# 1.Overview

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| High Availability (HA) là gì? Cụm từ HA được sử dụng rộng rãi trong giới tin học có nghĩa là những hệ thống IT với độ sẵn sàng cao, hoạt động liên tục và luôn sẵn sàng cung cấp dịch vụ hay tài nguyên cho người dùng cuối. HA là một phương pháp thiết kế hệ thống để đạt được hiệu suất và tính sẵn sàng cao nhất mà không vướng phải bất cứ gián đoạn nào như hệ thống đơn lẻ. |

## Architecture

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| Mô hình:   * **Hardware**: node 1(**Active**), node 2(**Standby**) * **Cluster Stack**: Pacemaker + Corosync/Heartbeat * **Services**: Apache Web Server * **Virtual IP**:   E:\The Linux Command Line - William Shotts\Part 1 - Learning the shell\LinuxSystem_PaceMaker\apache-ha.jpg |

## 1.2. Pacemaker

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| Pacemaker  là một phần mềm mã nguồn mở dành cho HA, còn đc gọi là “Cluster Resource Manager”.  Lớp Cluster Resource Management Layer có những đặc điểm sau:  **.** Start and Stop cluster Resources  **.** Monitoring cluster Resources  **.** Migrating cluster Resources  **.** Grouping cluster resources  **.** Location Checks |

## 1.3.Corosync

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| Corosync là gì? Corosync là một hệ thống liên lạc bên trong cluster với chức năng xác định node lỗi và chuyển tài nguyên sang những node đang hoạt động khác. |

## 1.4. Cấu hình Apache High Availability

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| **Các node và địa chỉ**  node1.broexperts.com 10.0.0.10/24 node2.broexperts.com 10.0.0.20/24 node3.broexperts.com 10.0.0.30/24  **Virtual IP**  10.0.0.100/24  **iSCSI Storage Server**  storage.broexperts.com 10.0.0.90/24  **Client**  client.broexperts.com 10.0.0.99/24 (Win-7 client for testing) E:\The Linux Command Line - William Shotts\Part 1 - Learning the shell\LinuxSystem_PaceMaker\network-design.jpg Node1  OS: CentOS 7  Hostname: node1.hoang.lab  eth0: 192.168.100.197  Gateway: 192.168.100.1  NETWORK: 192.168.100.0/24  Node2  OS: CentOS 7  Hostname: node1.hoang.lab  eth0: 192.168.100.198  Gateway: 192.168.100.1  NETWORK: 192.168.100.0/24  Virtual IP  IP: 192.168.100.123  Gateway: 192.168.100.1  NETWORK: 192.168.100.0/24  https://camo.githubusercontent.com/bf6d9f67c22c5f4944f5fa334789e63ca5d5c64c/687474703a2f2f696d6167652e70726e747363722e636f6d2f696d6167652f37653965316132366537656634623630393361663633383434393135303532652e706e67 |

### 1.4.1. Edit host file

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| Bước 1: Edit Host File Update /etc/hosts file  vi /etc/hosts  Copy dòng sau vào file /etc/hosts, Trên node1 node2, chúng ta mở file /etc/hosts và sửa tương tự.   |  | | --- | | **[root@CMS-DB-01 vt\_admin]# cat /etc/hosts**  127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4  ::1 localhost localhost.localdomain localhost6 localhost6.localdomain6  172.23.0.81 CMS-DB-01  172.23.0.82 CMS-DB-02 | |

### 2.2 CÀI ĐẶT Service TOMCAT or APACHE

### 2.3 CÀI ĐẶT PACEMAKER

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| Install Pacemaker: (Do on both servers)  |  |  | | --- | --- | |  | yum install -y pacemaker cman ccs |   Add them to start up: (Do on both servers)  |  |  | | --- | --- | |  | chkconfig pacemaker on |  Create Corosync Key: (Only do on the first server)  |  |  | | --- | --- | |  | corosync-keygen |   Set permissions on the key: (Do first server)  |  |  | | --- | --- | |  | chown root:root /etc/corosync/authkey  chmod 400 /etc/corosync/authkey |   Rsync the key to your 2nd node:  |  |  | | --- | --- | |  | rsync –avh /etc/corosync/authkey root@10.1.0.2:/etc/corosync/authkey |   Get a couple additional files we will need: (One is an admin utility the other is a dependency) (Do on both servers)  |  |  | | --- | --- | |  | rpm -Uvh http://download.opensuse.org/repositories/network:/ha-clustering:/Stable/CentOS\_CentOS-6/x86\_64/pssh-2.3.1-2.1.x86\_64.rpm  rpm -Uvh http://download.opensuse.org/repositories/network:/ha-clustering:/Stable/CentOS\_CentOS-6/x86\_64/crmsh-1.2.6-4.4.x86\_64.rpm |   **Note: Log out of your putty session and log back in to all the CRM utility to be ran.** Install a base corosync config: (Do on first server)  |  |  | | --- | --- | |  | cp /etc/corosync/corosync.conf.example /etc/corosync/corosync.conf |  Edit the corosync.conf file: (Do on first server)  |  | | --- | | [root@CMS-DB-01 vt\_admin]# cat /etc/corosync/corosync.conf  # Please read the corosync.conf.5 manual page  compatibility: whitetank  totem {  version: 2  secauth: off  threads: 0  interface {  ringnumber: 0  bindnetaddr: 172.23.0.80  mcastaddr: 239.255.1.2  mcastport: 4000  ttl: 1  }  }  logging {  fileline: off  to\_stderr: no  to\_logfile: yes  to\_syslog: yes  logfile: /var/log/cluster/corosync.log  debug: off  timestamp: on  logger\_subsys {  subsys: AMF  debug: off  }  }  amf {  mode: disabled  }  quorum {  provider: corosync\_votequorum  expected\_votes: 2  } |   Make the log folder: (Do on both servers)  |  |  | | --- | --- | |  | mkdir /var/log/cluster |   Rsync the config file to the 2nd node in cluster:  |  |  | | --- | --- | |  | rsync -avh /etc/corosync/corosync.conf root@10.1.0.2:/etc/corosync/corosync.conf |   Start the service: (Do on first server)  |  |  | | --- | --- | |  | /etc/init.d/corosync start |  [**root@CMS-DB-01 vt\_admin]# ps aux | grep corosync**root 2777 0.0 0.0 548984 4696 ? Ssl 2017 672:07 corosyncCheck the log file make sure nothing jumps out for errors: (Do on first server)  |  |  | | --- | --- | |  | tail -f /var/log/cluster/corosync.log |  Create the folder crm configure needs: (Do on both servers)  |  |  | | --- | --- | |  | mkdir -p /var/lib/pacemaker/cores/root |   Stop the service as we will use crm to manage it and pacemaker to start it: (Do on first server)  |  |  | | --- | --- | |  | /etc/init.d/corosync stop |   **Note: If for some reason you can’t get corosync to stop and it takes forever to unload.  Reboot your server, this seems to be an issue on CentOS the first time its started.** Setup the pacemaker cluster: (Do on first server)  |  |  | | --- | --- | |  | # At the [**command**](https://www.gocit.vn/bai-viet/tag/command/) line  ccs -f /etc/cluster/cluster.conf –createcluster openvpn  ccs -f /etc/cluster/cluster.conf –addnode server01  ccs -f /etc/cluster/cluster.conf –addnode server02  ccs -f /etc/cluster/cluster.conf –addfencedev pcmk agent=fence\_pcmk  ccs -f /etc/cluster/cluster.conf –addmethod pcmk-redirect server01  ccs -f /etc/cluster/cluster.conf –addmethod pcmk-redirect server02  ccs -f /etc/cluster/cluster.conf –addfenceinst pcmk server01 pcmk-redirect port=server01  ccs -f /etc/cluster/cluster.conf –addfenceinst pcmk server02 pcmk-redirect port=server02  echo “CMAN\_QUORUM\_TIMEOUT=0” >> /etc/sysconfig/cman |  Rsync cluster file to 2nd server:  |  |  | | --- | --- | |  | rsync -avh /etc/cluster/cluster.conf root@10.1.0.2:/etc/cluster/cluster.conf |   Start pacemaker: (On the first server)  |  |  | | --- | --- | | 1 | /etc/init.d/pacemaker start |  Allow Pacemaker through [iptables](https://www.gocit.vn/bai-viet/tag/iptables/" \o "Posts tagged with Iptables): (On both servers)  |  |  | | --- | --- | |  | iptables -I INPUT 1 –protocol udp –dport 5405 -j ACCEPT  iptables -I INPUT 1 –protocol udp –sport 5404 -j ACCEPT  iptables -I OUTPUT 1 –protocol udp –dport 5405 -j ACCEPT  iptables -I OUTPUT 1 –protocol udp –sport 5404 -j ACCEPT |   **Note: If you don’t add these iptables rules you may get the error:  ERROR: running cibadmin -Ql: Could not establish cib\_rw connection: Connection refused (111)** Setup the cluster options: (On the first server)  |  |  | | --- | --- | |  | # At the command line  crm configure  > edit |   **Note: This will open the xml file inside vi / vim or whatever your default editor is.** Delete everything in the file and paste in the following: (On the first server)  |  |  | | --- | --- | |  | node CMS-DB-01 \  attributes standby="off"  node CMS-DB-02 \  attributes standby="off"  primitive DB\_IP ocf:heartbeat:IPaddr2 \  params ip="172.23.40.6" cidr\_netmask="26" nic="bond0:1" \  op monitor interval="10s"  primitive mariaDB lsb:mysql \  op monitor interval="5s" timeout="30s" \  op start interval="5s" timeout="40s" \  op stop interval="5s" timeout="60s" \  meta target-role="Started"  primitive storage\_backup ocf:heartbeat:Filesystem \  params device="/dev/mapper/CMS-DB-BACKUPp1" directory="/BACKUP" fstype="xfs"  primitive storage\_data ocf:heartbeat:Filesystem \  params device="/dev/mapper/CMS-DB-DATA01p1" directory="/DATA" fstype="xfs"  group maria DB\_IP storage\_backup mariaDB  order mariadb\_after\_storage inf: storage\_data maria  property $id="cib-bootstrap-options" \  dc-version="1.1.10-14.el6\_5.1-368c726" \  cluster-infrastructure="classic openais (with plugin)" \  expected-quorum-votes="2" \  stonith-enabled="false" \  no-quorum-policy="ignore" \  last-lrm-refresh="1482947223"  rsc\_defaults $id="rsc-options" \  resource-stickiness="100" |   **# Small additional note, if you are doing a cluster of more than 2 servers, do some research on the no-quorum-policy and stonith-enabled.** Save and commit your changes:  |  |  | | --- | --- | |  | # Exit and save  :wq  # At the crm command line  commit  exit |   Restart Pacemaker and check the logs: (On the first server)  |  |  | | --- | --- | |  | /etc/init.d/pacemaker restart  tail -f /var/log/cluster/corosync.log |   Start Pacemaker on the 2nd server:  |  |  | | --- | --- | |  | /etc/init.d/pacemaker start |   **I had some trouble getting my firewall rules (iptables) to stick when the ip floated from one to the other, to resolve this issue make sure you are saving  your iptable rules if you are using an init script.**   |  |  | | --- | --- | |  | service iptables save |   To test our setup we will launch crm\_mon on the passive node, while running a ping in another session to watch for packet loss:  |  |  | | --- | --- | |  | crm\_mon |   On the server that currently has the virtual ips:  |  |  | | --- | --- | |  | reboot | |