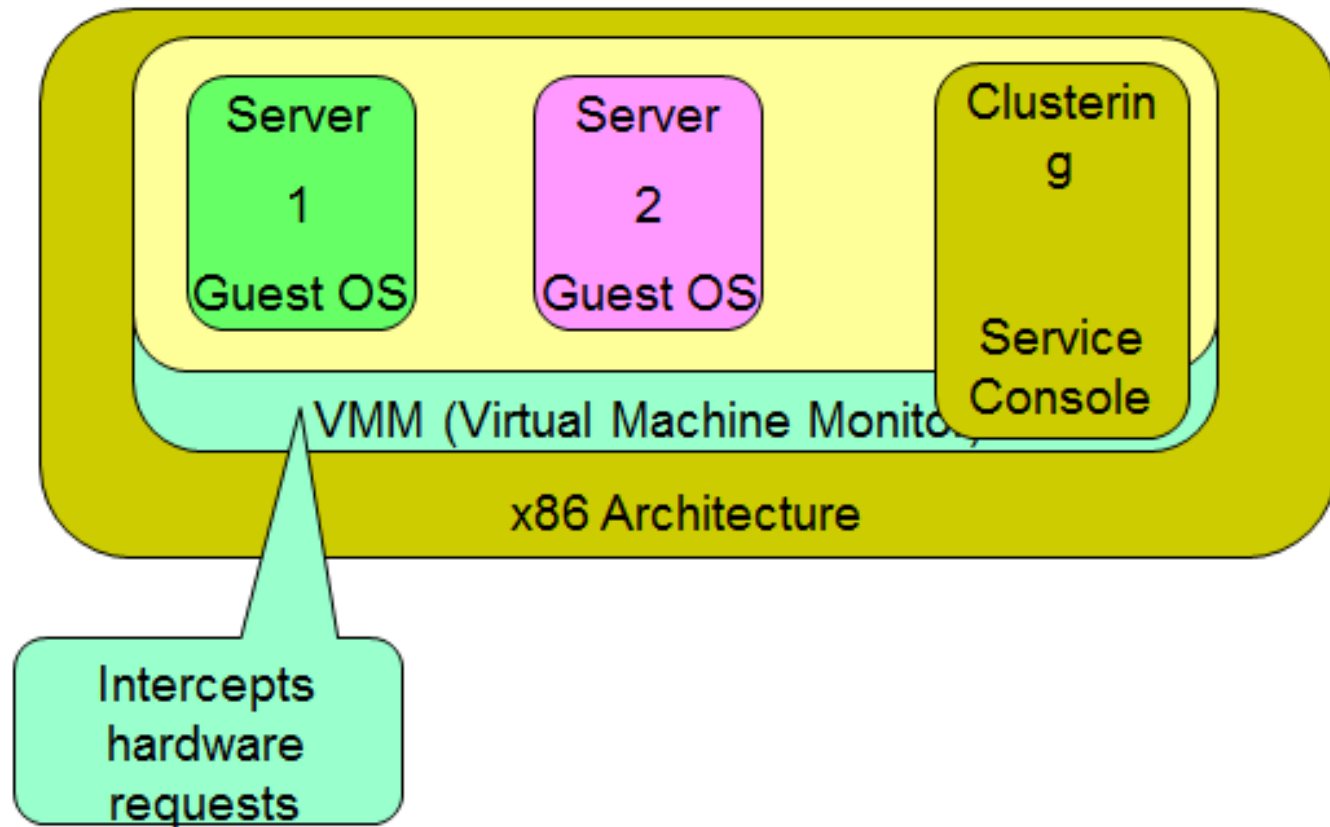# Server Virtualization

Server Virtualization

- Virtual servers seek to encapsulate the server software away from the hardware

- This includes the OS, the applications, and the storage for that server.

- Servers end up as mere files stored on a physical box, or in enterprise storage.

- A virtual server can be serviced by one or more hosts

- One host may house more than one virtual server

Server Virtualization

- Virtual servers can still be referred to by their function i.e. email server, database server, etc.

- If the environment is built correctly, virtual servers will not be affected by the loss of a host.

- Hosts may be removed and introduced almost at will to accommodate maintenance.

Server Virtualization

- Virtual servers can be scaled out easily.

- If the administrators find that the resources supporting a virtual server are being taxed too much, they can adjust the amount of resources allocated to that virtual server

- Server templates can be created in a virtual environment to be used to create multiple, identical virtual servers.

- Virtual servers themselves can be migrated from host to host

Server Virtualization

- Pros
  - Resource pooling
  - Highly available
  - Rapidly deploy new servers
  - Easy to deploy
  - Reconfigurable while services are running
  - Optimizes physical resources by doing more with less

- Cons
  - Slightly harder to conceptualize
  - Slightly more costly (must buy hardware, OS, Apps, and now the abstraction layer)
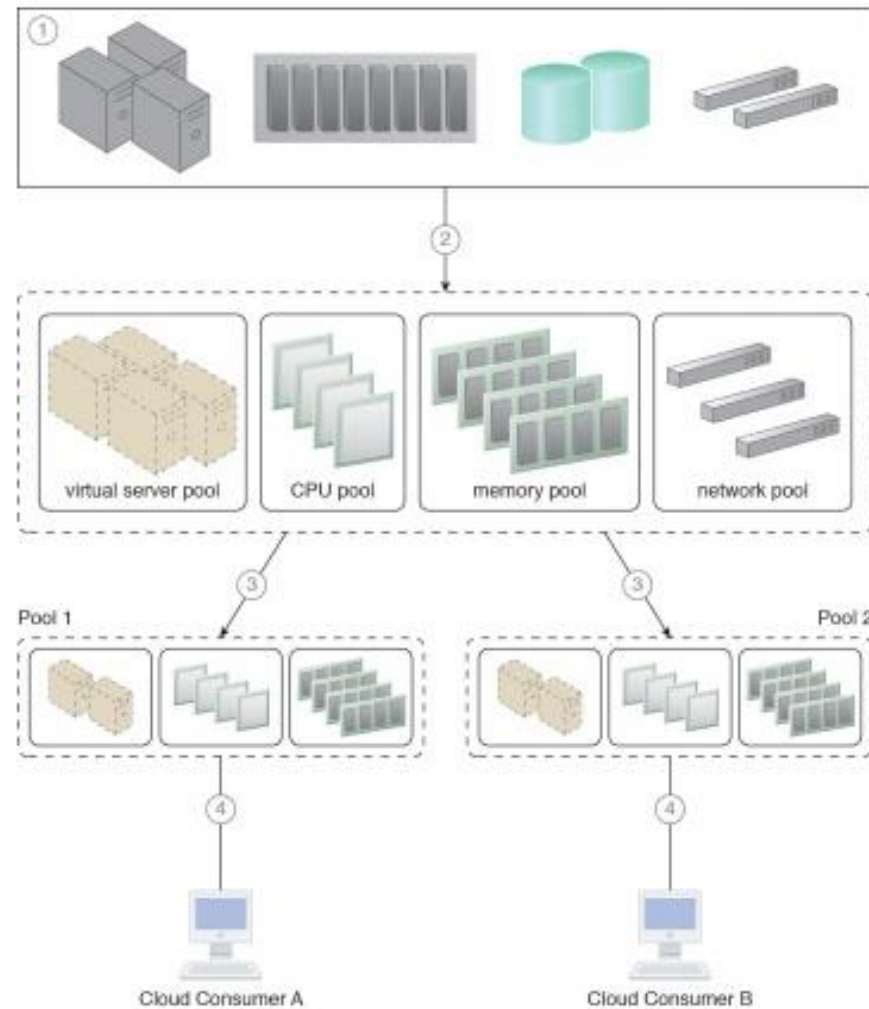
Resource Pooling

- Cloud computing, cloud data centers requires to maintain huge amount of all types of computing resources to provide different services to consumers

- Pooling: Grouping of resources
  - How group or nested groups are formed
  - How resources are organized

- Effective pooling of resources requires appropriate system design and architectural planning

Resource Pooling

- Consumes use well connected pool of computing resources

- No knowledge or control over the locations from where physical resources are allotted to them

- Providers some times ask to choose location(country or continent). Only possible for large service providers who have data centers on multiple locations

- Cloud computing delivers resources to consumers in transparent manner from pool of computing resources.

- Consumer are unaware about the actual resource location

Resource Pooling

Resource Pooling Architecture

- Combine multiple pools of resources
- Each pool groups identical computing resources
- Challenge is to build an automated system to ensure all of the pools get together in synchronized manner
- Computing resources
  - Computer/server
    - Processor
    - Memory
  - Storage
  - Network

Resource Pooling: developing rich pool of processor, memory, storage and network

Resource Pooling Architecture

Resource Pooling: developing rich pool of
processor, memory, storage and network
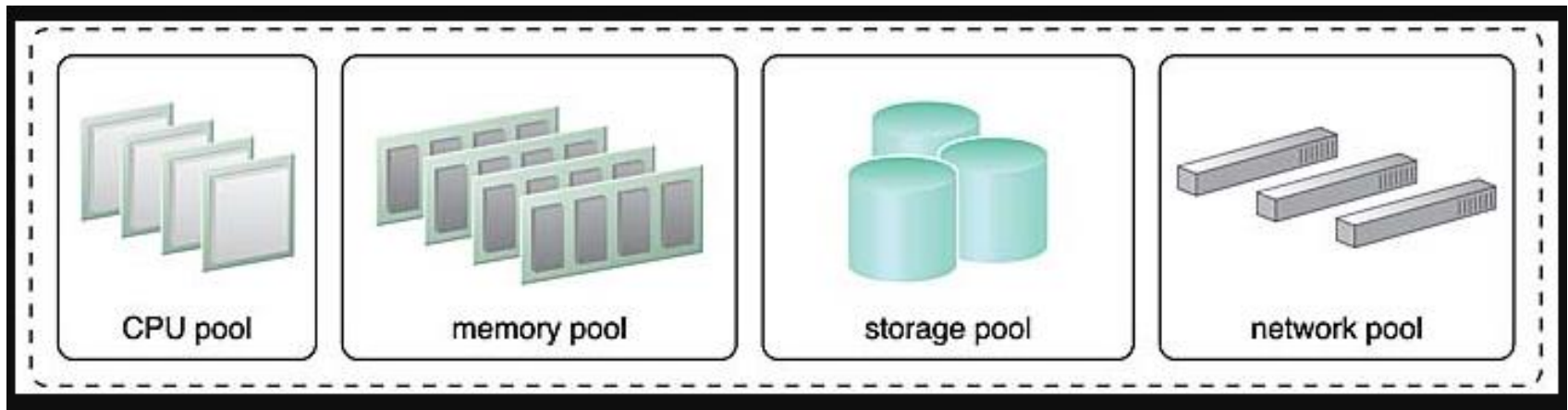
Computer or Server Pool

- Physical machine pools installed with OS and necessary system s/ws

- Virtual machines built on these physical servers and combined into virtual machine pool

- Physical memory and processor components from respective pools linked with virtual servers in virtualized mode

Computer or Server Pool

- Dedicated processor pools
  - Various capacity processors
- Dedicated memory pools
  - Various capacity memories
- Processor and memory are allocated to virtual machine as and when required

virtual server pool
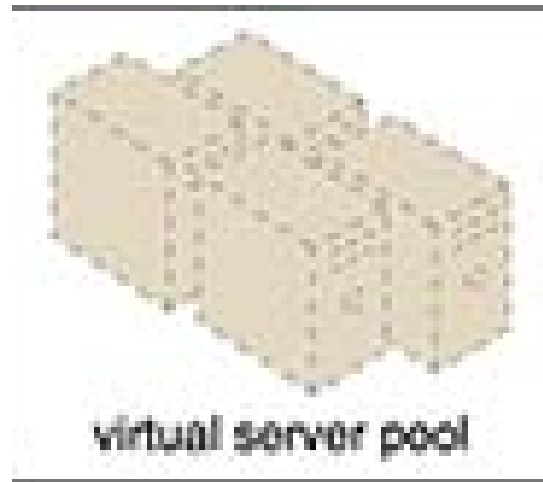
Storage Pool

- File based or Block based storage disks
- Configured with proper partitioning and formatting
- Available to consumers in virtualized mode
- Virtual storage disks are actually saved in pre-configured physical disk


storage pool

Network Pool

- Network resource owned by service provider and well connected with other pools

- Switches, routers

- Provide in virtualized mode

- Consumers may use for building their own virtual networks
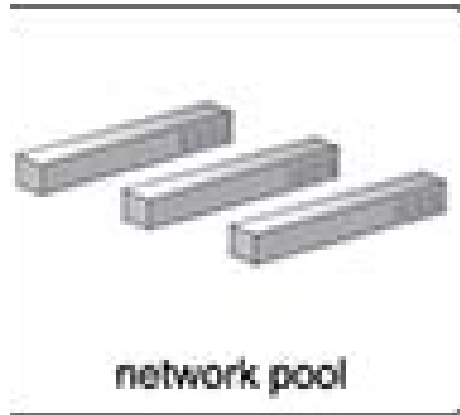
network pool

Hierarchical Organization

- Cloud data centers

- Separate resource pools of processor, memory, storage and network

- Combined in large pool

Hierarchical Organization

K J Somaiya College of Engineering
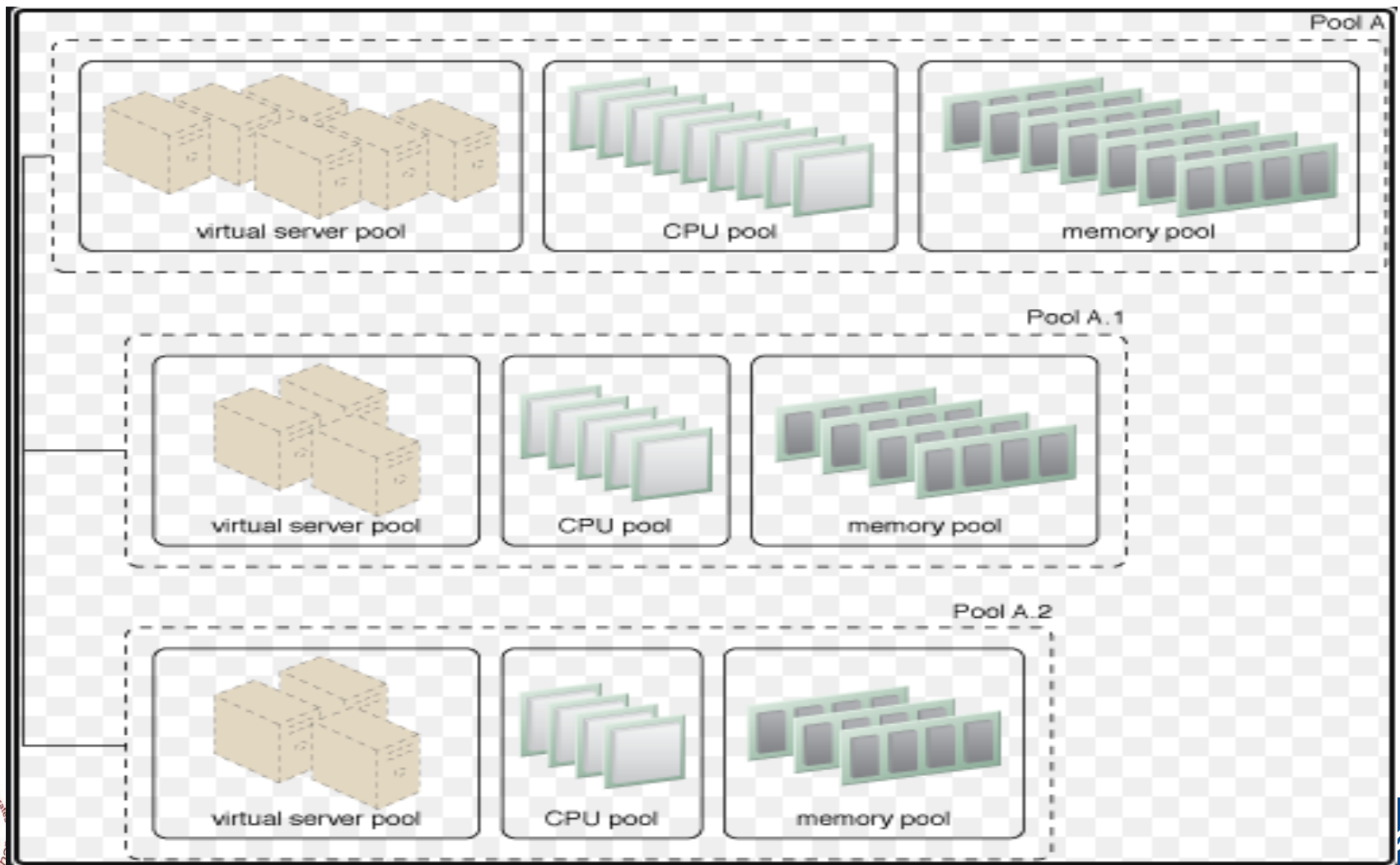
Data Center

- Cloud data centers:

- Commodity H/W: widly available, inexpensive, inter changeable with other H/W of similar type

- Technology have been succeeded to produced high computing performance by combining the power of Commodity H/Ws

- Commodity H/Ws -> achieve operational efficiency

Standardization Automation and Optimization

- Cloud data centers:

- All resource pools made of commodity H/W wrapped with virtualization

- This virtualization: set of methodologies on which common practices are developed

- Standardization

- Automation

- Optimization

Standardization Automation and Optimization

- Standardization
  - Commodity H/W with various architectural standards
  - Resource virtualization decouples the application instances from underlying H/W systems.
  - Creates the standardized logical resources
    - Automation: Resource deployment, VM instantiation to bring VMs off-line back online and to remove them rapidly and automatically
    - Optimization: get optimal resource performance with limited set of resources

References

- *Cloud Computing*, Sandeep Bhowmik
- Inforit: https://www.informit.com/articles/article.aspx?p=2093407&seqNum=2