Reconstruyendo una Nube Privada con la Innovadora Hiper-Convergencia
Infraestructura Huawei FusionCube Hiper-Convergente

Ronald Paz – IT Product Director
Huawei del Peru
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1. Huawei Corporation
2. IT Infrastructure Evolution
3. FusionCube: Pioneering Private Cloud Infrastructure Transformation
4. Building a Private Cloud Based on Innovative Technologies
5. Success Stories
Today, Huawei is leading ICT

Who is Huawei
- A leading global ICT solutions provider
- A Fortune Global 500 company, ranking No. 228 in 2015 and No. 129 in 2016
- No. 88 of Interbrand's Top 100 Best Global Brands

Employees
- 176,000+ employees worldwide
- 79,000+ engaged in R&D, 45% of the total workforce
- LinkedIn World's 100 Most In Demand Employers

Market Progress
- Providing professional services for 1,500+ networks in over 170 countries and regions
- Serving 1/3 of the world's population
- 108M units of Smartphone shipments in 2015, grow 44%, ranked No. 3
- 2016H1, revenue reached CNY245.5B, grow 40%

Continuous Growth
Global leader of ICT for 3 business groups

- **Consumer Business**
  - A brand loved by consumers

- **Carrier Business**
  - Customers' best strategic partner

- **Enterprise Business**
  - Enterprises' best innovation partner

**A Global Leader of ICT Solutions**

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**Professional services**
Huawei take root in Peru, grow with Peru

- **230** Employees
  - Local staff 80%

- **700** Direct & indirect job

- **2300+** rural sites with Telefonica, for 0.5M users,

- **211M USD**
  - 2011-2015 TAX paid

- **2000+** clients and employees trained in China

- **30** “Future seeds” in 3 years

- **4** provinces national broadband for local municipals and schools

- Serving all operators
  - 90% of users
  - 1st 3G, 1st 4G, 1st Smart Home, 1st 4.5G

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Achieve win-win outcomes with global partners through open collaboration
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Ever-growing service demands are driving infrastructure towards a distributed and cloud-based architecture.
Evolution of Traditional Architecture

**Traditional Information-based Architecture**
- Server: VM, VM
- FC/IP network
- SAN/NAS
- Isolated Computing Storage Resources

**Ultra-large Web-scale Architecture**
- Server: VM, VM, VM
- InfiniBand/10 GE Network
- Distributed storage
- Server local storage
- Shared Distributed Mode

**Hyper-converged Architecture**
- Server: VM, VM, VM
- Device-agnostic
- Distributed storage engine
- Agile management
- Software-Defined, Simplified Management

Evolution of Internet architecture to all industries is difficult due to distributed storage and complex management.
Hyper-Converged Architecture Is the Predominant Trend

A scalability pattern similar to Internet scale-out

Compute node as storage

Compute power and storage capacities increase with demands

Linear expansion of performance and capacities

Low TCO

The global hyper-convergence market is set to grow rapidly from NOW forward.
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FusionCube: Pioneering the Private Cloud Infrastructure Transformation

- Infrastructure
  - VMware FusionSphere
  - Physical machines
    - HP, Dell, Huawei
    - Cisco, HP, Huawei
    - NetApp, EMC, Huawei

- Applications
  - Physical machines
  - VMware FusionSphere

- FusionCube

[Image: HUAWEI and Bicsi logos]
Software-Defined Storage: Replacing Dedicated Servers with Universal Servers

FusionCube
Hyper-converged Infrastructure

NO SAN
Cloud-Enabled Enterprise Data Center

Unified Management

VMware/FusionSphere
Physical machines

Storage volumes

FusionCube scale-out storage pool

VMware/FusionSphere
Physical machines

HANA
Advanced Hardware Platform Unleashes Compute and Storage Power

### FusionCube 6000
- **4U with four nodes**
- Configurations:
  - **XH628**
    - 12 disks
    - Computing and storage converged node
  - **XH628**
    - 12 disks
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  - **XH628**
    - 12 disks
    - Computing and storage converged node
  - **XH628**
    - 12 disks
    - Computing and storage converged node

### FusionCube 9000
- **12U with 16 nodes**
- Configurations:
  - **FusionCube 6000**
    - 12 disks
    - Computing and storage converged node
  - **FusionCube 9000**
    - 12 disks
    - Computing and storage converged node
  - **FusionCube 6000**
    - 12 disks
    - Computing and storage converged node
  - **FusionCube 9000**
    - 12 disks
    - Computing and storage converged node

### Networking
- **2/4 x 10 GE + 2 GE Ethernet**

### Node Configurations
- **CH121**
  - Half-width 2-socket compute node
- **CH222**
  - Full-width storage node
  - 15 SSDs
- **CH220**
  - Full-width high-performance I/O node
- **CH242 V3**
  - Full-width 4-socket compute node

### Additional Nodes
- **CX311**
  - 10 GE/FCoE
- **CX611**
  - IB FDR
FusionCube 9000: A Leading Computing, Storage, and Networking Converged Platform

1. **Computing**
   A single chassis supports 64 Haswell EP 145W CPUs, the highest density in the industry.

2. **Storage**
   A single chassis supports an internal storage capacity of up to 316.8 TB, the largest single-chassis internal storage capacity in the industry.

3. **Networking**
   Based on state-of-the-art Huawei data center switch technologies and supports 10 GE/IB/FC. 15.6 Tbit/s midplane switching capacity, up to 128 10 GE uplink ports per chassis.

4. **Reliable**
   Supports continuous operation at 40°C. Failure rate 15% lower than the industry average.

5. **Energy efficient**
   China Environmental Labeling certified, with top ranking in China Mobile and China Unicom tests.

6. **Easy-to-use**
   Plug-and-play boards and cards, automatic configuration and transfer of parameters.

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**Easy management**
Rapid deployment: System go-live time shortened from weeks to hours.

**Modular design**
Modular design: Meeting IT hardware resource requirements in multiple service scenarios.

**High-density architecture**
Computing density improved by 66%: Supports next-decade evolution of CPU and network technologies.

**Energy conservation**
Industry-leading Platinum PSUs: Improves energy efficiency by 13% with patented energy-conservation technologies.
FusionCube 6000: An Integrated Platform with Converged Computing and Storage

- **4** PSUs in redundancy
  - 750W/1,200W Platinum AC PSU (94%)
  - or 800W golden DC PSU (92%)

- **8** HHHL rear PCIe 3.0 x8 slots

- Chassis management module

- **5** counter-rotating fan modules, tolerating failures of a single fan module
  - N+1 redundancy, with 3,000W heat dissipation capability

- **12** hot-swappable hard disks
FusionCube 2000: Enhanced Foundation for Enterprise Basic IT Services

- 16*8TB ultra-large local storage capacity
- 44-core new-generation full series processors
- 24 NVMe SSDs superior storage performance
- 9 PCIe slots flexible I/O expansion

44 cores + 16*8TB storage capacity + 9 PCIe slots, ideal for Big Data, Virtualization, and VDI
Trendsetting Embedded Distributed Storage Software

FusionCube Distributed Block Storage enables universal servers to replace dedicated storage.

**Cloud**
- FusionSphere
- vSphere
- OpenStack
- KVM

**Database**
- Oracle
- SAP HANA
- MySQL
- IBM DB2
- Sybase
- 达梦数据库

**High Scalability**
- Simultaneous linear growth of performance and capacities
- Resources added/reduced on demand, protecting customer investments

**High Performance**
- Industry’s highest performance: 6 million IOPS
- Distributed engines for parallel I/O
- Industry’s fastest 56 Gbit/s IB network

**High Reliability**
- Supports multiple copies
- Fast self-healing; rebuild time for 1 TB data shorter than 15 minutes
- Cross-node redundancy
Heterogeneous Virtualized Platform Enables Unified Management of Resources

- Protects initial enterprise investments
  - Heterogeneous third-party mainstream virtualization platforms, VMware, KVM, etc.
  - Heterogeneous management of physical and virtual resource pools

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Converged Resource Pool

- VMware resource pool
- Third-party virtualization (VMware)
- FusionSphere

- Resource pool 1
- Resource pool 2

Infocast  COFCO Coca-Cola

Open architecture, unified management of heterogeneous resource pools
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Hyper-Converged Infrastructure: Highest Performance in the Industry

**Highest Performance (Databases)**
- Single Rack Huawei FusionCube 9000: 7.2M IOPS
- Single Rack Oracle Exadata X6-2: 4.5M IOPs

**Highest Performance (Virtualization)**
- Single Chassis Huawei FusionCube 6000: 280K IOPS
- Single Chassis Nutanix: 210K IOPs
- Single Chassis VSAN: 220K IOPS

**10x Performance of Legacy Architecture**
- Single Rack Huawei FusionCube 9000: 7.2M IOPS
- HDS VSP G1000: 2M IOPS
- IBM DS8870: 0.45M IOPS

Superior Performance
Always-on Services
Simplified Management
World’s Fastest SAP HANA Appliance

Single cabinet supports 96 CPUs

56 Gbit/s InfiniBand

Distributed storage built on SSDs

18 billion records

30 TB live-network data

3.2s of query time
Symmetric Distributed Architecture for All-Node Non-Blocking Concurrency

- **Symmetric distributed architecture, without metadata nodes**
  Supports concurrent I/O for 256 nodes, without independent metadata nodes

- **InfiniBand high-speed interconnections**
  Network with industry’s highest speed and shortest latency, P2P interaction between nodes

- **RDMA data direct reading**
  Data direct reading, reducing CPU resource consumption and achieving shortest latency
Cache Convergence Technology for Global Sharing of Cache Pool

- Cache convergence for up to 256 nodes
- Huawei proprietary consistency technology supports write cache
- Dynamically adjust read/write cache ratio according to I/O model

**Simplified Management**

**Superior Performance**

**Always-on Services**

**Simplified Management**

**Cache resource pool**

Host

APP 1

APP 2

< Host

APP 1

APP 2

Storage SRV 1>

Storage SRV 2>

Storage SRV 3>

Storage SRV 4>

Cache convergence and sharing, allowing for scale-out

App

Write cache

Write cache

9.6 TB

7.2 TB

Supports write cache, low write latency
Full NVMe SSD Configuration Eliminates I/O Bottleneck

** Dominant Performance **
- 800K IOPS
- 3.2 GB/s bandwidth

** High Reliability **
- 2 million hours MTBF
- 5 years service life

ES3000 V3 NVMe SSD

- Huawei proprietary SSD controller chip
- High performance
- Energy-efficient
- High efficiency

- Groundbreaking Huawei NVM Control technology
  - Intelligent FTL
  - CVT scheduler
  - LDPC error correction
  - Dynamic RAID

NVMe SSDs replace hard disks: Game-changing performance improvement

Superior Performance  Always-on Services  Simplified Management
Multiple Data Safeguarding Mechanisms
Ensure Always-on Services

- Snapshot
- Linked clone
- Virtualization Fault self-healing
- Disaster recovery
- Three-copy backup
- Complete distributed architecture
- Full component redundancy
- Selected components
- Server reliability design
- SSD reliability algorithm

Simplified Management
Superior Performance
Always-on Services
Simplified Management
HUAWEI

Bicsi
VM Intelligent Self-Healing, Improving Rebuild Speed by 40 Times

- Data is distributed across servers or cabinets, ensuring successful data access even when a server or cabinet is faulty.
- Data slices are distributed across the resource pool and can be auto-built in parallel within the resource pool after a hard disk fails. Only the data of the faulty disk is rebuilt, without requiring independent hot spare disks.

1 TB data rebuild time < 15 minutes (12 hours are required by a traditional SAN), and data reliability is improved.
First in the Industry to Support Cabinet-Level Security

- Tolerates dual-node faults
- Tolerates concurrent dual-server faults
- Tolerates concurrent dual-cabinet faults
- Supports cabinet-level security

2-copy scenario: Reliability ≥ 99.99%; 3-copy scenario: Reliability ≥ 99.99999%

Data reliability always comes first. Suggest using three copies with FusionCube.
Google, Facebook, and BAT all use at least three copies.
Integrated Delivery: Services Go Live in 30 Minutes

FusionCube: Fastest arrival within 1 week; install and commission within 30 minutes

1 to 3 weeks
1 to 3 weeks
4 to 8 weeks
1 week
1 week
1 week
1 week
1 week
1 week

10–18 weeks

**Pre-integration**
- Preinstalled with virtualized database software
- Shortens system integration time
- Prevents human error

**Pre-verification**
- Based on best practice
- Real-world verification with vendors
- Accelerates solution design

**Unified service**
- Simplifies procurement process
- Shortens arrival time
- Improves after-sales experience
Unified Resource Allocation and Simplified Device Management

FusionCube Builder (installation tool)
- All-in-one delivery
- Device auto-discovery
- Wizard-aided installation
- Preinstallation and preconfiguration
- Graphical configuration
- Fast initialization

FusionCube Center (management tool)
Unified resource management
- Hardware devices
- Virtualization platform
- Storage resources
Unified alarm management
- Alarm list display and export
- Alarm threshold and masking settings
- Alarm statistics
Unified monitoring
- Physical machine health monitoring
- VM status monitoring
- Performance indicator monitoring

Empowers enterprises to use a simplified, high-performance, and high-reliability private cloud with a unified set of management software.

Public network demonstration: https://112.95.253.74
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CITIC Bank Builds a Flexible and Reliable Data Platform with Huawei FusionCube

Initial investment down by **30%**; RPO in seconds and RTO in minutes
Guangzhou Local Taxation Bureau Builds an Efficient Agile Private Cloud with Huawei FusionCube

Improves performance by 10 times compared with traditional architecture, enabling easy management and fast rollout.
Sinopec Builds the World’s Largest Enterprise Data Warehouse System with Huawei FusionCube

87 TB, the largest SAP cluster in the world, improving performance by 4 to 6 times
Nankai University Enables Intelligent Education on a Private Cloud

Unified management platform, improving O&M efficiency by 50%
PLA 305 Hospital Builds an Agile IT Infrastructure with Huawei FusionCube

Equipment footprint reduced by 60% and resource utilization improved by 70%
Huawei FusionCube Enables Fast Desktop Cloud Rollout for **Hong Kong Airlines**

Deployment efficiency improved by **10 times**
China Mobile Jiangsu Builds an Operation Analytic System with Huawei FusionCube

Replaces midrange computers for data analytics, empowering precision marketing to a massive userbase.
Gracias