HA-AP APPLIANCE SUCCESS STORY

Smart City Cloud-Datacenter (China)

Guaranteeing Zero-downtime Continuity for Cloud-based IAAS Datacenter

KEY HIGHLIGHTS

Industry: City Government

The Challenge

- Support zero-downtime business continuity of a cloud-based IAAS datacenter, for the development of a smart city pilot site in China.
- Provide high-availability access and protection of storage pool residing on multiple storage systems; support 10 physical servers, up to 1000 cloud-based VMware virtual clients, and up to 3PB of data.

HA-AP Benefits

- Modular, clustered active-active mirroring engines, provide business-level HA solution for mission-critical applications, with dual read/write capabilities and performance.
- Continuous availability of mission-critical data for the entire city's smart applications.
- Affordable, high-availability, easy-to-manage business-level storage HA solution; which protects against interruption to business continuity caused by failures of FC fabric and storage systems.
- Simple and centralized administration.

HA-AP Versatility

- Multiple HA-AP engines can be clustered over Fibre Channel SAN to create local and/or remote mirroring protection.

The Customer

Our case subject is a prefectural-level city located in the East China Region; governing several city districts, counties, development and functional zones, and county-level cities; with size just over 3,000 square miles and a population of approximately 7.3 million. To protect its privacy, our customer has requested that we write this story under a pseudo name. We honor that request and from here on out, will simply refer to it as CSSC, short for Case Study Smart City.

CSSC is well placed by the Changjiang River and costal economic zones with easy access to its vast hinterlands via railway, highway, waterway; also to costal and international ports via seaway; which has enabled it to become a regional and national economic and trade center through centuries of evolution.

Background: Smart City Initiatives in China

Prefectural-level city. It is an administrative division of the People's Republic of China (PRC), ranking below a province and above a county in China's administrative structure. Prefectural-level cities form the second level of the administrative structure (alongside prefectures, leagues and autonomous prefectures).

A prefectural-level city is often not a "city" in the usual sense of the term (i.e., a large continuous urban settlement), but instead an administrative unit comprising, typically, a main central urban area (a city in the usual sense, usually with the same name as the prefectural-level city), and its much larger surrounding rural area containing many smaller cities, towns and villages. Prefectural-level cities nearly always contain multiple counties, county level cities, and other such sub-divisions. More often than not, they have become significant fixtures of the nation's social and economic landscapes.

Smart City. A smart city is an instrumented, interconnected, and intelligent city that uses smart computing technologies to make the critical infrastructure components and services of a city – which include administration, education, healthcare, public safety, real estate, utilities, and transportation – more intelligent, interconnected, and efficient.

Smart City Initiatives in China. China has attached great importance to building smart cities. Between January 2013 and April 2015, MOHURD (Ministry of Housing and Urban-Rural Development) selected a total of more than 300 pilot project sites in three batches; including prefectural-level cities, districts, counties and townships across the country; of which CSSC is among the second batch.

SUCCESS STORY
Guaranteeing Zero-downtime Continuity
for Cloud-based IAAS Datacenter

Challenge: Support Cloud-based IAAS Datacenter for a Smart City

A smart city is an urban development vision to integrate multiple Information and Communication Technology (ICT) and Internet of Things (IoT) solutions in a secure fashion to manage a city's assets – including but not limited to, local administration's information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services. These solutions allow city administrators to interact directly with the community and the city infrastructure; and to monitor what is happening in the city, how the city is evolving, and how to enable a better quality of life. As such, these solutions also share the following characteristics:

1. Automated data collection. Through the use of sensors integrated with real-time monitoring systems, data are collected efficiently from mobile devices deployed throughout the city.
2. Full data mining. Fully utilize technologies such as data mining, big data, machine learning, and knowledge management tools to turn collected data into meaningful information.
3. Information integration and sharing. Information is integrated and shared among all applications to reduce redundancy and improve efficiency.
4. Smart applications. To its citizens, government and enterprises, the information and knowledge gathered are keys to better quality of life.

The goal of building a smart city is to improve quality of life by using urban informatics and technologies to improve the efficiency of services and meet residents' needs. At the center of it all, is the cloud-based datacenter that delivers the essential Infrastructure as a Service (IAAS) to make everything operational, around the clock.

Figure 1. A Conceptual Smart City

The IAAS datacenter's design must be of high availability (HA), which must be addressed at all levels including application, host, network, and storage. A sound HA solution should deploy software-clustered hosts and virtual host technology, to ensure the availability of hosts and continuity of applications; as well as fully redundant FC switches to ensure the availability of network paths. In addition, the SAN storage must be enabled to deliver equivalent availability, so that an end-to-end redundancy from hosts through network to storage may be achieved.

SUCCESS STORY
Guaranteeing Zero-downtime Continuity
for Cloud-based IAAS Datacenter

Solution: HA-AP-enabled Active-Active Cloud IAAS Datacenter

The new CSSC IAAS datacenter will be a cloud-based computing and storage infrastructure that provides 24x7x365 computing power, data protection and storage resource availability services to the city's various smart applications. The ultimate goal of the IAAS datacenter is to facilitate streamlined and shared business practice, which requires data consolidation; while data consolidation in turn requires streamlined joint operations of storage, computing, and network resources.

Figure 2. HA-AP Appliance Dual-engine Cluster

This requirement raises the bar for storage availability considerably. Fortunately, the project team finds that a HA-AP-enabled, fully redundant, dual active-active storage solution fits the bill perfectly. It protects against any single-point logical or physical failure, handles instantaneous failover and failback automatically without human intervention, and meets high business continuity requirements.

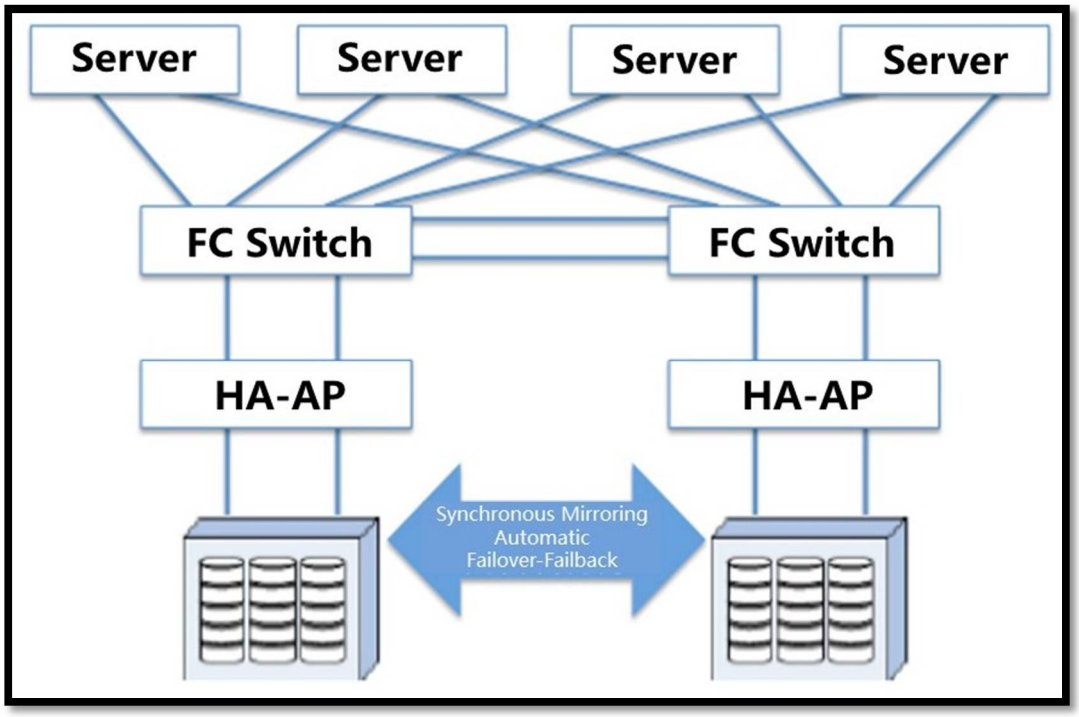

Figure 3. HA-AP-enabled Active-Active IAAS Datacenter Logical Diagram

Specifically, the HA-AP Appliance solution offers the following technical advantages over other comparable solutions:

1. Enables active-active-mirror of two, or all-active-mirror of multiple storage systems, which eliminates system downtime caused by a single-point-failure of any storage system; provides enterprise-grade data availability and business continuity protection with instantaneous automatic failover and failback upon hardware failure, while no interruption to the applications or human intervention is required. The solution meets true RPO=0 and RTO=0 requirements.
2. Supports and manages heterogeneous storage systems of different brands and models.
3. Requires no agent or driver software on the servers, additional servers can be added by simple configuration update, which makes the solution a lot more open and desirable for future system expansion.
4. Supports all mainstream applications and operating systems, including Windows, Linux, UNIX system platforms; also server virtualization solutions such as VMware, CITRIX, HYPER-V, and KVM.

With that selection, all pieces of the ISSA puzzle are finally in their right places. The complete system structural design includes the following major components:

1. Storage pool of up to 3PB total capacity at the back-end.
2. Four FC switches connect with the storage pool to provide the backbones of the HA SAN.
3. Database and various smart applications on the front-end.
4. Two database servers and eight cloud-computing servers, capable of configuring and supporting up to 1000 virtual clients.
5. A clustered 4-engine Loxoll HA-AP Appliance connecting the front and back ends, with guaranteed independent redundant data paths from any server to the storage pool; which protects against any single-point logical or physical failure, handles instantaneous failover and failback automatically without human intervention.

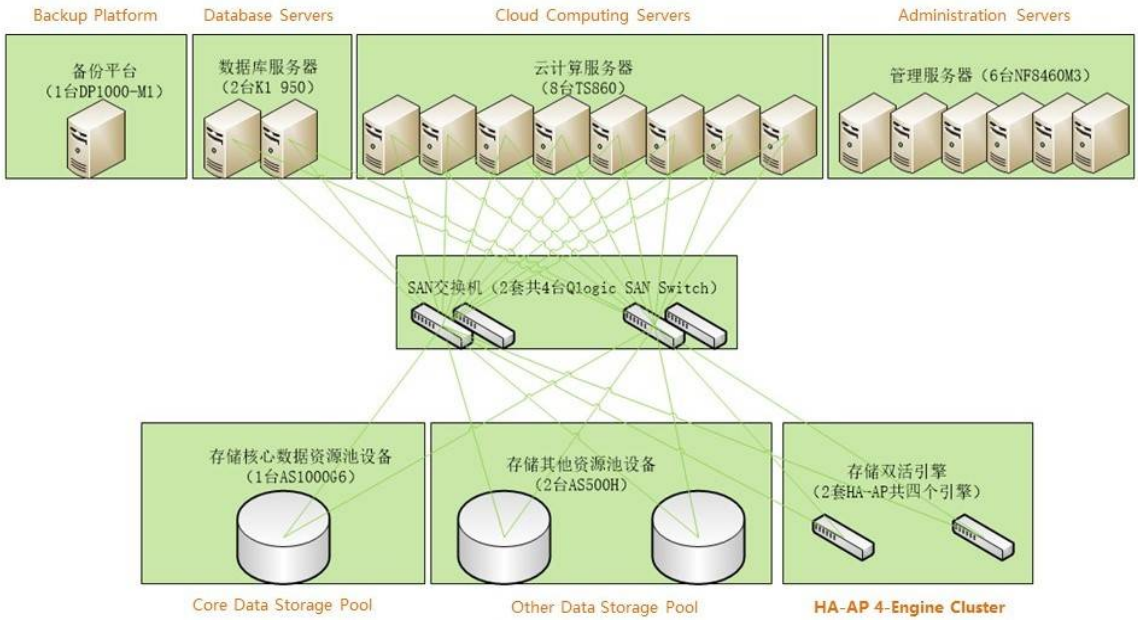

Figure 4. CSSC Cloud-based IAAS Datacenter Topology Diagram

Loxoll Inc.
Loxoll Inc. is a privately held company in California, USA. Loxoll specializes in the delivery of affordable high availability storage solutions on SAN. www.loxoll.com. Rev. 1.0, 112316. All rights reserved. Content is subject to change without notice.