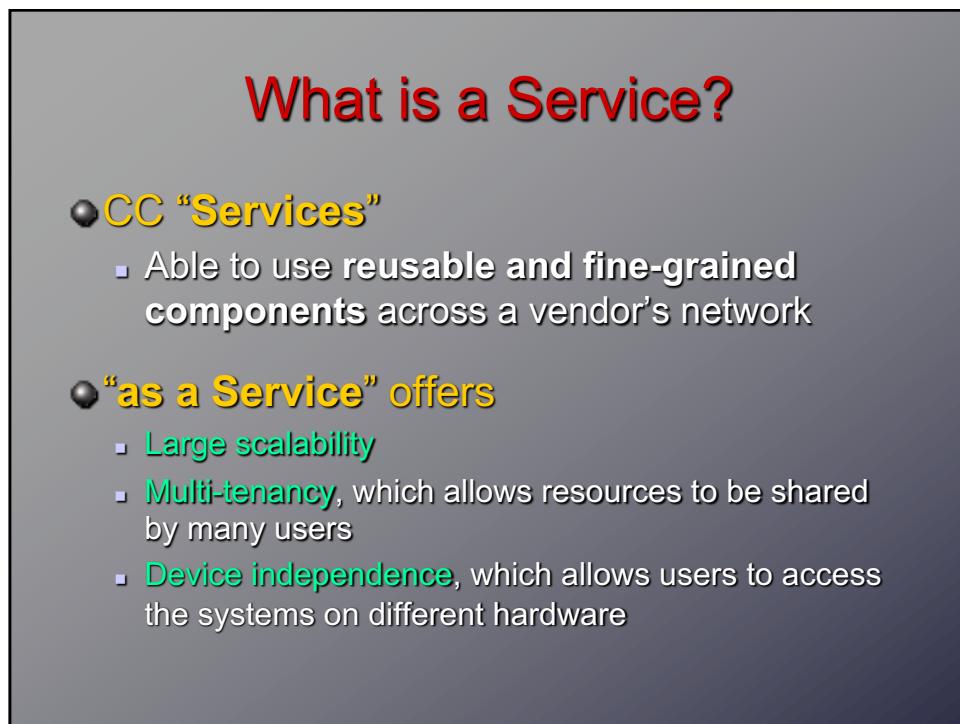
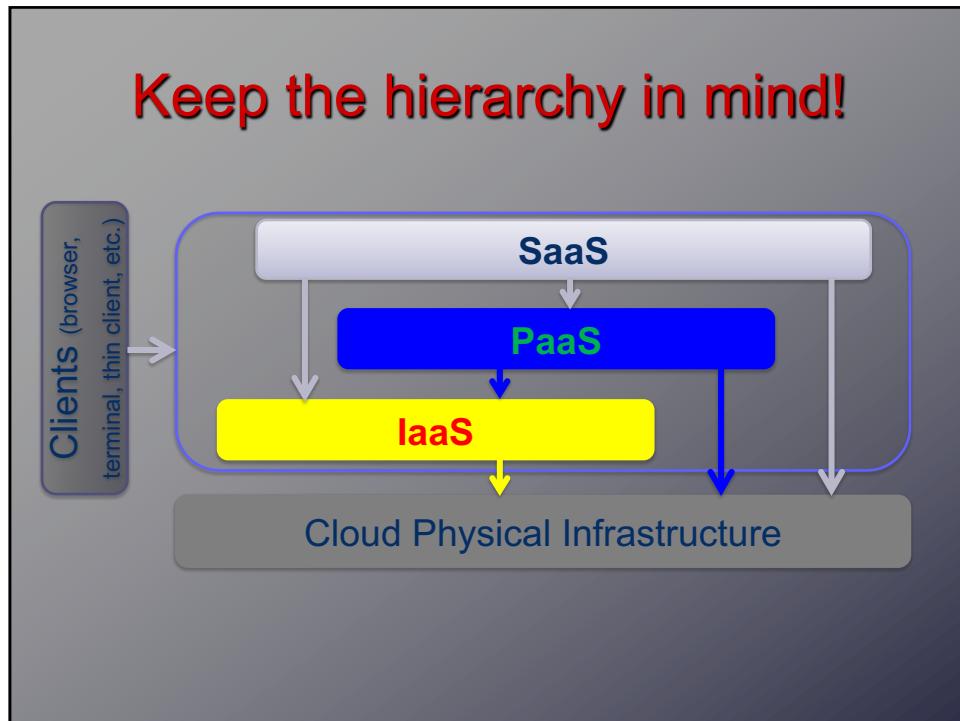


# Infrastructure as a Service (IaaS)

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## Learning Outcomes

- Define IaaS
- Define system redundancy
- Define NAS devices
- Define Load balancing
- IaaS solutions
  - Advantages and disadvantages



## Cloud Computing Services!!!

- Storage
- Data
- Information
- Process
- Application
- Platform
- Security
- Management/Governance

Why IaaS?

## Data Centre




(www.datacenterknowledge.com)

- Requirements
  - Access to high-speed Internet service
  - Cooling System to eliminate the heat
  - Administrative staffs: hardware, networks, OS
  - Uninterrupted power supply & power generators
  - Fire suppression systems

## Data Centre

- Single point of failure:
  - Fire, flood, weather, an act of terrorism, etc.
  - Data centre will be shut down




Duplicate




## IaaS Capabilities

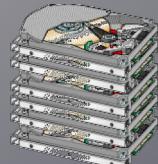
- IaaS

- Offers Low level layer of services available in the clouds.
- Offers the computing hardware resources
- Allows existing applications to be run on a cloud supplier's hardware
- Allows to put whatever they want onto it; i.e., responsible for installing and managing the systems
- Allows to rent resources and management capabilities
- Avoids purchasing and administrating servers

## IaaS resources

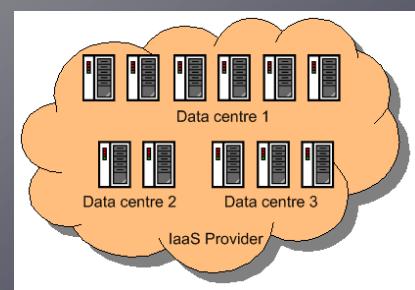
- IaaS allows users to rent resources such as

- CPU cycles
- Storage space
- Servers
- Network equipment, etc.



## IaaS providers

- Hosting IT infrastructure for multiple customers
  - Share power, cooling system, support staff, etc.
- Least expensive to launch a data centre

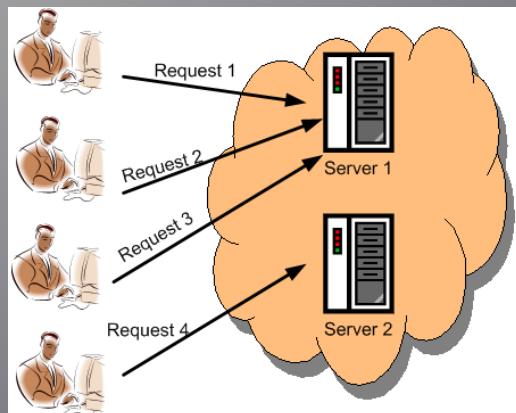


## Server Types

- Customers require one or more servers
- Server Types of a IaaS solution
  - Physical server
    - Hardware is allocated for the customer's dedicated use
  - Dedicated virtual server
    - Virtual server is allocated, which runs on a physical server that may have other virtual servers
  - Share virtual server
    - Access a virtual server that may be shared with other customers

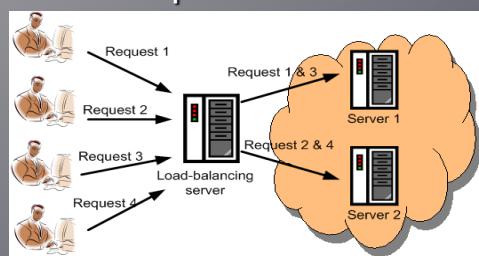
## Load Balancing

- Huge network traffic requirements



## Load Balancing

- Load balancing
  - Share requests across multiple servers
- Load balancing server
  - Between users and Servers
  - Distribute web requests



## Storage Redundancy

- IaaS providers allow to
  - Add servers, processors, RAM, etc.
  - Scale resource allocation
- Colocation
  - Duplicate off-site servers, storage devices
  - Can failover from one location to another
  - Load balancing
  - Co-located resources
    - Less susceptible to power loss, natural disasters, terrorism
    - Improve performance through a distributed workload

## IaaS Advantages & Disadvantages

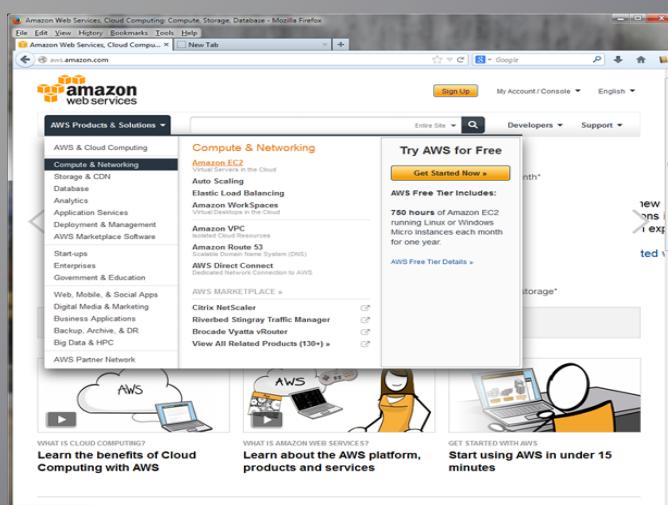
- Advantages
  - Eliminate expensive private infrastructure
  - Ease of hardware scalability
  - Better resource utilisation
  - On-demand; pay-as-you-go scalability
  - Supports Green
  - Complete system admin and management
- Disadvantages
  - Security issues
  - Interoperability issues
  - Performance issues

## Example of IaaS providers

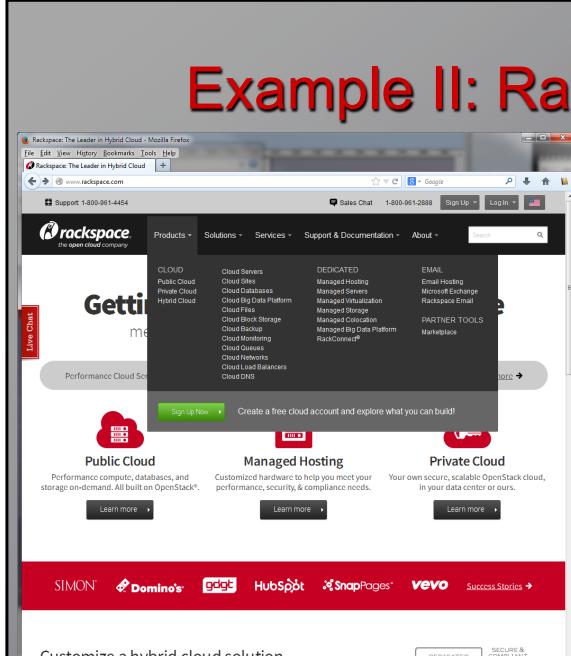
### Top IaaS providers:

- AWS, Bluelock, CSC, GoGrid, IBM,
- OpenStack, Rackspace, Savvis, Terremark, VMWare, HP Cloud, Compute Engine, etc.
- A range of providers using the OpenStack open source cloud stack

## Example I: AWS



## Example II: Rackspace



The screenshot shows the Rackspace website homepage. It features a navigation bar with links for Support, Sales Chat, Sign Up, Log In, and a search bar. Below the navigation is a main menu with categories: CLOUD (Peak Cloud, Private Cloud, Hybrid Cloud), PRODUCTS (Cloud Servers, Cloud Storage, Cloud Databases, Cloud Big Data Platform, Cloud Compute, Cloud Block Storage, Cloud Backup, Cloud Monitoring, Cloud Queues, Cloud Networks, Cloud Load Balancers, Cloud DB), DEDICATED (Managed Hosting, Managed Servers, Managed Virtualization, Managed Compute, Managed Colocation, Managed Big Data Platform, RackConnect), EMAIL (Email Hosting, Microsoft Exchange, Rackspace Email), and PARTNER TOOLS (Marketplace). A sidebar on the left has a 'Live Chat' button. The main content area includes sections for 'Getting Started' (Performance Cloud Services), 'Public Cloud' (Performance compute, databases, and storage-on-demand, all built on OpenStack®), 'Managed Hosting' (Customized hardware to help you meet your performance, security, & compliance needs), and 'Private Cloud' (Your own secure, scalable OpenStack cloud, in your data center or ours). There are also 'Learn more' buttons for each section. At the bottom, there's a red banner with logos for SIMON, Domino's, gdgt, HubSpot, SnapPages®, vevo, and Success Stories, followed by a 'Customize a hybrid cloud solution' button.

**Rackspace:**

- Cloud hosting, managed hosting
- Data centre
- Pay-as-you-go, on-demand storage, load balancing
- Cloud-based email, file sharing, backups, etc.
- Cloud Files: high performance file system

## Example III: Eucalyptus

### Eucalyptus

- <https://www.eucalyptus.com/>
- easy to install and configure the cloud.
- highly configurable and customizable to a variety of environments

```
$ euca_describe_availability_zones verbose
AVAILABILITYZONE myeuccluster 192.168.10.121
AVAILABILITYZONE |-- vm types free / max cpu ram disk
AVAILABILITYZONE |-- m1.small 0016 / 0016 1 128 2
AVAILABILITYZONE |-- c1.medium 0014 / 0014 1 256 5
AVAILABILITYZONE |-- m1.large 0007 / 0007 2 512 10
AVAILABILITYZONE |-- m1.xlarge 0003 / 0003 2 1024 20
AVAILABILITYZONE |-- c1.xlarge 0001 / 0001 4 2048 20
```

### Ubuntu Enterprise Cloud (Ubuntu Cloud Infrastructure)