Chapter 1
Cloud Systems Introduction

Mastering Cloud Computing

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(based on materials from Paul Talaga)

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As of now, computer networks are still in their infancy, but as they grow up and become sophisticated, we will probably see the spread of 'computer utilities' which, like present electric telephone utilities, will service individual homes and offices across the country.

-Leonard Kleinrock, 1969, ARPANET

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The vision...


I need to grow my infrastructure, but I do not know for how long...
I have a lot of infrastructure that I want to rent ...
I have a surplus of infrastructure that I want to make use of
I cannot invest in infrastructure, I just started my business....
I have infrastructure and middleware and I can host applications
Global Cloud Marketplace
I want to focus on application logic and not maintenance and scalability issues
I have infrastructure and provide application services
I want to access and edit my documents and photos from everywhere..

Defining Cloud Computing

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Huh?

- It's a Buzzword!
- Term for MANY ideas and concepts

Cloud computing refers to both the applications delivered as services over the Internet and the hardware and software in the datacenters that provide those services. - Armburst

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. - NIST

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Reese's definition (as a utility)

- The service is accessible via a Web browser or a Web services application programming interface (API)
- Zero capital expenditure is necessary to get started.
- You pay only for what you use as you use it.

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A cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers.

Buyya et al, (our text author)

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What types of clouds exist?

Cloud Deployment Models

Public/Internet Clouds

* 3rd party, multi-tenant Cloud infrastructure & services:

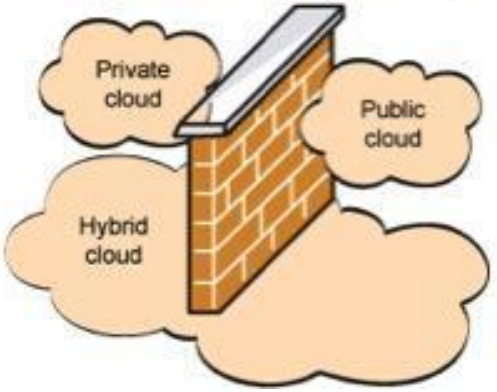
* available on subscription basis to all.

Private/Enterprise Clouds

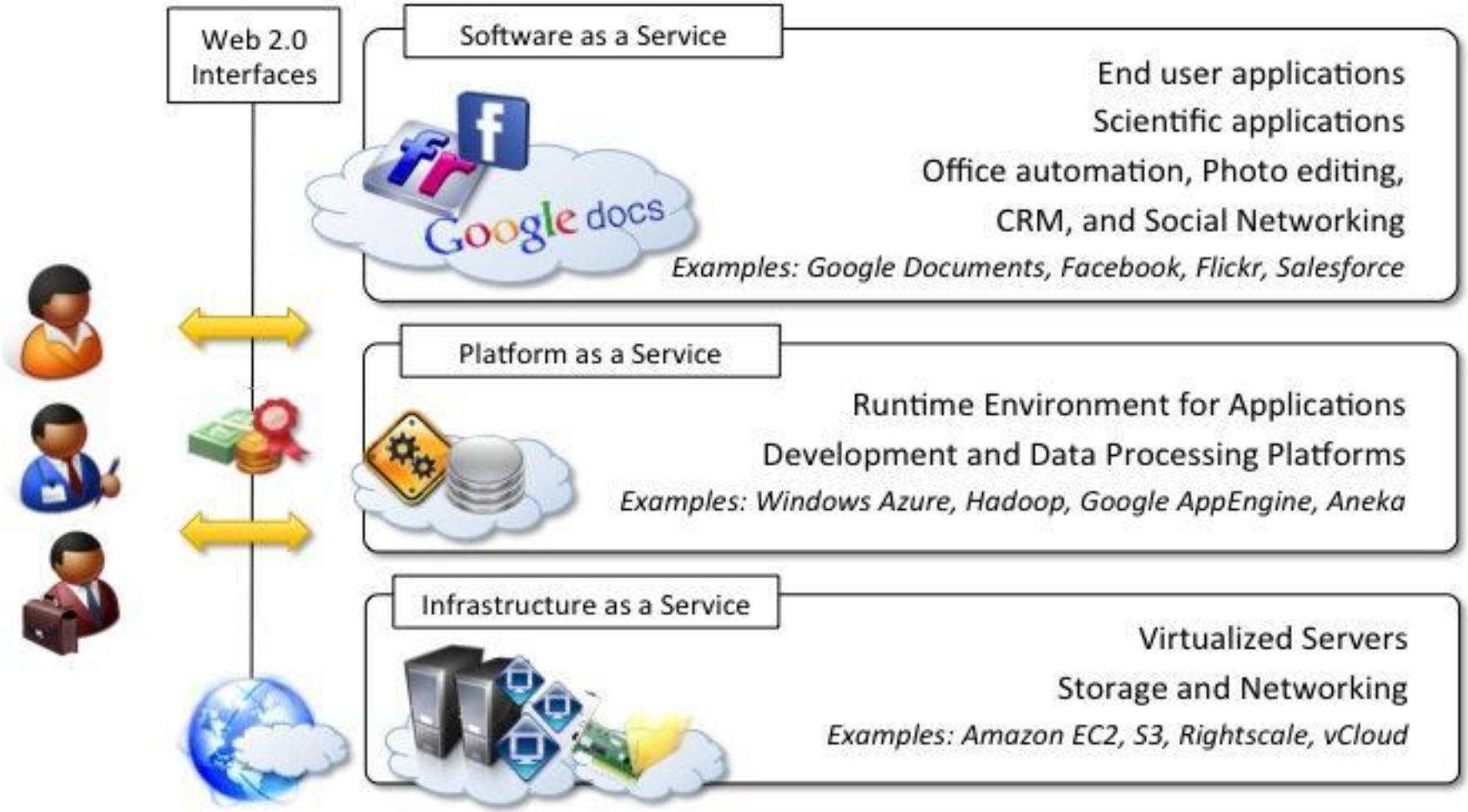
* A public Cloud model within a company's own Data Center / infrastructure for internal and/or partners use.

Hybrid/Inter Clouds

* Mixed usage of private and public Clouds: Leasing public cloud services when private cloud capacity is insufficient



Reference Models



What are the benefits to a (regular) business?

- No up-front commitments
- On-demand access
- Nice pricing (capital costs -> utility costs, no depreciation)
- Simplified app acceleration and scalability
- Efficient resource allocation
- Energy efficiency??
- Seamless creation and use of third-party services

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Benefits for a software company going to SaaS?

- NO deployment issues (CDs, downloads, etc)
- No need to support multiple OSs
- Faster to market
- A/B testing of features
- Efficiency and reliability now key
- More efficient developers, just try it!

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Storms may be on the horizon..

- Security
  - Confidentiality, Secrecy, Protection
- Legal
  - Google/Facebook privacy
  - Differing viewing laws
- Latency & Data Location (later)

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How did we get here?

5 core technologies:

1. Distributed Systems
2. Virtualization
3. Web 2.0
4. Service-oriented computing
5. Utility-oriented computing

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