

A Virtual Cluster over Multiple Physical Clusters Using P2P Overlay Network

Cybermedia Center, Osaka University, Japan

Introduction

Recently, virtual cluster technology has attracted attention in scientific research field. A virtual cluster system allows scientists to build their private computational environment which is customized as they like on one physical cluster.

However a virtual cluster over multiple physical clusters is still difficult to realize. This is because each physical cluster is commonly isolated by Firewall or NAT and so VMs deployed on different clusters cannot connect directly with each other. A virtual cluster over multiple physical clusters needs to virtualize network to hide disconnect of network.

We develop such a cluster over multi physical cluster leverage cluster install toolkit software with P2P overlay network software.

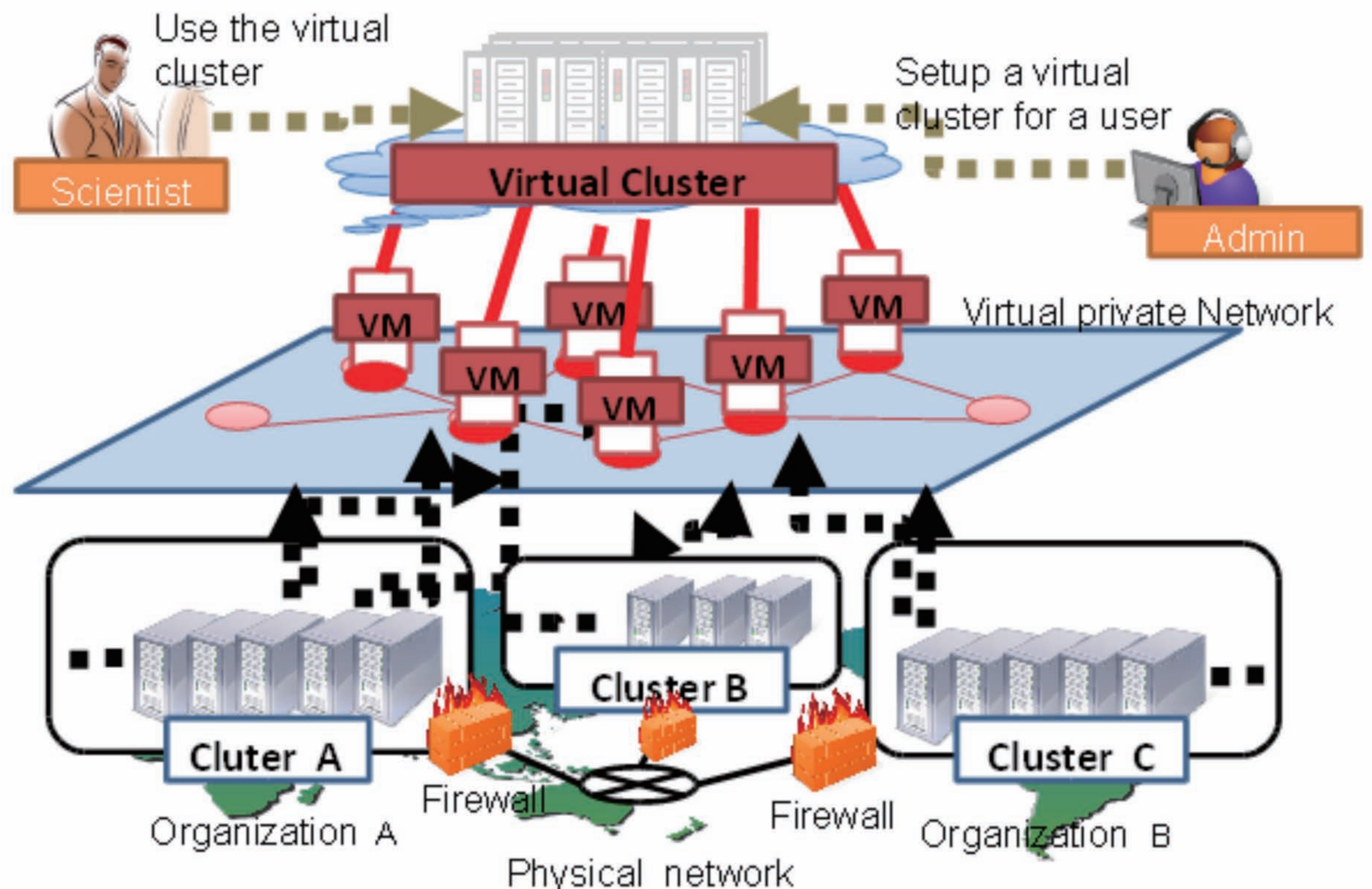


Figure 1 : Concept of our virtual cluster

Our Virtual Cluster

Utilizes Two key technologies

N2N : A P2P software which establishes an encrypted layer-two virtual private network based on a P2P protocol implemented by ntop.org.

Rocks : A cluster installing toolkit including virtual cluster implemented by UCSD.

The process of developing a virtual cluster

Our virtual cluster is set up on multiple Rocks physical clusters. N2N virtual private network are established between VMs which are deployed by Rocks. The setup processes are performed by a admin of one Rocks physical cluster. Rocks clusters which allow admins to set up a virtual cluster are known in advance. The process of developing a virtual cluster is shown in the following.

1. Register selected vm-containers to each Rocks DB.
2. Establish a P2P virtual private network among the selected vm-containers and make configuration for VMs.
3. Start a Rocks virtual Frontend on a physical frontend.
4. Start VMs on selected vm-containers.

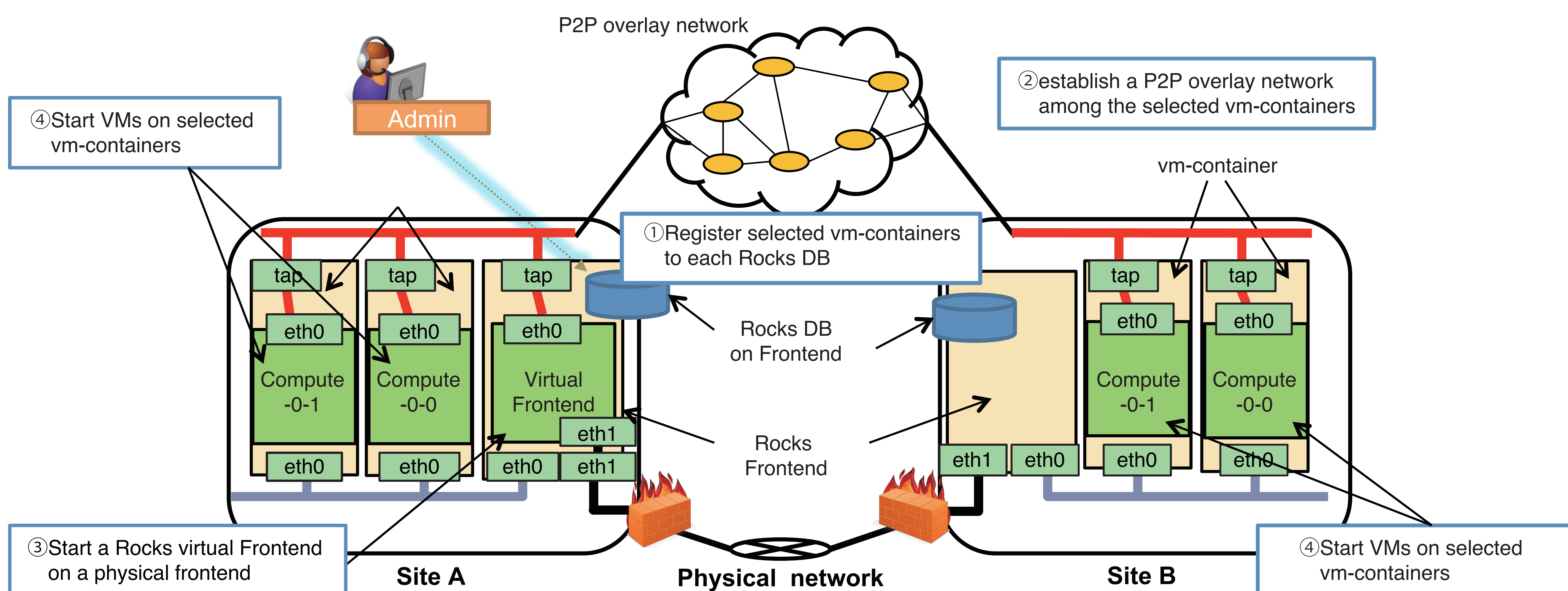


Figure 2 : Detailed design of our proposed virtual cluster