

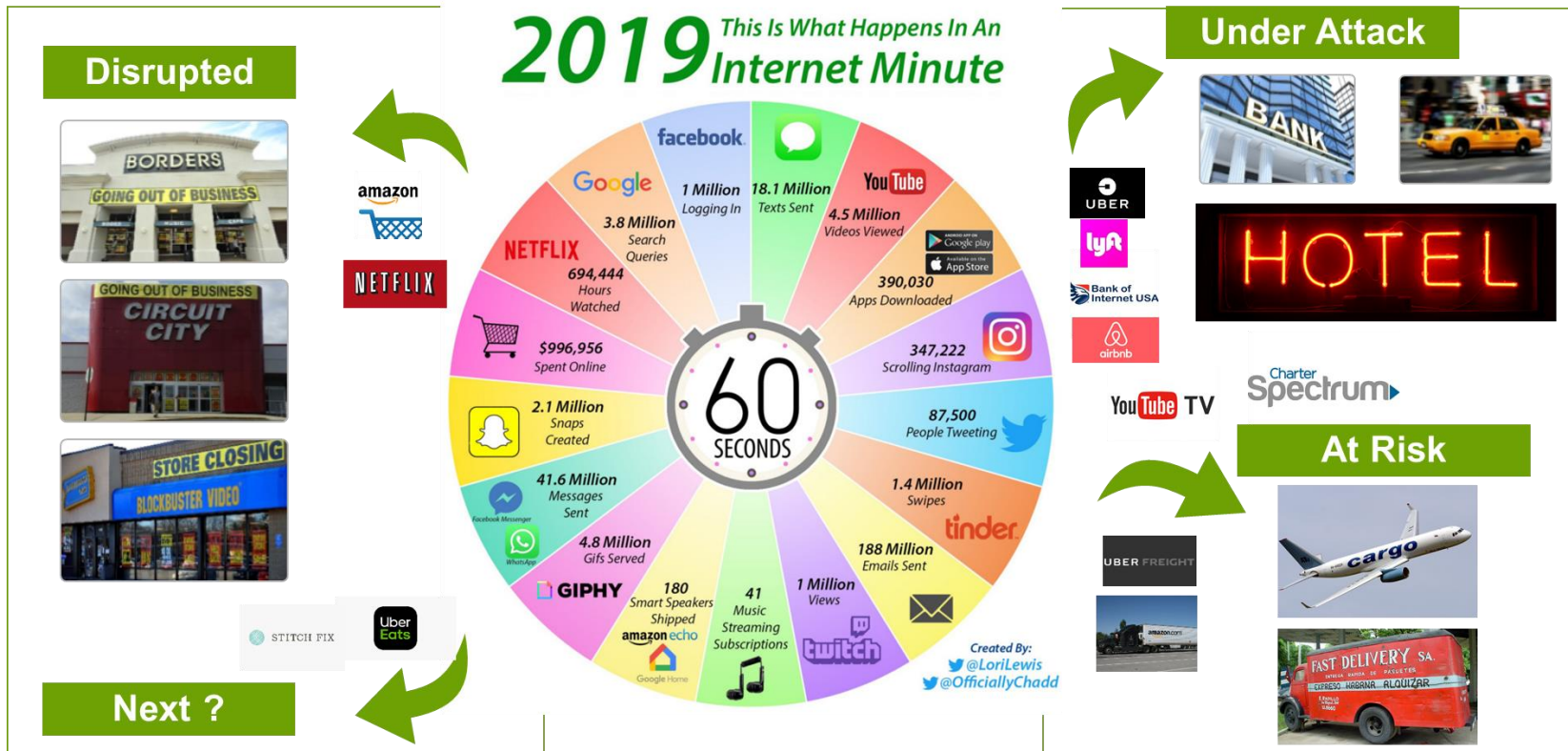
Dell Vision

Sami Fredj
Channel PreSales Manager

DELLTechnologies

Digital Transformation

IT must be the enabler of the Transformational Journey





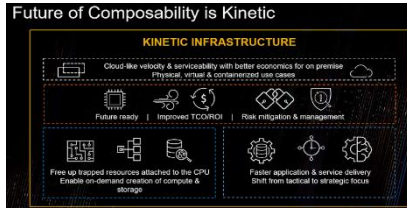
Digital Transformation



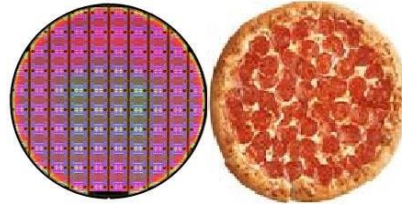
The Edge is Real



Data Science



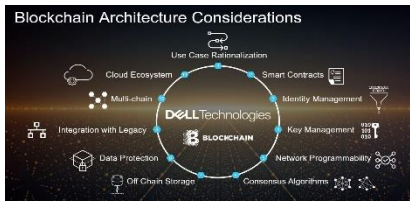
Future of Composability



Data Consumption



Multi-Cloud

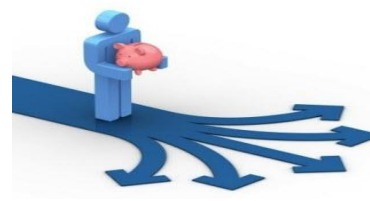


Blockchain

Security



Find your Path



Telemetry & Decision
Automationologies

Technology Trends

Disruptions happening at every layer

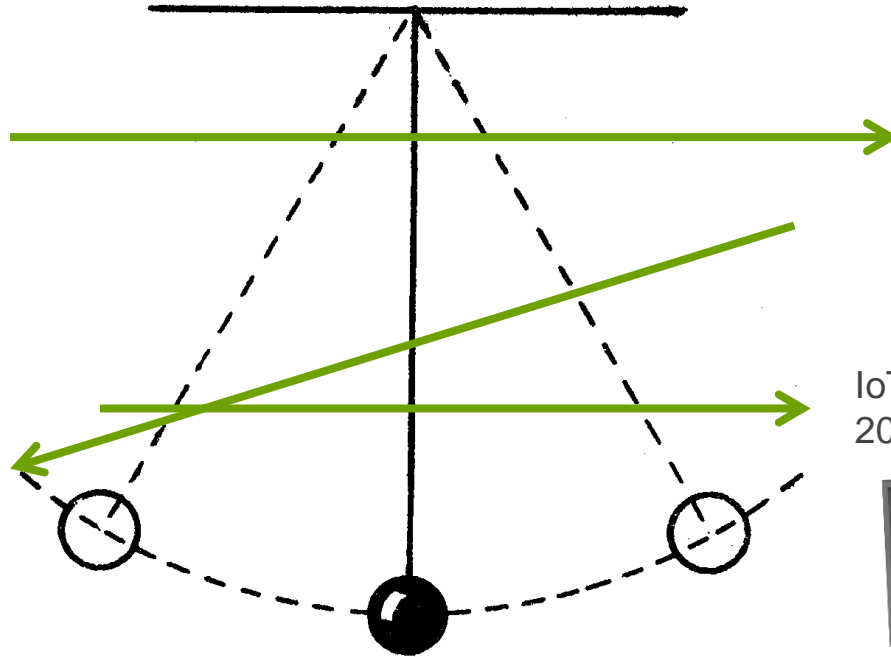
| | TODAY | TOMORROW |
|--------------------------|--------------------------------------|--|
| Users | People | + Machines, AI, bots |
| User Experience | Websites | + AR/VR |
| Application | Java, .net | + Microservices, curated, 12 factor, API-driven |
| Data Management | Relational databases | + In-memory dbs, memory-centric architectures |
| Orchestration | Single cloud | + Multi-cloud |
| OS/Virtualization | VMs, Microsoft, Linux | + Uni-kernels, functions, containers, serverless |
| Network | Discrete: FC Ethernet InfiniBand | + Open networking, integrated networking, NVMe over fabric |
| Storage | Block, File | + Object, key value stores, memory-centric architectures |
| Compute | X86 | + GPU, FPGA, TPU, IPU, diverse accelerators, ARM, GenZ |
| Media | SSD HDD DRAM | + Non-volatile memories, NVMe, SCM |

Edge is Changing Compute.....Again

Compute will follow the Data



Terminal -
Mainframe
1960-1970

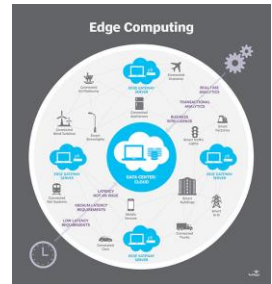


Client-Server
1980-2000



Mobile-Cloud
2005-2020

IoT - Edge
2020-



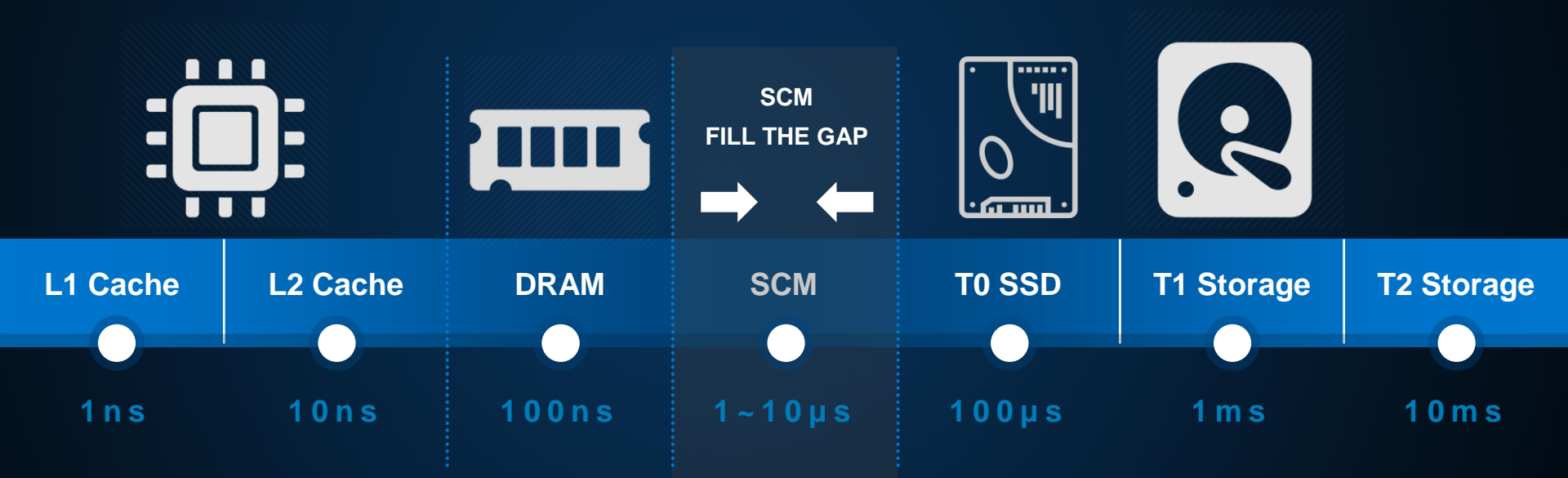
Centralized

Distributed
Computing

F(\$ of compute cycles, \$ of moving data, size of data, data complexity, latency)

STORAGE CLASSE MEMORY (SCM - NVME)

BETWEEN MEMORY AND STORAGE - FASTER THAN SSD. SLOWER THAN DRAM

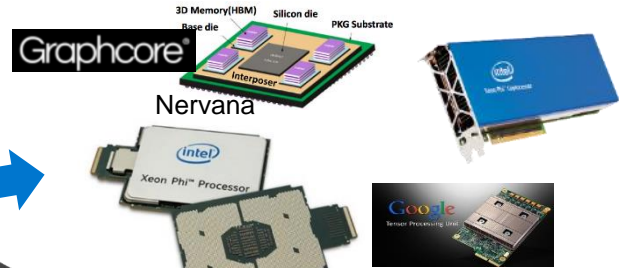


Processor Directions

Rise of Domain Specific Architectures

Fabrication Equality + Low Perf CAGR + Big Data + IA/ML

→ Exciting times in Silicon Design



Date Production Part Available*

| Foundry | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------|-------|-------|----------------|-----------------|-------|---------------|-------|--------------|------|
| tsmc | 28HPM | | 20SaC 28HPC | 16FF T 16FF+ | 16FFC | 10FF | 7FF | 7HPC | 5nm |
| SAMSUNG | | | 20LPE | 14LPE | 14LPP | 10LPE | 10LPP | | 7nm |
| PoRRRIES | | | | | 14LPP | 22FDX | | 7nm 12FDX | |
| intel | 22nm | 22SoC | 14nm | 14SoC | 14nm+ | 10nm 10SoC | | | 7nm |

*risk production and qualification start is typically 1 year ahead

Tech Insights

Specialty Processors

FPGAs

GPUs

SmartNICs



CPUs Competition re-emerges

New uArch off loads

Storage Class Memory

Data Movement, Locking...



SCM: PCM, 3DxPt, STT-MRAM, ReRAM, NRAM



NVDIMM-N/P

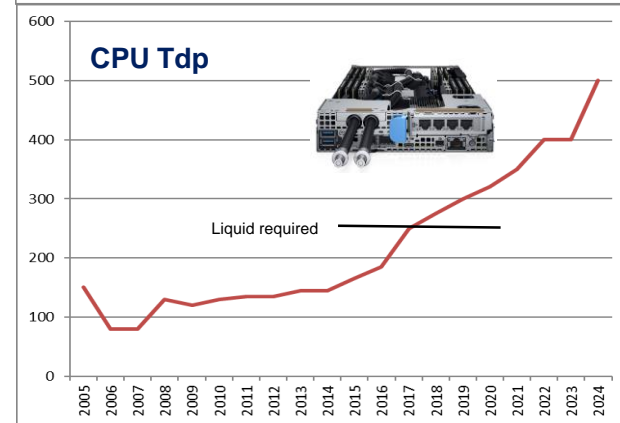
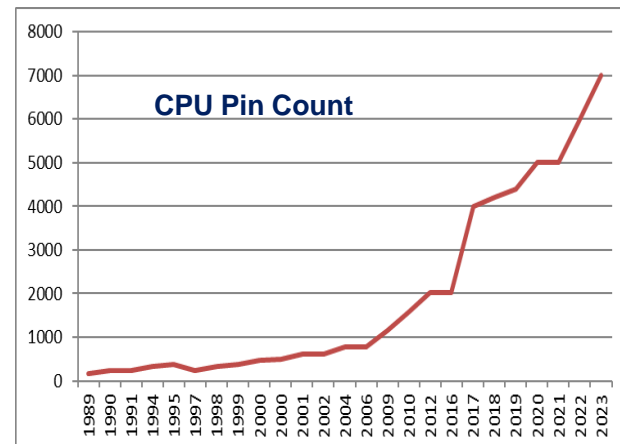
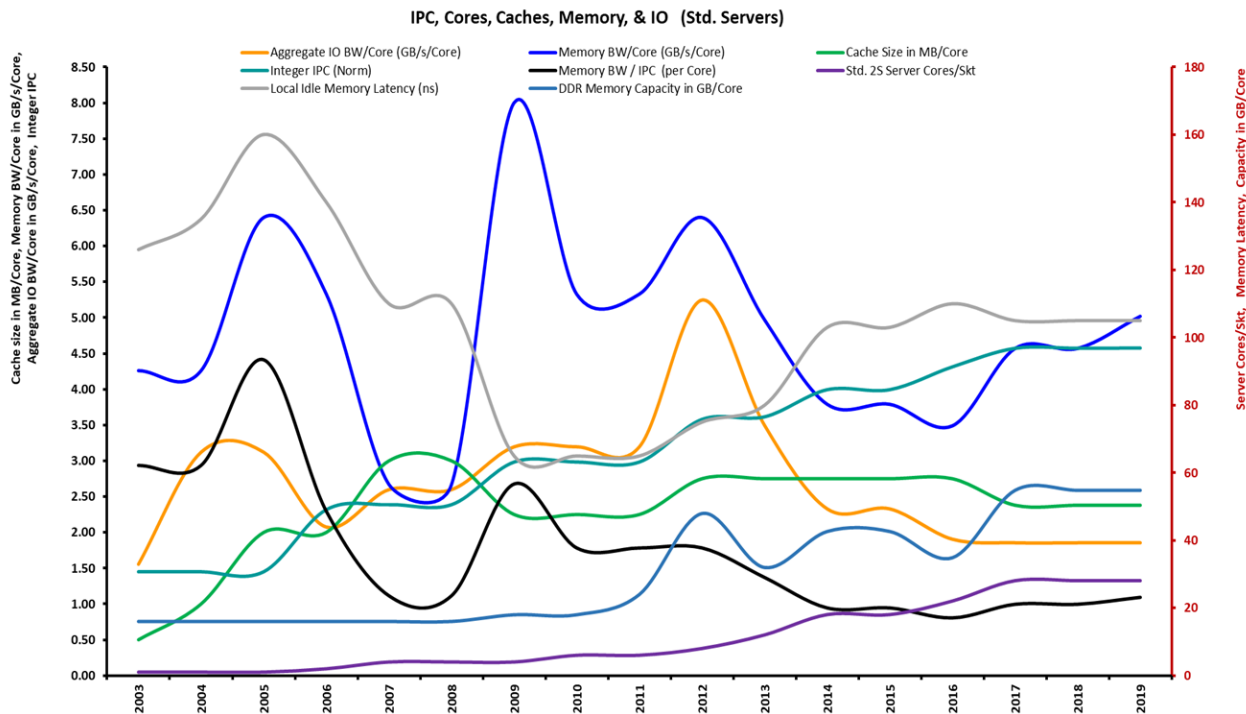
| Startup in China | Startup Worldwide | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------------|-------------------|-------------------|----------|----------------|-----------|--------|--------|-----------|--------|-------------------|------|-----------|------------|--|--------|--------------------|-----------|----------------|-------------|--|---------|--------|---------|-------|----------|--|----------------------|----------|--|
| Cambricon 地平线 BITMAIN intelLusion ChipIntelli Think Force Canson 云知声 ASPEECH NXP Enflame 亿智科技 | <table border="1"> <thead> <tr> <th>Startup Worldwide</th> <th>Startup Worldwide</th> <th>Startup Worldwide</th> </tr> </thead> <tbody> <tr> <td>Cerebras</td> <td>WAVE COMPUTING</td> <td>Graphcore</td> </tr> <tr> <td>habana</td> <td>thinci</td> <td>SambaNova</td> </tr> <tr> <td>KALRAY</td> <td>LIGHTINTELLIGENCE</td> <td>HALO</td> </tr> <tr> <td>Esperanto</td> <td>Tensorrent</td> <td></td> </tr> <tr> <td>MYTHIC</td> <td>Preferred Networks</td> <td>brainchip</td> </tr> <tr> <td>PEZY Computing</td> <td>GREEN WAVES</td> <td></td> </tr> <tr> <td>AMOTIVE</td> <td>KONIKU</td> <td>Tachyum</td> </tr> <tr> <td>logix</td> <td>SYNTIANT</td> <td></td> </tr> <tr> <td>gyrfalcon technology</td> <td>NOVUMIND</td> <td></td> </tr> </tbody> </table> | Startup Worldwide | Startup Worldwide | Startup Worldwide | Cerebras | WAVE COMPUTING | Graphcore | habana | thinci | SambaNova | KALRAY | LIGHTINTELLIGENCE | HALO | Esperanto | Tensorrent | | MYTHIC | Preferred Networks | brainchip | PEZY Computing | GREEN WAVES | | AMOTIVE | KONIKU | Tachyum | logix | SYNTIANT | | gyrfalcon technology | NOVUMIND | |
| Startup Worldwide | Startup Worldwide | Startup Worldwide | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cerebras | WAVE COMPUTING | Graphcore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| habana | thinci | SambaNova | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KALRAY | LIGHTINTELLIGENCE | HALO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Esperanto | Tensorrent | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MYTHIC | Preferred Networks | brainchip | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PEZY Computing | GREEN WAVES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AMOTIVE | KONIKU | Tachyum | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| logix | SYNTIANT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| gyrfalcon technology | NOVUMIND | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

扫码访问AI芯片文章

...where & how we spend transistors is changing.

DELL Technologies

Architectural, Power, Cooling Challenges

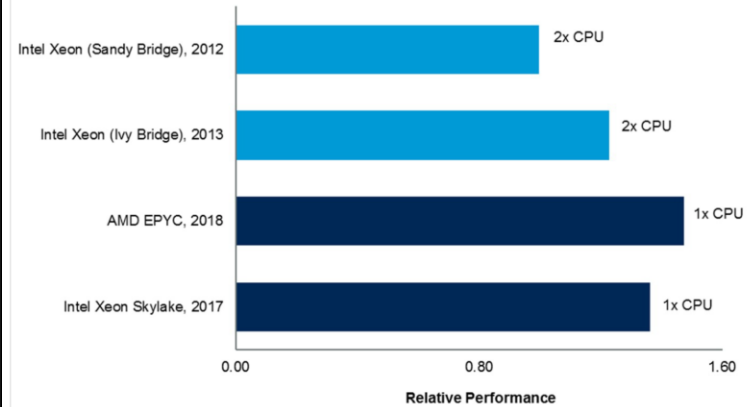


Standard Compute Architectures are not keeping up and POWER problem is back!!!

1S POV

- More than enough cores per socket and trending higher
- Replacement of underutilized 2S servers
- Easier to hit binary channels of memory, and thus binary memory boundaries (128, 256, 512...)
- Lower cost for resiliency clustering (less CPUs/memory....)
- Better software licensing cost for some models
- Avoid NUMA performance hit – IO and Memory
- Power density smearing in data center to avoid hot spots
- Repurpose NUMA pins for more channels: DDRx or PCIe or future buses ([CxL](#), [Gen-Z](#))
- Enables better NVMe direct drive connect without PCIe Switches
- Gartner agrees and did a paper. (<https://www.gartner.com/doc/reprints?id=1-680TWAA&ct=190212&st=sb>)

Relative Performance of 16 Cores

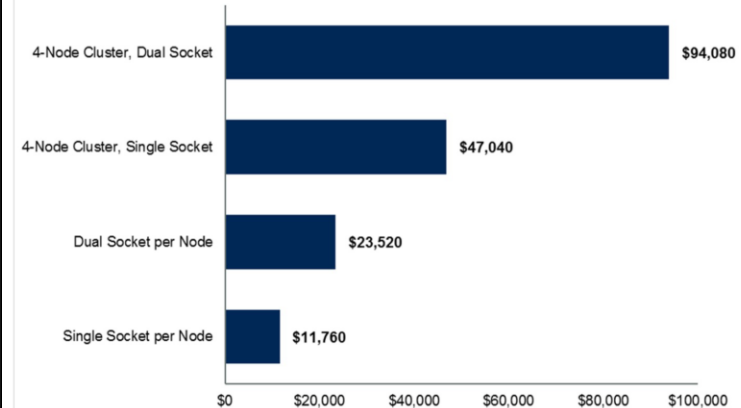


ID: 373722

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vSAN License List Price, U.S.

vSAN Advanced HCI Kit With 3 Years of S&S

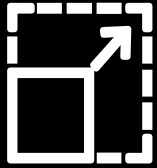


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Server Modularity

Resource Optimizations (Kinetic Infrastructure)



Compose servers with resources app requires



Unlock trapped resources



Avoid overprovisioning



Purchase resources independently

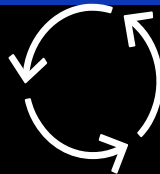
INCREASE AGILITY

OPERATE EFFICIENTLY

UNLOCK VALUE



Increase RAS



Repurpose retired resources



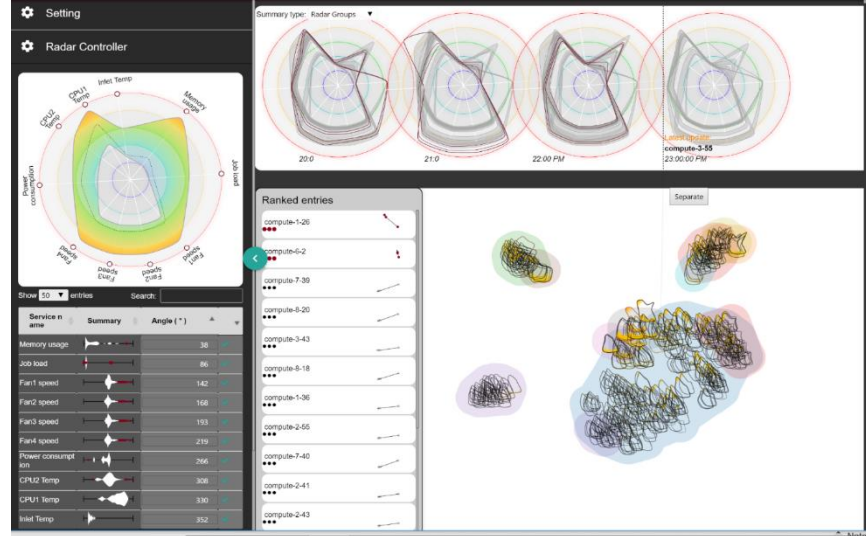
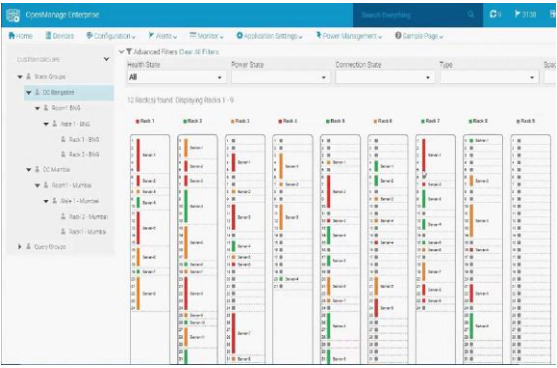
Technologies can evolve – and deployed independently



Monitoring & Automation

Cognitive Telemetry & AI for Monitoring and Management

- iDRAC-gathered high value telemetry data
- Create on-prem “data lake”
 - Hardware Sensors, Performance
- Visualization layout across server, rack, datacenter (core to the edge)
- Health data visualization across
- Provide additional scope for intelligent management using relevant data



APPLICATIONS



Multi-Cloud

DELL EMC READY SOLUTIONS

DELL EMC READY SOLUTIONS



Hyper-Converged Infrastructure



Ready Nodes,
Ready Bundles
PowerEdge Servers



reddot design award

DATA CENTER INFRASTRUCTURE: RACKS, POWER & COOLING

Dell EMC “BUILD-TO-BUY” options for any data center

HPC

DATA
ANALYTICS

BUSINESS
APPLICATIONS

SOFTWARE
DEFINED

Built on PowerEdge

THE BEDROCK OF THE MODERN DATA CENTER

85%

of **CIOs** are investing in Artificial Intelligence in the next three years

By 2020, 20% of the enterprise infrastructures deployed will be used for AI.. up from 3% in 2017

Stats from Gartner, Accenture

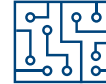
IT industry trends



SOFTWARE DEFINED DATA CENTER



WORKLOAD ACCELERATION



EDGE COMPUTING/IoT



ARTIFICIAL INTELLIGENCE



PROCESS CHALLENGES



DELLTechnologies