**EMC BUSINESS RECOVERY SOLUTION FOR MEDITECH**

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**Executive Summary**

MEDITECHis a healthcare information technology company that provides electronic health record solutions for healthcare providers. Dell EMC is a professional product and service provider that enables disaster recovery and backup solutions to businesses, including MEDITECH. The proposed solution for MEDITECH is an efficient information infrastructure for backup and disaster recovery. EMC’s solution for MEDITECH includes different components such as Networker Module, RecoverPoint, VMAXe, FAST VP, DD Boost, VMware, and Cisco UCS.

        The components reduce the size of datasets to allow more space for backups, provide both virtual and physical storage, and are all implemented that create an easy deployment process in non-traditional data center environments. The solution is designed with a hospital environment in mind: the MEDITECH applications function normally during a full backup. These components work together to provide backup and disaster recovery that meets MEDITECHS requirements, including the backup time.

**Introduction**

The HITECH Act was established in 2009 and implemented in 2011 as a piece of legislation to stimulate the adoption of electronic health records (EHR) (Rouse). The HITECH Act began offering incentive payments in 2011 for companies to demonstrate meaningful use of electronic health records. By the year 2015, they began implementing financial penalties for every eligible professional. The goal was to get healthcare providers to transfer to electronic records. This made the market for EHR systems increase very quickly in a short period of time.

MEDITECH provides EHR solutions for hospitals and health systems, physician practices, and post-acute services. Their goal is to help healthcare providers do more for their patients by utilizing technology. Their customer base has grown in the last six years, since the passing of the HITECH Act. MEDITECH needed to implement a reliable back and recovery process. In the event of any error that causes information loss, it is important for a company to have backups of their information. In the case of MEDITECH, it is especially important because of the type of information EHRs include. EHR’s include basic patient information like name, age and height. However, they also contain information about the patient’s medical history, illnesses, surgeries, etc.. This information is especially important in emergency situations, requiring all EHR providers to have a backup plan in place in the case of information loss.

EMC Business Recovery Solution is a Dell service that provides disaster recovery and backup solutions to businesses. This service allows for companies like MEDITECH to ensure their information is backed up and a plan is in place in the case of information loss.

**Case Background**

Business continuity plans in the US healthcare environment have become mandatory according to the The Health Insurance Portability and Accountability Act in 1996. The regulation was implemented to reduce healthcare costs by standardizing data processing, and most importantly, securing data and improving business continuity standards. MEDITECH plays a large role in the healthcare industry by providing support applications such as patient care and payrolls in hospitals. It is extremely important that a recovery plan is well organized in the healthcare environment to avoid delays that could affect the lives of patients.

As the implementation of EHR is growing more and more in the healthcare industry, MEDITECH has implemented the EMC solution to enhance their products and services. For instance, the data volume is increasing exponentially which result in faster backup and recovery. Therefore, MEDITECH needs to come up with solutions to improve their business recovery capabilities. Dell EMC, a professional product and service provider for technology solutions, has been chosen as a candidate for a new system implementation. The objective is to increase the backup and recovery speed and reduce business risk and IT cost. These requirements must also fall within the compliance of the various regulations in the medical industry. The solution also needs to include flexibility and scalability as their main feature so that the clients can easily implement and expand the system as required.

**Evaluation of Solution Chosen**

EMC’s solution for MEDITECH includes different components that optimize the backup and recovery process through additional hardwares and configuration. The components introduced are NetWorker Module, RecoverPoint, VMAXe, FAST VP, DD Boost, VMware, and Cisco UCS. EMC NetWorker comes with many application module. The module for MEDITECH helps to integrate with existing disaster recovery capabilities for higher-performance backup and data replication both local and remote. With the increasing amount of data that needs to be backed up by MEDITECH’s clients, the NetWorker functions to enhance the backup process by deduplication. This helps to reduce the size of datasets and allows space for backups to retain on-site for faster restoration. In addition, the replications off-site could be achieved efficiently over the existing network for disaster recovery. This is an optimal solution for MEDITECH because it allows for integration with existing ISR, compression of data for backup, and replication without the interruption of the application which is critical for hospital use.

MEDITECH requires storage that can handle large volumes of data generated by a broad range of healthcare organizations. EMC VMAXe storage platform is an adequate solution to remedy the storage issue because it provides virtual storage capabilities and both flash and regular drives for optimal performance. VMAXe allows for virtualized cloud storage which provides the clients with accessibility and efficient utilization of the resources. In addition, the storage platform is designed for organizations with limited storage expertise and IT resources which makes it easier for implementation. With trusted data security and the multi-tenancy feature of the platform, the specifications meet the solution requirement. They also help to optimize system performance and reduce storage cost. One flaw in usage of this solution component is the price. IBM XIV is an alternative storage platform that includes all aspects of the VMAXe except the overall cost is significantly lower.

One of the aspects that MEDITECH highlighted is the simplicity of the new solution that would allow deployment process easier in non-traditional data center environments. Cisco’s Unified Computing System helps to simplify the multiple devices that need to be configured. The unification of the devices are beneficial as it gives the ability to manage everything through a single graphical interface which increases business agility. Although there are other alternatives that could replace the Cisco’s UCS, it is still the best solution when it comes integration of multiple devices. For instance, HP’s BladeSystem Matrix is an alternative to the Cisco’s UCS but it is more costly and the systems management software only supports HP hardware and software which is not adequate for the EMC’s solution where different providers are integrated together.

**Evaluation of Solution Implementation**

With regards to the solution architecture, various components like the EMC VMAXe, Recoverpoint cluster, Cisco UCS server, Networker server, and EMC VNX5700 all make use of a fiber channel storage area network. Cisco 8GB directors handled the traffic between these Fiber channel attached devices. Additionally, contained within the solution are certain components that make use of high speed Ethernet uplinks. This includes the Cisco UCS server, the networker server, and the two separate RecoverPoint clusters. In terms of the big-picture solution architecture, fiber channel over ethernet is used anytime an FC SAN attached device needs to communicate with an ethernet attached device (for instance any communication between the EMC VNX5700 and UCS server would require a fiber channel frame being wrapped inside an ethernet packet).

        An important note about the RecoverPoint clusters is that there is a total of 14 appliances built into two separate node clusters (7 appliances in each) and these two separate clusters communicate with each other over a wide area network. These separate nodes are also zoned as a means of consolidating resources. They are both zoned separately to a UCS to handle all compute needs and node 1 is zoned to the EMC VMAX3 for storage while node 2 is zoned to a VNX 5700. The RecoverPoint clusters are versatile pieces of machinery, they offer reliable replication of data over virtually any distance, are scalable depending on storage needs, and have both ethernet and fiber channel physical ports.

        While the EMC networker server may look small within the solution architecture diagram (Figure 1), its role in this solution is major. It functions as a backup server and storage node, which means when administrators schedule backups and create replicas, there is no performance impact or interruption on the application. Simply put, this is because the application is running on the Meditech server while the backup and replica creation is happening on the EMC networker server. In the medical industry, there is no room for degraded performance on applications, especially if performance is being degraded due to backup and disaster recovery reasons. Perhaps the most crucial of the components in this solution, the EMC Networker server is essentially the brain of all the backup and recovery operations, allowing for seamless disaster recovery without requiring the use of resources from any component that could degrade application performance.

An idea our group had to improve the configuration of this overall solution is to leverage more of the fiber channel backbone by placing the two RecoverPoint clusters on the same FC SAN. If you examine Figure 1, you’ll notice that the two clusters are on two physically separate sites both connected via a wide area network. While placing the two clusters on the same FC SAN would require beefing up the SAN to handle the additional traffic (adding additional lines and directors as well as bringing the VNX5700 over the FC SAN to support the second RecoverPoint cluster), this could seriously reduce operating costs by having both clusters on the same site. This holds especially true when considering the costs of operating a separate site like cooling, electricity, the cost of a high speed ethernet line, and maintenance. While the case study does not mention why this type of solution configuration was not perused, one can certainly make a strong case for it when considering cost model analysis and the financial benefit this would bring to a company.

**Evaluation of Results**

Once all the components were in place and configured, the EMC solution team conducted tests based off of MEDITECH’s proprietary certification suite and MEDITECH audited all of the tests. The EMC solution delivered on all fronts, as all tests were well within the requirements put forth by MEDITECH, especially in terms of backup times. The test showed that the 20TB of data that needed to be backed up were easily done within the SLA specified time of less than four hours. However, when one examines table 5 and table 6 of the case study, you can see that the remote VMAXe backup took much longer than the local one which begs the question why not just have two onsite backup devices as a means to improve backup times?

        A point that is iterated more than once throughout this case study is that when you’re dealing with the hospital production IT environment, you really can’t afford to have any performance degradation or downtime during the backup window. Perhaps what this solution does best (in addition to the more than reasonable backup times) is allow the MEDITECH application(s) to function completely normally even during a full backup. According to a report done by Accenture in 2015, one of the trends it found about the Medical IT field is that of data importance. “The third trend is around data, what's billed in the report as the "intelligent enterprise" – essentially a "data explosion" that will lead to tremendous clinical outcomes opportunities” (McCann). Essentially, data is becoming increasingly important for the medical industry to perform critical functions and its growing faster than ever. Both the data domain and Recoverpoint clusters within this solution offer a good deal of scalability and the use of a fiber channel backbone along with 10 Gigabit ethernet lines allow for the rapid availability of this data, as you can see by the peak backup rate of 2.88GB per second under table 5.

**Suggestions for Improvements / Other Solutions**

First, as mentioned previously in the report, the team believes that the EMC solution for MEDITECH could be improved if they were to implement more fiber channel configurations. As the system currently stands, each of the two clusters that are connected to their respective SAN are simply connected over a network. While there is nothing necessarily wrong with configuring a system in that manner, making use of a fiber channel SAN could noticeably increase performance of the system. When dealing with medical systems that contain critical information of patients, performance is of the utmost importance. Seconds can be the difference in the outcome of a patient’s situation. The use of FC SAN would make it so that system operations such as disaster recovery are faster than they were before, which benefits patients, who are the most important part of any medical facility. FC SAN could also lower costs, which no organization will ever turn down.

While this solutions was state of the art when it was introduced in October of 2011, it has fallen behind the times of current technology standards, being almost six years old. There are multiple aspects of their system that should be updated if this system were to be implemented today. The Cisco UCS Blade server that was used in the 2011 system used 196 GB of RAM, two Intel Xeon processors, and two 10 GB ethernet ports. Today, the lowest their Cisco UCS Blade server can support up to 1.5 TB of RAM, two upgraded Intel Xeon multicore processors, and 40 GB of ethernet bandwidth. The increase in performance is overwhelming, and a no-brainer for medical facilities that want to implement a similar MEDITECH and EMC system today. Other performance upgrades in the system could be seen in the updated software versions for MEDITECH, VMWare, and VMAXe.

Finally, when looking around the market for similar systems to compare to MEDITECH and EMC, a solution that exists is provided by Commvault, a company that specializes in data protection and backup infrastructure. They offer backup solutions for a wide array of systems, not simply MEDITECH. The solution operates by integrating itself with Windows file systems, and allows Commvault software to take instant snapshots of all the databases that MEDITECH uses to operate. The snapshots allow for easy and instant backups of the data system, and this type of snapshot function could work well in the EMC and MEDITECH solution. Once again, performance is everything for these types of systems with critical information, and snapshots would help make the system performance better.

**Summary**

MEDITECH is a widely used software across the medical industry for managing all facets of databases and EMRs for medical facilities and hospitals. Since these medical systems contain high value information, it is crucial that medical facilities have proper backup and disaster recovery systems to ensure data availability. EMC has crafted a complex hardware and software solution that will fit the needs of any MEDITECH client. The use of VMAXe, Recerpoint, Cisco servers, VMWare, and more all come together to create a system that meets most crucial performance requirements crucial performance requirements. The system does a great job of backing of large amounts of data, and only suffers issues when attempting to back up VMAXe remotely. However, the team has concluded that this issue within the system could be fixed by utilizing FC SAN technology.

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