tipping risk

Lifting tool
Not forklift truck!!

Four strong
person lift

Three strong
person lift



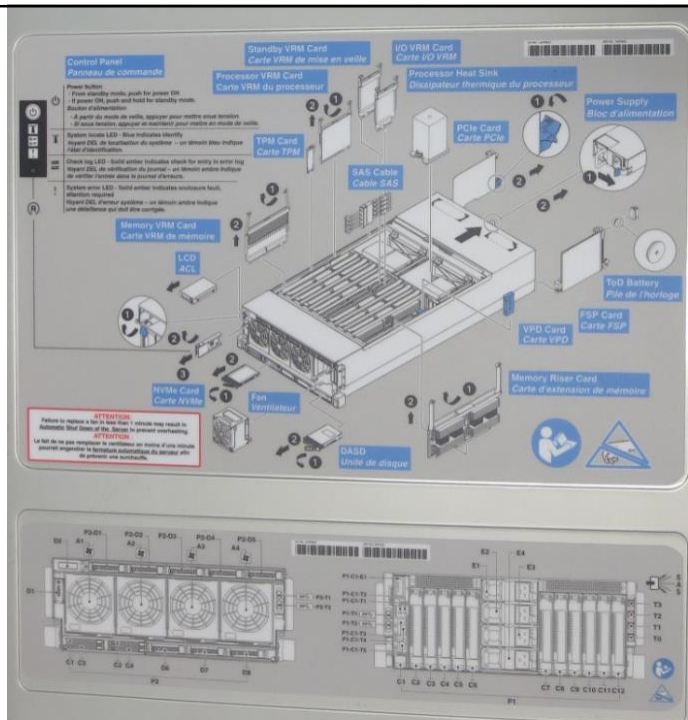
Remove Bezel, fans
power supplies & 11 adapters
(not the FSP in C1)

Remove lid
& memory cards

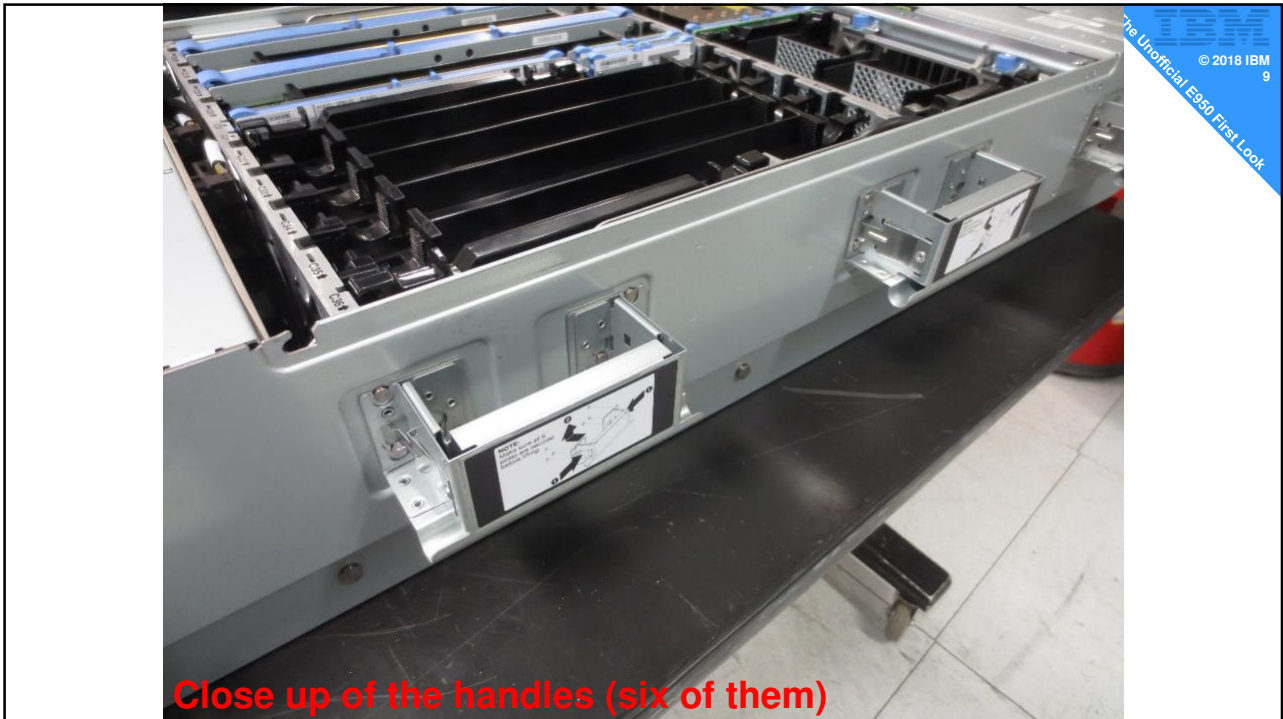
Note: Front 8 SFF disks are heavy too!

Top lid Technical Diagram label

Excellent
Information
+ terms
+ numbering



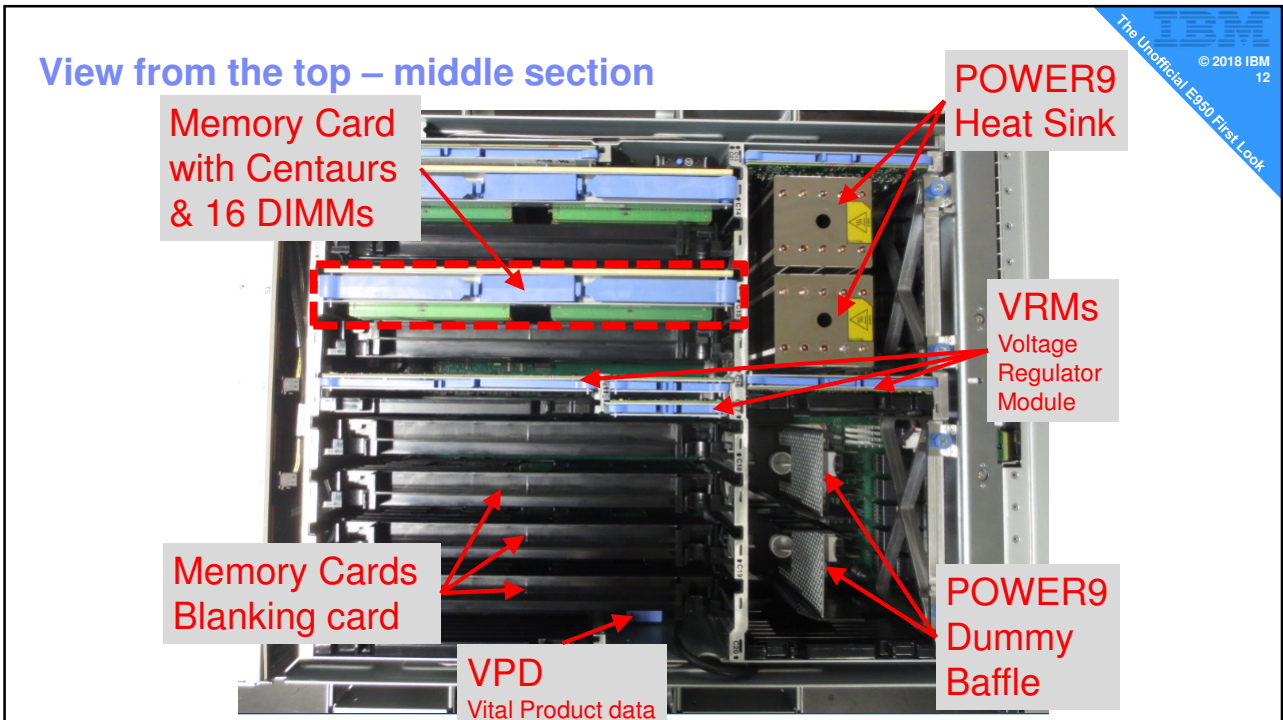
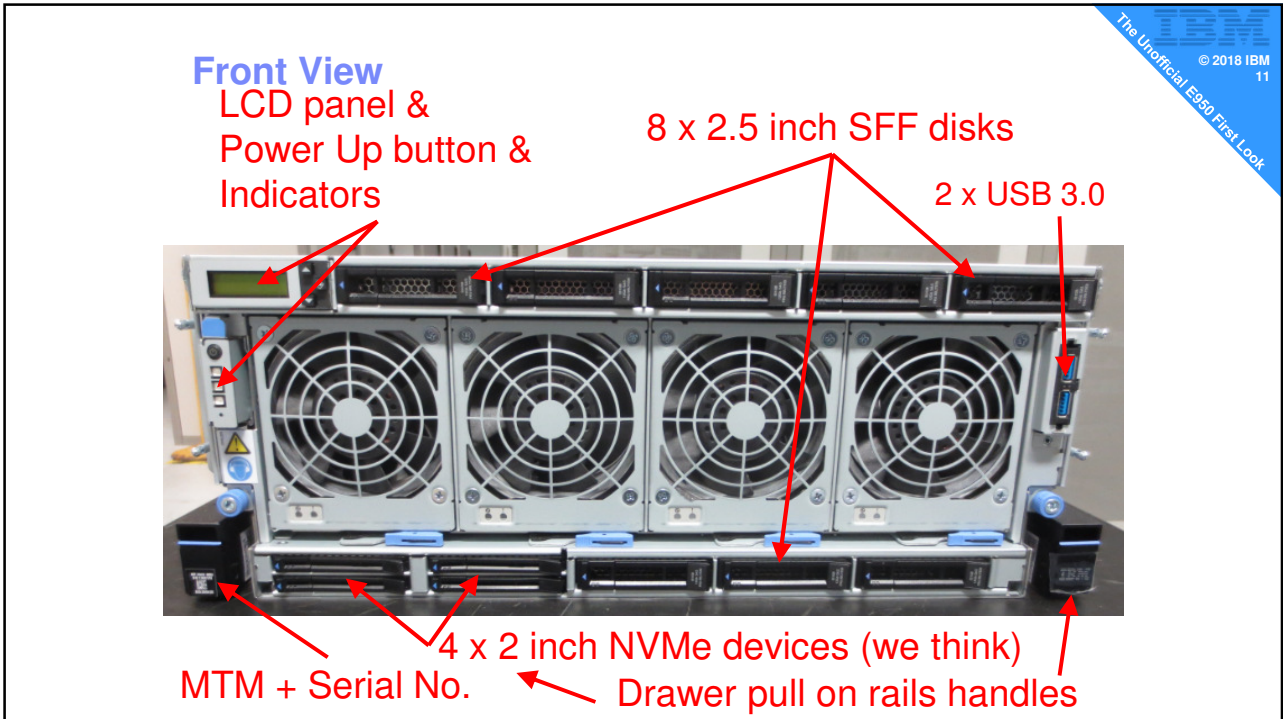
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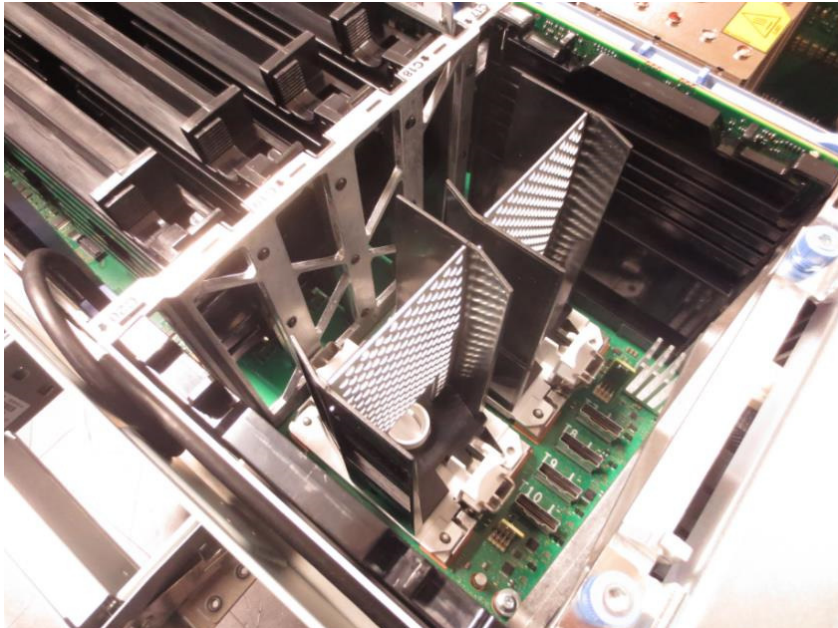
Close up of the handles (six of them)



On the bench

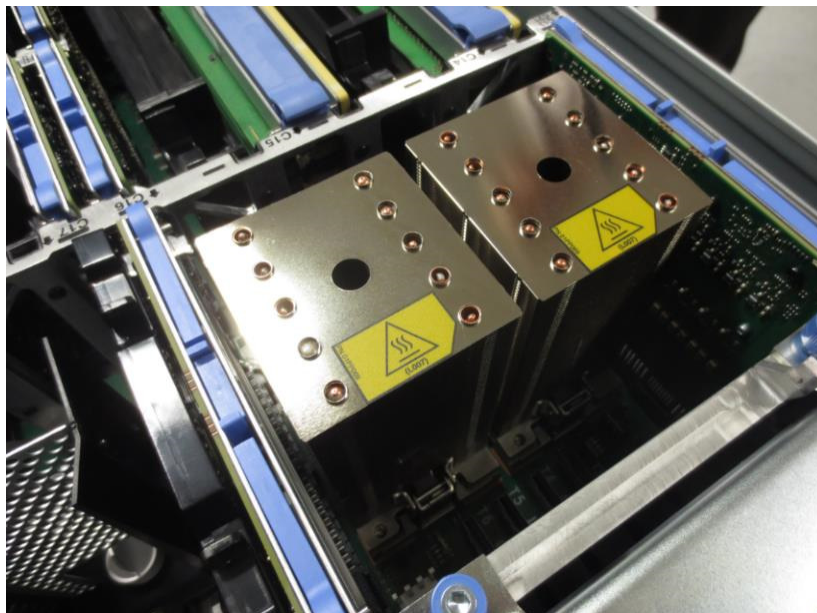


Dummy POWER9 CPU air baffle & POWER9 Socket at the bottom

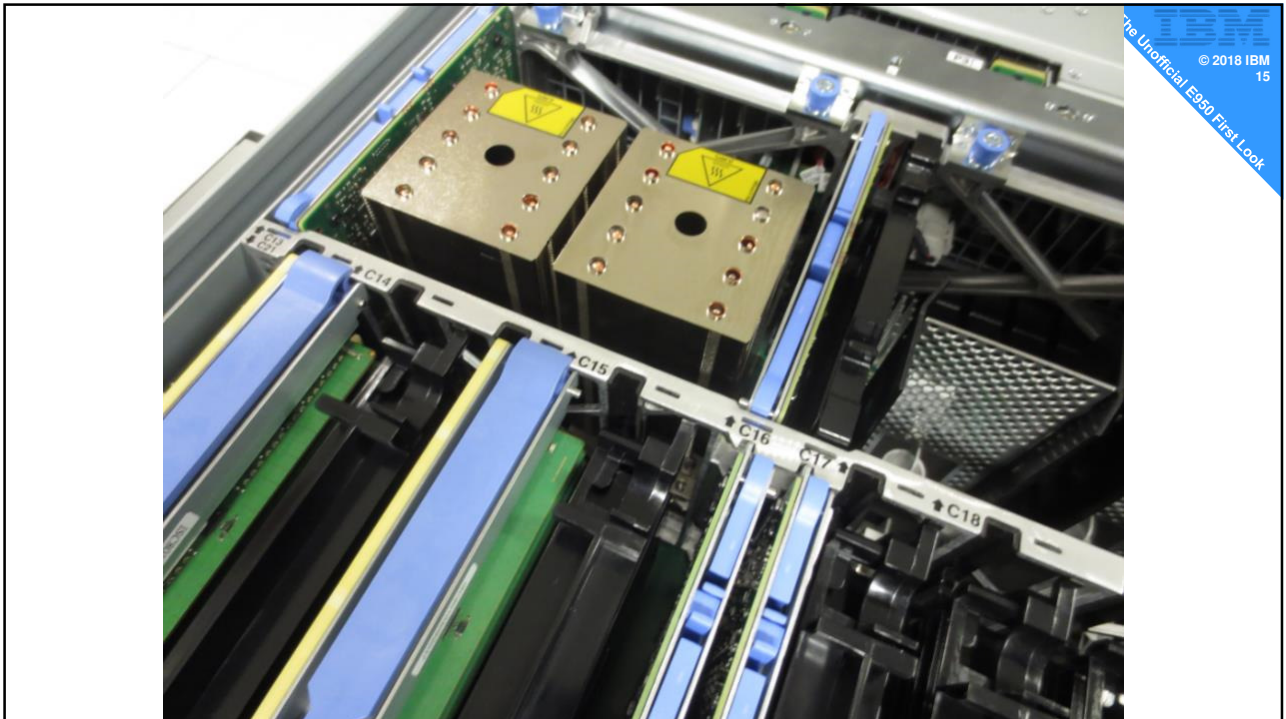


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Real POWER9 CPU & POWER9 Socket at the bottom



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Memory Card 16 DDR4 DIMMs (simple/easy to remove)



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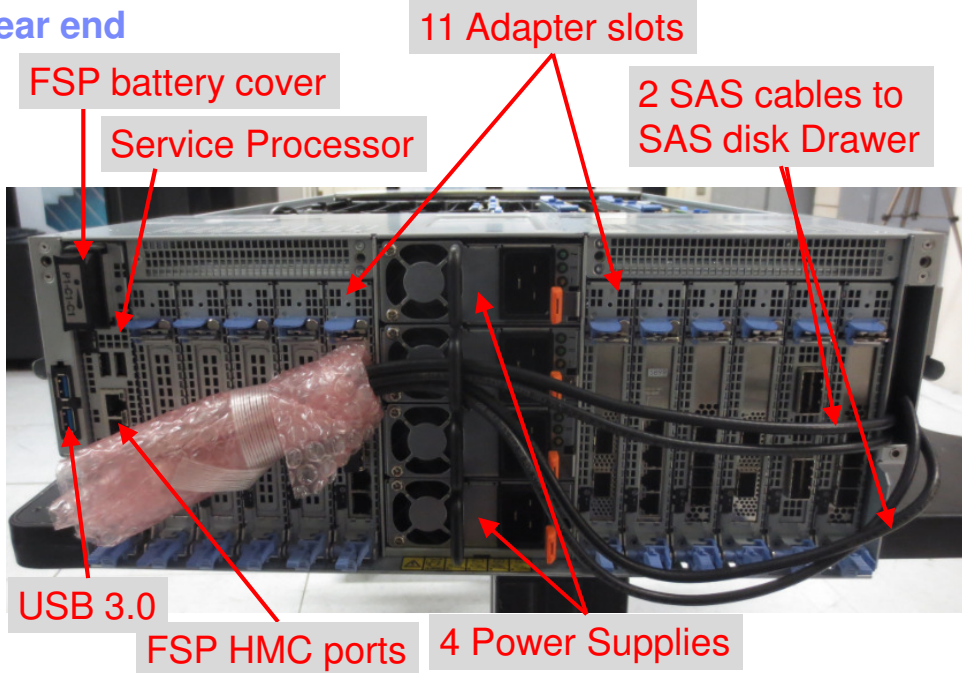
Memory blanking plate Missed opportunity to spell out "IBM"

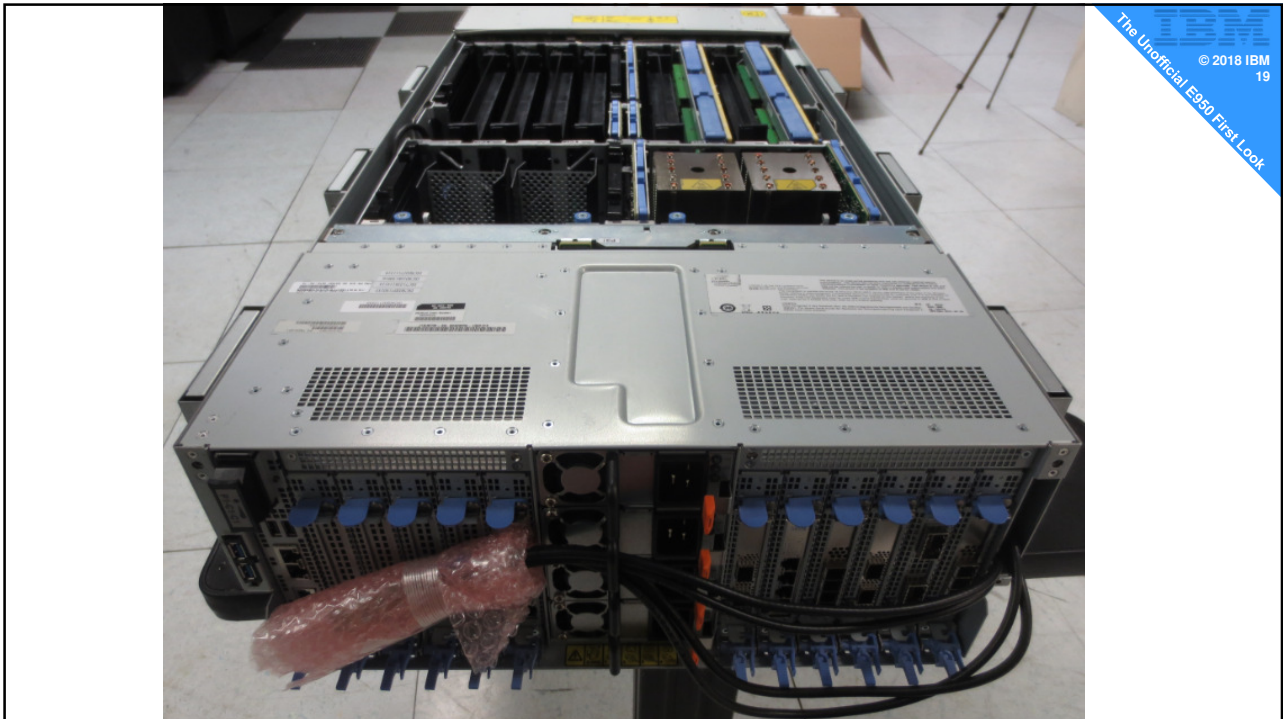
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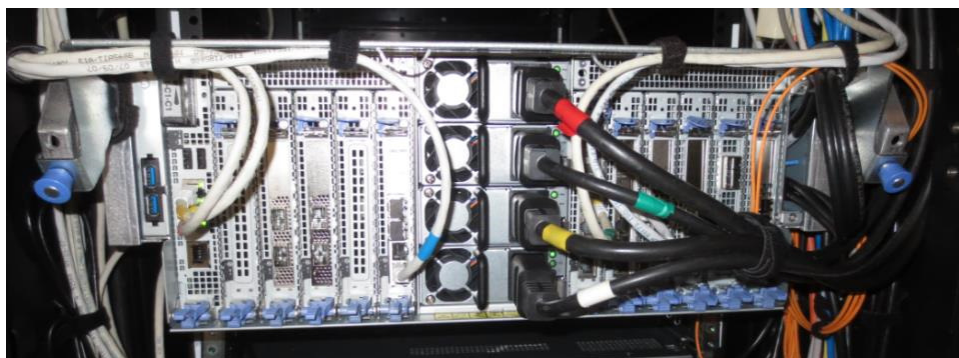
E950 rear end

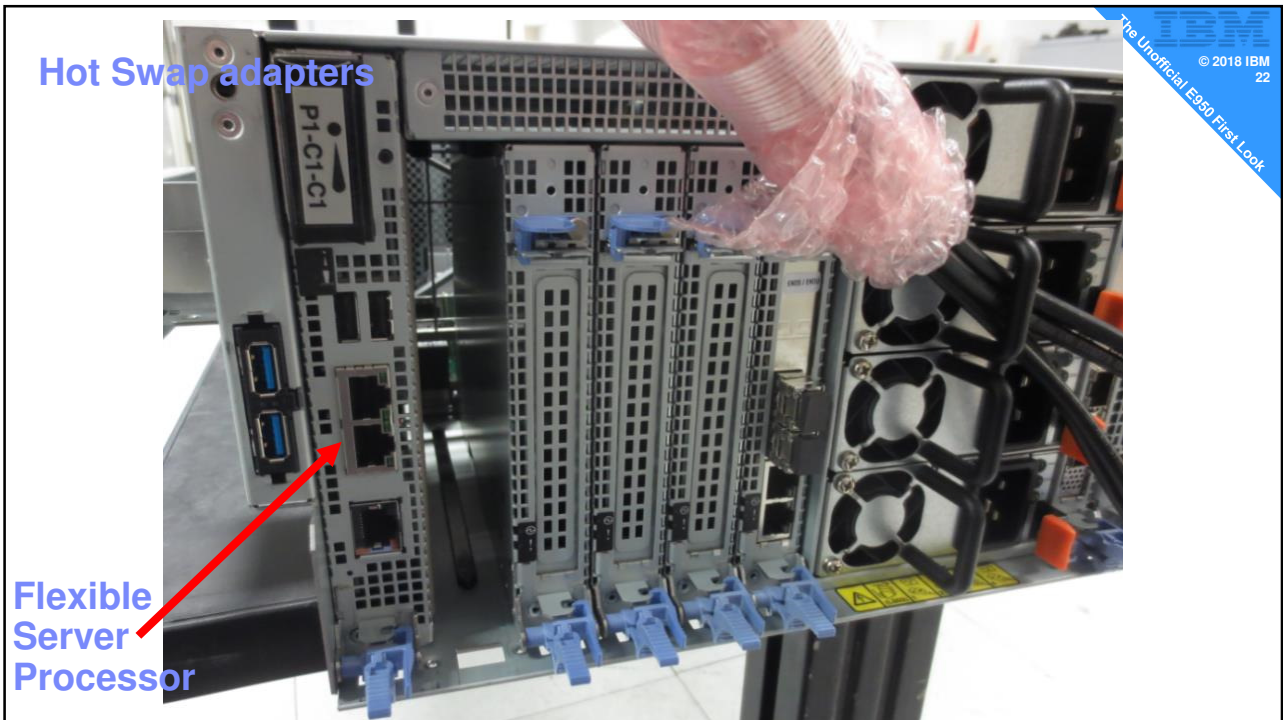
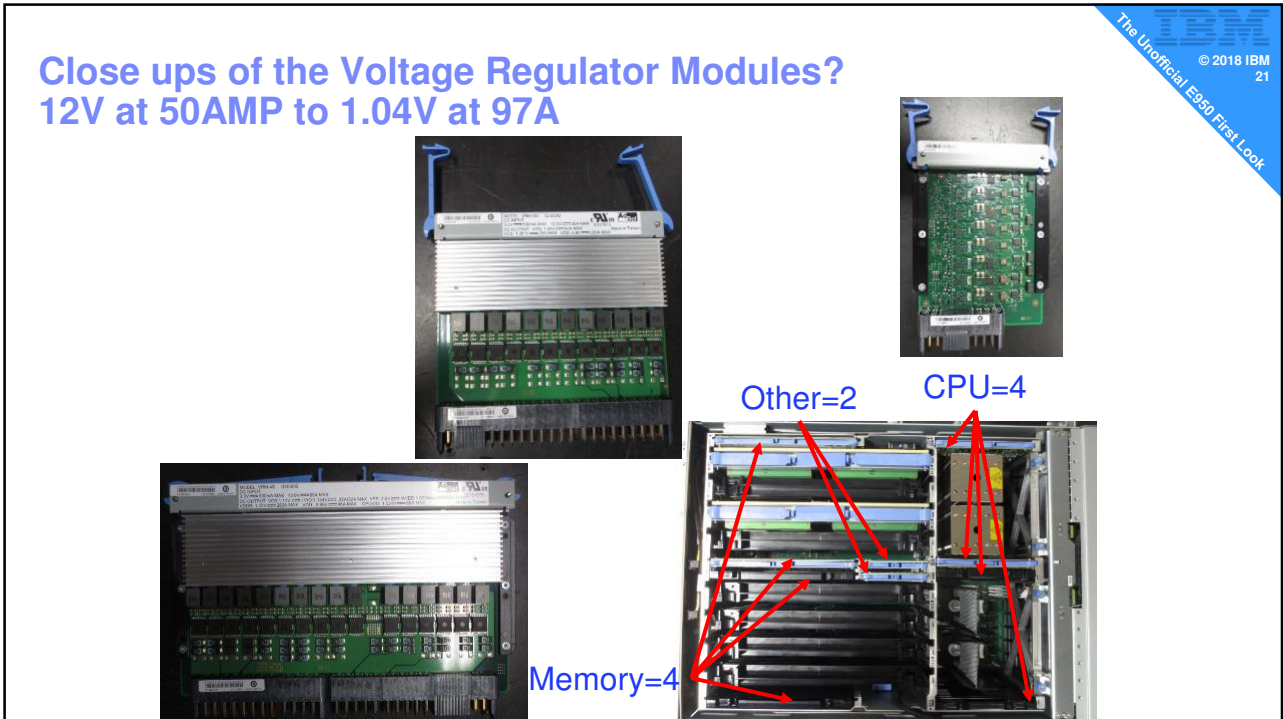
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Rear View with cabling bracket– see later



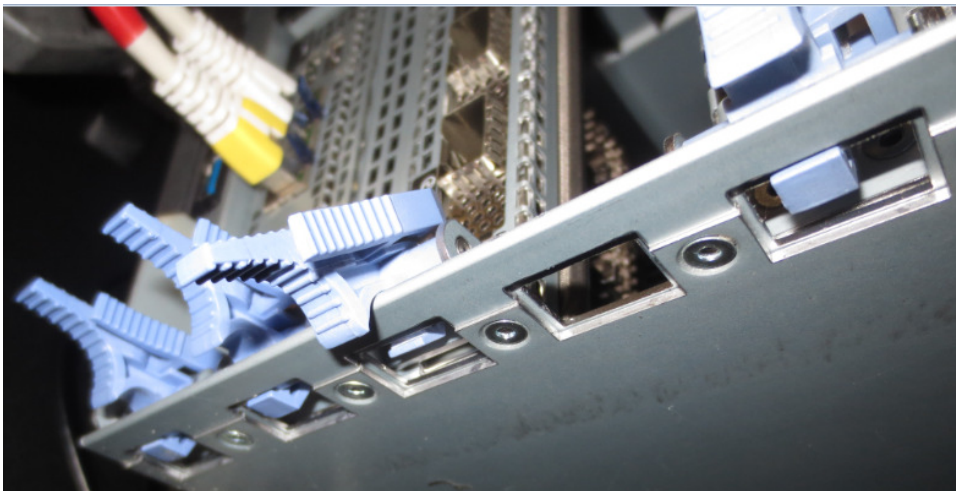


**Press right release catch & turn down
Give it a tug & the adapters slides out**



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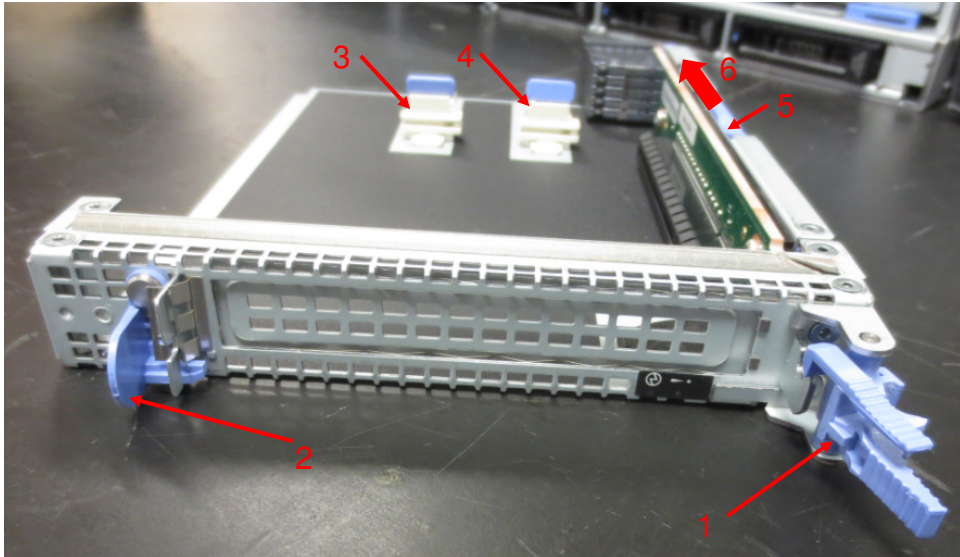
**Note: the handles lock the adapters and
do the final push in via the slots below
Make sure the angle is right to allow this**



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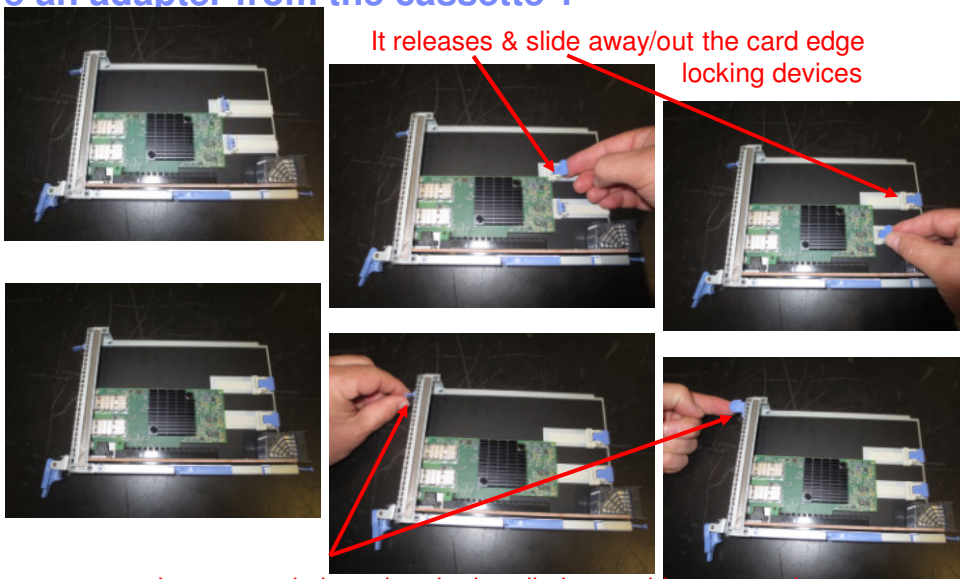
New Adapter Cassette

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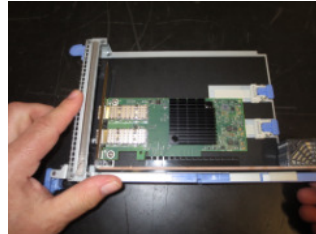
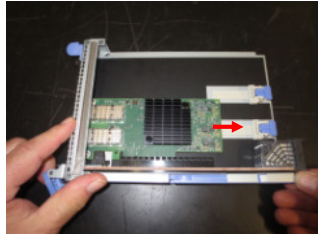
Remove an adapter from the cassette 1

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Remove an adapter from the cassette 2

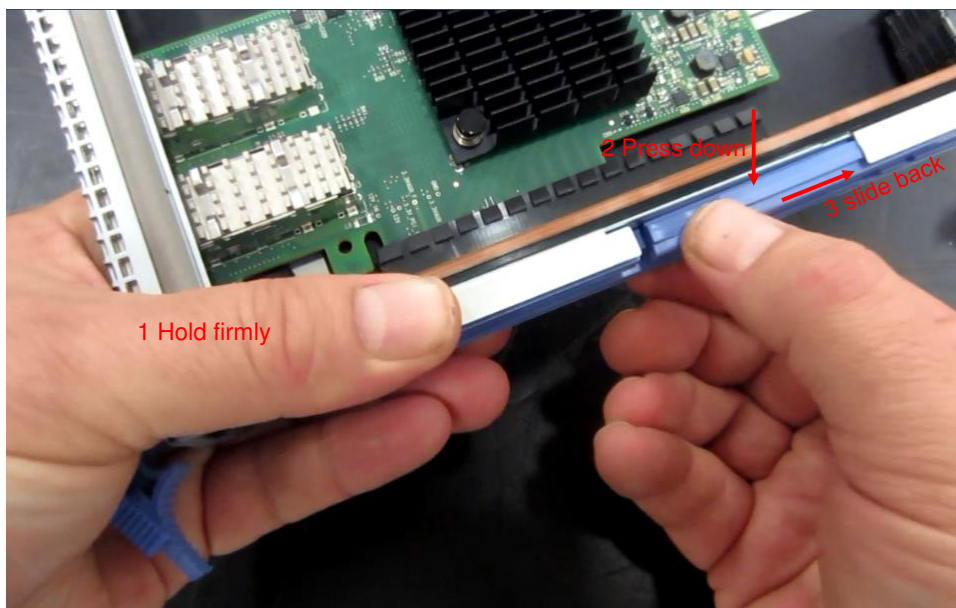
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But HOW?

Remove an adapter from the cassette 2

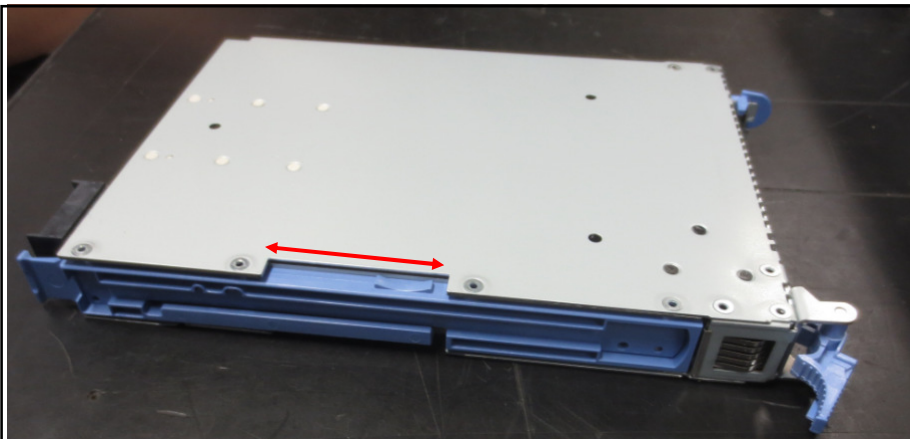
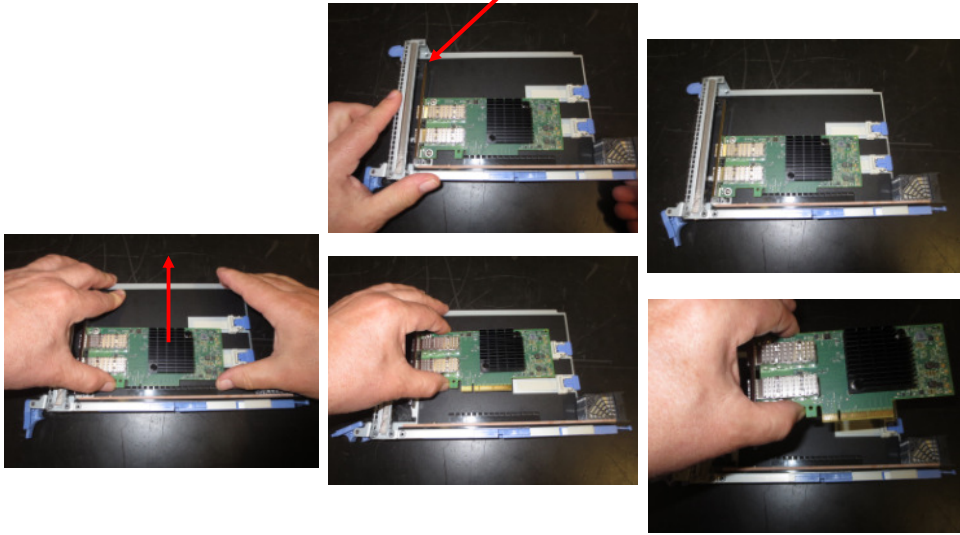
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Remove an adapter from the cassette 3

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Adapter tail stock now free for removal

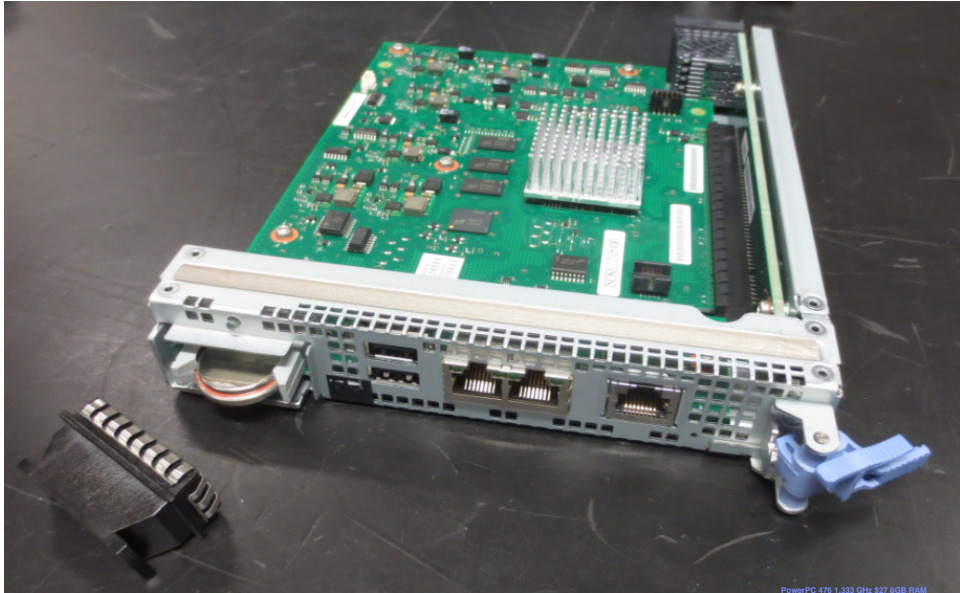


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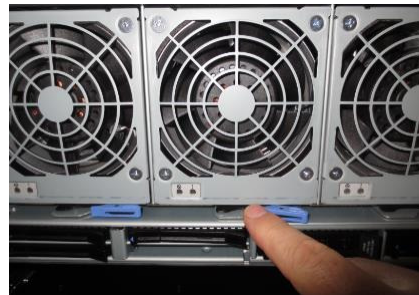
Flexible Service Processor 2 with time of day battery cover removed

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Air Moving Device (fan)

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Air Moving Device (fan)



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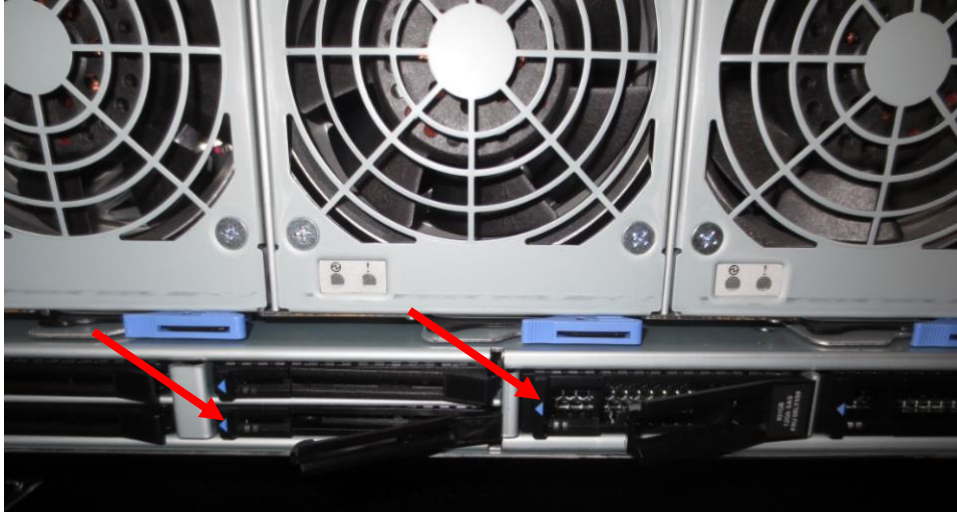
Seriously Powerful Fans

1. You can feel it sucking your hand in
2. Initial start up → very noisy
louder than our 2 CEC E880 !!
3. It quiets down after a few minutes
4. Developers told me this is to safely support the full 16TB of RAM configuration for extreme environments like:
 - heavy RAM use (gets warmer)
 - hot computer room (more air needed for cooling)
 - high altitude (thin air)

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Internal Disk and NVMe drive removal

- Press blue triangle to release the handle
- Rotate handle outwards to release drive
- Pull



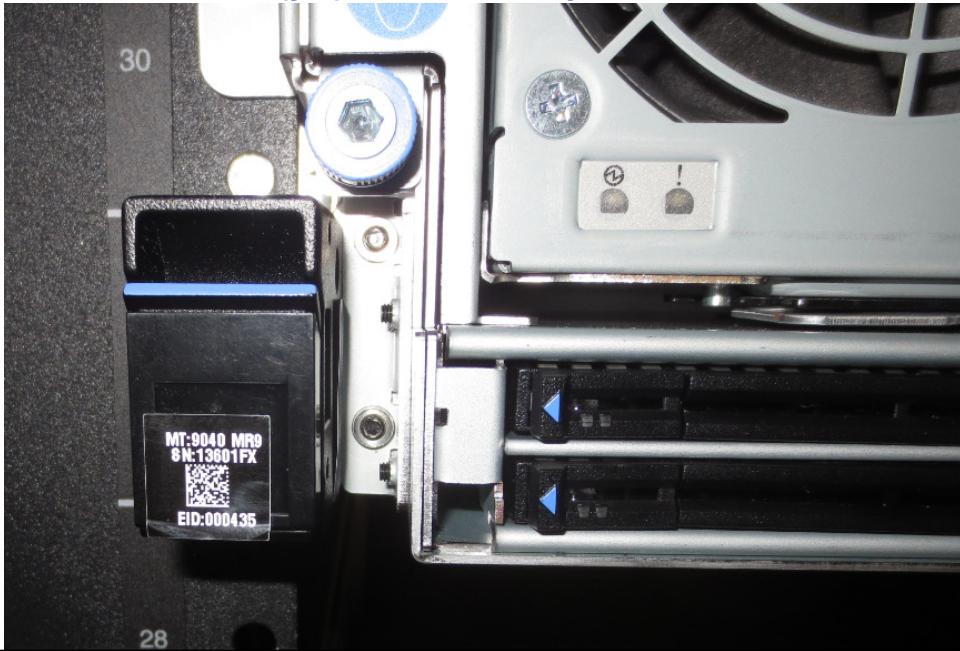
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800GB SSD via NVMe
2.5 inch x 7 mm
other GB sizes available



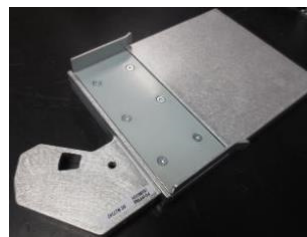
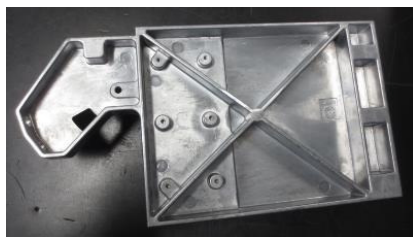
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No front covers (yet) + standard tiny MTM+Serial No

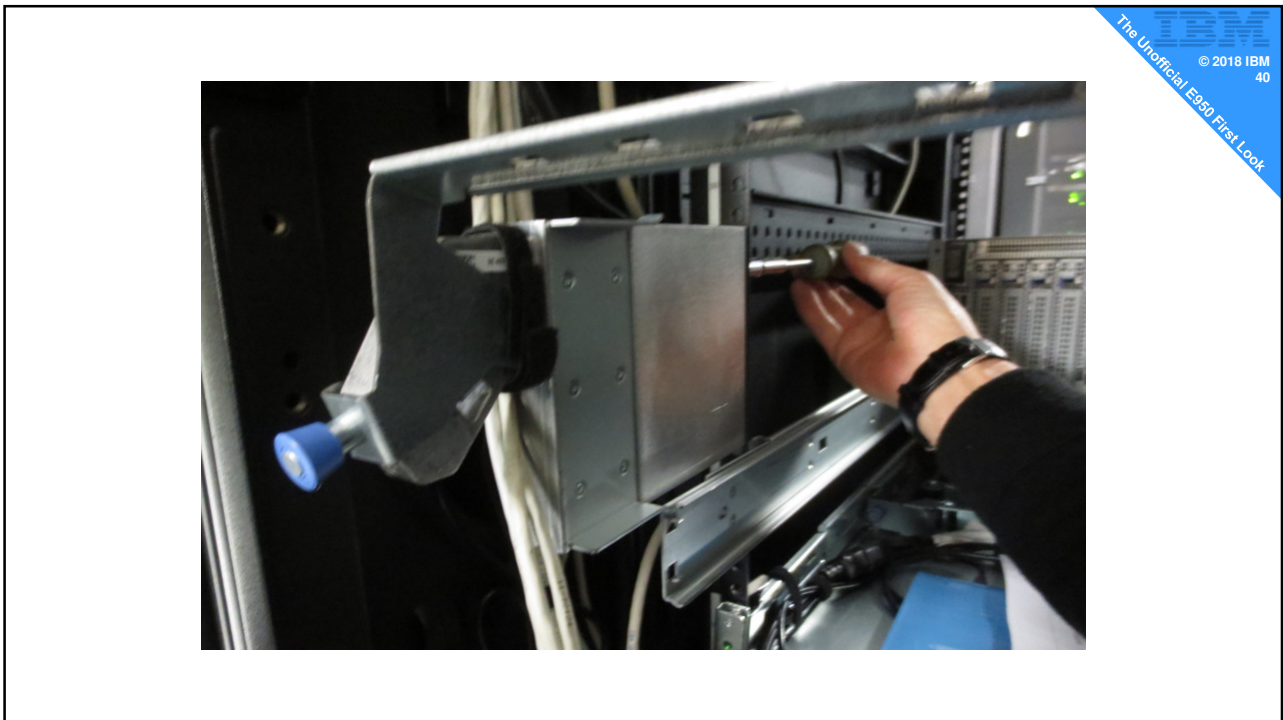
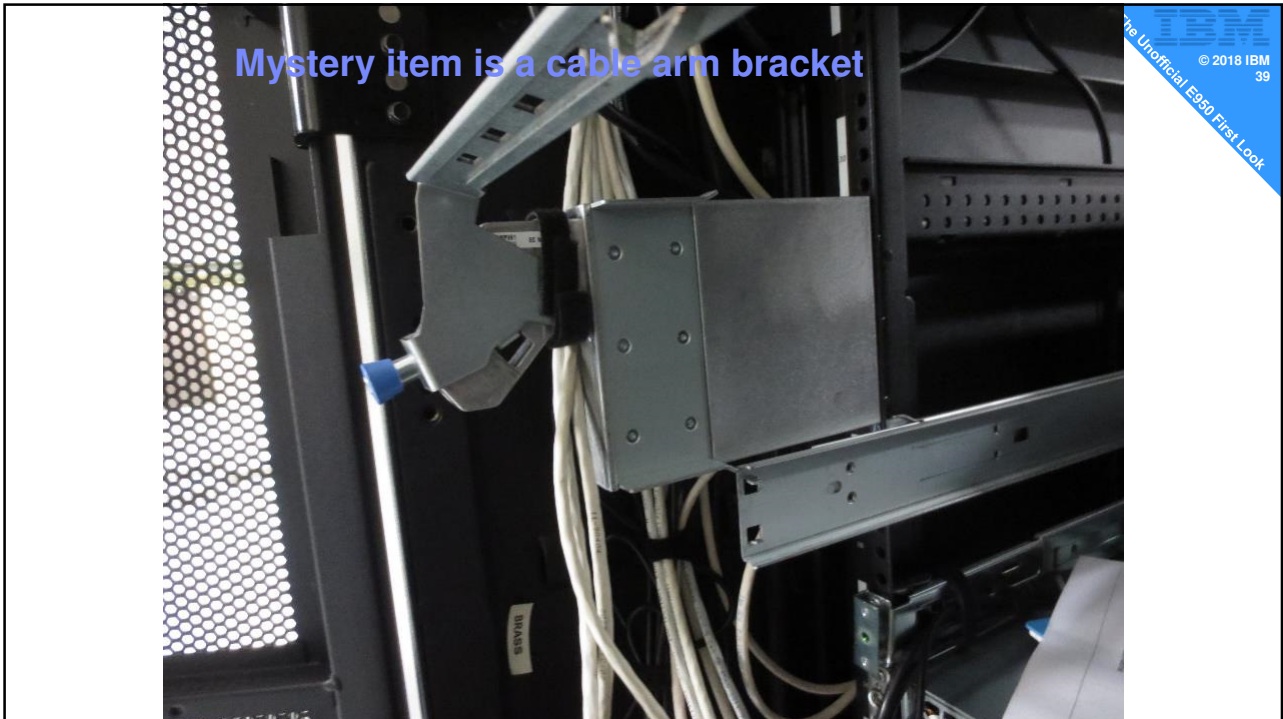


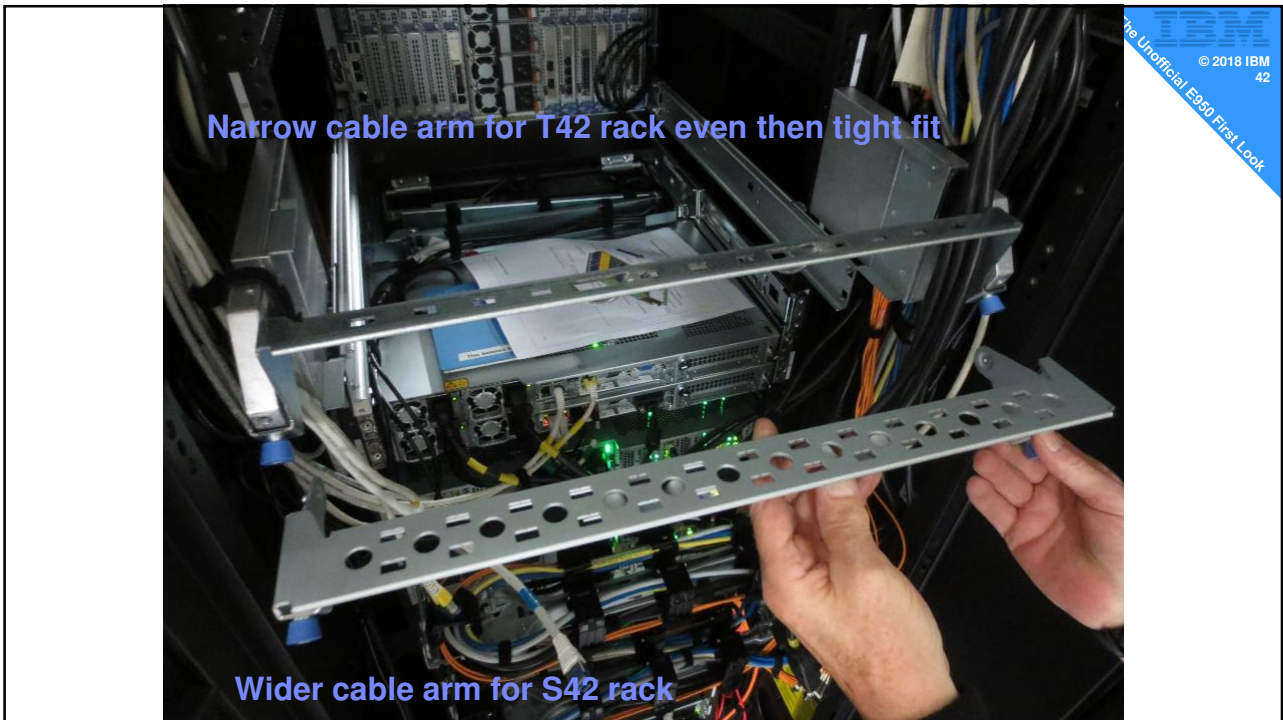
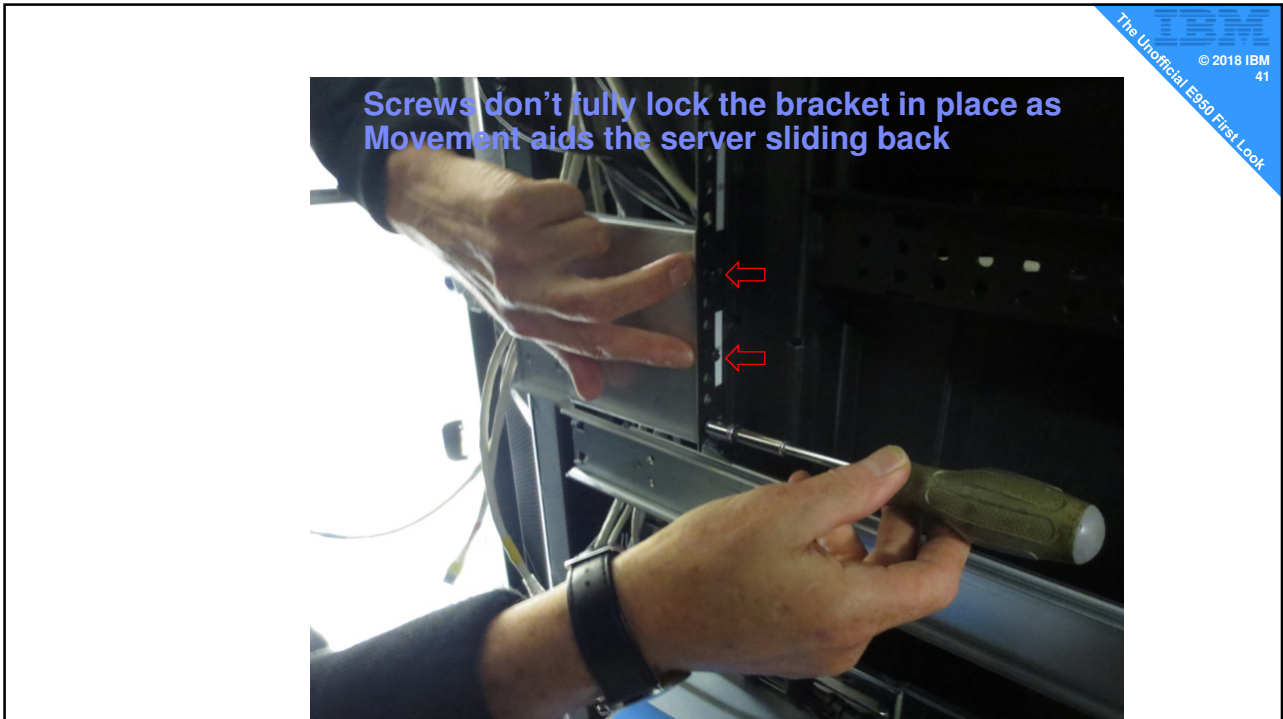
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Mystery items (a pair)



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Software: must use the Approved Levels

In beta testing we used

- HMC → software 9 series
- New VIOS → 2.2.6.20+
- New AIX → 7200-02-02-1822

▪ Now Running but need to upgrade to official GA levels

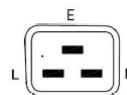
- VIOS 2.2.6.21* - to be upgraded
- AIX 7.2, 7.1, 6.1 as virtual machines
- SLES 15
- Ubuntu 18.04 (not supported but works fine)

11 Quick Observations

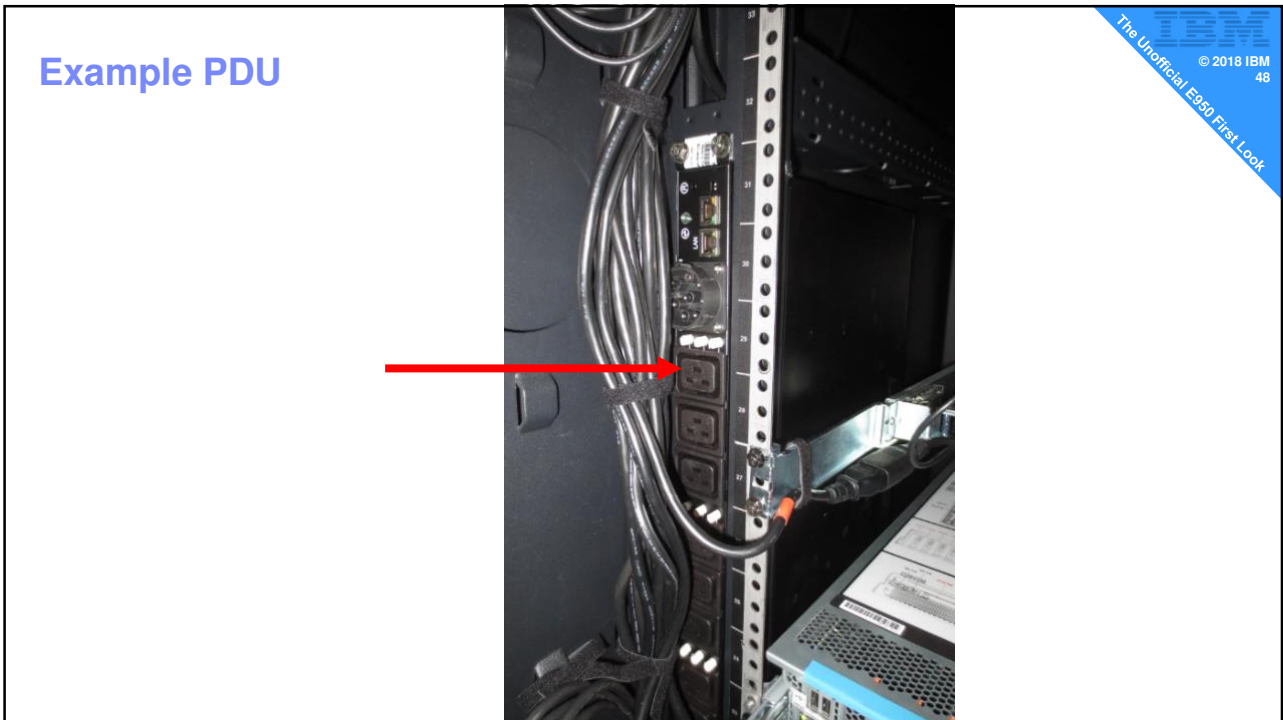
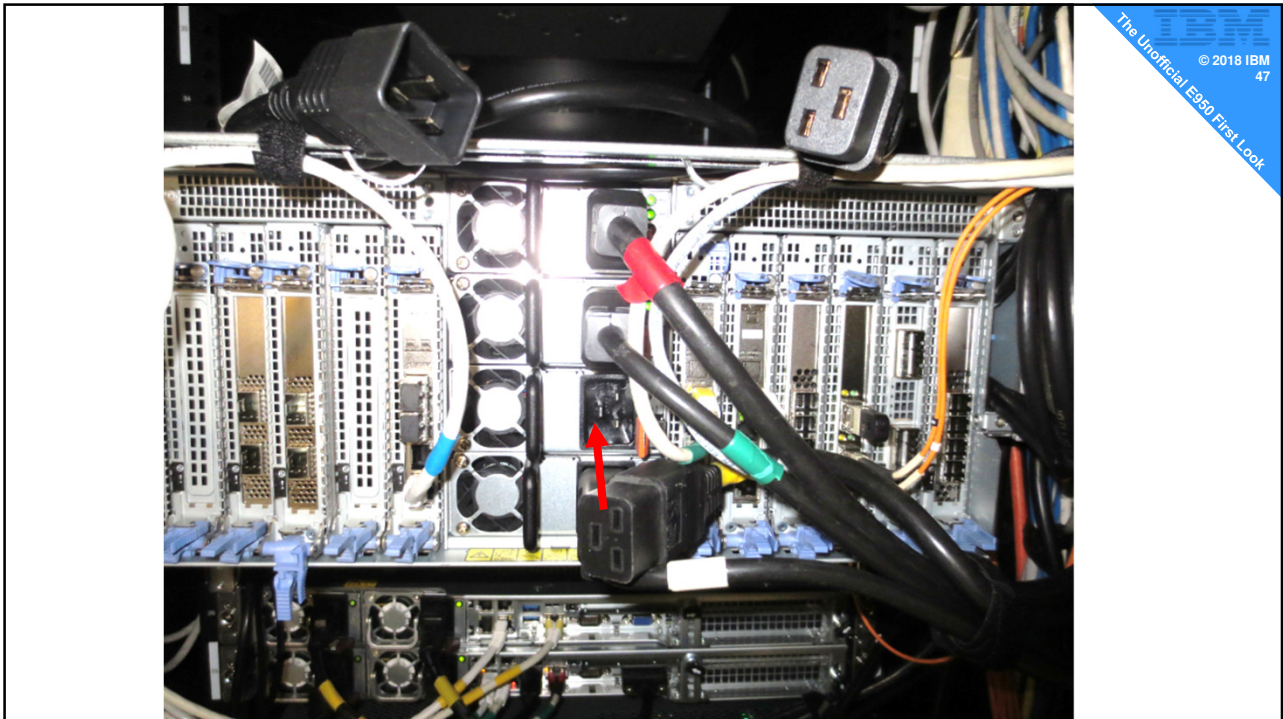
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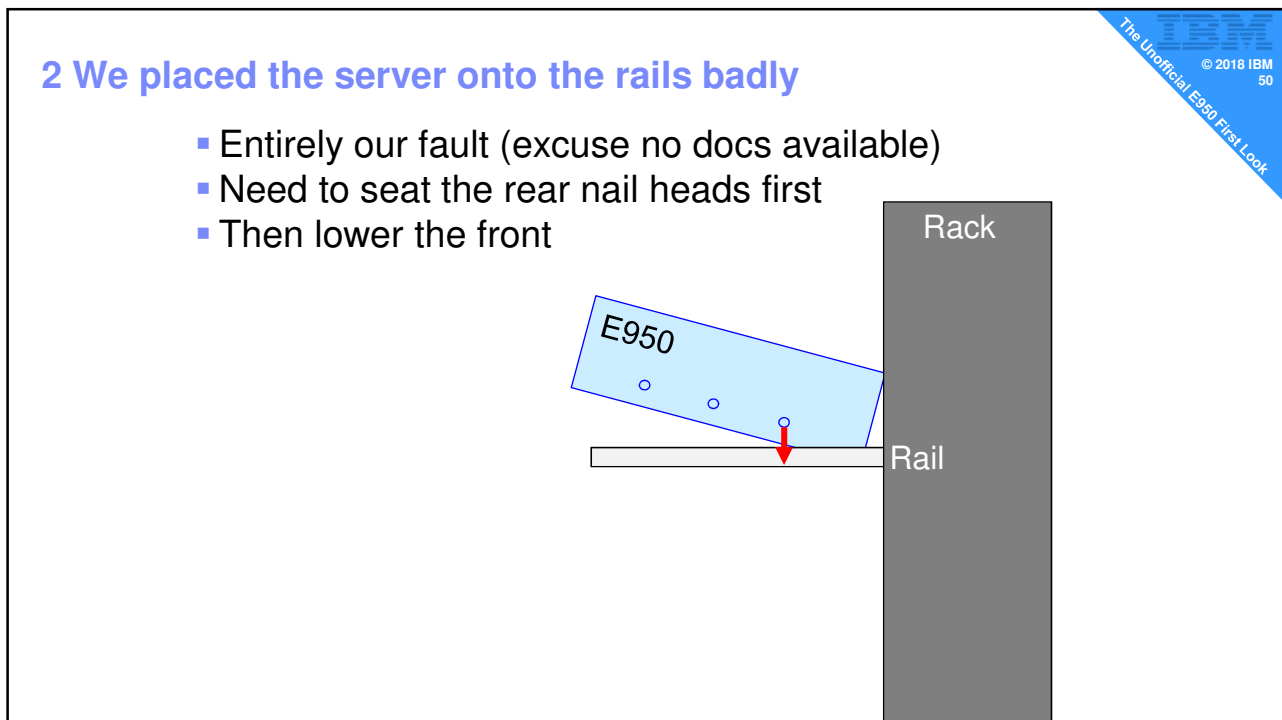
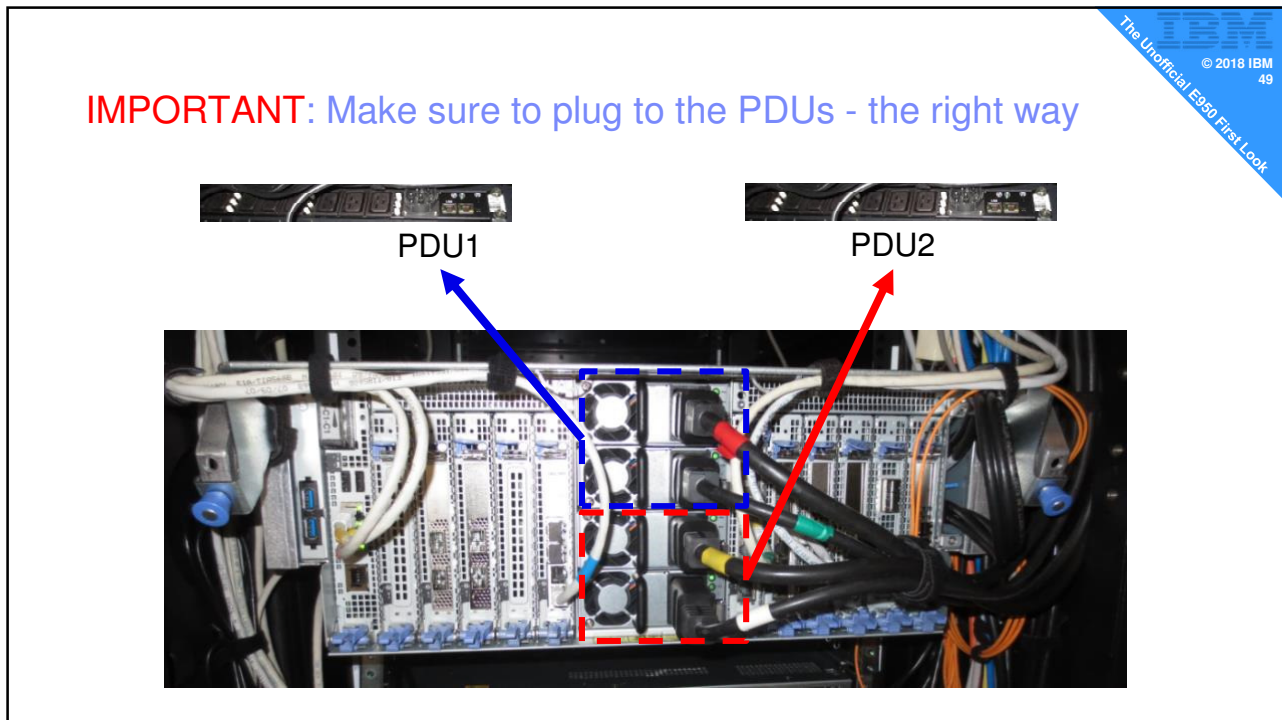
1 Power cords are IEC 60320 C19 /C20

- Not the regular “kettle leads” = C13
- Four Power supplies of 2000 Watts each
 - Different to the POWER8 E850
- Documents says 2 + 2
 - 1 power supply failure = carry on
 - 2 power supply failures = may reduce GHz



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3 Surprisingly Heavy !

- Roughly: 69 kg or 152 Lbs (depends on config)
- This is a Four person lift



- I (Nigel) recommend:
If above the waist height: use the famous Lifting Tool

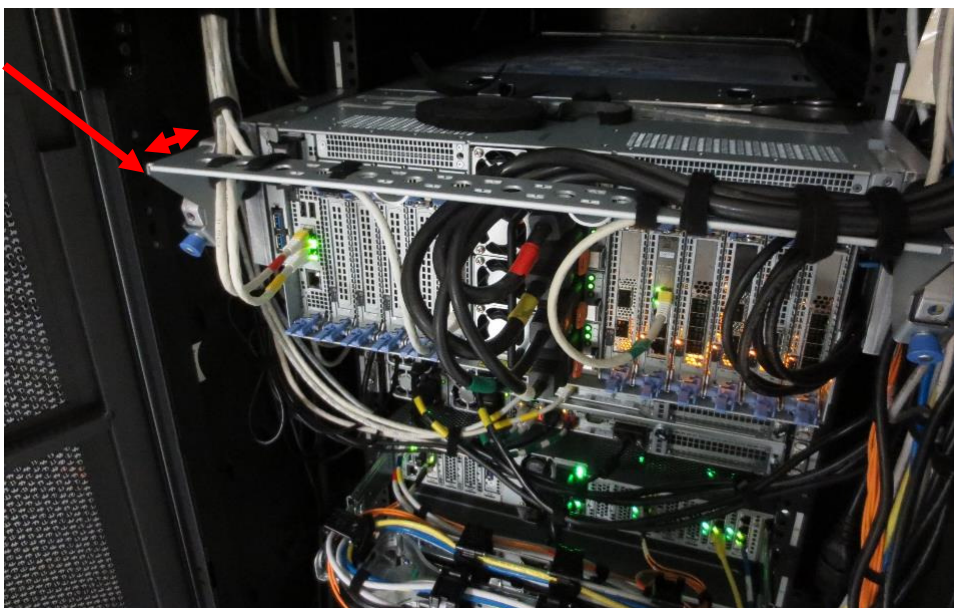
4 Surprisingly long !

- E850 is 776 mm
- E950 is 35.5 inches

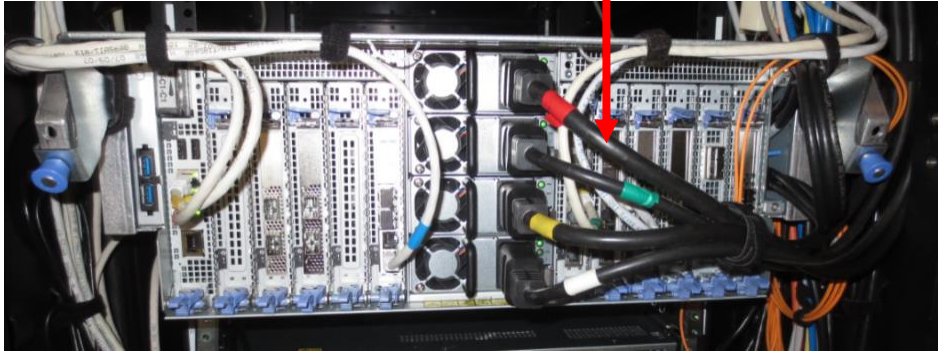
4 Surprisingly long !

- E850 is 30.5 inches = 776 mm
- E950 is 35.5 inches = 902 mm Longer by 5 inches = 126 mm
- Classic IBM rack is the T42
 - Hard to stay within the T42 → rear door needing a push
 - Particularly: Power cables & remote I/O drawer connectors
 - Even with thin cable bracket is a problem due to EIA19 cable turn
 - Having to push the door close against cables = **not good**
- Recommend: T42/S42 (Constellation) with 8 inch extension
 - Double check 3rd party racks carefully
- Could cause issues:
 - Client upgrading E850 to E950
 - Multiple servers = many cables to push in with the door

4 Server too long. Wider Cable bracket hits the door so it will not close. 1st attempt Power cables



Reworked the cables
Changed to the cable management bracket
This is just inside the door
The EIA19 cables still touch the rear door foam padding



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5 Label on inside of the top lid

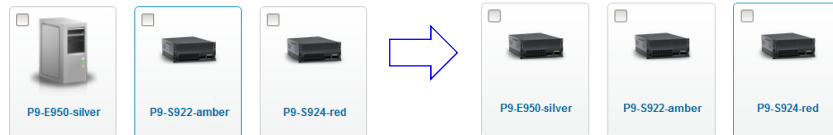
- If you lift the lid then place it on a table, you will never see the information labels
- So now you know



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6 Wrong (ugly) icon on HMC

- Partly fixed on a HMC upgrade



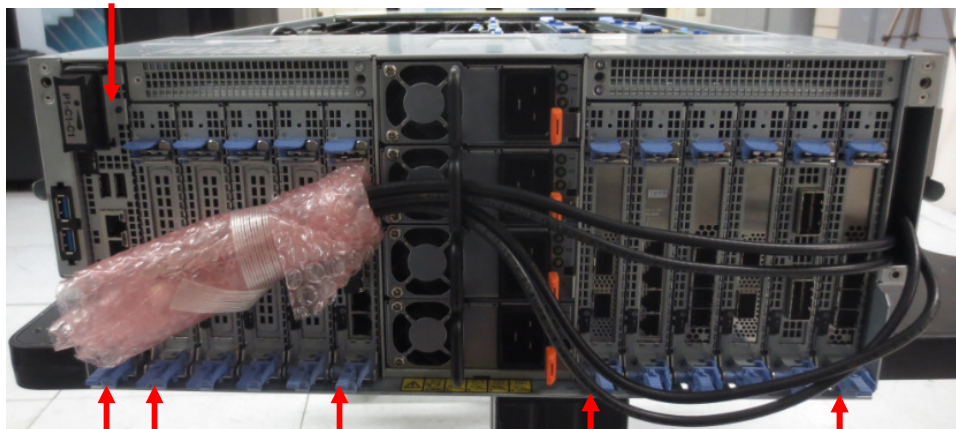
- HMC development team say they have this fixed

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7 Missing slots → E950 rear end

FSP ← 4 empty slots → C6 full
Not a
PCIe

← Six full slots →



Slots C1 C2 → → → C6

C7 → → → → C12

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7 Missing adapter slots C2-C5 not HMC list

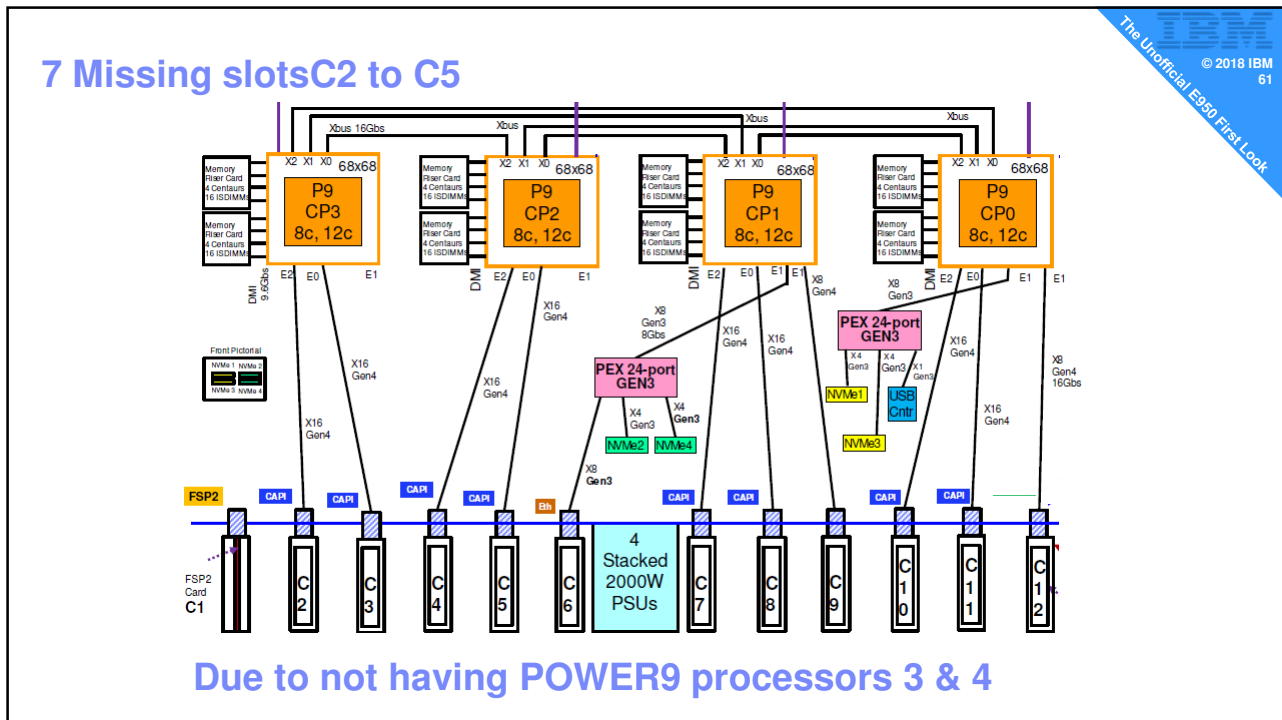
Adapter Description	info	Physical Location Code	Owner	Bus Number
PCIe2 16Gb 2-Port Fibre Channel Adapter	i	U78D4.001.CSS149W-P1-C10	Unassigned	24
PCIe3 Expansion Drawer Cable Card	i	U78D4.001.CSS149W-P1-C11	Unassigned	16
SAS RAID Controller, PCIe3 x8, Quad-port 6Gb	i	U78D4.001.CSS149W-P1-C12	Unassigned	17
PCIe2 4-Port (10GbE SFP+ & 1GbE RJ45) Adapter	i	U78D4.001.CSS149W-P1-C6	Unassigned	37
1 Gigabit Ethernet (UTP) 4 Port Adapter PCIe-4x/Short	i	U78D4.001.CSS149W-P1-C7	silvervios2	40
1 Gigabit Ethernet (UTP) 4 Port Adapter PCIe-4x/Short	i	U78D4.001.CSS149W-P1-C8	silvervios1	32
SAS RAID Controller, PCIe3 x8, Quad-port 6Gb	i	U78D4.001.CSS149W-P1-C9	Unassigned	33
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C1	Unassigned	19
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C2	Unassigned	35
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C3	silvervios2	20
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C4	silvervios1	36
Universal Serial Bus UHC Spec	i	U78D4.001.CSS149W-P1-T1	Unassigned	21

Next slide Zooms in

7 C1-C4 here are the NVMe disks

Adapter Description	info	Physical Location Code	Owner
PCIe2 16Gb 2-Port Fibre Channel Adapter	i	U78D4.001.CSS149W-P1-C10	Unassigned
PCIe3 Expansion Drawer Cable Card	i	U78D4.001.CSS149W-P1-C11	Unassigned
SAS RAID Controller, PCIe3 x8, Quad-port 6Gb	i	U78D4.001.CSS149W-P1-C12	Unassigned
PCIe2 4-Port (10GbE SFP+ & 1GbE RJ45) Adapter	i	U78D4.001.CSS149W-P1-C6	Unassigned
1 Gigabit Ethernet (UTP) 4 Port Adapter PCIe-4x/Short	i	U78D4.001.CSS149W-P1-C7	silvervios2
1 Gigabit Ethernet (UTP) 4 Port Adapter PCIe-4x/Short	i	U78D4.001.CSS149W-P1-C8	silvervios1
SAS RAID Controller, PCIe3 x8, Quad-port 6Gb	i	U78D4.001.CSS149W-P1-C9	Unassigned
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C1	Unassigned
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C2	Unassigned
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C3	silvervios2
Non-Volatile Memory Controller	i	U78D4.001.CSS149W-P1-P2-C4	silvervios1
Universal Serial Bus UHC Spec	i	U78D4.001.CSS149W-P1-T1	Unassigned

NVMe devices are on PCIe ports but no adapter slot



8 NVMe Usability

- NVMe is like SSD – it wears out
- Built with plenty of “spare” capacity to replace wear
- Life depends on its use → I/O’s per day
- We don’t count that on disks – they just fail
- NVMe has better engineering & monitors/reports wear
- `nmvemgr` command . . .

8 NVMe Usability

```

silvertios1:/home/padmin $ lsdev | grep -i nvme
hdisk0                Available      NVMe 4K Flash Disk
nvme0                 Available      PCIe3 x4 NVMe Flash Adapter
silvertios1:/home/padmin $

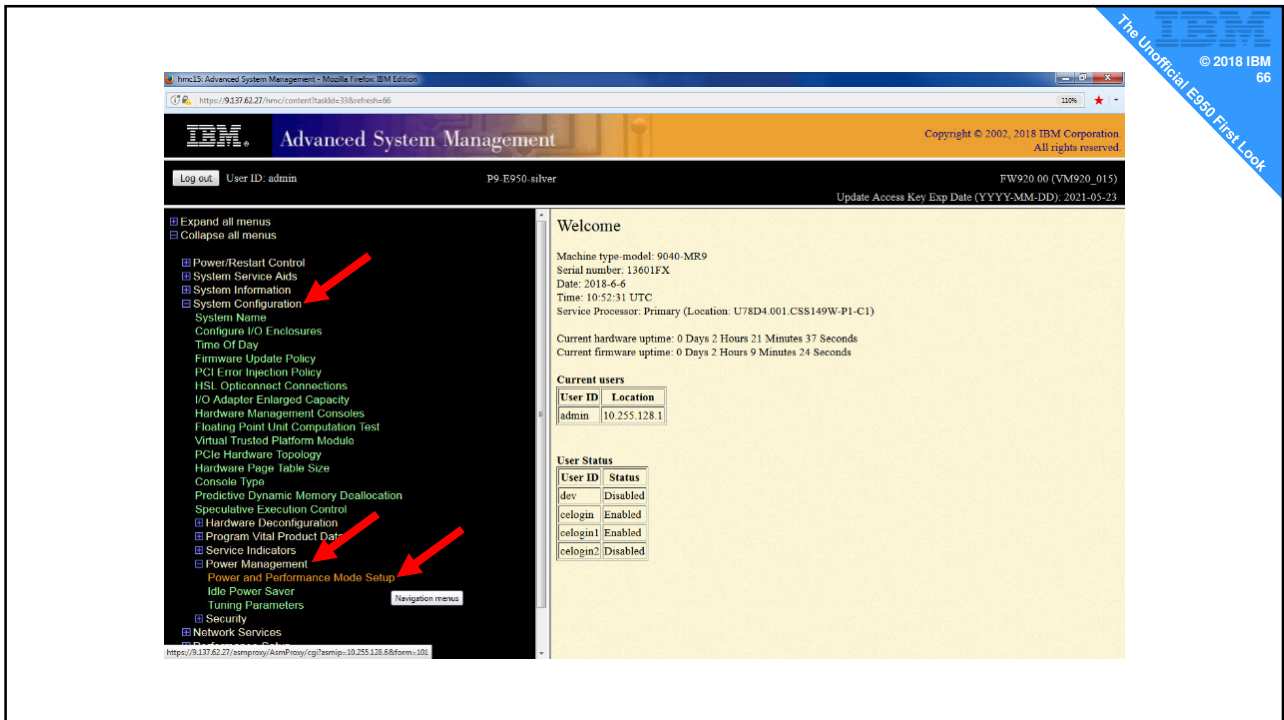
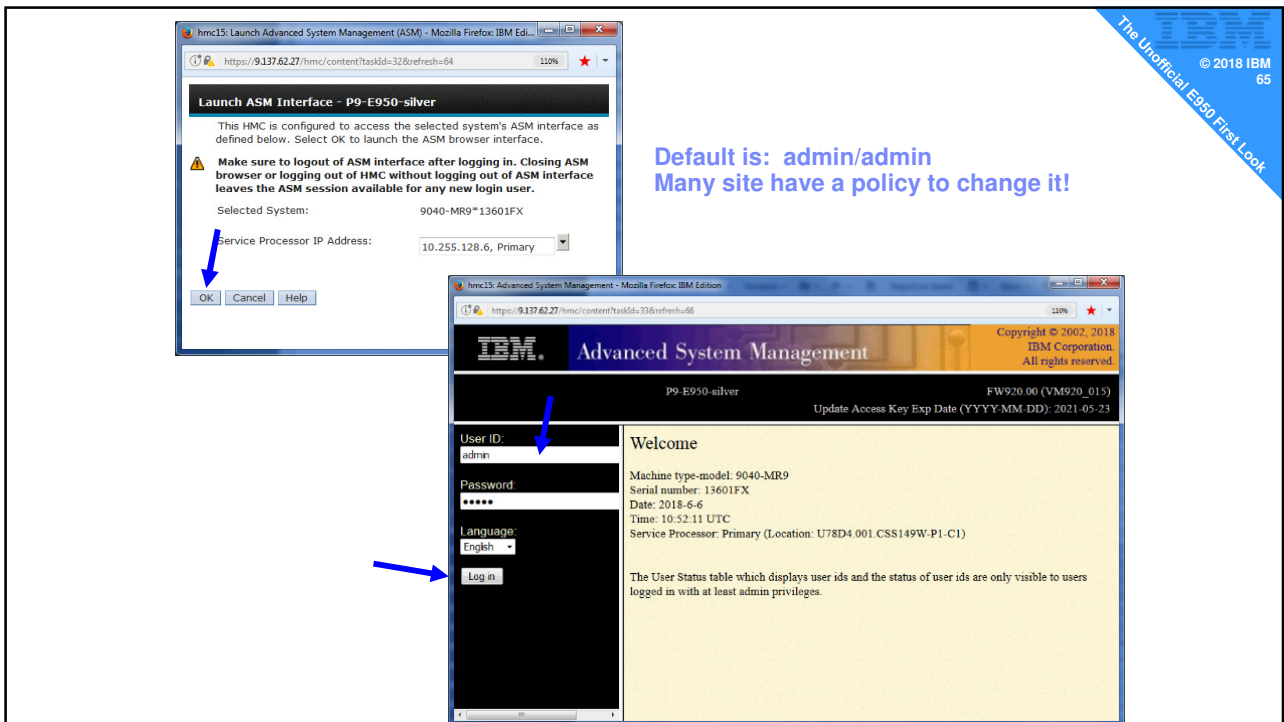
# nvmmgr -M -l nvme0
Critical Warning ..... 0x0
Composite Temperature (Kelvin) ..... 306
Available Spare (%) ..... 100
Percentage of NVM subsystem life used ..... 0
Data Units Read (1000 units of 512 bytes) ..... 1928423
Data Units written (1000 units of 512 bytes) ..... 2141752
Host Read Commands ..... 14109948
Host Write Commands ..... 29866123
Number of Power Cycles ..... 30
Power On Hours ..... 1620
Unsafe Shutdowns ..... 10
Media and Data Integrity Errors ..... 0
Number of Error Information Log Entries ..... 54

# # lsvg rootvg
VOLUME GROUP:      rootvg      VG IDENTIFIER:    00fb601f0000163b6bdc0b7
VG STATE:          active      PP SIZE:          1024 megabyte(s)
VG PERMISSION:     read/write  TOTAL PPs:        745 (762880 megabytes)

```

8 Check the POWER9 Performance mode

The screenshot shows the Hardware Management Console (HMC) interface. The main view is titled "All Systems" and displays a list of systems. Two systems are visible: "P9-E950-silver" and "P9-S922-amber". The "P9-S922-amber" system is selected, and a context menu is open over it. The menu items include: "View System Partitions", "View System Properties", "View Performance Dashboard...", "Performance Data Collection", "Turn Attention LED Off...", "Schedule Operations...", "Updates", "Serviceable Events Manager...", "Reference Code Log", "Reset or Remove System Connection...", and "View All Actions". The "View All Actions" option is highlighted with a blue arrow. The background shows the HMC dashboard with system status indicators and attention LED levels.



Select + Continue for instant mode change

Power and Performance Mode Setup

Current Power Saver Mode : Enable Maximum Performance mode

Disable all modes [?]
 Enable Static Power Saver mode [?]
 Enable Dynamic Performance mode [?]
 Enable Maximum Performance mode [?]

Note: Enabling any of the Power Saver modes will cause changes in the processor frequencies, changes in processor utilization, changes in power consumption, and performance to vary. Other effects are possible as well. Please see the EnergyScale™ white paper for more information on power saving modes.

[?]

9 Surprisingly Noisy !

- We had early firmware
 - Fans at 100% all the time! → not untypical for early servers
 - The noise was VERY LOUD
- Current firmware does proper thermal fan control
 - Noise is actually low for our small config
 - Completely drowned out the E880 in next rack!
- Please:
 - Read the documentation on noise levels and take suitable ear protection precautions

10 nmon on AIX is OK

- POWER9 mode at Nominal 3.3 GHz + MTM+serial OK
- AIX 7200-02-02

```

-----
N   N   M   M   OOOO  N   N   For online help type: h
NN  N  MM  MM  O   O  NN  N   For command line option help:
N   N  N  M  MM  M   O   O  N  N  N   quick-hint: nmon -?
N   N  N  M   M   O   O  N  N  N   full-details: nmon -h
N   NN  M   M   O   O  N  NN   To start nmon the same way every time?
N   N  M   M   OOOO  N   N   set NMON ksh variable, for example:
-----
                                export NMON=cmt

TOPAS_NMON
      16 - CPUs currently
      16 - CPUs configured
      3300 - MHz CPU clock rate
PowerPC_POWER9 - Processor
      64 bit - Hardware
      64 bit - Kernel
      1,silver1 - Logical Partition
      7.2.2.16 TL02 - AIX Kernel Version
silver1.aixncc.uk.ibm.com - Hostname
      silver1 - Node/WPAR Name
      13601FX - Serial Number
      IBM,9040-MR9 - Machine Type

```

nmon APPROVED

If you want nmon to report the actual GHz, please raise a PMR ☺

11 Top lid refit

Only remove the lid when needed

- Weight reduction
- Upgrade CPU, RAM
- Fix CPU, RAM, VRM

otherwise no need to remove



Deck includes lots of detailed pictures for you to use



Call to Client Action

→ We need to make sure everyone understands

Good News

1. E950 is not a massive change from E850
2. Up to 48 CPU cores: POWER9 performance boost ~42%
3. Memory jump → 4 TB to 16 TB
4. Adapters → Easy rear PCIe cassette access

Shocks

1. Electricity → C19/C20 connectors for higher amps
2. Size → It's a longer - check racks & doors
3. Heavy → Loading in to the rack needs extra care or lift tool
4. Noisy → May need ear protection

The Unofficial E950 First Look
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Before we end

- Slides
- Replays

- Much larger slide deck

**PDF of todays slides & replay from
<http://tinyurl.com/PowerVUG>**

**Going to share the PowerPoint
on the Power VUG website**

<http://tinyurl.com/AIXpert>

- I have ~250 slides including**
- ~ 100 picture slides of the server**
 - Pictures are of a beta machine**
 - GA servers might differ slightly**