



# Cloud Computing & Lab Computing

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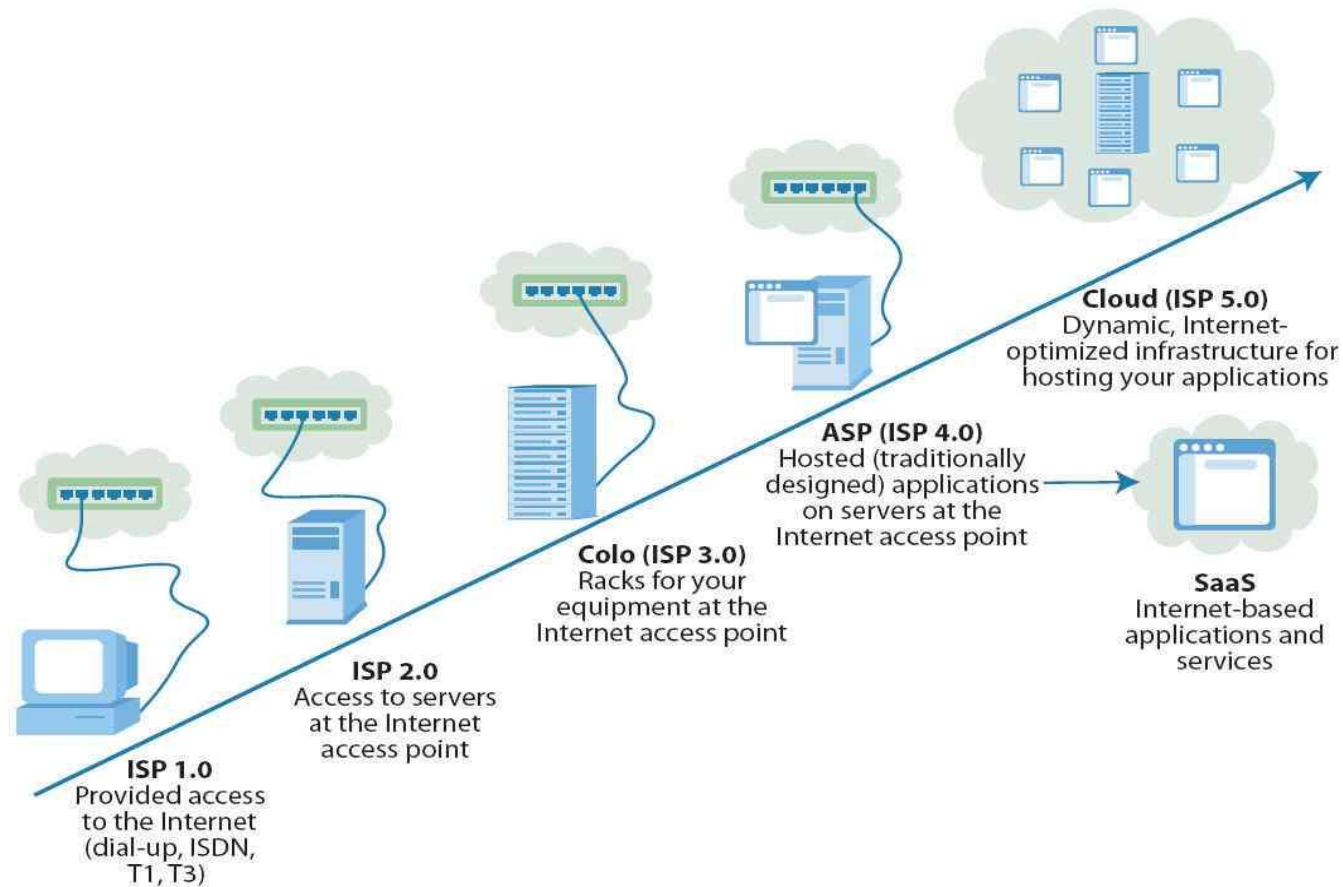
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# What is Cloud Computing?



# Evolution of the Cloud

**Figure 3** Cloud Computing: The Latest Evolution Of Hosting



# Definition of Cloud Computing

**Cloud Computing refers to the:**

- ↻ **Use of computing resources (HW & SW)**
- ↻ **Delivered as a service, via**
- ↻ **A network (typically internet).<sup>1</sup>**

Source 1: Wikipedia [http://en.wikipedia.org/wiki/Cloud\\_computing](http://en.wikipedia.org/wiki/Cloud_computing)



# Types of Cloud Computing

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## ☞ **Private**

- ☞ Cloud infrastructure provided and used solely over a proprietary private network.
- ☞ Private clouds are managed by the organization it serves

## ☞ **Community**

- ☞ Shared infrastructure between several organizations with a common purpose and in a shared costing model

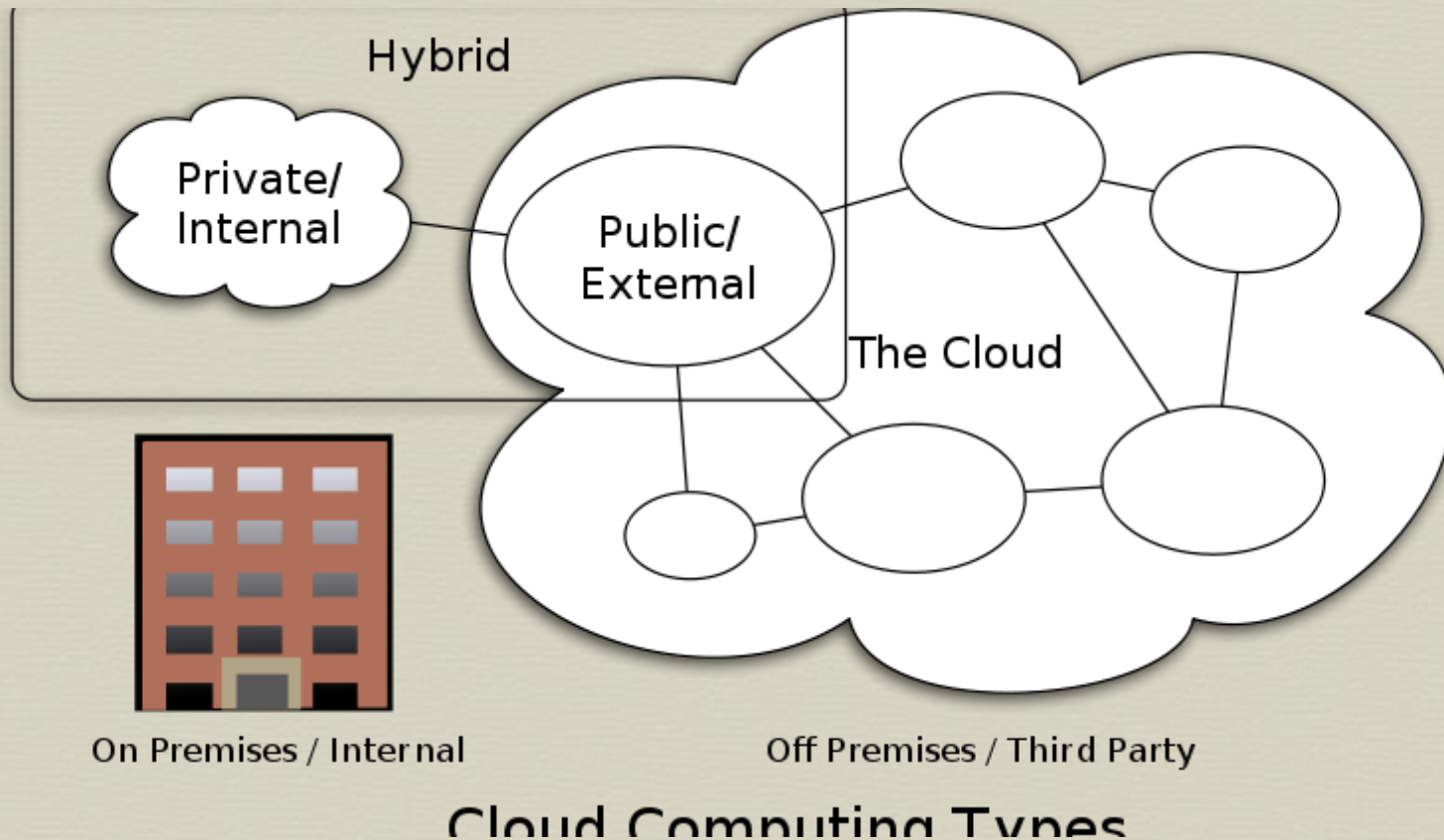
## ☞ **Public**

- ☞ Resources such as applications, storage made available to general public over the internet
- ☞ Vendors: Amazon, Microsoft, Google, Rackspace

## ☞ **Hybrid**

- ☞ A combination of public, community and private cloud

# Type of Cloud - Illustration



# Cloud Service Options

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- ☞ SaaS – Software As a Service
- ☞ PaaS – Platform As a Service
- ☞ IaaS – Infrastructure As a Service
- ☞ RaaS – Recovery As a Service
- ☞ BaaS – Backup As a Service
- ☞ STaaS – Storage As a Service
- ☞ DaaS – Desktop As a Service
- ☞ TEaaS – Test Environment As a Service
- ☞ ..... And the list goes on

# Cloud Sourcing

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- ❧ Similar to outsourcing
- ❧ Enables organizations to outsource migration and management of IT Solutions to the cloud
- ❧ Refers specifically to sourcing complete solutions to the cloud by cloud sourcer bringing together cloud apps, infrastructure and platforms



# Cloud Success Stories

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- **GE**

- Global procurement hosting 500k suppliers and 100k users in six languages on SaaS platform to manage \$55B/yr in spend

- **Washington DC**

- Google Apps used by 38k employees reducing costs to 50/user per year for email, calendaring, documents, spreadsheets, wikis, and instant messaging

- **Eli Lilly**

- Using Amazon Web Services can deploy a new server in 3min vs 50days and a 64-node Linux cluster in 5min vs 100days

- **NASDAQ**

- Using Amazon Storage to store 30-80GB/day of trading activity

# Potentials for cloud sourcing for Lab

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- ☞ Digital Pathology
- ☞ Advanced Analytics and Transactional Analytics
- ☞ Billing (SaaS)
- ☞ Lab Information System (SaaS)
- ☞ Collaboration Portals
- ☞ Connectivity
- ☞ Email
- ☞ IT Cloudsourcing
- ☞ And of course other IT functions– IaaS, DaaS, BaaS, STaaS etc...

# Benefits of Cloud Computing

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- ☞ Scale, Flexibility, Adaptability – Cloud offers very scalable solutions to fit your capacity
- ☞ Low cost entry – CAPEX & OPEX
- ☞ Agility – break shackles of asset depreciation, and time to market for solutions
- ☞ Focus on core competency – Option to focus on core competency and cloud source the rest
- ☞ Better collaboration and communication

# Cloud Strategy – Things to consider (To be or not to be)

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- ☞ Core Competency & Core Business
- ☞ IT Architecture, internal infrastructure investments & standards
- ☞ Organizational Culture & IT Culture
- ☞ Maturity of cloud solutions & supportability
- ☞ Applications suitable for cloud sourcing – Start w/ Application Portfolio Management
- ☞ Size and scale of IT organizations – Public vs. Hybrid Cloud
- ☞ From now on – **To Cloud or not to Cloud**

# Cloud Vendors (Familiar Names)

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- ☞ Amazon Web Services (AWS)
- ☞ Force.com (Salesforce.com)
- ☞ Office 365 & Azure (Microsoft)
  
- ☞ Lab Cloud Vendors
  - ☞ Aurora Interactive
  - ☞ Viewics (Lab Analytics)
  - ☞ Atlas, 4Medica (SaaS vendors)

# Cloud Challenges

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- ☞ Security & Privacy
- ☞ Compliance – regulatory – HIPAA
- ☞ Vendor lock & portability
- ☞ Reliability (lack of control in outage situations)
- ☞ Integration challenges in a Hybrid cloud
- ☞ Ownership of data

# Cloud Implementations (My Involvement)

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- ☞ Backup As A Service - AWS
- ☞ Recovery As A Service – IT Lifeline
- ☞ Software As A Service – Viewics, 4Medica, Aurora Interactive
- ☞ Extensive Research in
  - ☞ Storage As A Service (IBM)
  - ☞ Office 365 (Microsoft)
  - ☞ Infrastructure As A Service (Data Center Cloud sourcing)



## Questions