24x7x365 Business Continuity of OpenEMR in Cloud

ViSolve High Availablity & Disaster Recovery Solutions

A Case Study

ESSENTIALS

Customer Profile

Industry: Healthcare
Customer Type: Medical Practice
Practice Size: 10 Physician Practice

Business Challenges

Improve availability of OpenEMR in Cloud and seamless access of clinical data to enable improved patient outcomes, reduce downtime costs and recovery time of critical clinical applications during disasters

Solution

High Availablity and Disaster Recovery Strategy implemented using open source technology:

- Heartbeat
- MySQL replication
- rsync

Results

- 24x7x365 access to patient data through increased availability of OpenEMR in Cloud
- Reduced recovery time of critical medical applications from days to seconds during disaster
- Eliminated $25,000 worth downtime costs caused by hardware/software failure

Business Challenge:

Silvercreek Medical Practice encountered a server crash that left its physicians and staff without access to their cloud based electronic health record for most of the 24 hour period. The 10 Physician Practice discovered huge chaos when the front office staff reported that patients kept calling requesting appointments and patients queued in for doctor visits and how the staff struggled with no access to records, labs and appointment scheduling information. The Practice is completely electronic and when the system goes down it left all the medical staff almost blindfolded. The Physicians felt the crash could have been a tragedy if they had to deal with life and death situations.

The practice apologized to its patients and assured them that they were committed to learning from this and improving their service. Also the Practice performed daily backing up of files to online storage systems and tapes and then storing them at a different offsite location. However this was not good enough because it took them several days to restore all the operations when they were confronted with an unforeseen disaster.

It was essential to have a High Availability(HA) Disaster Recovery(DR) plan so that critical applications can recover within seconds incase of software, hardware failure and catastrophic disasters. The Practice decided to work with ViSolve, renowned for their strategic working relationship with Enterprises such as HP, VMware and supporting business continuity of mission critical healthcare applications in Cloud. ViSolve was approached to formulate a strategic IT Plan that assured that Silvercreek Physicians can always access patient information when providing healthcare services and also ensure safety of patient data inspite of server crashes and unexpected calamities.

Solution:

ViSolve decided to transform Silvercreek Physicians Medical Practice's IT infrastructure to a Highly Available and Disaster proof environment, especially for Business Continuity of OpenEMR in Cloud using the following solution strategy:

- **High Availability (Server Failover)** - When production/primary server goes down, the HA/secondary server takes over and provides business continuity
- **Disaster Recovery (Data Center failover)** - When the datacenter goes down, business continuity is achieved with the help of applications and DB available in DR server located in another Date Center (DC)

Linux Open Source Tools and Software used to implement the HA/DR Strategy include:

- **Heartbeat** - Heartbeat is a daemon that provides high-availability (clustering) solution between two or more Linux servers
- **MySQL replication** - MySQL replication is a process which allows us to have a copy/sync of the database from master server to the slave server
- **rsync** - rsync is a Linux command line utility which is used for copying/syncing of the application files/documents/folders from one host to another

Current IT Setup

The following details represent the current setup of OpenEMR in Amazon Web Services (AWS) cloud ISP. Three EC2 instances in the AWS with 2 in one Data Center and 1 in a different Data Center is created.

Oregon Datacenter (2 servers)

- Server-A – Production/Master server
- Server-B – HA/Secondary server

North California Datacenter (1 server)

- Server-C - DR server

Implementing HA/DR

The following steps are intended to implement HA/DR solution for healthcare organizations using OpenEMR:

Heartbeat

- Download and install Heartbeat software in the server-A and server-B
- Configure heartbeat to monitor the following services
    a. floatingIP – Attach/Detach the floating IP (Global IP) for clients to connect to the server
    b. httpd – Web server

c. nginx – High performance HTTP and reverse proxy server

- Heartbeat runs as master in one server and slave in another server. In the master server, all the services will be up & running (httpd/nginx/cron/etc). Whereas in slave server, the services will be in halted state

MySql Replication

- Configured MySQL database replication from server-A to server-B and vice versa
- When server-A is active (master), clients will be connecting to server-A and data will be updated accordingly. When any insert/delete/update operation is performed in server-A, it will be immediately synced/replicated to server-B
- Likewise, when server-B is active, clients will be connecting to server-B and data will be updated in server-B database. When any insert/delete/update operation is performed in server-B, it will be immediately synced/replicated to server-A
- Also since data has to be replicated to DR server located in DC-2, configuring one master and multiple slaves is required to make sure that the database is replicated to multiple slave servers listed as follows:
    a. Server-A to server-B & DR server (**OR**)
    b. Server-B to server-A & DR server
- MySQL needs to be up and running in both the servers for replication. So it will not be configured in Heartbeat for monitoring

Synchronization

- Configure web files/documents/folders synchronization from server-A to server-B and vice versa
- When server-A is active (master), synchronization will happen from server-A to server-B
- When server-B is active (master), synchronization will happen from server-B to server-A
- Whichever server (server-A/server-B) is active; the files/documents/folders will also be synchronized to DR server too

Backup

- When there is any insert/delete/update operation performed in one server, it will be immediately reflected in another server as replication has been configured. But if any operation is performed accidentally and if that data has to be recovered, it becomes cumbersome to retrieve
- In order to overcome the issue of data retrieval, configuring database backup in master server to run 3-4 times a day (according to the requirement) is necessary
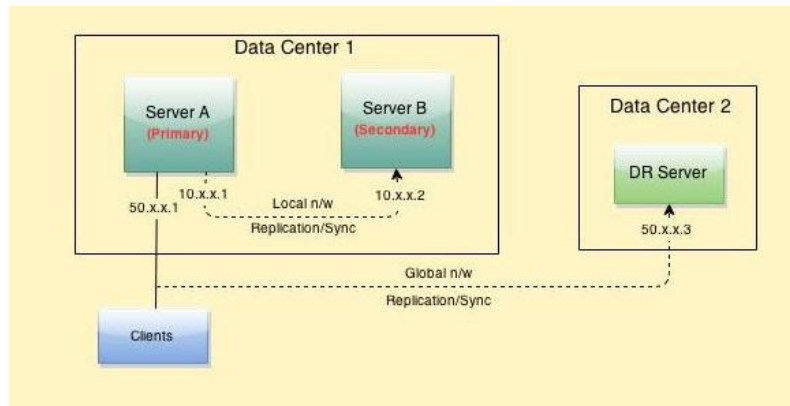
Normal setup
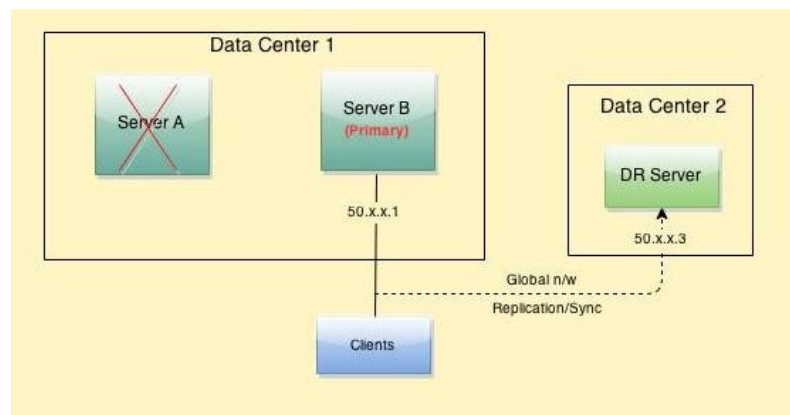

Figure1: Initial setup

Server failure

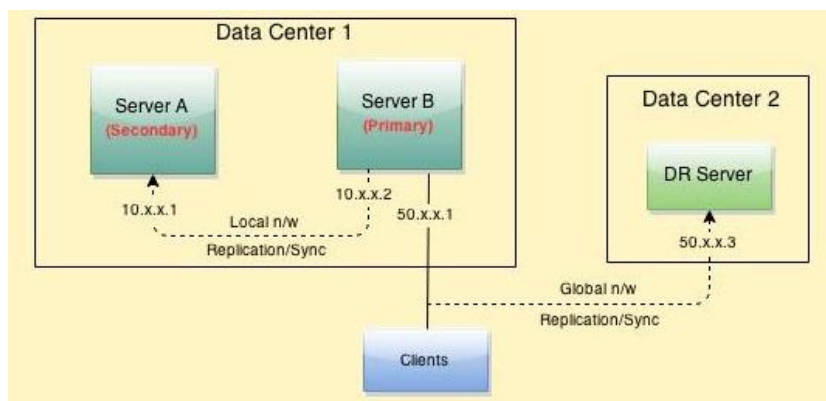Figure2: Server-A failure

Server recovery

Figure3: Server-A Recovery

Results:

Since implementing the proposed solution, Silvercreek Medical Practice has achieved one of its most important goal which is high availability of critical medical applications and access to patient information 7*24*365. This is closely connected with their clinical objective of improving delivery of patient care, enhancing quality of patient outcomes and most importantly saving lives. During the recent storm, when the data center at the Medical Practice was affected, the Physicians and Staff at Silvercreek was enabled with access to patient information within seconds rather than days, due to the efficient disaster recovery plan. Most importantly the practice was able to save $25,000 worth downtime costs caused by hardware/software failure.

The case study also demonstrates how to leverage Open Source tools and software to provide high availability and disaster recovery for mission critical Open EMR applications hosted in Cloud in Healthcare organizations resulting in reduced or no downtime, faster recovery from disasters and hardware/software failure enabling 24*7*365 Business Continuity.

> **ViSolve has not only helped us to reduce IT costs for equipment and staff but has also enabled our practice with outstanding business continuity during hardware or software failures and catastrophic disasters. They support us to focus on patient care and continue to add true business value to our practice.**
>
> Chief Medical Officer, Silvercreek Medical Practice

To know how ViSolve Solutions and Services can help you solve your Business and IT Challenges, please visit our website www.visolve.com and email services@visolve.com or call +1 (408) 850 2243.

Disclaimer

Whilst every effort has been made to ensure the accuracy of all information and statements contained in this document, the functionality, the service levels, performance and capabilities referred to are best estimates and best practices only, based on the general understanding of ViSolve Consultants. Contents of this document are subject to change without notice. The development, release, and timing of any features or functionality in this document remains at the sole discretion of ViSolve Inc. All copyrights and trademarks are the property of their respective owners

Proprietary Notice