How Big Data and Cloud Computing aspects can be utilized

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Agenda

1	**Cloud, Big Data and Big Data Analytics**
2	**Developing National Cloud and using Big Data in e-Learning**
3	**Developing National Cloud and using Big Data in e-Agriculture**
4	**Considerations in adopting Cloud and Big Data Strategy**
5	**Case Studies**

What is Cloud

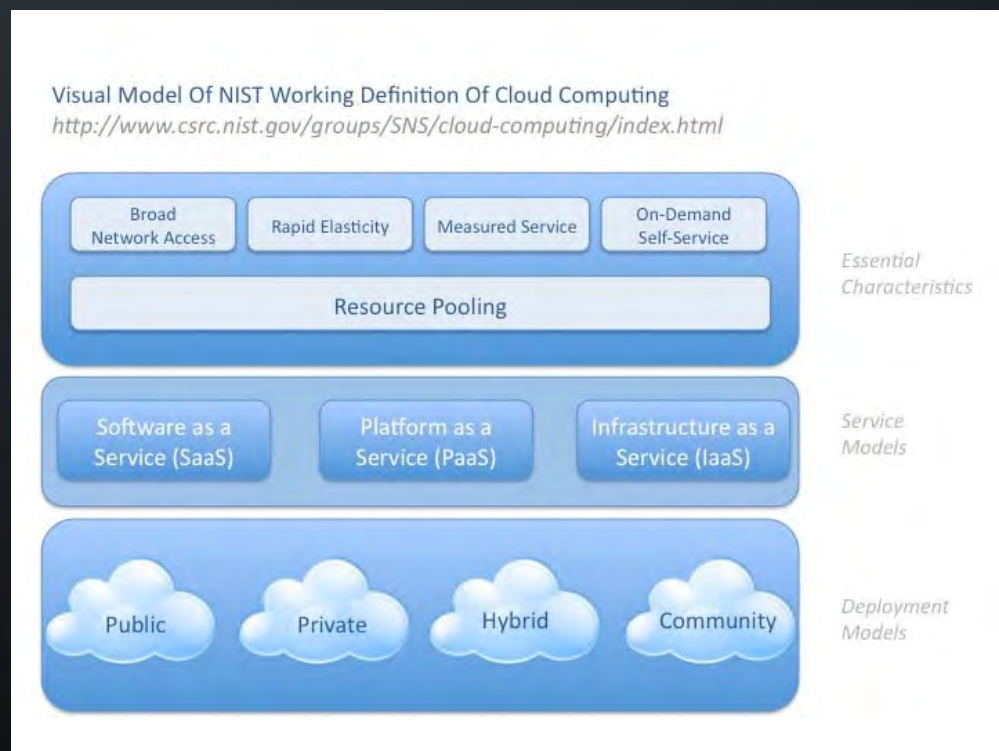- **Essential Characteristics**

  - On-demand self-service
  - Broadband network access
  - Resource pooling
  - Rapid elasticity
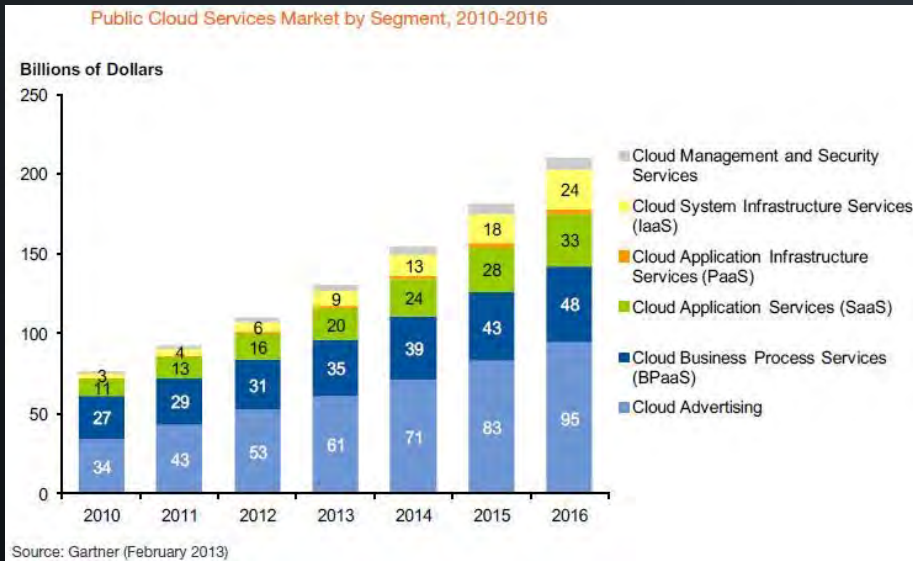 - Measured

- **Service Models**

  - Software as a Service (SaaS).
  - Platform as a Service (PaaS)
  - Infrastructure as a Service (IaaS)

- **Deployment Models**

  - Private cloud
 - Community cloud
  - Public cloud
  - Hybrid cloud

Visual Model Of NIST Working Definition Of Cloud Computing
http://www.csrc.nist.gov/groups/SNS/cloud-computing/index.html

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Big Data and Big Data Analytics

- Big Data
  - Massive volume of both structured and unstructured data that is so large, it is difficult to process using traditional database and software techniques.
  - In most enterprise scenarios the volume of data is too big or it moves too fast or it exceeds current processing capacity.

- Big Data Analytics
  - Process of collecting, organizing and analysing large sets of data (called Big Data)
  - Discover patterns and other useful information.
  - Help organizations to better understand the information contained within the data
  - Identify the data that is most important to the business and future business decisions.
  - Big data analysts basically want the *knowledge* that comes from analysing the data.

Public Cloud and Big Data Trends

Public Cloud Services Market by Segment, 2010-2016

Billions of Dollars

- Cloud Management and Security Services
- Cloud System Infrastructure Services (IaaS)
- Cloud Application Infrastructure Services (PaaS)
- Cloud Application Services (SaaS)
- Cloud Business Process Services (BPaaS)
- Cloud Advertising

Source: Gartner (February 2013)

Big Data Market Forecast, 2012-2017 (in $US billions)

- Wikibon, predict Big Data revenues of $53.4B by 2017, as more businesses begin to realize real benefits from Big Data analytics.

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Developing National Cloud and using Big Data in e-Learning

E-Learning Trends

E-Learning 2012-2017 Growth (CAGR)

- Higher Ed E-Learning 38%
- Corporate E-Learning 12%
- K-12 E-Learning 50%
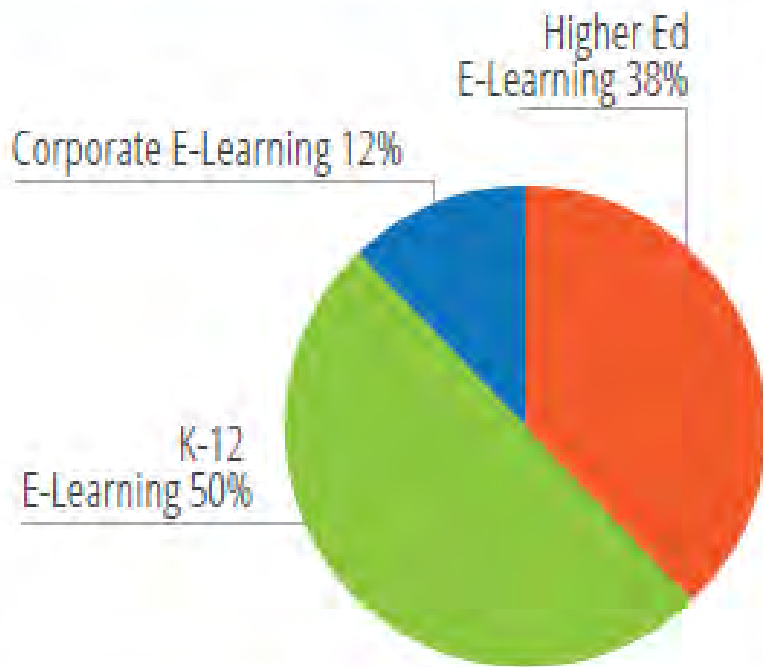
Source: GSV ADVISORS

- K-12 (kindergarten through 12th grade) is the term commonly used for talking about a persons first 13 years of schooling before entering university.

- Global Education expenditure has grown consistently in recent years and the K-12 sector plays a big role in this growth

- K-12 sector 50% CAGR 2012-2017

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Traditional Learning Challenges

- Requires Physical location
- Teacher Centred
- Limited number of students per class
- Static Content
- Books
- No 24 x 7 access
- Does not support distance based remote learning
- Non standard learning
- Not customisable
- Not cost effective
- Travel costs
- Not self paced.

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How e-learning benefits from cloud computing

- E-learning cloud can serve as a reservoir of information
  - Students can access learning when they are connected through mobile devices or low cost power tablets
  - An educational cloud can leverage the power of thousands of researchers and academics to focus on one problem

- Lower cost
  - Lower maintenance costs
  - No local Infrastructure or data storage costs.

- Automatic Updated software
  - Software always kept up to date
  - All clients can be updated at once.

- Improved performance
  - No reliance on local inadequate infrastructure

- Asynchronous learning
  - Students can access courses anytime or anywhere

- Instructor Benefits
  - Courses and content can be managed centrally

- Better file compatibility
  - Risk of file distortion eliminated

- Improved security
  - Less risk to confidential Data
  - Less exposure to security breaches

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Big Data in terms of the eLearning industry

- Data created by students while they are taking an eLearning course or training module.

- If a student is interacting with a training module, his/her progress, assessment results, social sharing, and any other data being produced during the eLearning course is "big data".

- The **Learning Management System**, the eLearning Authoring Tool, social media, multimedia, etc, that have been set by the organization or the eLearning professionals, collect the data.

- The term "big data" doesn't only apply to the volume of data itself, but the individual pieces of data that are being collected.

- These pieces of data can be analysed to offer schools or eLearning professionals the opportunity to determine how the learner is acquiring information

- Identify any problems that may exist within the eLearning strategy itself.

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Benefits That Big Data Offer To eLearning

- Allow teachers to customize the eLearning experience
  - Provide learners with more effective, engaging, and informative eLearning courses and modules.

- Allocate resources among schools in a more intelligent manner

- Offering invaluable feedback.
  - Identify where the student, eLearning course be improved.
  - Online facilitator can make adjustments to improve learners'   performance.

- Allowing eLearning professionals to design more personalized eLearning courses.
  - Modules can be custom tailored to meet the individual needs of the learner
  - Offer a high quality and meaningful learning experience.

- Targeting effective eLearning strategies and eLearning goals.
  - Identify which eLearning strategies are working and which ones are not
  - Devote resources to the aspects that are working, so student receives the preparation they need to fulfil their learning goals.

- Tracking learner patterns.
  - Track a learner throughout the entire process, from start to finish.
  - Pinpoint patterns about the learning behaviours of the individual learner, and also group as a whole.

- Expand understanding of the eLearning process.
  - Better understanding of eLearning process and how learners are responding to the eLearning courses

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Developing National Cloud and using Big Data in e-Agriculture

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What is e-Agriculture?

- An emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (ICT) in the rural domain, with a primary focus on agriculture.

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Why is use of Cloud and Big Data important ?
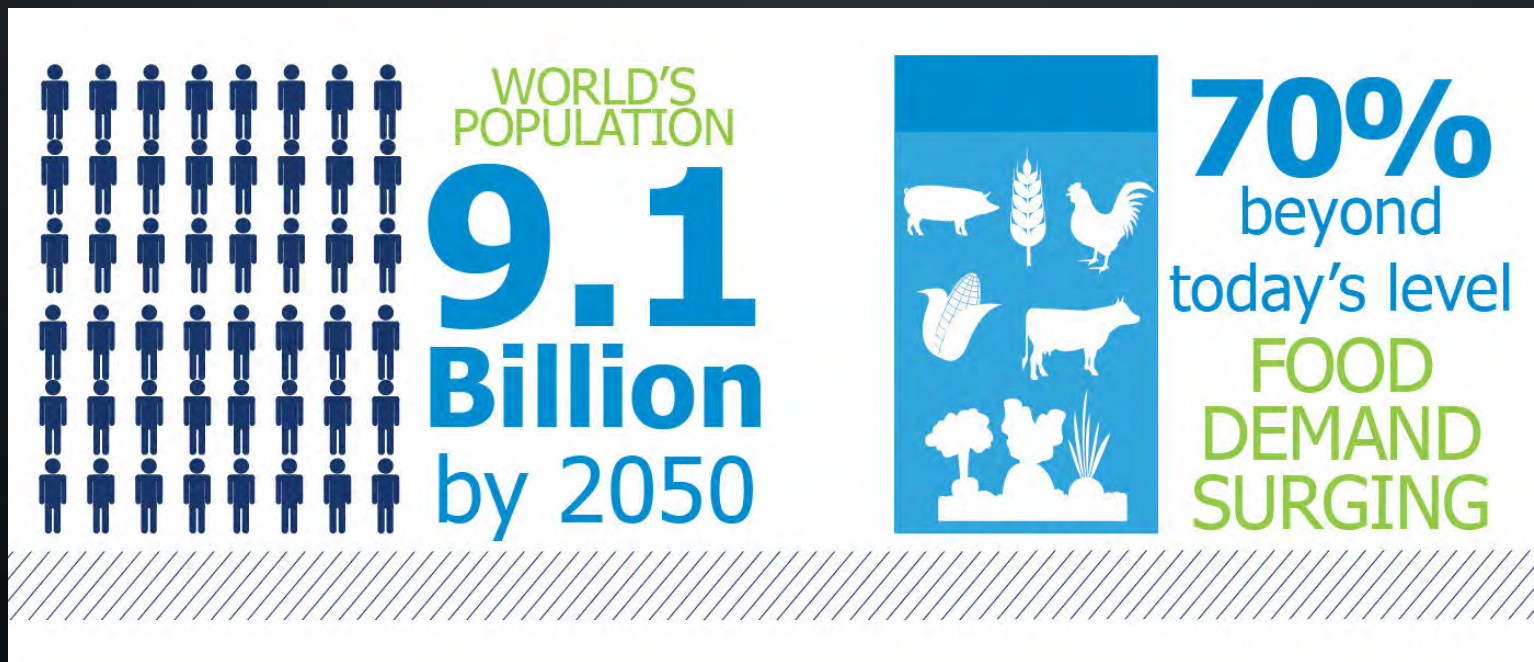
The world's population will rise to 9.1 billion by 2050 with food demand surging 70 percent beyond today's levels
- *UN Food and Agricultural Organization.*

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Traditional Agriculture Challenges

- Farms
  - Small traditional rural family farms run by 1 or maybe 2 people
  - Fragmentation
  - Poor Infrastructure
  - Information is shared verbally and mostly only amongst family members
  - Agricultural production is decentralized

- Outdated methods due to lack of knowledge
  - Equipment, Tools
  - No way of measuring crop yield
  - Matching of crop to soil type
  - Crop rotation

- No Access to Information
  - Seeds, Produce and fertilisers
  - Crop and livestock ,disease and prevention
  - Weather Patterns
  - Inability to connect with agricultural experts to gain critical information

- Supply Chain
  - Supply and Demand
  - Too many intermediaries reducing margins
  - Constant cycle of low productivity and investment leads to Global uncompetitiveness

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How cloud and Big Data can assist farmers

- Cloud offers central knowledge vault storing all agricultural information.
- Improved networking and communication
- Facilitates online trading and e-commerce
- Farmers able to access information through kiosks in community centres on the following:

  - Ordering supplies and offers (seeds, fertiliser, pesticides etc)
  - Yield Information
  - Crop Prices
  - Timely information on weather forecasts and calamities
  - Better and spontaneous agricultural practices
  - Better marketing exposure and pricing
  - Access to Global agricultural experts
  - Reduction of agricultural risks and enhanced incomes

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How cloud and Big Data can assist farmers

- Big Data Analytics

  - Seed Planting
    - Choice of hybrids
  - Supply chain construction and improvement
  - Analysing and sharing of weather forecasts to find the right time to plant and harvest crops.
  - Real-time tracking, monitoring and assistance in agricultural production and product quality
  - Regulator easily trace sources of food when there are safety concerns

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Agriculture Value Chain Benefits of Cloud and Big Data

- Cloud creates virtual cluster of all value chain participants, delivering the same benefits as vertical integration does in mature agricultural economies like the USA and Europe

- Unlocking farmer potential

  - Enhanced competitiveness in agriculture
  - Trigger cycle of higher productivity
  - Higher incomes
  - Greater investment
  - Higher quality and productivity.

- Growth in rural incomes

  - Increased demand for industrial goods
  - Fuels continued growth of local economy.
  - Propels economy into a higher growth trajectory.

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IoT in e-Agriculture

- The use of big data and the evolution of the Internet of Things compensates the shortcomings of traditional agriculture

- Setting up sensors with cameras in farms to collect data about crops, temperatures, precipitation and humidity.

- Supplying Farmers with mobile devices in order to record data relating to their agriculture processes.
    - The data, along with that recorded by farmers through mobile devices could then be uploaded to the cloud and analysed to help better manage the farms

- Farmer using a smart phone to scan the barcode of a packet of certified seeds
    - Something that could ensure quality and a fair price
    - installation of low-cost sensors at the village-level for hyper local weather information

- Machine Data
    - Aggregating performance data across a field inventory of working machines has a tremendous benefit for companies and can help improve future designs.

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Considerations in adopting Cloud and Big Data Strategy

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Considerations when adopting Cloud

- Early Planning
  - Engage key stakeholders from every aspect of the business early in process
  - IT, Legal, Security, Finance etc

- Understand Cloud Models
  - IasS, SaaS, PaaS,
  - Different approaches, to securing, managing, pricing and procuring

- Utility Pricing Model
  - Pay-as-you-go
  - Pay only for Services that are consumed
  - Flexibility

- Security
  - Industry best practices, standards, auditing and controls
  - Shared Responsibility between provider and customer

- Cloud Data Governance
  - Control and ownership of customer data.

- Consider OpenSource Options
  - OpenStack is now the defacto Cloud OS
  - Integration to third parties
  - Open API's
  - Cloud deployments built around opensource are more attractive as they prevent lock-in and leverage global communities of information and development

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Considerations when selecting Big Data Platform

- Data platform drivers
  - Storage or advanced analytics?
  - Storing and processing tens of terabytes of data, using an open-source distributed file system is a mature choice due to its predictable scalability over clustered hardware.
  - run analytics in online or real-time applications, hybrid architectures containing distributed file systems combined with distributed database management systems (which have lower latency).

- Low latency, Real time application
  - Consider In-memory solution

- Availability and Consistency requirements for the platform
  - CAP theorem-- systems can't be both consistent and available when a break in the network causes the system to be partitioned.
  - trading off consistency for availability.
  - Modern systems have developed strategies for dealing with partitioning scenarios, reducing the impact and improving the ability of systems to recover from partitions in a less disruptive way

- How is data be accessed by users and applications
  - Specific application interfaces (APIs) for NoSQL Databases

- Workload Profile
  - Consider spikes in in workload

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Summary

- Leveraging Cloud and Big Data can overcome traditional challenges posed by Education and Agriculture
  - Reservoir of Information
  - No or low cost
  - Centralised
  - Real time, on-demand access
  - Knowledge management efficiency
  - Access to global experts

- E-Learning
  - Tailor Content to students needs
  - Self-Paced e-Learning
  - Tracking student and improve content
  - Allocate resources more intelligently

- E-Agriculture
  - Use of Big Data to select seeds, weather patterns
  - Eliminate intermediaries
  - Supply chain
  - Real-Time tracking and monitoring to ensure produce quality
  - Leads to increased income, productivity in farming

- Plan Cloud and Big Data strategy early and thoroughly

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Huawei in Cloud and Big Data

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Huawei Cloud Computing and Big Data Efforts and Recognition

Gartner
- Member of the Magic Quadrant for x86 Server Virtualization Infrastructure
- Member of the Magic Quadrant for Integrated Systems

Top 2
New market shares obtained in China in 2014

10,000
Huawei employees working in cloud computing and dedicated to meeting every IT requirement

No.1
Industry-leading performance according to the SPECvirt server virtualization performance benchmark

Frost & Sullivan 2013
Cloud Infrastructure Product Innovation Award
BBTM Award 2014
"Most Innovative Tool for Driving Real-Time Intelligence" award at the Broadband Traffic Management (BBTM) & Telco **Big Data** Summit

OpenStack
Gold Member
TPC-BDWG
Key Member
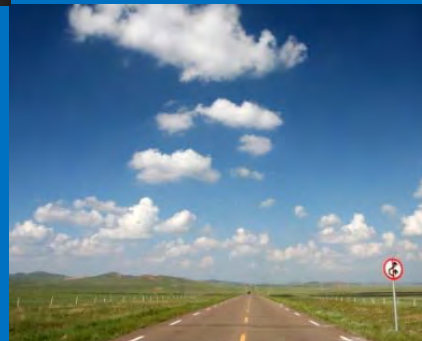
100,000
Desktops in the world's largest-scale deployment

Case Studies

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Huawei and College of Information Science and Technology of Peking University - Big Data Research

Challenges

- School of Electronics Engineering and Computing Science, Peking University is first choice of HANA ISV in China for SAP. The School is leading the industry of governmental security **Big Data** application.

- The governmental security industry requires the SAP HANA to run based on high performance servers, which requires the extremely high reliability and computing performance of the hardware platform.

Solutions

- Huawei RH5885 V2 rack servers are used to build the SAP HANA appliance. RH5885 V2 server is the first server in China that has been certified by SAP HANA, enjoys 35 RAS features, supports Intel E7 series processors. Thus, the servers are highly reliable and of high performance.

- The RH5885 V2 is configured with dual 10GE NICs and multiple GE NICs to expand the network bandwidth, Huawei ES3000 PCIe SSD card to improve the storage I/O performance and to ensure the high-speed service running.

Customer Benefits

- The hardware application requirements of the governmental security industry are fulfilled by the high reliability and performance compatibility of the SAP HANA appliance that runs on high performance servers.

- Huawei innovative SSD card improves the appliance I/O performance by 5 times, saves the hardware investments by 60%, and hence enhances the advantages of the appliance.

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Tsinghua University Builds a Hadoop Big Data Research Platform with Huawei Servers

RH2288 V2

"We are impressed by Huawei's advanced technologies and creative engineers. Huawei servers are built on a well-designed architecture. They offer optimal performance and adopt unique design in structure and cooling to adapt to our teaching environment. As a result, the big data research platform can easily address our research requirements."

---- Tsinghua University's Institute for Interdisciplinary Information Sciences

Challenges

- Tsinghua University's Institute for Interdisciplinary Information Sciences wanted to build a world-class interdisciplinary information research center and talent-fostering base. The institute's Hadoop big data research platform required high computing and I/O performance of numerous servers.
- The institute has not been established long and has no professional equipment rooms. It is a big challenge to build a modern **Big Data** research platform in old buildings.

Solution

- To meet performance requirements of the research platform, Huawei provided RH2288 V2 servers. Each RH2288 V2 server supports the latest Intel processors, twelve 3 TB and two 1 TB hard disks, and Huawei's 10GE NICs to provide high computing performance, large storage capacity, and outstanding system I/O performance.
- To address the customer's difficulties in equipment room design, Huawei provided plans for reforming the distributed data center, weak and strong current, and fire extinguishing system.

Customer Benefits

- The **Hadoop Big Data** research platform built on RH2288 V2 servers has super performance.
- Huawei's solution enables distributed deployment in existing buildings, unified management, and simplified O&M, which helps slash construction and O&M costs by 40%.

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Guangzhou Education Cloud: Sharing of Education Resources Leads to the Balanced Development of Education

The Education Bureaus of Guangzhou are composed of Education Bureaus of 10 districts and two counties, but the education development in each district and county is imbalanced. The Education Bureau of Guangzhou plans to eliminate the digital divide of education within three years and realize the equalization of education between city and countryside in Guangzhou. Although the education of Guangzhou is top-ranked nationwide, several suburban districts and counties of Guangzhou such as Conghua, Zengcheng, and Baiyun District still fall behind in informatization, and the excellent experience of many schools of Guangzhou is difficult to be shared with schools that fall behind. More than 60,000 PCs are phased out by schools of districts and counties every year, causing a high purchasing cost.

Challenges

- The Education Bureaus of **Guangzhou** are composed of Education Bureaus of **10 districts** and **two counties**, but the education development in each district and county is imbalanced.
- The imbalance of education is eliminated, and special attention is paid to the high quality teaching resources.
- The utilization rate of the education resources is increased, and a waste of resources is reduced.

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- Equalization of education resources is realized through the **remote education** and **resources sharing.**
- Resource capability is allocated **dynamically** through the **elastic computing of cloud computing**, and then the utilization rate of resources is greatly increased.
- The **digital education content** and diversified access terminals allow the education resources to be visited at **any time** and **anywhere**.

Customer Benefits

- A cloud platform of education resources is built, and equalization of education resources is realized through the remote education and resources sharing.
- The **cloud computing** greatly increases the **utilization rate of resources**, and allows the education resources to be visited at **any time** and **anywhere**.
- IT system investment is reduced, and the life cycle of IT devices is extended.

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Laos national DC
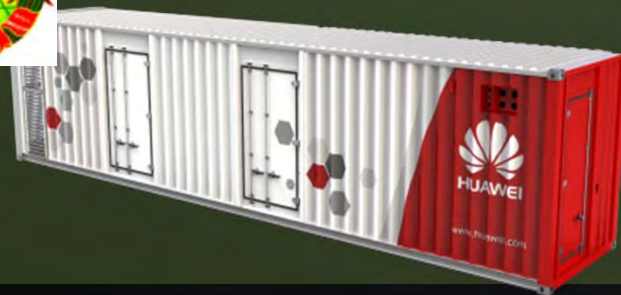
Challenges

A variety of government services and low resource utilization cause a serious waste of information resources and O&M investments.

The existing IT facilities lag behind the application development, which adversely affects the e-Government service level. An efficient DC is required urgently to optimize the ROI.

Solution

Provides end-to-end DC solutions from Layer 1 to Layer 4 and uses a container DC as the DR center.

- Cloud DC: develops an efficient, reliable, and energy-efficient cloud DC and unified management platform.

- Rich cloud services: provides various cloud services covering commerce, **Agriculture**, and finance for Laotian government, enterprises, and citizens.

- Equipment room facilities: uses the energy-efficient equipment room IDS2000\1000 to support flexible expansion and energy savings.

- Professional services: provides Huawei proprietary services such as technical trainings, service consultation, and optimization.

Customer benefits

•The government information and work process are open, achieving transparent government affairs.

•The information sharing and construction of department informatization improve the work efficiency of employees.

•The public can learn about the basic information about Laotian government easily.

•The public involvement is enhanced to allow more people to participate in the discussions on government affairs.

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THANK YOU

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