

Cloud Computing meeting 2

Virtualisasi dan Container

Rencana

- Dasar Teori Virtualisasi
- Virtualisasi MMU
- Virtualisasi CPU
- Virtualisasi IO
- Virtualisasi dan Kontainer

Cloud dan Virtualisasi

- Virtualisasi pada cloud diperlukan untuk mengemulasi dan manajemen resource baik HW maupun SW
- Cloud computing infrastructure make extensive use of virtualization technologies
- Providing flexible allocation of HW resources
- Resource scheduling

Istilah dan definisi

- **Virtualization** is the application of the layering principle through enforced modularity, whereby the exposed virtual resource is identical to the underlying physical resource being virtualized.
- A **virtual machine** is an abstraction of a complete compute environment through the combined virtualization of the processor, memory, and I/O components of a computer.
- The **hypervisor** is a specialized piece of system software that manages and runs virtual machines.
- The **virtual machine monitor (VMM)** refers to the portion of the hypervisor that focuses on the CPU and memory virtualization.¹

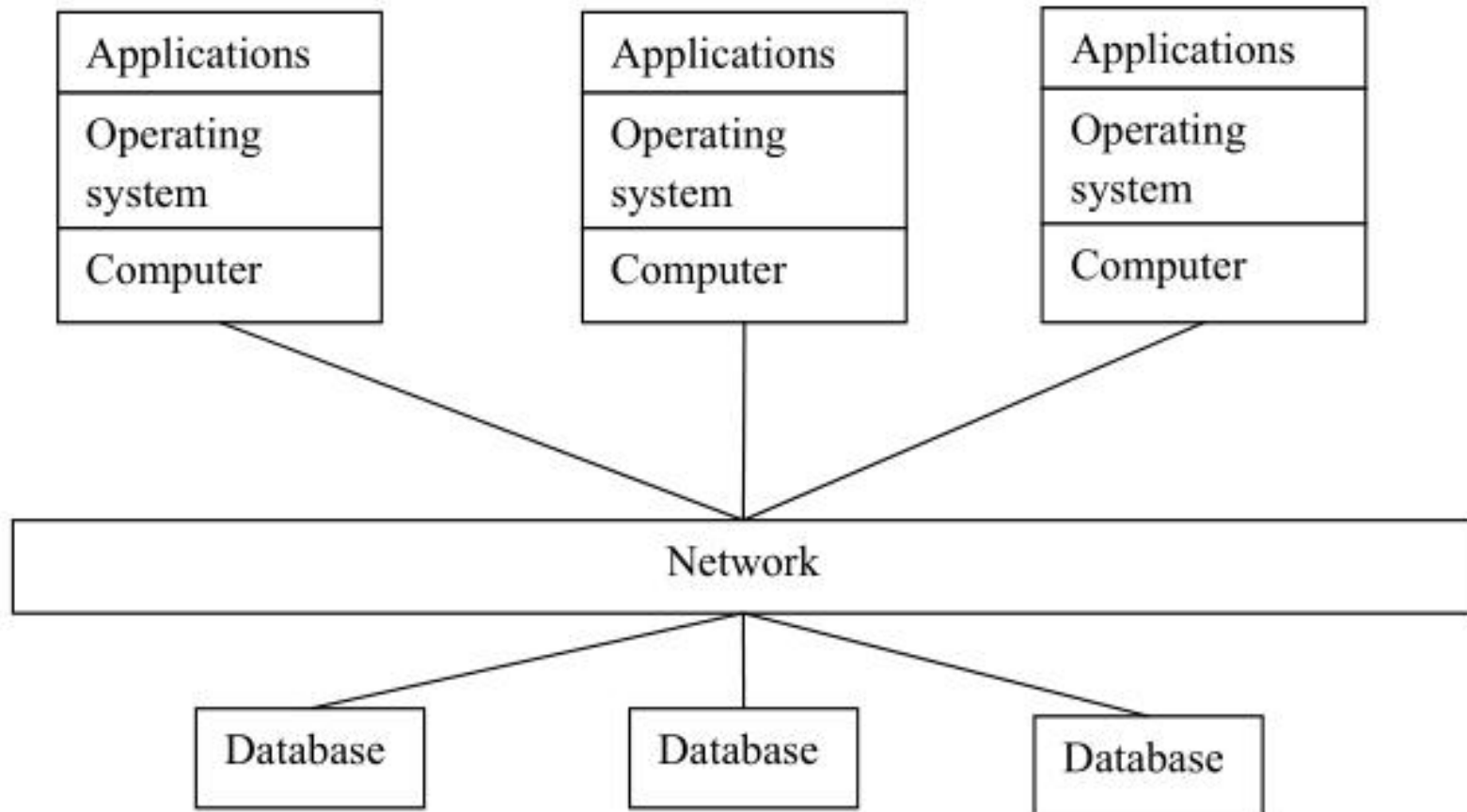
Level Virtualisasi

- Virtualisasi di Hardware: memory management unit (MMU) membuat ilusi address space dari memori
- Virtualisasi di OS : contoh OS membuat ilusi multiplexing seolah-olah banyak program berjalan bersamaan
- Virtualisasi di level Bahasa / program :
contoh JVM membuat mesin abstrak yang mengeksekusi bytecode hasil kompiler

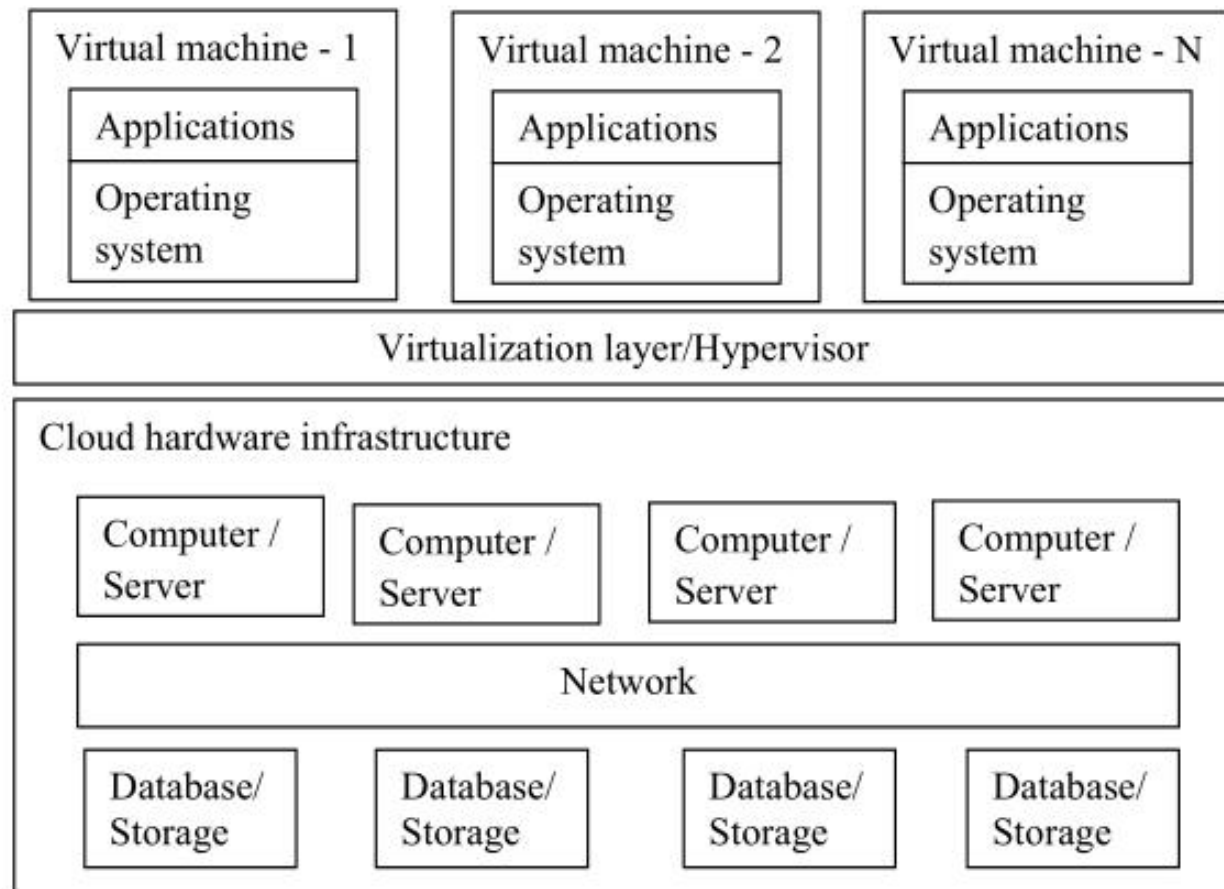
Hypervisor

- Special form of system software that runs virtual machines with goal of minimizing execution overhead
- **Type 1** : berjalan di atas perangkat keras
Microsoft Hyper-V, Xen, Vmware ESX
- **Type 2** : berjalan pada ekstensi host, OS yang komponennya diadaptasi untuk virtualisasi
Vmware workstation, KVM, Oracle VirtualBox

Infrastruktur tanpa Virtualisasi

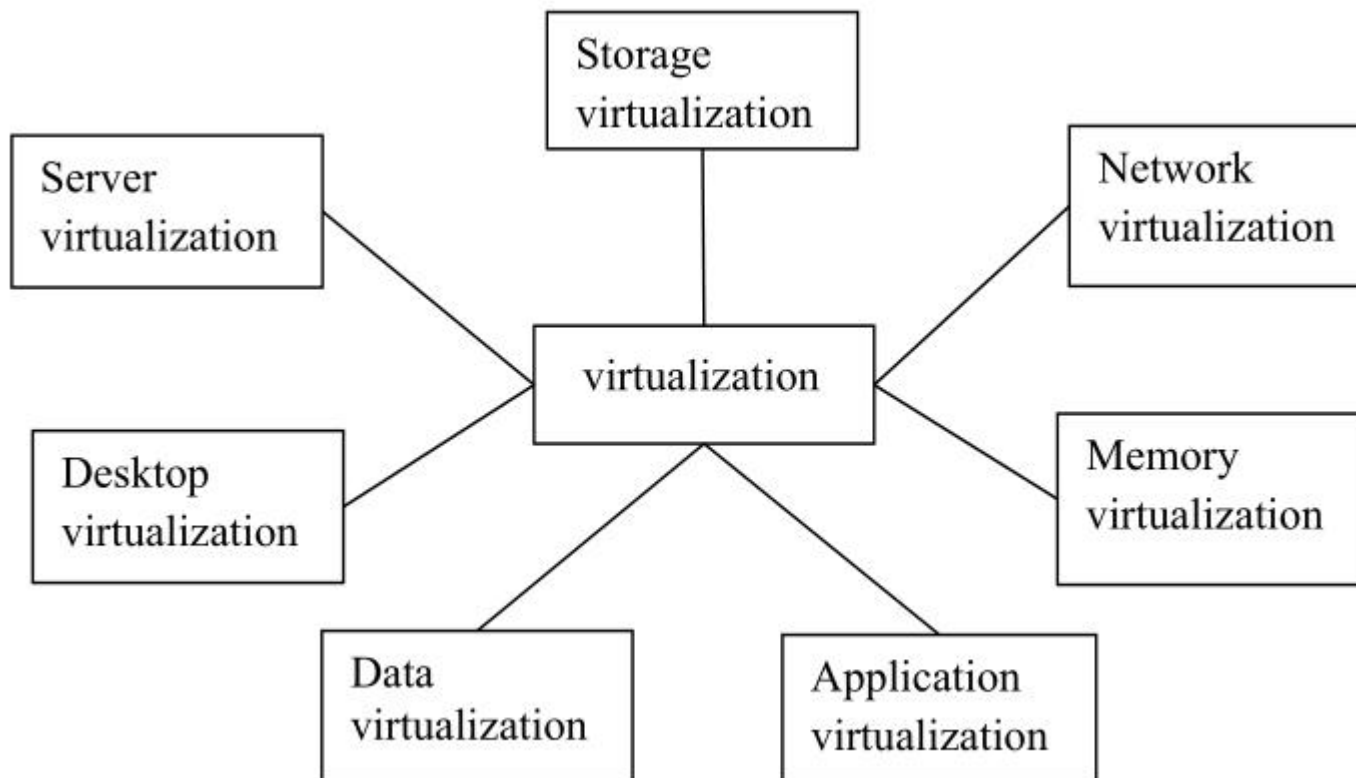


Infrastruktur dengan Virtualisasi



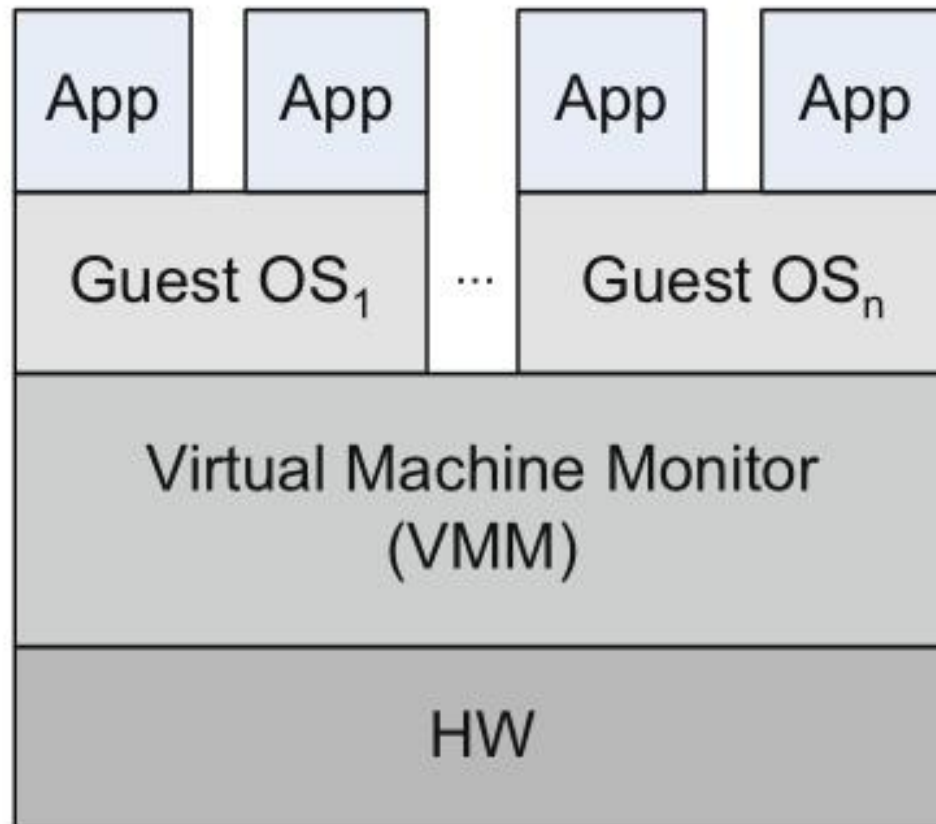
Jenis Virtualisasi

- Terhadap resource yang di-manage



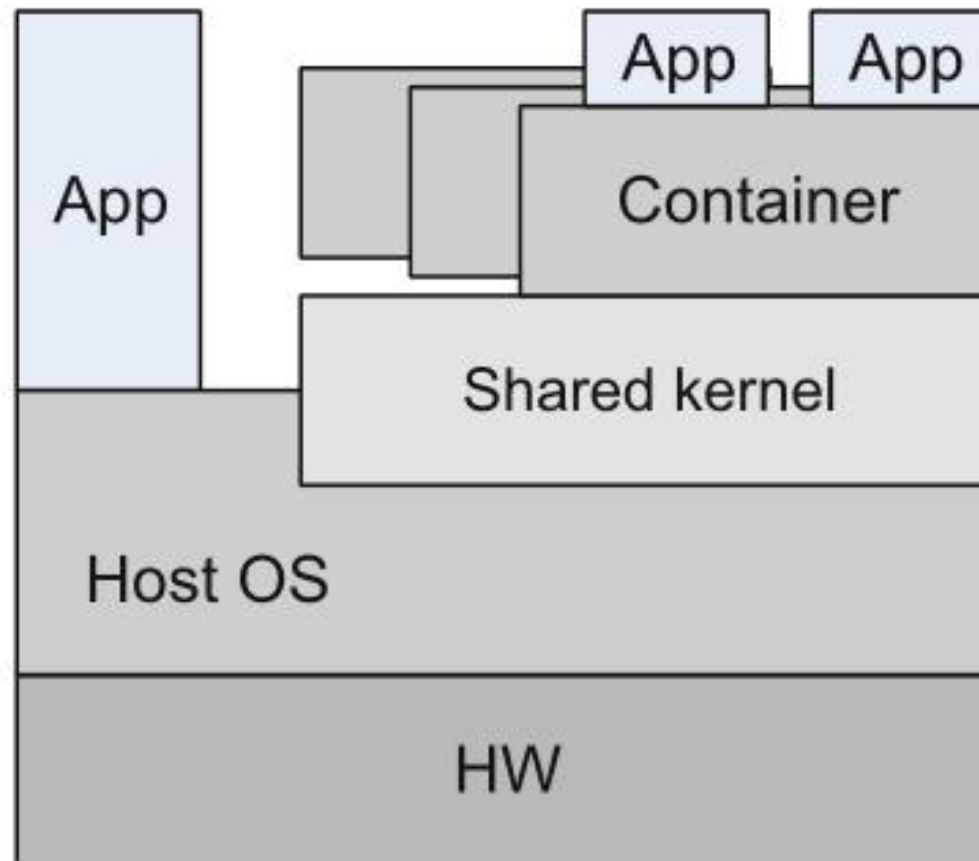
System-level VM

- Mengemulasi full OS



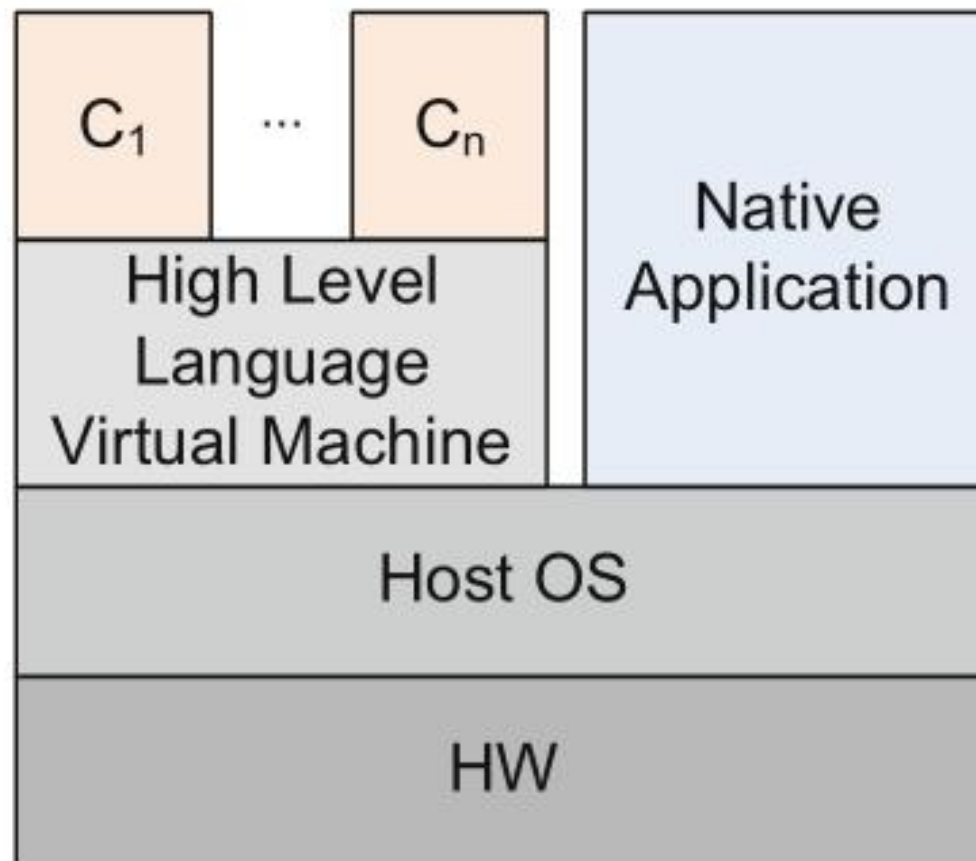
Container

- Komponen shared Kernel dan isolasi di level aplikasi (contoh: Docker, Linux LXC)



Hibrid VM

- Virtualisasi di level bahasa program, contoh Java



Virtualisasi Full OS vs Kontainer

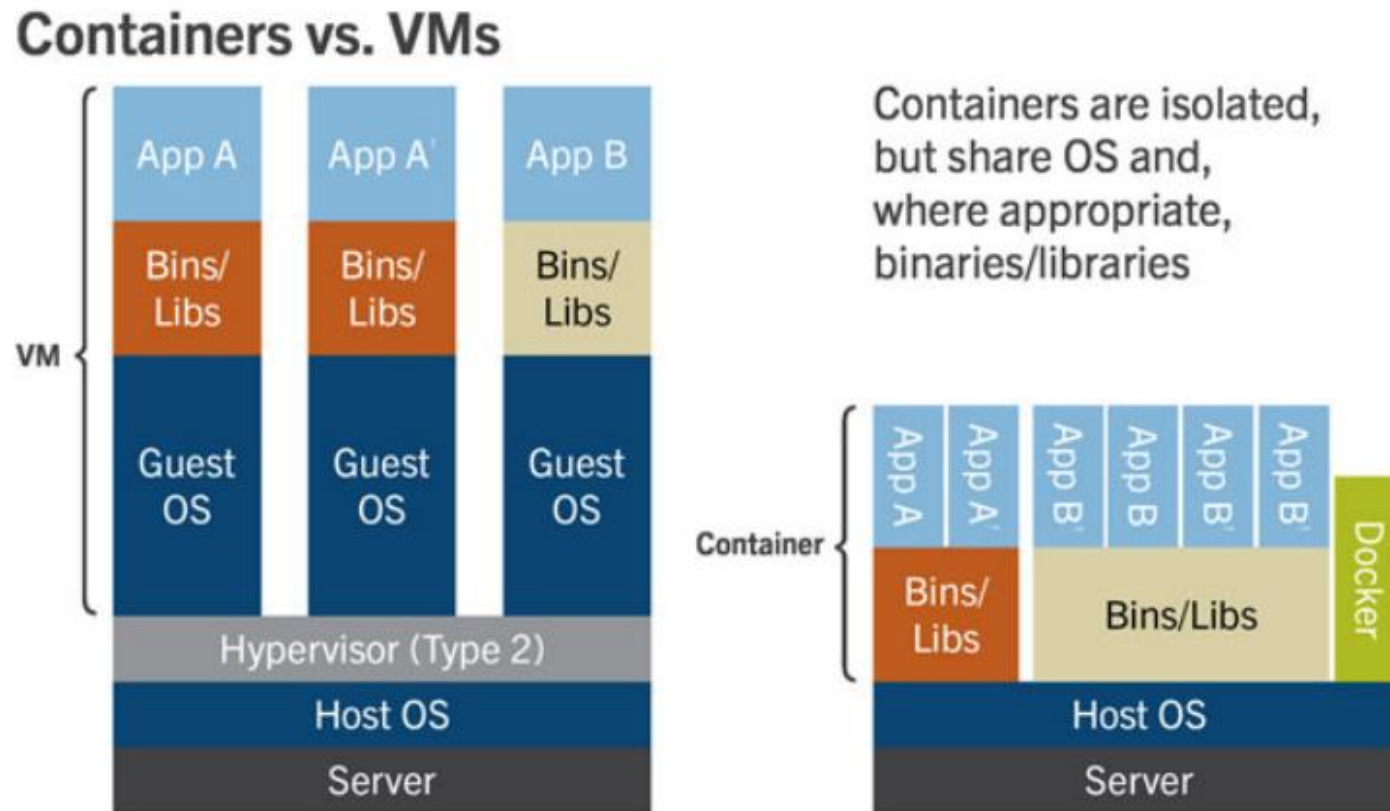


Fig. 1.4 Architectural similarities and differences between containers and virtual machines

Keuntungan Virtualisasi

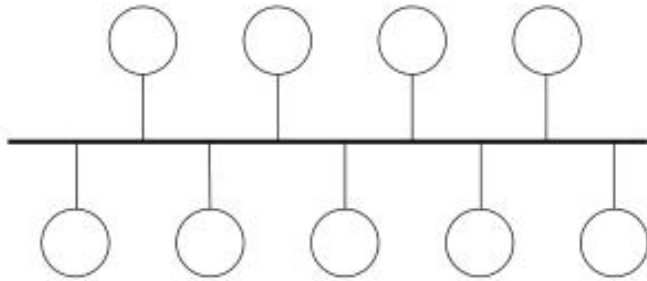
- OS variety
- Mobilitas
- Provisioning lebih mudah dan cepat
- Backup lebih mudah
- Manajemen sumber daya via software hypervisor / OS

Arsitektur Cluster

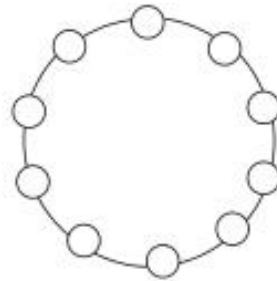
- Cloud lekat dengan komputasi performa tinggi (High performance computing)
- Arsitektur :
 - Grid computing
 - Cluster computing
 - Parallel computing
 - Distributed computing
- Cluster :

sekumpulan node komputasi yang terhubung oleh network dan memiliki lapisan manajemen yang mengatur alokasi resource dan eksekusi program pada node-node tersebut

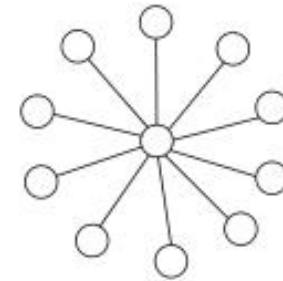
Arsitektur Cluster



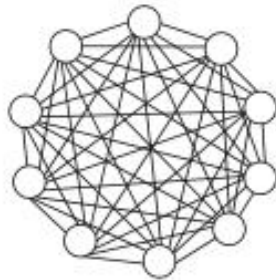
bus



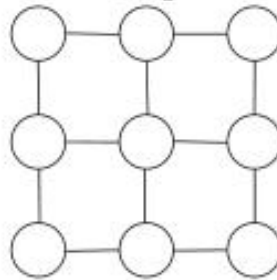
ring



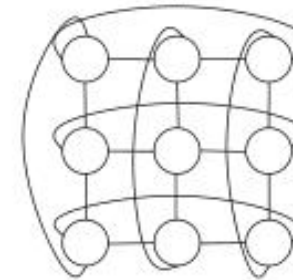
star



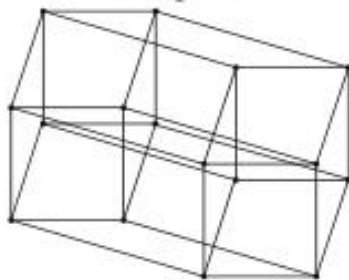
complete



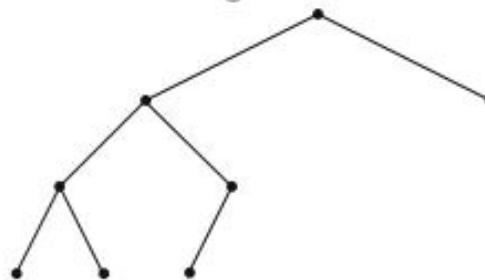
grid



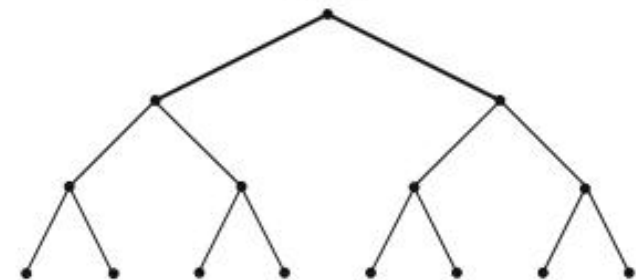
torus



hypercube



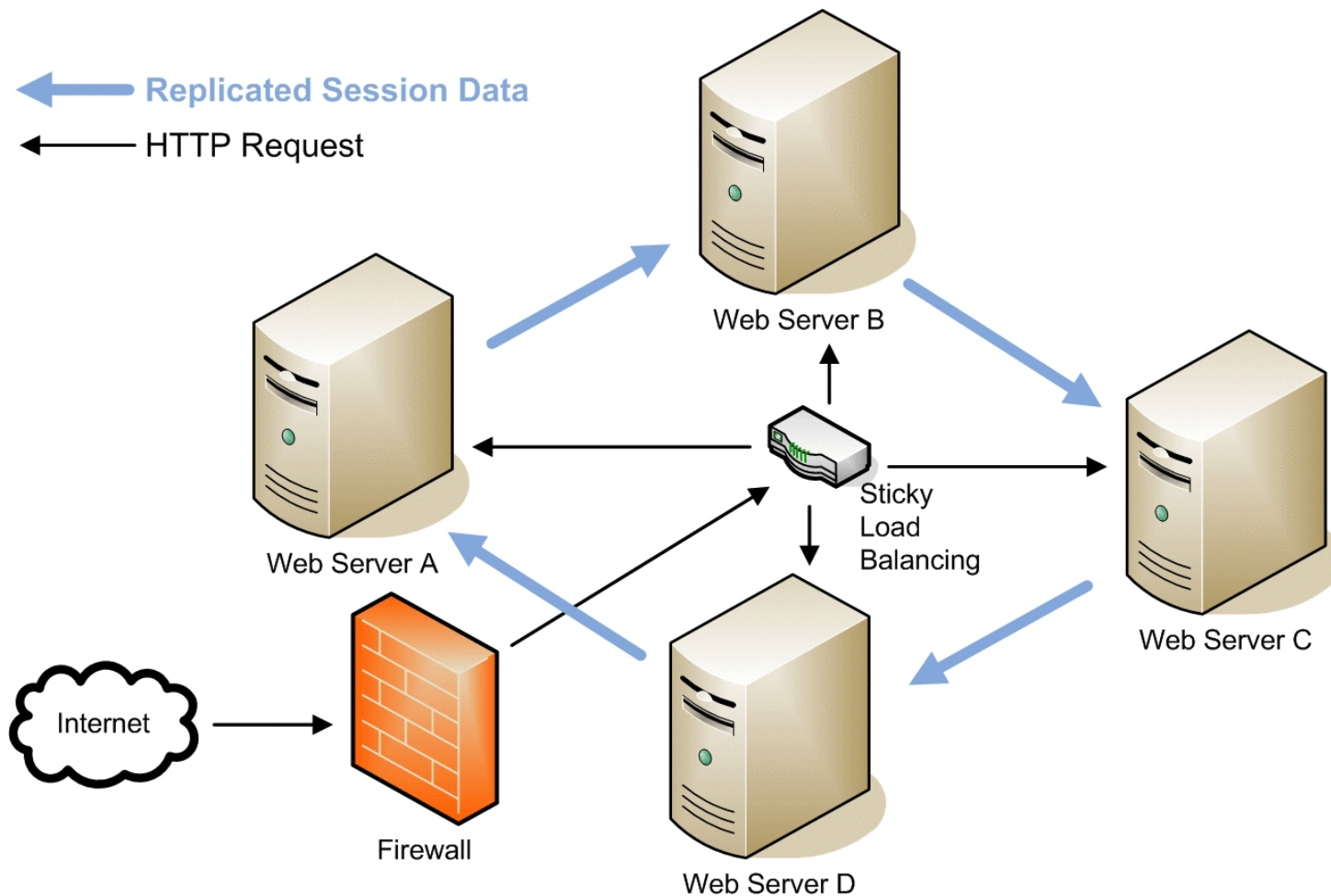
tree



fat tree

Cluster server web

- Memungkinkan menjalankan 1 aplikasi web oleh lebih dari satu server bersama-sama



Tiga Jenis Cluster

- High performance cluster
untuk keperluan parallel programming
- High availability cluster
backup dan redundansi
- Load balancing cluster
pembagian beban antar mesin
- Pembagian implementasi :
- Cluster fisik (mesin)
- Cluster of VM (atau kontainer) : virtual cluster