

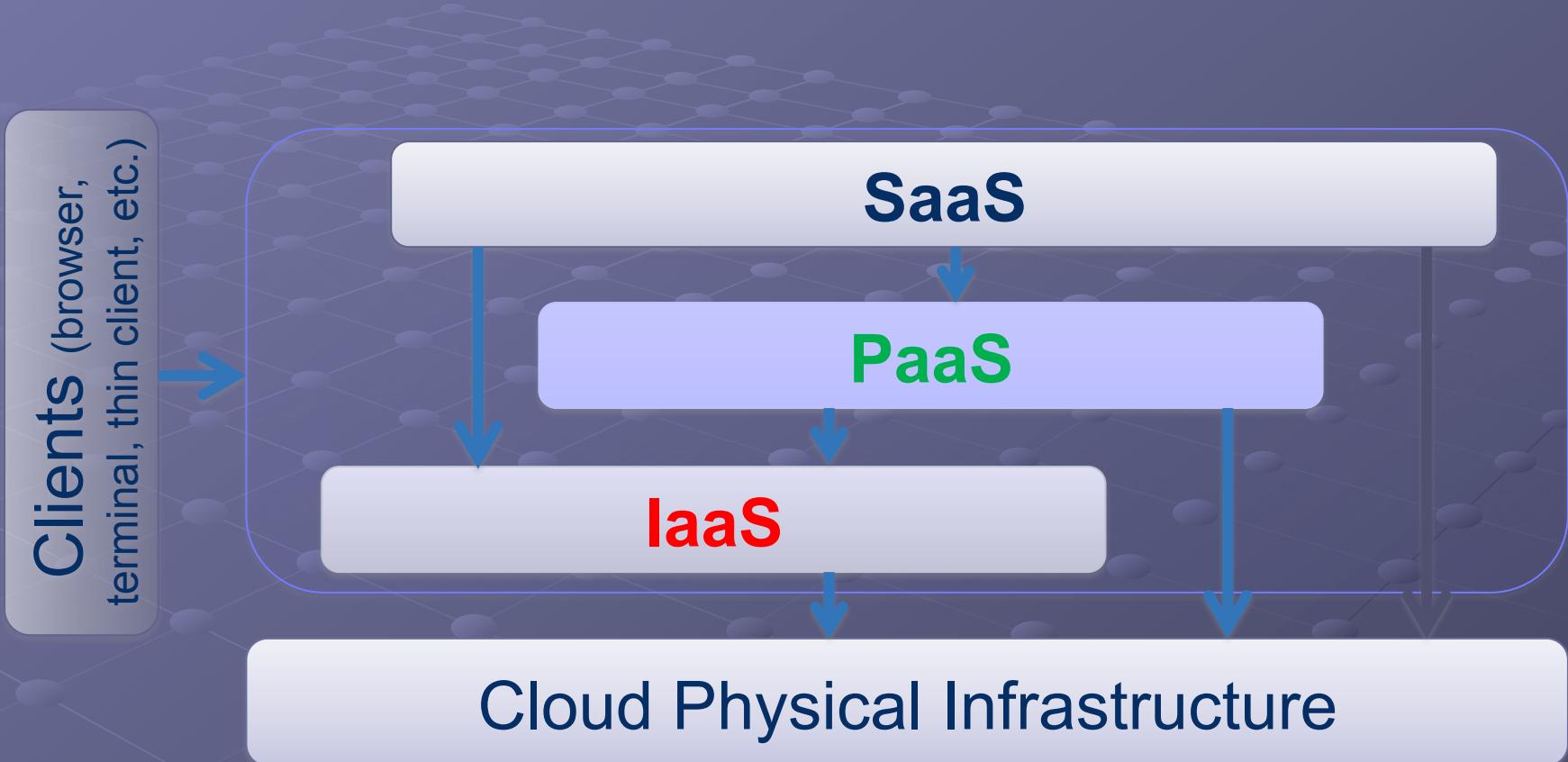
# **Infrastructure as a Service (IaaS)**

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# Outline

- Services
- Define IaaS
- IaaS solutions
- Load balancing
- Pros and Cons of IaaS solutions

# Keep the hierarchy in mind!

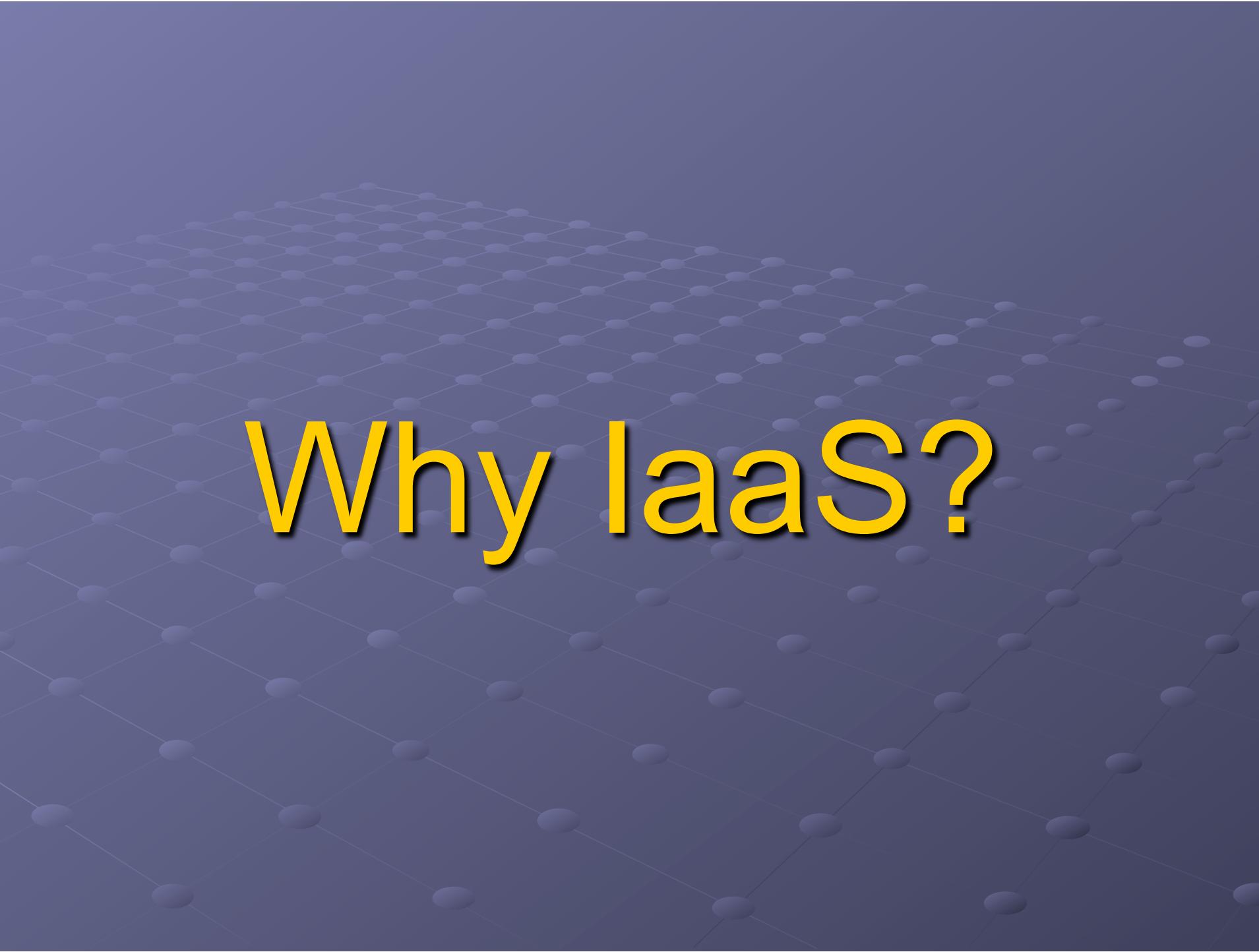


# What is a Service?

- “**Services**” in cloud computing:
  - Able to use **reusable and fine-grained components** across a vendor’s network.
- “**as a Service**” offers:
  - Large scalability
  - Multi-tenancy, which allows resources to be shared by many users
  - Device independence, which allows users to access the systems on different hardware

# Cloud Services!!!

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



# Why IaaS?

# Data Centre



(www.datacenterknowledge.com)

## ● Requirements:

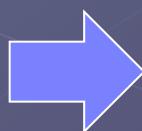
- Access to high-speed Internet service
- Air conditioning to eliminate the heat
- Administrative staffs: hardware, networks, OS
- Uninterrupted power supply & power generators
- Fire suppression systems

# Data Centre

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



Duplicate

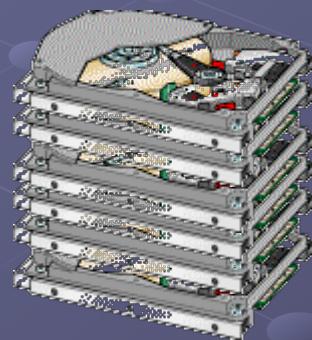


# IaaS

- Lower layer of services available in the clouds.
- Offer the computing hardware resources
- Allow existing applications to be run on a cloud supplier's hardware
- Users can put whatever they want onto it i.e. responsible for installing and managing the systems
- Rather than purchasing and administrating servers, users rents those resources and management capabilities

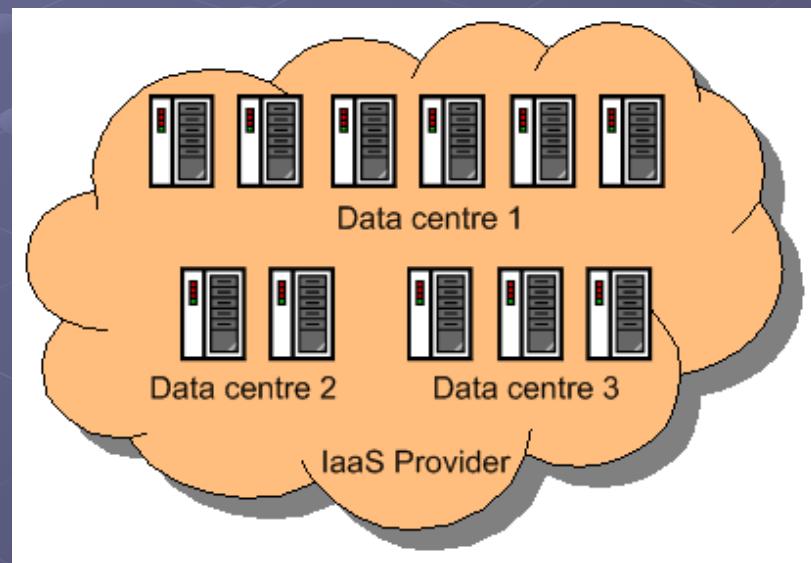
# IaaS resources

- IaaS allows users to rent resources such as:
  - CPU cycles
  - Storage space
  - Server space
  - Network equipment, etc.



# IaaS providers

- Hosting data centres for multiple customers
  - Share power, air conditioning, support staff, etc.
- Least expensive to launch a data centre

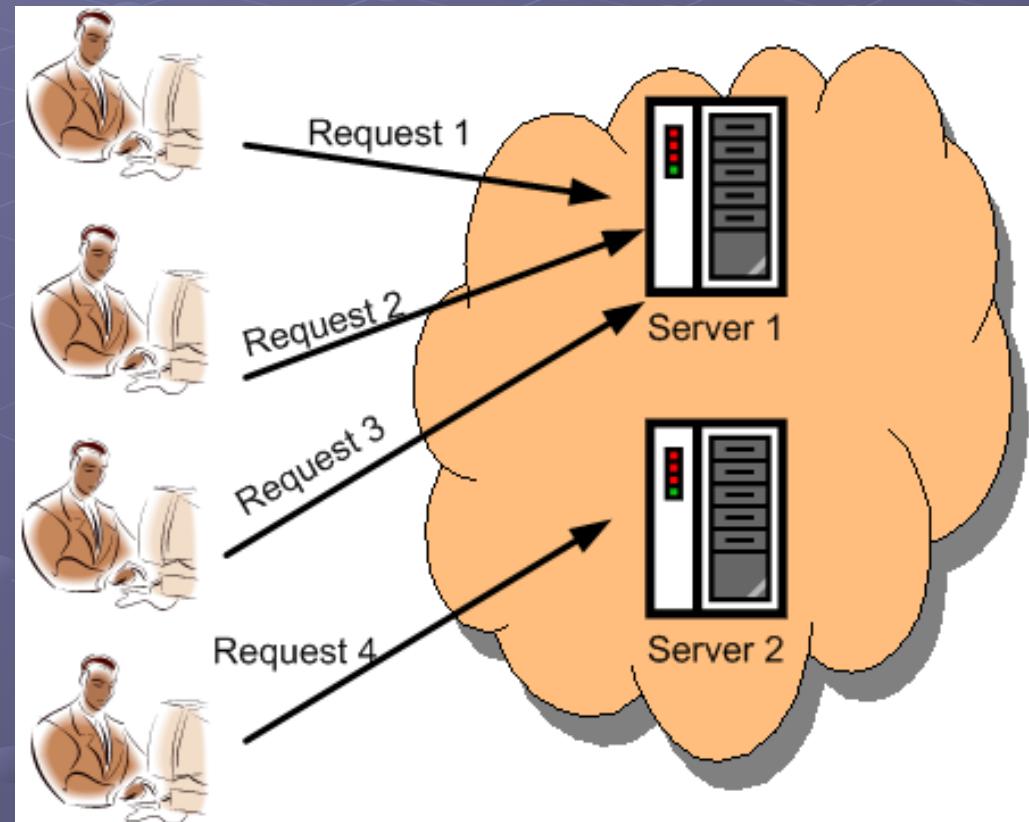


# Server Types

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

# Load Balancing

- Huge network traffic requirements



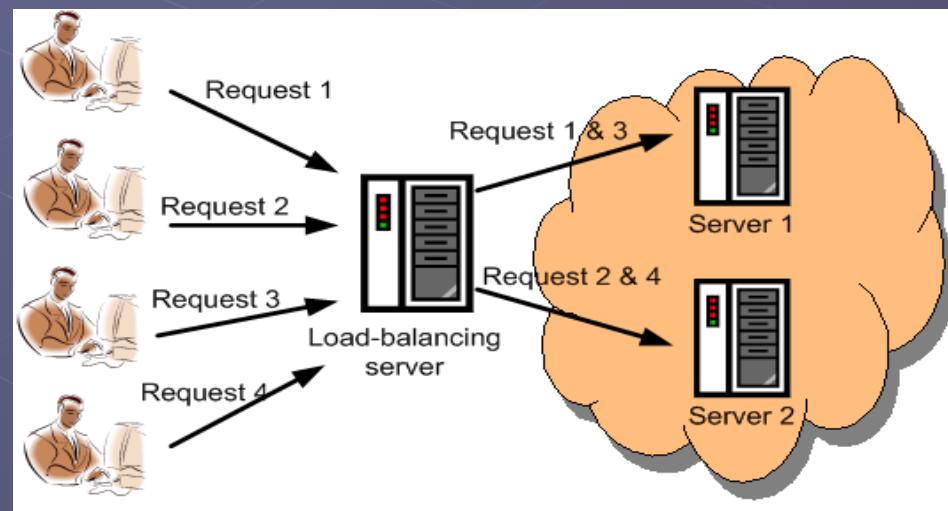
# Load Balancing

- Load balancing:

- Share requests across multiple servers

- Load balancing server:

- Between users and Server
  - Distribute web requests



# Storage Redundancy

- IaaS providers allow to:
  - Add server, processors, RAM, etc.
  - Scale resource allocation
- Colocation:
  - Duplicate off-site servers, storage devices
  - Can fail over from one location to another
  - Load balancing
  - Pros:
    - Less susceptible to power loss, natural disasters, terrorism
    - Improve performance

# Pros and Cons of IaaS

- Pros:

- Elimination of an expensive data centre
- Ease of hardware scalability
- Reduced hardware cost
- On-demand, pay-as-you-go
- Reduction of IT staff

- Cons:

- Manage all software
- Responsibility for maintaining system updates

# Example of IaaS providers

- Top IaaS providers:

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

# Example I: AWS

The screenshot shows the AWS homepage within a Mozilla Firefox browser window. The URL in the address bar is [aws.amazon.com](http://aws.amazon.com). The page features the Amazon logo at the top left. A navigation bar includes links for "Sign Up", "My Account / Console", and "English". On the left, a sidebar titled "AWS Products & Solutions" lists categories like "Compute & Networking", "Storage & CDN", "Database", etc. The main content area highlights "Compute & Networking" services such as EC2, Auto Scaling, and VPC. A prominent "Try AWS for Free" section offers 750 hours of EC2 usage per month. Below this, there are three call-to-action boxes: "WHAT IS CLOUD COMPUTING?", "WHAT IS AMAZON WEB SERVICES?", and "GET STARTED WITH AWS". Each box contains a video thumbnail and descriptive text.

Amazon Web Services, Cloud Computing: Compute, Storage, Database - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Amazon Web Services, Cloud Compu... × New Tab × +

Sign Up My Account / Console English

AWS Products & Solutions

Compute & Networking

Amazon EC2 Virtual Servers in the Cloud

Auto Scaling

Elastic Load Balancing

Amazon WorkSpaces Virtual Desktops in the Cloud

Amazon VPC Isolated Cloud Resources

Amazon Route 53 Scalable Domain Name System (DNS)

AWS Direct Connect Dedicated Network Connection to AWS

AWS MARKETPLACE

Citrix NetScaler

Riverbed Stingray Traffic Manager

Brocade Vyatta vRouter

View All Related Products (130+)

Try AWS for Free

Get Started Now »

AWS Free Tier Includes:

750 hours of Amazon EC2 running Linux or Windows Micro Instances each month for one year.

AWS Free Tier Details »

WHAT IS CLOUD COMPUTING?

Learn the benefits of Cloud Computing with AWS

WHAT IS AMAZON WEB SERVICES?

Learn about the AWS platform, products and services

GET STARTED WITH AWS

Start using AWS in under 15 minutes

aws.amazon.com/ec2/

# Example II: Rackspace

The screenshot shows the Rackspace website homepage in a Mozilla Firefox browser window. The URL in the address bar is [www.rackspace.com](http://www.rackspace.com). The page features a navigation bar with links for Support, Sales Chat, Sign Up, Log In, and a search bar. A sidebar on the left includes a 'Live Chat' button and a 'Getting started' section. The main content area highlights 'Public Cloud', 'Managed Hosting', and 'Private Cloud' services, each with a 'Learn more' button. A central call-to-action button says 'Create a free cloud account and explore what you can build!'. The footer contains logos for SIMON, Domino's, gdgt, HubSpot, SnapPages, vevo, and Success Stories, along with 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 myueccluster 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)

# Summary

- IaaS definition
- IaaS providers solution
- Pros and cons of IaaS
- Examples of IaaS providers