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The Industry is Changing

It's No Longer – "Business as Usual"

40% of businesses in the top 20 of every industry will be disrupted by 2018.[1]

50% of the G2000 will see the majority of their business depend on digitally-enhanced products and services by 2020.[2]

THIS IS THE LEAST AMOUNT OF CHANGE WE WILL EVER SEE

1. PNC – Digital Disruption Challenges (source); 2. IDC FutureScape: Worldwide IT Industry 2017 Predictions (source)

THE COMING FLOOD OF DATA

BY 2020

AVG INTERNET USER	~1.5 GB OF TRAFFIC PER DAY
SMART HOSPITAL	3,000 GB PER DAY
AUTONOMOUS VEHICLES	4,000 GB PER DAY... EACH
AIRPLANE DATA	40,000 GB PER DAY
SMART FACTORY	1,000,000 GB PER DAY

Business Outcomes Rely on Digital Strategy

DATA DRIVEN

Trusted, Real-time Data

SMART DECISIONS

Speed time to insight to make better decisions

ON-DEMAND

Reduce IT/ Operational Technology Cost; Increase Agility

TRUSTED

Security and privacy

CONNECTED EXPERIENCE

Connectivity and access anywhere on any device

INNOVATIVE WORKFORCE

Workplace Transformation

Yet Business Cannot Compete on Old Infrastructure

- SILO'D APPLICATIONS & DATA POCKETS
- SLOW DEPLOYMENT OF NEW SERVICES
- SECURITY EXPLOITS GROWING
- NETWORK BOTTLENECKS
- DATA INFLUX SWAMPING STORAGE
- WORKFORCE SKILLS MISMATCH

Outdated infrastructures result in a **6X** slower rate for product innovation and time to market.[1]

AT 4 YEARS

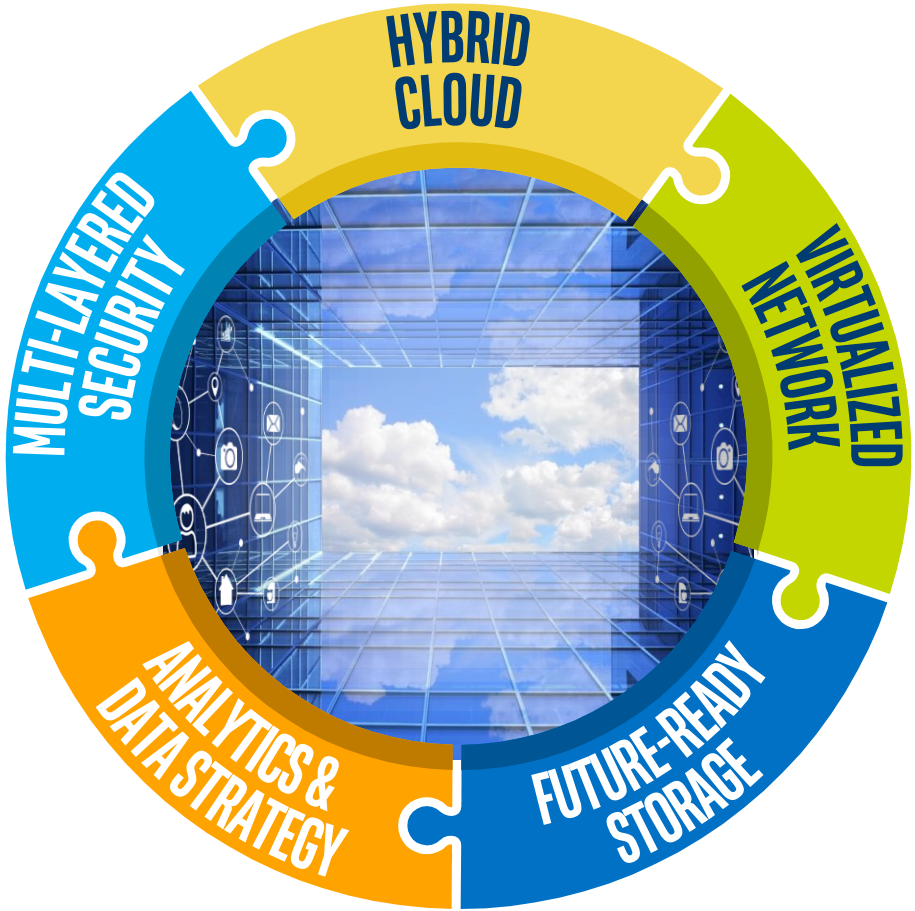
server performance drops **33%**

and maintenance costs climb **148%**[2]

1. The Enterprise Strategy Group, 2017; 2. IDC 2015 (source)

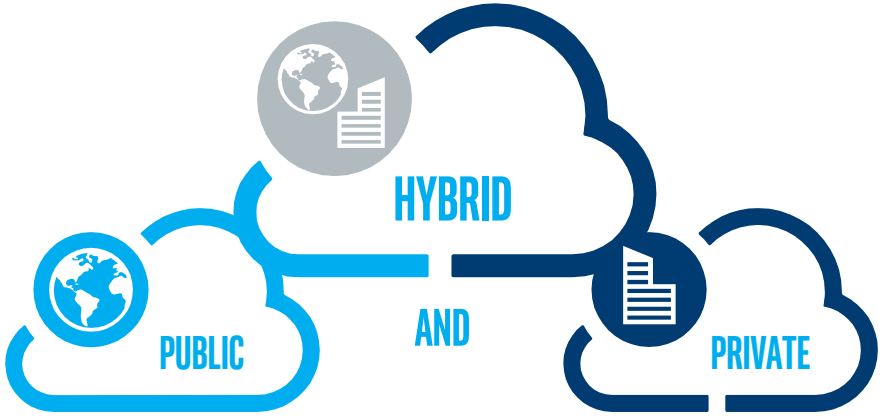

BUSINESS SUCCESS NOW
RELIES ON
IT TRANSFORMATION

Key Principles of IT Transformation



Hybrid Cloud

Holistic Cloud Plan Is Critical



40% of enterprises are using hybrid cloud today[1]

60% of enterprises are testing or planning a hybrid cloud implementation within 24 months[1]

Both public & private cloud make sense

Intel IT Examples

Deployed different workloads in both public and private clouds

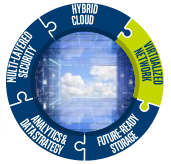
On-prem IaaS: **>2X** savings vs public[2]

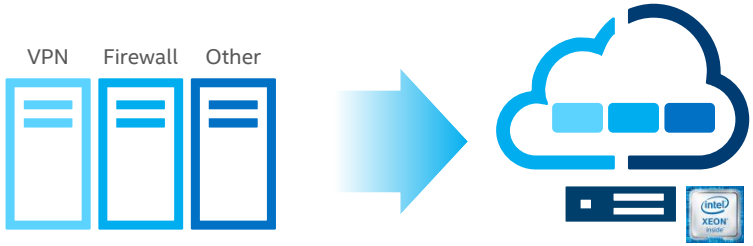
Off-prem SaaS solution: **73.6%** cost savings[2]

1. Forrester commissioned research 2017; 2. Cost savings based on Intel experience. Intel does not guarantee or warrant others will obtain similar results.

Virtualized Network

Agile, Secure and Dynamic Provisioning





Fixed Function Proprietary Network

Virtualized Network Functions on Industry Standard Servers

Enterprise IP traffic will grow **2X** from 2015 to 2020[1]

Organizations are recognizing the critical role of network virtualization in IT Transformation

Bank Leumi Case Study[2]

Deployed a private cloud based on a SDI model powered by Intel® technology

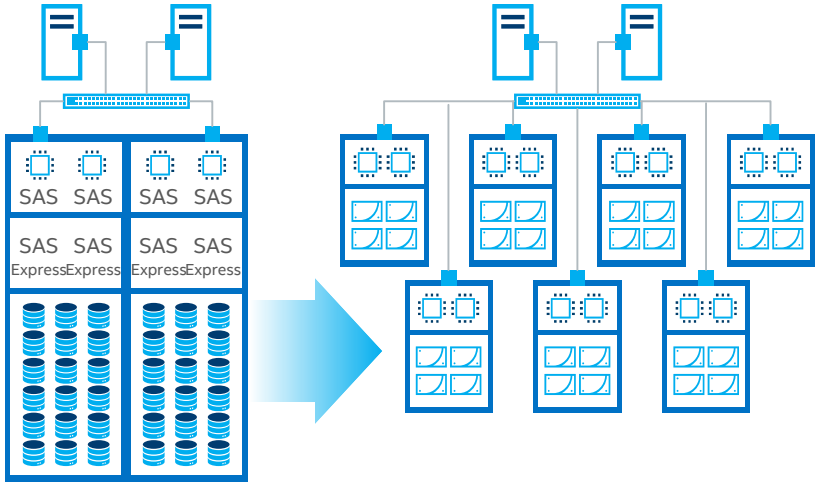
New services setup: 3 WEEKS ▶ 3 HOURS

Firewall policy defined: 8 HOURS ▶ 15 MINS

1. 2016 Cisco VNI Complete Forecast 2. Intel case study https://builders.intel.com/docs/cloudbuilders/bank-leumi-launches-mobile-only-banking.pdf

Future-Ready Storage

Agile, Efficient, Accessible



Data growth **>30%** CAGR while IT storage investment is **~3%** growth[1]

Un-tiered data in legacy silos is inefficient to support data growth and drive better decision making

Large Grocery Retailer[2]

Deployed software-defined storage solution

92% Performance gain

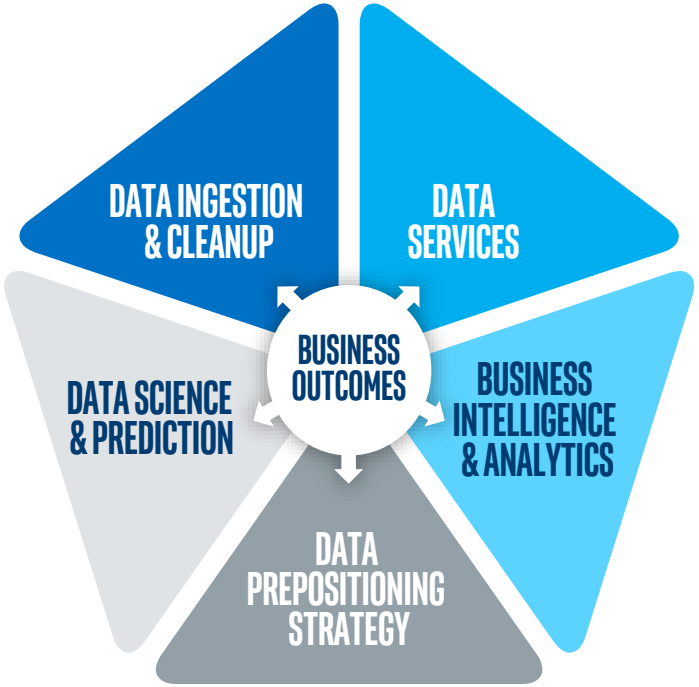
80% CapEx reduction

90% Footprint reduction

1. Worldwide Semiannual IT Spending Guide: Industry and Company Size, IDC February 2017; 2. Ken LeTourneau blog (Intel NSG) https://itpeernetwork.intel.com/scaling-software-defined-storage-in-retail/

Analytics & Data Strategy

Accelerate Your Insights



CIOs #1 Investment Priority[1]

Goal is to reduce "time to insight" and drive competitive differentiation

Yet challenges exist:

Data scattered, often unusable

Shortage of skilled data experts

Solution proliferation and complexity

Caesars Entertainment Case Study

Implemented Hadoop environment with CDH on Intel® architecture:

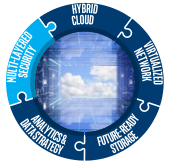
Reduced processing time **3 hours ▸ 45 minutes**

Expanded capacity to **3 million records per hour**

1. Gartner CIO Survey 2017; 2. Case Study: https://www.intel.com/content/www/us/en/big-data/xeon-entertainment-caesars-case-study.html

Multi-layered Security

Defense in Depth



VIGILANCE WITH ANALYTICS

DATA PROTECTION
AT REST | IN-FLIGHT | IN USE

PLATFORM SECURITY
TRUST | RESILIENCE | CONTROL

$2.1 TRILLION

projected cost of cyber crime
to business by 2019[1]

Effective security is built on multi-layered trust & vigilance

Barriers include:

High cost of encryption due to reduced performance

Lack of solutions in the market that can analyze high volume and varied data

High levels of human intervention required for threat detection, analysis and remediation

1. Juniper Research 2015

INTEL® XEON® SCALABLE PLATFORM

THE INDUSTRY'S
BIGGEST PLATFORM ADVANCEMENT
IN A DECADE

INTEL® XEON® SCALABLE PROCESSORS

BEST

SCALABLE PERFORMANCE
HARDWARE-ENHANCED SECURITY
ADVANCED RAS

OPTIMIZED FOR WIDEST RANGE OF EVOLVING/MULTI WORKLOADS

MISSION-CRITICAL, VIRTUALIZATION/CONSOLIDATION, REAL-TIME ANALYTICS AND ARTIFICIAL INTELLIGENCE

GREAT

SCALABLE PERFORMANCE
MEMORY PERFORMANCE
ADVANCED RAS

WORKLOAD-OPTIMIZED + EFFICIENCY & AGILITY

PERFORMANCE FOR GENERAL-PURPOSE COMPUTE, STORAGE AND NETWORKING

GOOD

AT LOW POWER
STANDARD RAS

MODERATE TASKS

INTEL® TURBO BOOST TECHNOLOGY AND INTEL® HYPER-THREADING TECHNOLOGY FOR MODERATE WORKLOADS

ENTRY

SCALABLE PERFORMANCE
HARDWARE-ENHANCED SECURITY
STANDARD RAS

LIGHT TASKS

ENTRY PERFORMANCE, PRICE SENSITIVE FOR LIGHT WORKLOADS

MAINSTREAM | EFFICIENT | ENTRY

INTEL® XEON® SCALABLE PLATFORM

DELIVERS

PERFORMANCE

UP TO

1.65X

AVERAGE GENERATIONAL GAINS[1]

SECURITY

UP TO

2X

DATA PROTECTION PERFORMANCE GEN OVER GEN[2]

AGILITY

4.2X

GREATER VM CAPACITY vs 4-YEAR-OLD SERVER[3]

65%

LOWER TOTAL COST OF OWNERSHIP vs 4-YEAR OLD SERVER[4]

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1. Geomean based on Normalized Generational Performance going from Intel® Xeon® processor E5-26xx v4 to Intel® Xeon® Scalable processor (estimated based on Intel internal testing of: OLTP Brokerage, SAP SD 2-Tier, HammerDB, Server-side Java, SPEC*int_rate_base2006, SPEC*fp_rate_base2006, Server Virtualization, STREAM* triad, LAMMPS, DPDK L3 Packet Forwarding, Black-Scholes, Intel Distribution for LINPACK.
2. 2X gains in Reed Solomon Erasure Code: Intel Xeon® Processor Scalable Family: Platinum 8180 Processor, 28C, 2.5 GHz, H0, Neon City CRB, 12x16 GB DDR4 2666 MT/s ECC RDIMM, BIOS PLYCRB1.86B.0128.R08.1703242666.Intel® Xeon® E5-2600v4 Series Processor, E5-2650 v4, 12C, 2.2 GHz, Aztec City CRB, 4x8 GB DDR4 2400 MT/s ECC RDIMM, BIOS GRRFCRB1.86B.0276.R02.1606020546. Operating System: Redhat Enterprise Linux 7.3, Kernel 4.2.3, ISA-L 2.18, BIOS Configuration, P-States: Disabled, Turbo: Disabled, Speed Step: Disabled, C-States: Disabled, ENERGY_PERF_BIAS_CFG: PERF.
3. Up to 4.28x more VMs based on server virtualization consolidation workload: Based on Intel® internal estimates 1-Node, 2 x Intel® Xeon® Processor E5-2690 on Romley-EP with 256 GB Total Memory on VMware ESXi* 6.0 GA using Guest OS RHEL6.4, glassfish3.1.2.2, postgresql9.2. Data Source: Request Number: 1718, Benchmark: server virtualization consolidation, Score: 377.6 @ 21 VMs vs. 1-Node, 2 x Intel® Xeon® Platinum 8180 Processor on Wolf Pass SKX with 768 GB Total Memory on VMware ESXi6.0 U3 GA using Guest OS RHEL 6 64bit. Data Source: Request Number: 2563, Benchmark: server virtualization consolidation, Score: 1580 @ 90 VMs. Higher is better
4. Up to 65% lower 4-year TCO estimate example based on equivalent rack performance using VMware ESXi* virtualized consolidation workload comparing 20 installed 2-socket servers with Intel Xeon processor E5-2690 (formerly "Sandy Bridge-EP") running VMware ESXi* 6.0 GA using Guest OS RHEL6.4 compared at a total cost of $919,362 to 5 new Intel® Xeon® Platinum 8180 (Skylake) running VMware ESXi6.0 U3 GA using Guest OS RHEL 6 64bit at a total cost of $320,879 including basic acquisition. Server pricing assumptions based on current OEM retail published pricing for 2-socket server with Broadwell based Intel Xeon processor systems– subject to change based on actual pricing of systems offered.

DELIVERING PERFORMANCE BEYOND BENCHMARKS

CLOUD	Baidu 百度 SEARCH	HUAWEI FUSIONSPHERE	KINGSOFT MYSQL CLOUD SERVICE	Neusoft ACLOME	Tencent 腾讯 CLOUD
	1.74X CLICK-THROUGH-RATE[1]	1.62X ENTERPRISE CLOUD APPLICATIONS[2]	1.63X OLTP DATABASE[3]	1.5X CLOUD MONITORING[4]	1.72X VIDEO STITCHING[5]
AI & ANALYTICS	IBM DB2	IHS Markit ANALYTICS RISK ENGINE	LAMMPS	SAP HANA	sas
	1.47X IN-MEMORY ANALYTICS[6]	1.68X ENTERPRISE RISK MANAGEMENT[7]	1.72X MOLECULAR DYNAMICS[8]	1.59X DATABASE TRANSACTIONS[9]	2X BUSINESS ANALYTICS[10]
NETWORK	AsiaInfo VERIS	eBrisk EBLIVE	ERICSSON MEDIAFIRST	sandvine VIRTUAL SERIES	Telefónica VIRTUAL BNG
	2.21X BUSINESS SUPPORT SYSTEM[11]	1.9X HEVC VIDEO ENCODING[12]	1.5X VIDEO TRANSCODING[13]	1.64X PACKET INSPECTION[14]	1.67X ROUTING[15]

1. Baidu Search Click-Through-Rate (CTR): OS: CentOS Linux release 7.3.1611. Testing by Intel June 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
2. Huawei FusionSphere virtualized cloud Platform: OS: RHEL 7.2. Testing by Intel May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
3. KingsoftCloud Image Processing and MySQL Cloud Service: OS: CentOS 7.3.1611. Testing by Intel May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
4. Neusoft SaCa Aclome: SaCa Aclome workload (for general performance) and compressing/decompressing workload (for QAT). OS: CentOS 7.3.1611. Testing by Intel and Neusoft May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
5. Tencent Business Analytics: Video Stitching workload. OS: CentOS 7.3.1611 Linux kernel 4.9.8. Testing by Intel April 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
6. IBM DB2: DB2 v11.1.1.1. The IBM Big Data Insights Internal Heavy Multiuser Workload (BDInsights) is a multi-user data warehousing workload based on a retail environment. Testing by Intel and IBM April/May 2017. 4S Intel® Xeon® processor E7-8890 v4 vs 4S Intel® Xeon® Platinum processor 8180.
7. IHS Markit Analytics Risk Engine: internal synthetic portfolio. OS: Windows server 2016. Testing by Intel and IHS Markit May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8168.
8. LAMMPS: Testing by Intel June 2017. 2S Intel® Xeon® processor E5-2697 v4 vs 2S Intel® Xeon® Platinum processor 8168.
9. SAP HANA: TBD.
10. SAS Business Analytics: SAS 9.4 m4 application running the 3D session SAS Mixed Analytics workload. OS: CentOS 7.2 kernel 3.10.0. Testing by Intel and SAS May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
11. AsiaInfo Telco BSS: AsiaInfo Telco BSS workload. OS: RHEL 7.3. Testing by Intel & AsiaInfo May 2017. 4S Intel® Xeon® processor E7-8890 v4 vs 4S Intel® Xeon® Platinum processor 8180.
12. eBrisk: OS: Windows Server 2012 R2 Standard Build 9600. Test clips: https://media.xiph.org/video/derf/. Testing by Intel May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8180.
13. Ericsson MediaFirst Video Processing UHD HEVC transcoding workload. OS: CentOS Linux® 7.2 kernel 3.10.0. Testing by Ericsson in May 2017. 2S Intel® Xeon® processor E5-2699 v4 vs 2S Intel® Xeon® Platinum processor 8168.
14. Sandvine Virtual Series: OS: CentOS Linux release 7.3.1611 Kernal Linux 3.10.0-514.6.2.el7.x86_64 Hypervisor: qemu-kvm-1.5.3-126.el7_3.3.x86_64 VNF sizing: 3vCPU (6 pCPU threads), 128 GB RAM. Testing by Sandvine, June 2017. 2S Intel® Xeon® processor E5-2699 v3 vs 2S Intel® Xeon® Gold processor 6150.
15. Telefonica: Testing by Telefonica. 2S Intel® Xeon® processor E5-2600 v4 vs 2S Intel® Xeon® Platinum processor 8168.

CONGRATS CISCO !!!

UCS M5 SERVERS

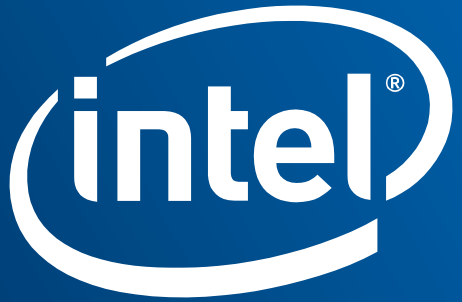
9

WORLD RECORDS

https://blogs.cisco.com/datacenter/cisco-ucs-continues-its-world-record-tradition

Summary

- Technology is transforming industries
- Business outcomes rely on Digital strategy
- 5 Key tenets of IT Transformation
  - ✓ Hybrid Cloud,
  - ✓ Virtualized Network,
  - ✓ Future-ready Storage,
  - ✓ Analytics/Big-data,
  - ✓ Multi-layered Security
- Intel Xeon Scalable Platform → Performance, Security, Agility & Lower TCO
- Cisco & Intel → Your Trusted Partners on IT Transformation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