**Case Study**  
**Medical Center and Teaching Hospital in Asia**

“Embracing cloud computing has always been an ingrained part of our long-term strategy. What we have been trying to identify is an integrated solution that leverages open-source software and commodity hardware as much as possible to consolidate our daily operations in a cost-effective private cloud. We would also like to use the same platform as a reference architecture to support the customers of our IT products such that our in-house solutions can be readily ported to the client sites with little or no unnecessary tuning or modification. ProphetStor Federator more than met our criteria.”

— Director, Medical Center and Teaching Hospital in Asia

**IT Services Department at Medical Center**  
The medical center has developed many custom solutions for health-care-related applications used by third party health organizations. The IT Services department is in charge of managing over 100 applications on 100 different physical servers for its customers. The software-only approach presents many customer support and professional services issues.

Federator SDS provisions and monitors storage across disparate storage systems as well as standardized commodity hardware. Multiple pools of physical storage with different capabilities (capacity, performance, durability) are abstracted into virtual storage pools to work together in a coordinated manner for data storage, access, migration, protection, and management.

**Background**  
The Medical Center and Teaching Hospital in Asia provides safe and high-quality medical services with advanced facilities, diversified training curricula, and outstanding research and development programs. The center has 1,500 beds and has the capacity to provide care for up to 6,000 outpatients, 130 inpatients, and 180 emergency-room patients. Custom healthcare-related applications for customers is a natural extension to the hospital’s mission.

**Challenges**  
Healthcare reform has forced healthcare providers to reevaluate their operational efficiency and cost structure in order to stay competitive and in operation. Many hospitals are looking to consolidate their IT infrastructure using the cloud. However, adoption of cloud technology on a massive scale has been cautiously slow, given the number of mission-critical workloads that cannot afford to go offline even for a few hours.

Managing over 100 applications on 100 different physical servers has been a major resource drain for the IT Services Department at Medical Center. Creating a private cloud to consolidate current workloads offers a sound solution on paper, but the actual implementation of such a massive migration poses an even bigger challenge, especially since most of the existing workloads are running on legacy EMC and IBM storage arrays. In addition, building and managing a private cloud from scratch requires a different skill set, and the cost involved in hardware and software acquisition conflicts with the hospital’s shrinking budget.

A full featured yet cost efficient solution is the catalyst needed to initiate the transition to cloud for healthcare providers.

**Industry**  
Healthcare, IT Services

**Company Profile**  
The medical institution has developed many custom solutions for healthcare-related applications and has been marketing these solutions to third parties. One of the main issues caused by this software-only approach is that it has inflicted an enormous amount of customer support and professional service burdens for the IT department. It is clear that a converged hardware/software package is a preferred embodiment for their future MIS export business.

**IT Environment**  
- Microsoft Windows
- IBM AIX
- AIC Smart Rack
- OpenStack Horizon and Nova Servers
- OpenStack Cinder and Neutron Servers
- ProphetStor Federator SDS Deployment and Controller Servers
- ProphetStor Federator SDS Flexvisor Storage Servers
- 7TB of data

**Challenges**  
- Managing over 100 applications on 100 different physical servers produces a major resource drain for the IT department
- Existing workloads running on legacy EMC and IBM storage arrays
- Customer-facing applications cannot afford a downtime for even a few hours
- Building and managing a private cloud from scratch requires a different skill set
- Cost involved in hardware and software procurement does not fit with the medical institution’s shrinking budget

**ProphetStor Solutions**  
- ProphetStor Federator SDS
- Out-of-band storage management system
- A suite of rich data services

**Benefits**  
- Turnkey solution creates a complete cloud environment in a rack
- Automated, integrated system using commodity hardware over PXE
- Self-service provisioning for both virtual machines and storage through GUI dashboards
- Autonomous storage orchestration supporting both legacy and commodity storage systems
- Cost efficient in the following areas:  
  - Initial hardware and software acquisition
  - Deployment
  - Management and maintenance
ProphetStor Solution

ProphetStor Federator SDS provides the IT department with centralized control of their various storage systems, with automated discovery, abstraction and delivery for OpenStack and cloud computing. This solution architecture reinforces Cinder, the block storage service of OpenStack, and enriches it with advanced storage management and a host of sophisticated data services.

With the separation of control and data paths, Federator SDS makes it possible to manage storage resources from different vendors with a single pane of glass, and classify and abstract them into virtual pools that can be provisioned automatically. This provides the ability to manage legacy storage systems and add commodity storage with enterprise-grade features and performance while keeping spending in line within the hospital’s budget.

Packaged as a “cloud in a rack” solution, Federator SDS offers healthcare organizations a complete package of software-defined datacenter in a very cost-effective solution.

Benefits

ProphetStor Federator SDS allows the IT department to manage its storage infrastructure programmatically through a single opensource REST API. Federator SDS also provides all the necessary tools to enable seamless data migration from legacy storage systems to a new software-defined cloud environment.

Federator provides a turnkey solution to create a complete cloud environment in a rack, utilizing OpenStack over commodity hardware. It enables self-service provisioning for both virtual machines and storage through GUI dashboards, with autonomous storage orchestration.

This architecture allows the IT organization to first create a proof-of-concept sandbox and move less mission-critical applications over to the cloud first. As the confidence level increases in the cloud, racks can be added to accommodate more applications and workloads, which can be migrated to the cloud with minimum impact on the production servers.

Deployment Details

ProphetStor Federator SDS consists of storage orchestration and storage hypervisor core components. The orchestration functions allow different storage to offer storage services based on performance service-level, along with other storage service offerings.

ProphetStor Storage Cloud Builder (“Builder”) is a custom distribution of the OpenStack deployment tool FUEL, developed by Mirantis. As long as the physical server’s BIOS and NIC support the Pre-Boot Execution Environment (PXE), Builder is able to deploy either Federator SDS controller, Flexvisor storage hypervisor, and all essential OpenStack components on any Intel-powered bare metal servers.

The hardware portion of this solution is built on the AIC Smart Rack architecture, a rack solution inspired by the Open Compute Project (OCP) standard. Designed for low CAPEX and OPEX, AIC Smart Rack addresses a multitude of datacenter-specific issues including simplicity, energy and cooling efficiency, high density, serviceability, scalability, and manageability.

Individual servers (mount architectures) were selected from the following AIC rack, depending on the workload:

- **Compute Intensive:** 1U dual-node package powered by Intel E5 2600 V2 or V3 family processors. Each node is redundant and hot swappable for easy serviceability.
- **Storage Intensive:** 1U single-node package powered by Intel E5 2600 V2 or V3 family processors. The patented tool-less design provides an easy access to all eight (8) 3.5” hot-swappable drive bays.

Future Plans

The IT Services Department at Medical Center will continue to leverage ProphetStor’s healthcare cloud-in-a-rack to offer other healthcare providers a modular solution to introduce cloud computing into their existing legacy IT environment. As future needs grow, compute and storage resources can be scaled independently using different rack configurations.