

HA クラスタシステム(web server)の構築と運用

荒川真

HA cluster system

cluster system

Scalability

load balancing

HPCC(High-Performance Computing Cluster)

grid computing

Availability

HA(High Availability) cluster system

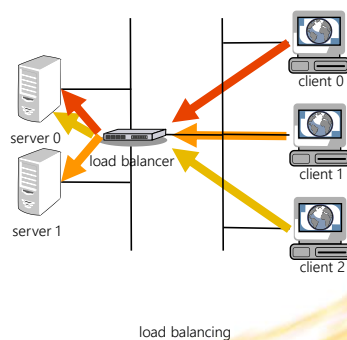
metro cluster system, continental cluster system

load balancing

load balancing

load balancer によりサーバの負荷分散を行う

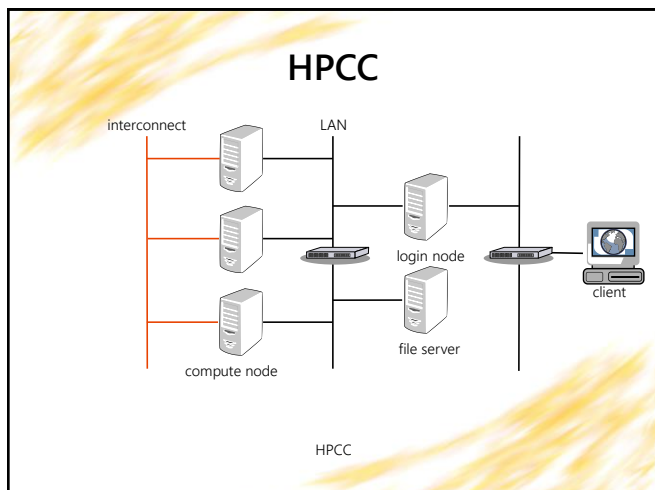
load balancing



HPCC

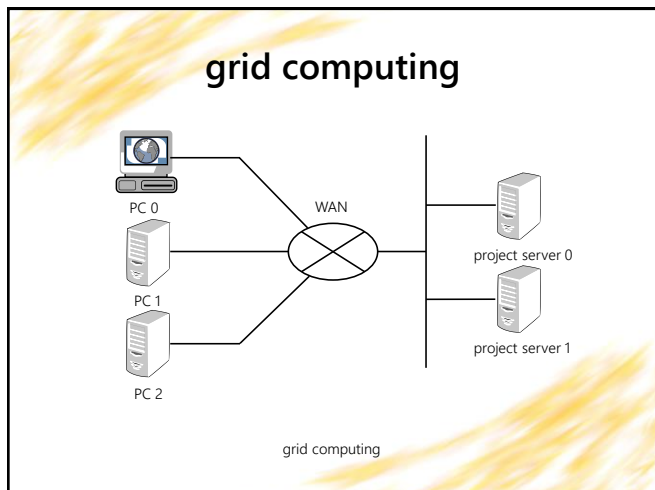
HPCC

interconnect で接続された compute node を束ねて高性能な計算を行う



grid computing

grid computing
LAN, WAN, Internet で接続された PC を束ねて高性能な計算を行う

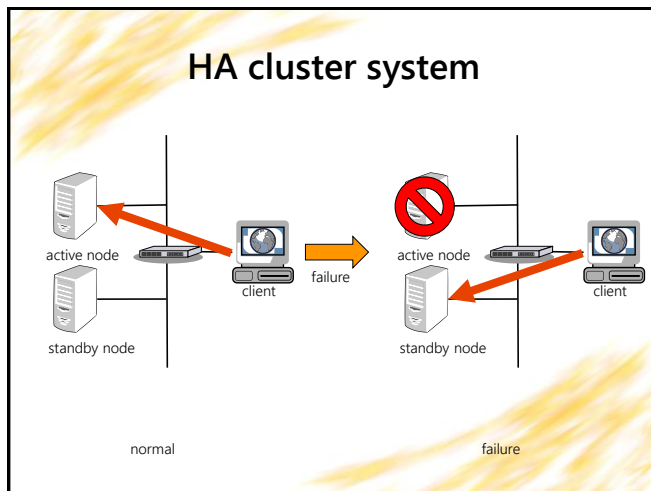


HA cluster system

HA cluster system
active node, standby node を障害時に切り替え

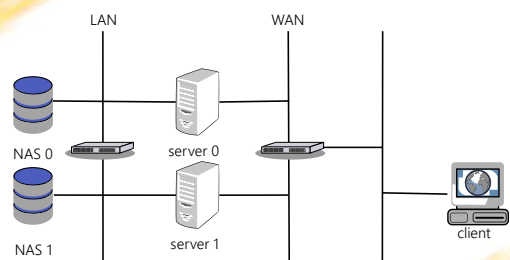
metro cluster system, continental cluster system

metro cluster system, continental cluster system
active node, standby node を都市間や大陸間の複数拠点に配置

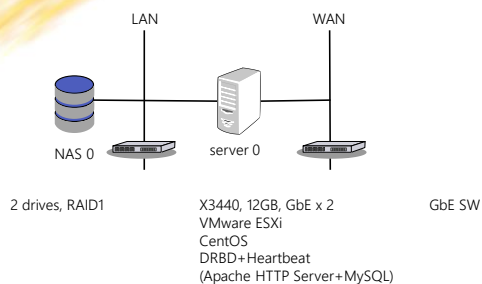


今回, 設計, 構築した
HA クラスシステム

network topology



system configuration



VMware ESXi

VMware ESXi → VMware vSphere Hypervisor

開発 VMware, Inc., ESX の無償公開版

2002年1月 ESX Release, 2006年6月 ESXi Release

2009年5月 ESXi 4.0 Release

Hypervisor

snapshot, testbed

CentOS

CentOS

開発 The CentOS Project, GPL

Red Hat Enterprise Linux 互換

DRBD

DRBD(Distributed Replicated Block Device)

開発 LIN:BIT, GPL

1999年11月 Release, 2008年12月 Version 8

ネットワーク越しの RAID1

DRBD

The diagram illustrates the DRBD (Distributed Replicated Block Device) architecture. On the left, a server labeled 'RAID' contains two hard drives, 'drive 0' and 'drive 1', connected to a 'RAID controller'. On the right, a 'DRBD' setup is shown with two nodes: a 'primary' node and a 'secondary' node. Each node has its own RAID controller and two drives. The nodes are connected via a 'LAN' (Local Area Network) for 'replication', indicated by a double-headed orange arrow. The primary node is connected to the LAN, and the secondary node is also connected to the LAN.

Heartbeat

Heartbeat → Pacemaker

開発 Linux-HA project, GPL

1998年11月 Release, 2005年7月 Version 2

死活管理

リソース切り替え

floating IP, DRBD, mnt, apache, MySQL

Heartbeat

The diagram illustrates the Heartbeat failover process, showing a transition from a normal state to a failure state.

Normal State:

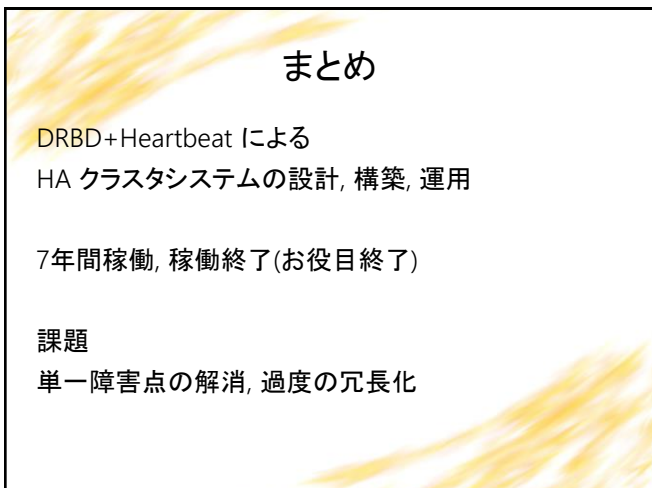
- A **primary** server and a **secondary** server are connected via a **heartbeat** line (red cable).
- Both servers are connected to a **LAN**.
- Each server has a **web server** component (orange box) and a **DB server** component (orange box).
- The **primary** server also has an **IP address** component (orange box).

Failure State:

- The **primary** server is marked as **stop** with a red 'X' over it.
- The **secondary** server is marked as **primary** with a red 'X' over it.
- The **failover** process is indicated by an orange arrow pointing from the normal state to the failure state.
- The **failback** process is indicated by an orange arrow pointing from the failure state back to the normal state.
- The **failover** process is also indicated by a red 'X' over the **heartbeat** line.
- The **failback** process is also indicated by a red 'X' over the **failover** arrow.



まとめ



まとめ

DRBD+Heartbeat による
HA クラスタシステムの設計, 構築, 運用

7年間稼働, 稼働終了(お役目終了)

課題
単一障害点の解消, 過度の冗長化