

## **BUSINESS CONTINUITY OF INFORMATION TECHNOLOGY SERVICES ACROSS THE ENTERPRISE UTILIZING ACTIVE-ACTIVE DATA CENTER'S**

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## **Abstract**

The College of Saint Benedict (CSB) and Saint John's University (SJU) depend on information technology resources more than ever before. Both organizations need sound practices for managing risk, securing data, and delivering the IT availability that our business units require to achieve their strategic and operational goals.

The original Data Center supporting both CSB and SJU is 28 years old and resides on the SJU campus. A few but significant outages have negatively impacted computing services across CSB and SJU campuses and affected both administrative and academic operations.

Business Continuity planning across our administrative and academic departments rely on 'business-critical' technology services and applications to be available and restored quickly in the event of a serious incident or disaster. Regrettably, IT Services Disaster Recovery (DR) plan had a significant weakness in that we relied on a single Data Center to provide all computing services. In addition, we lacked a formal DR site and therefore had not fully tested recovery of critical services or applications.

To meet the goals and objectives of our corporate Business Continuity Plan (BCP), a project was approved in 2011 to build a second IT Data Center on the College of Saint Benedict campus capable of housing the entire CSB/SJU IT Data Center operations. The CSB Data Center would be one of two active Data Centers and would house approximately 50% of IT operations. The Active-Active Data Center model supports IT Services strategic goals for Business Continuity, High Availability, Disaster Tolerance, Disaster Protection, Disaster Recovery and Security of its technology operations.

## **Introduction of the Organization**

The College of Saint Benedict (CSB), for women, and Saint John's University (SJU), for men, are nationally recognized Catholic liberal arts colleges and ranked as two of the top three Catholic colleges in the nation. They share one academic program, and students attend classes together on both campuses. This integrated learning experience combines a challenging academic program with extensive opportunities for international study, leadership, service learning, spiritual growth and cultural and athletic involvement. The combined enrollment of more than 3,800 students makes CSB and SJU the largest of the nation's liberal arts colleges.

Yet, CSB and SJU are two colleges. Each college retains its own campus, residence halls, athletic programs and traditions. CSB/SJU are committed to the development of the whole person, meeting the unique needs of both women and men in single-gender and co-educational experiences.

CSB and SJU are located six miles apart in central Minnesota, surrounded by 3,200 acres of pristine forests, prairies and lakes. The colleges are minutes away from the St. Cloud metropolitan area, with a population of more than 100,000, while Minneapolis and St. Paul are 70 miles southeast on Interstate 94.

## **Statement (Restatement) of the Problem/Initiative**

Information Technology Services is at the core of our Institutional Business Continuity Plan. To meet those operational goals and objectives, IT Services needed to update our departmental Business Continuity Plan. Foundationally, this meant that IT Services needed a solid Business Continuity Plan with embedded Disaster Recovery Services that would become part of the core services that we provide to our constituents.

Our Initiative: “Build a second Data Center on the CSB campus to provide Business Continuity of Information Technology Services across the Enterprise.”

According to Wikipedia, “**Business Continuity** encompasses a loosely-defined set of planning, preparatory and related activities which are intended to ensure that an organization's critical business functions will either continue to operate despite serious incidents or disasters that might otherwise have interrupted them, or will be recovered to an operational state within a reasonably short period.”

Within IT Services, Business Continuity Planning includes four key elements:

- 1) **High Availability** solutions help us develop and maintain reliable and flexible IT environments.
- 2) **Disaster Tolerant** solutions help protect IT operations and data by delivering data replication, failover, and storage capabilities between geographically dispersed sites.
- 3) **Disaster Protection and Recovery** solutions provide an integrated approach to cost-effectively protect data and recover from a service interruption.

4) **Security** solutions help protect data and applications, while reducing the amount of system downtime caused by malicious attacks, viruses or other security breaches.

CSB and SJU had an ideal opportunity with the two campuses located six miles apart to create an Active-Active Data Center design which is based upon 'business-critical services and applications' that would meet Business Continuity objectives.

## Design

The College of Saint Benedict Data Center design is part of an Active-Active design where both CSB and SJU Data Centers are 'active' and are 'sharing' IT workloads. This design is contrary to an Active-Passive design where there is one 'active' Data Center running the entire workload and a traditional DR site with some infrastructure and equipment to 'recover' specific business critical applications from an incident. An essential part of Business Continuity Planning includes defining your Recovery Time Objective (RTO – “time to recover from an outage”) and Recovery Point Objective (RPO – “point in time to recover to”). In general, RTO and RPO are inversely related to costs, meaning the lower the RTO/RPO, the higher the cost to meet those objectives. A low RTO/RPO was our goal, but we also had a limited budget relative to the size of our institutions. The Active-Active design enabled us to build a smaller Tier 3 Data Center with all of the advantages of a significantly more costly Tier 4 Data Center. Logically combined, the CSB and SJU Data Center’s function as a Tier 4 Data Center and support our RTO/RPO at a low Total Cost of Ownership (TCO).

The Data Center facility design consisted of renovating part of the existing Clemens Library at CSB. The facility includes: the Data Center (DC), the Network Operations Center (NOC), and office space for staff. Some of the key benefits of the CSB Clemens Library site included:

- 1) The building existed and the space was mostly a storage area and required little renovation saving us significant costs and time to build.
- 2) Its location is next to the loading dock for easy delivery of computer equipment.
- 3) There was ample space on the roof to place the natural gas generator and A/C units.

**About the Data Center:** The CSB Data Center room design included implementing APC's industry leading modular and scalable "Infrastruxure for DataCenters" System. The Infrastruxure system includes racks, power, cooling, and management software configured with a N+1 redundancy and designed in a two row hot isle containment configuration. Some of the key benefits of the APC system include:

- 1) integrated power, cooling and environmental management in a rack-optimized design;
- 2) modular and scalable components to meet current and future growth requirements;
- 3) and high availability & efficiency with a low Total Cost of Ownership (TCO).

**About the NOC:** The CSB Network Operations Center (NOC) was designed as a collaborative facility where IT Services staff can work together to manage their resources. It includes:

- 1) video conferencing system by Polycom;
- 2) video wall consisting of three 80" Sharp wall-mounted LED monitors that are controlled by a Crestron digital media switcher;
- 3) and a dedicated PC to run our monitoring applications.

With conference table and chairs for twelve staff, the NOC is utilized for both pro-active monitoring of IT infrastructure and re-active response to service outages. The NOC has also been designated as one of CSB's Emergency Response sites where the President and the Emergency Response Management Team could meet in the event of a campus emergency.

## Implementation

The project kickoff meeting was on July 5<sup>th</sup>, 2012 with the completion and move-in date set for November 23, 2012. In a short twenty-week time period, we were able to design, build and move 50% of IT Operations into the new CSB Data Center.

Renovation of the Clemens Library space included a 500 sq. ft. Data Center, 400 sq. ft. Network Operations Center and four 100 sq. ft. staff offices. Construction of the space utilized standard sheetrock wall construction, drop-tiled ceilings, carpet on cement slab floor for staffing areas, and anti-static tile on cement slab floor in the Data Center (i.e., no raised floor in Data Center).

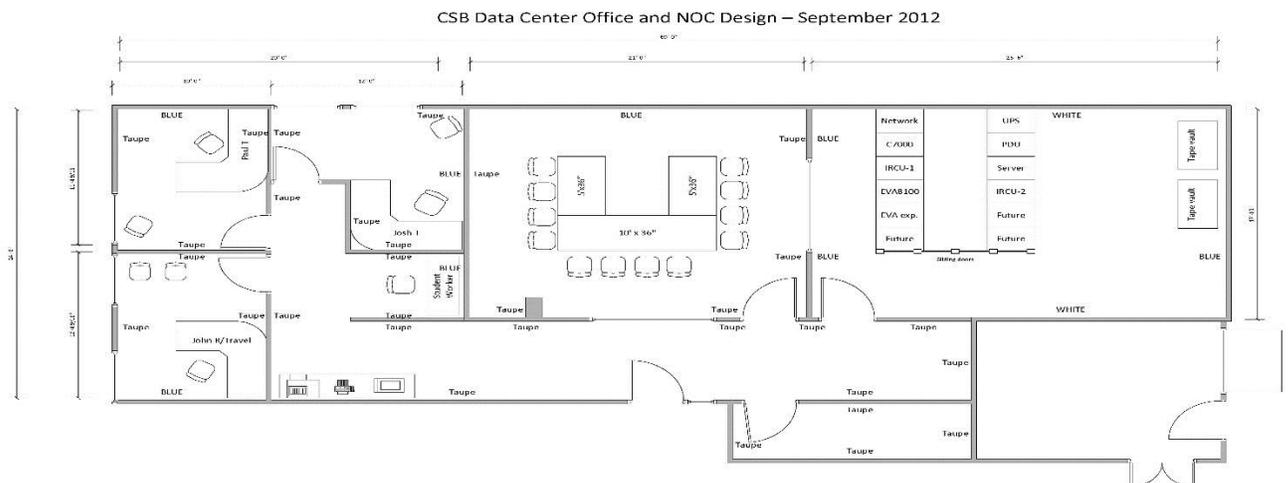


Figure 1.

In conjunction with the Data Center being built, the IT staff was preparing to move 50% of our operations by physically dividing the SJU Data Center into two rows, one row representing each Data Center. The SJU Data Center was divided as follows:

- 1) The core physical network was upgraded utilizing HP's Intelligent Resilient Framework switches into two racks so that one would be relocated to CSB and one would stay at SJU (Figure 2).
- 2) Four HP C7000 Blade Servers Systems were divided into two racks so that two C7000's would be relocated to CSB and two would stay at SJU (Figure 2).

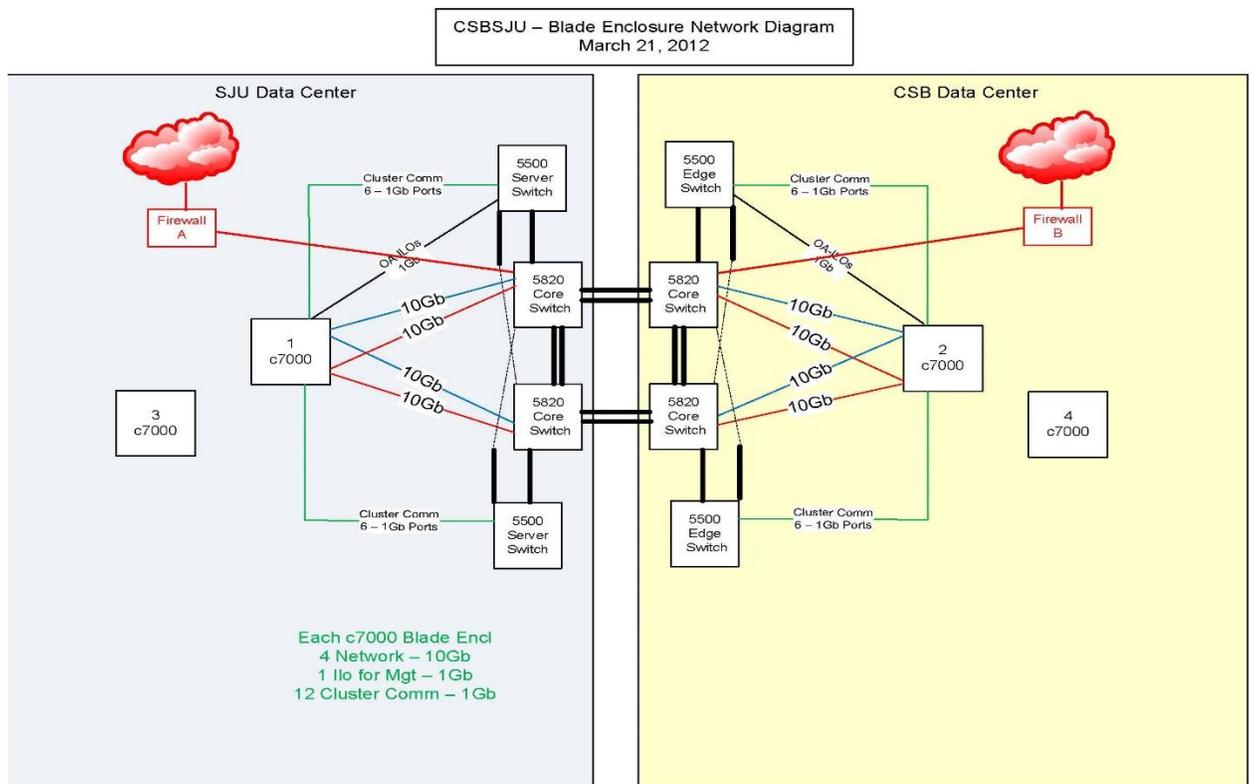


Figure 2.

3) Four Storage SANs were divided into four racks so that two SANs would be relocated to CSB and two would stay at SJU (Figure 3).

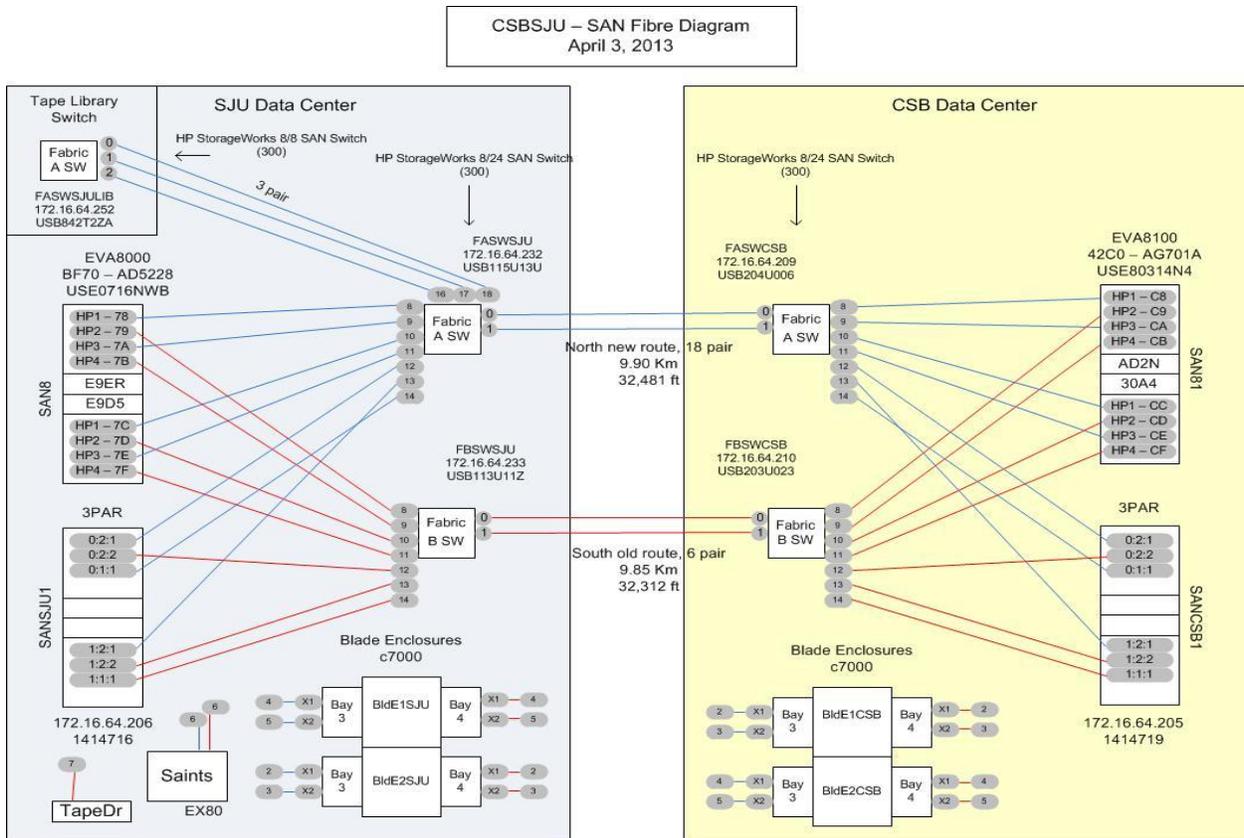


Figure 3.

In addition to dividing the physical infrastructure, we needed to determine which services and applications would run at each Data Center. To assist in that process, we defined three business critical levels that each service and application would be assigned to:

- 1) Level 1 - applications run at both Data Centers with syncing of systems and data at each Data Center;
- 2) Level 2 - applications run at one of the Data Centers with some replication to the other Data Center for disaster recovery purposes;

3) Level 3 – applications run only at one of the Data Centers;

Once services and applications were assigned a level, we were able to define the appropriate High Availability and Disaster Recovery technologies that would be implemented across Data Centers.

## Benefits

The completion of the CSB Data Center provides a fully redundant Data Center that currently runs 50% of IT operations. It is capable of housing the entire CSB/SJU IT Services operations in case of a disaster at the SJU Data Center. Benefits achieved:

- ✓ We have met our Service Level Agreements (SLAs) with respect to our institutions Business Continuity goals and objectives.
- ✓ We are able to operate and manage the two active Data Center's with zero additional staff.
- ✓ We were able to implement highly available services and applications utilizing our current capital budget for network, servers, and storage infrastructure.
- ✓ We have eliminated the need to lease a traditional Disaster Recovery site that is expensive and limited in scope.
- ✓ We have an innovative, flexible Data Center infrastructure able to respond to the ever changing business and technology requirements of higher education.

Listed below are some of the Level 1 business-critical services and applications that are running at both CSB and SJU Data Centers:

### 1) Services

- a. Internet service has two distinct loops, one to the CSB Data Center and one to the SJU Data Center.
- b. Active Directory LDAP service provides user authentication to our network and runs on multiple servers.

- c. Domain Name System service that provides for identification of services and runs on multiple servers.
- d. VMware virtualized servers in a stretched cluster running on multiple servers (Figure 4).

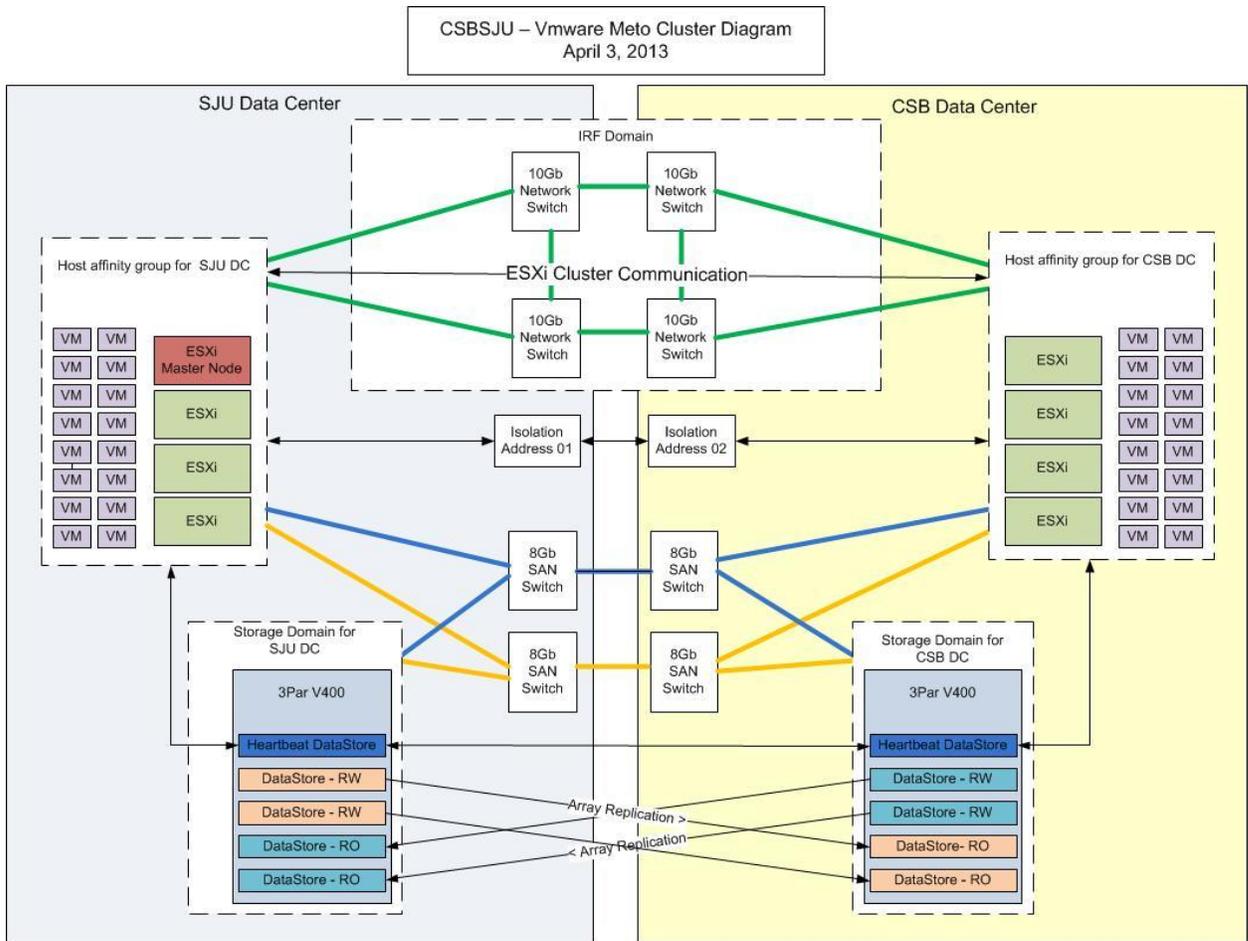


Figure 4.

## 2) Applications

- a. Banner ERP application utilizes Oracle DataGuard for Server and Database replication.
- b. SQL Database application utilizes Windows Server clustering and SAN replication of 100+ SQL application databases.

- c. Student, Faculty, Staff and Departmental File Shares utilizes Windows Server clustering with SAN replication.
- d. www.csbsju.edu website is replicated across Data Centers.
- e. Exchange Email application utilizes Windows Server clustering and MS Exchange application log shipping for server and database replication (Figure 5).

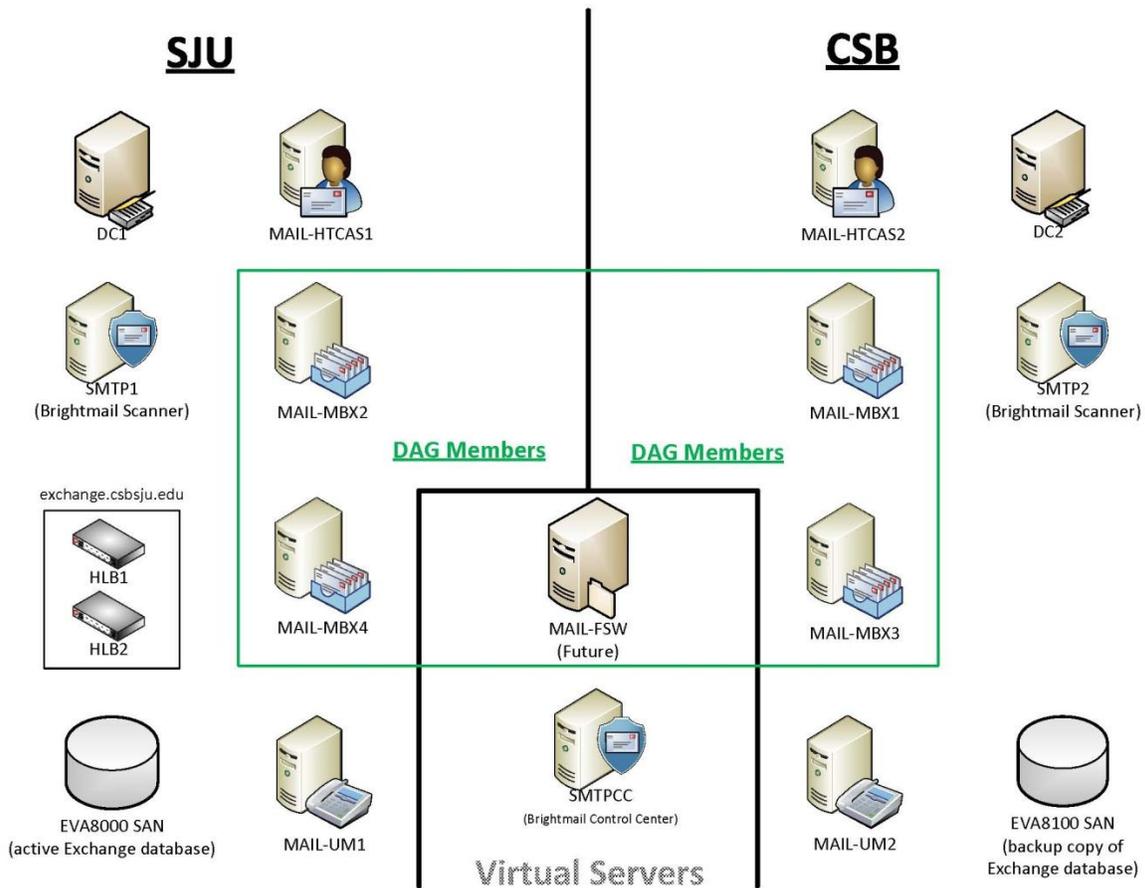


Figure 5.

## **Retrospect**

Business Continuity is all about ensuring that an organization's critical business functions can continue to operate. This project has met 100% of our goals and objectives with respect to Business Continuity. To date, both CSB and SJU Data Centers have maintained 100% uptime with our business-critical services and applications available across both CSB and SJU Data Centers.

Interesting to note, on January 14, 2014 a fire quickly engulfed a 100 year-old building on SJU campus. The SJU Paint Shop building was located just one block away from the SJU Data Center—and ironically less than a block from our fire station.

Sound Business Continuity Planning across the enterprise that is tightly integrated with IT Services can provide an institution with the assurance that services and applications will continue to operate or can quickly be restored in the event of a disaster.