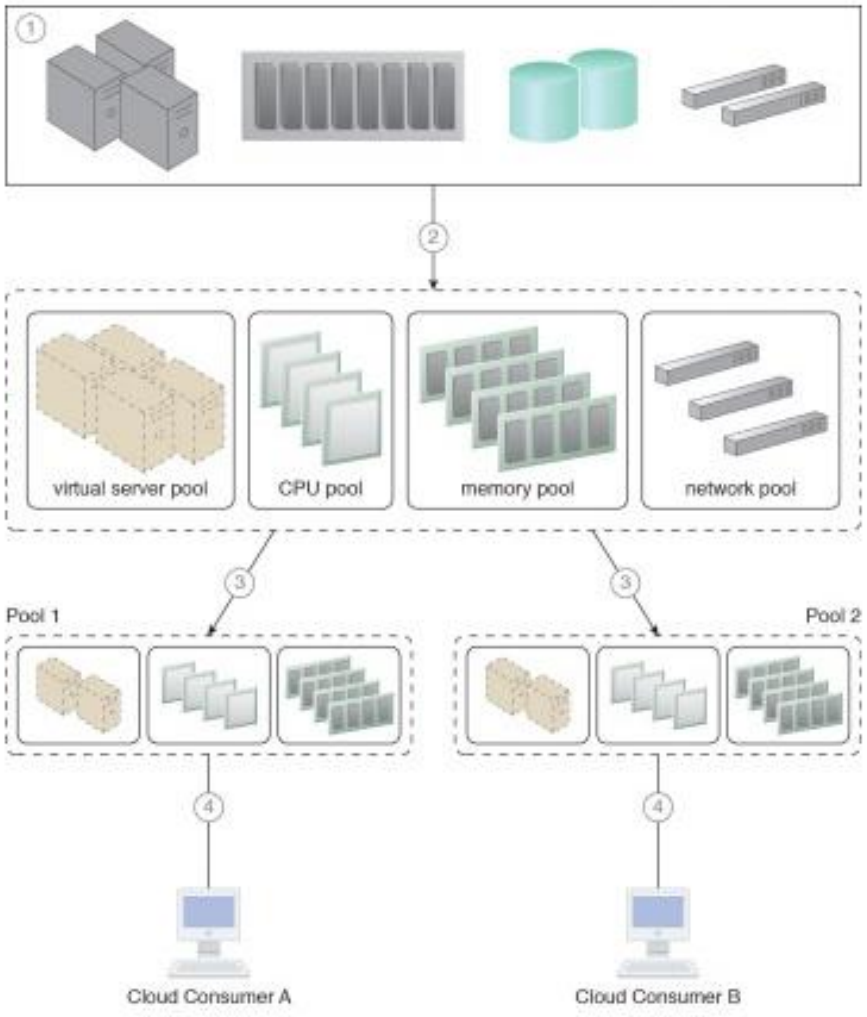
Resource Pooling

- 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



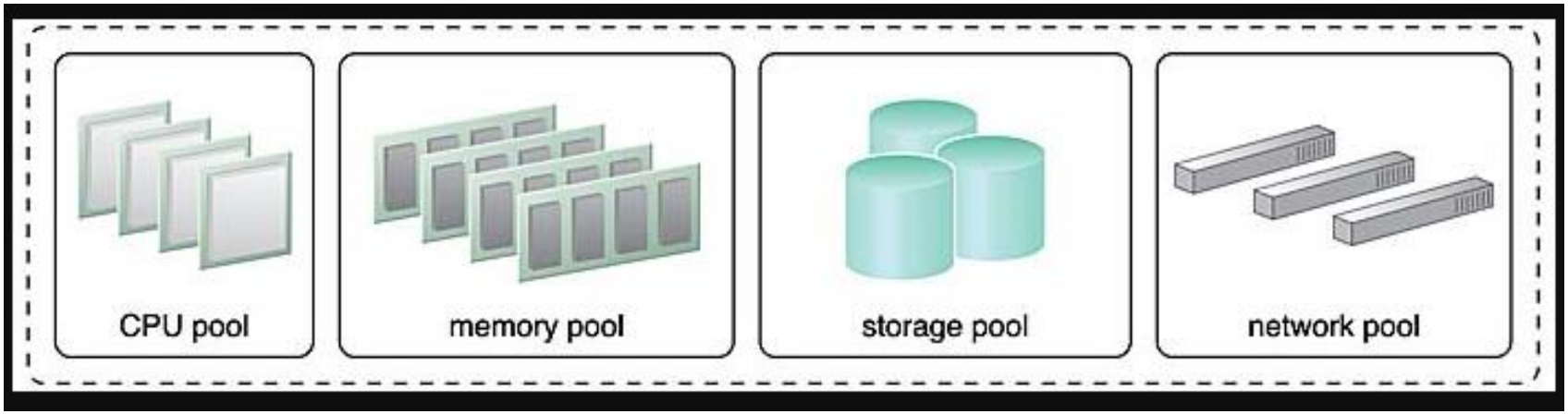
Resource Pooling Architecture

- 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

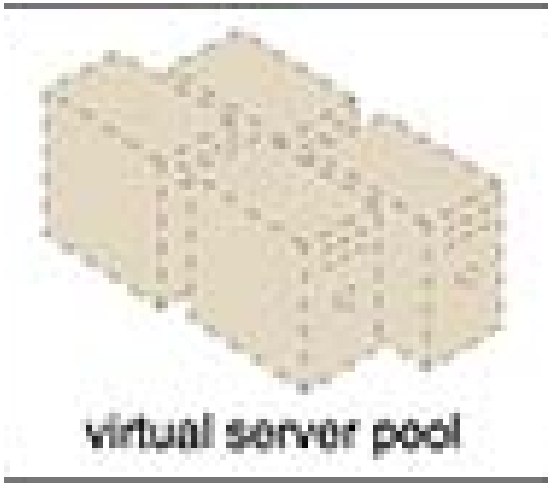


Computer or Server Pool

- 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

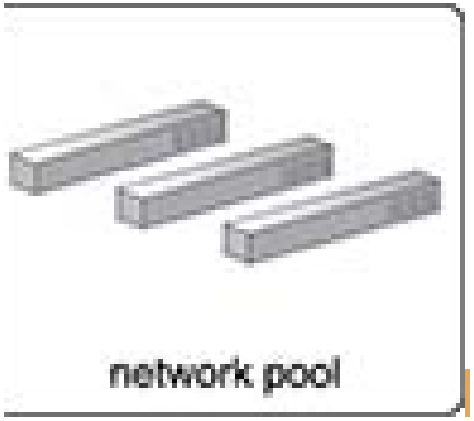


Storage Pool

- 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

Network Pool

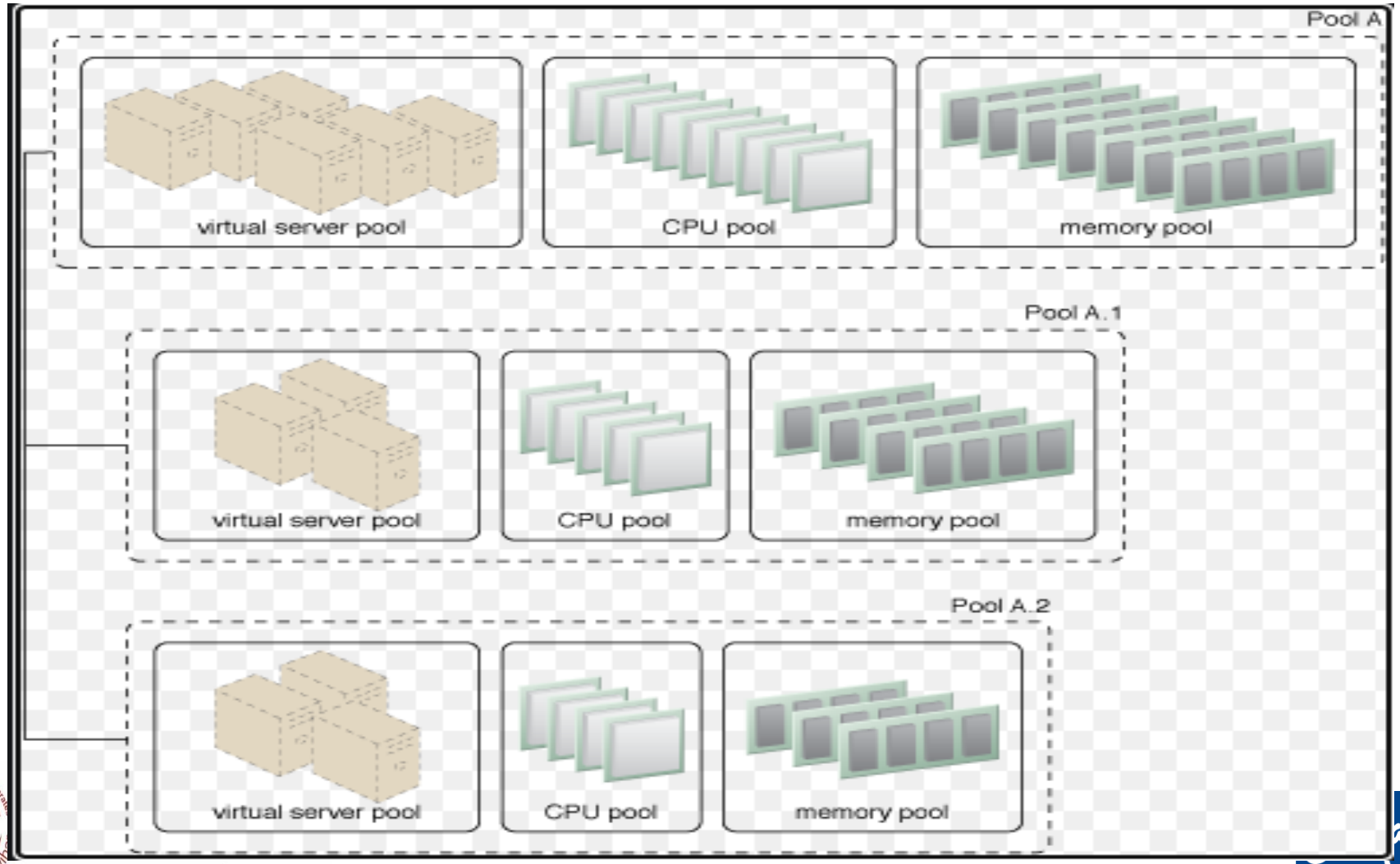
- Network resource owned by service provider and well connected with other pools
- Switches, routers
- Provide in virtualized mode
- Consumers may use for building their own virtual networks



Hierarchical Organization

- Cloud data centers
- Separate resource pools of processor, memory, storage and network
- Combined in large pool

Hierarchical Organization



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