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IST 615 – CLOUD MANAGEMENT

INTRODUCTION

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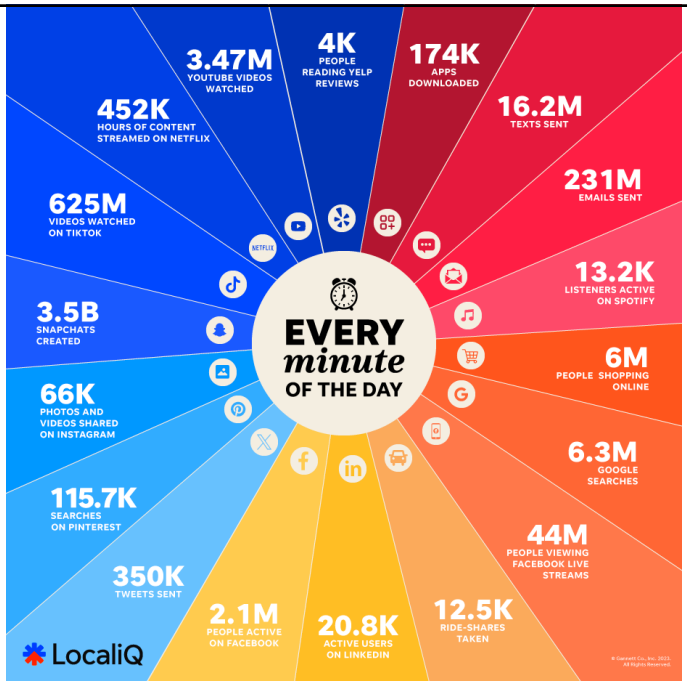

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Source: https://localiq.com/blog/what-happens-in-an-internet-minute/

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Cloud infrastructure

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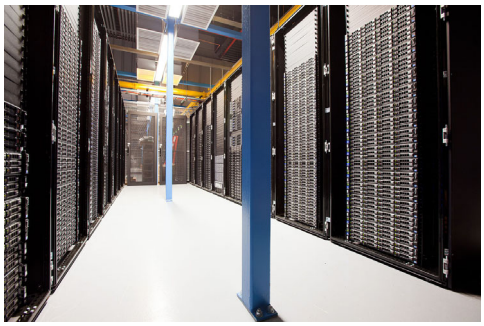
What is the cloud
https://www.youtube.com/watch?v=94PO2-TL4Vs



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The "Cloud"

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- Short for 'Cloud Computing'
  - Commercial services that evolved from scientific grid computing & enterprise-scale distributed computing
- Definition by NIST (National Institute of Standards and Technology)
  - 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.

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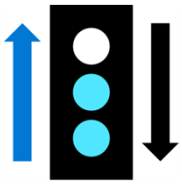
What is cloud computing?

Cloud Computing is the delivery of computing services over the internet, enabling faster innovation, flexible resources, and economies of scale.

Compute



Networking

Storage

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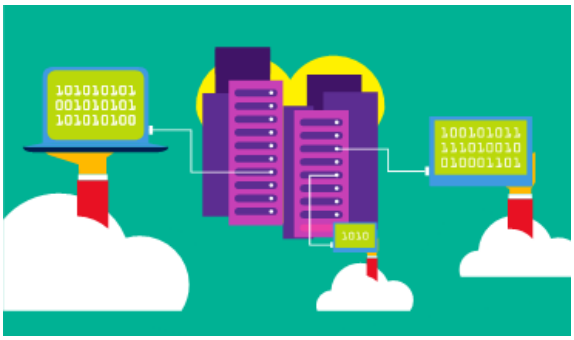
Public cloud

- Owned by cloud services or hosting provider.
- Provides resources and services to multiple organizations and users.
- Accessed via secure network connection (typically over the internet).



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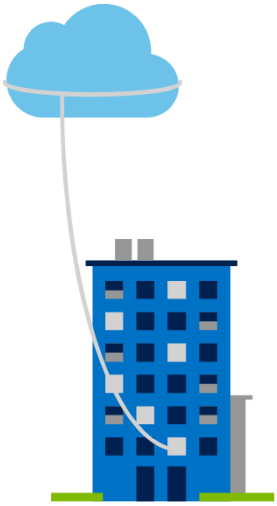
Private cloud

- Organizations create a cloud environment in their datacenter.
- Organization is responsible for operating the services they provide.
- Does not provide access to users outside of the organization.



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Hybrid cloud

Combines **Public** and **Private** clouds to allow applications to run in the most appropriate location.

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Cloud model comparison

Public Cloud	• No capital expenditures to scale up. • Applications can be quickly provisioned and deprovisioned. • Organizations pay only for what they use.
Private Cloud	• Hardware must be purchased for start-up and maintenance. • Organizations have complete control over resources and security. • Organizations are responsible for hardware maintenance and updates.
Hybrid Cloud	• Provides the most flexibility. • Organizations determine where to run their applications. • Organizations control security, compliance, or legal requirements.

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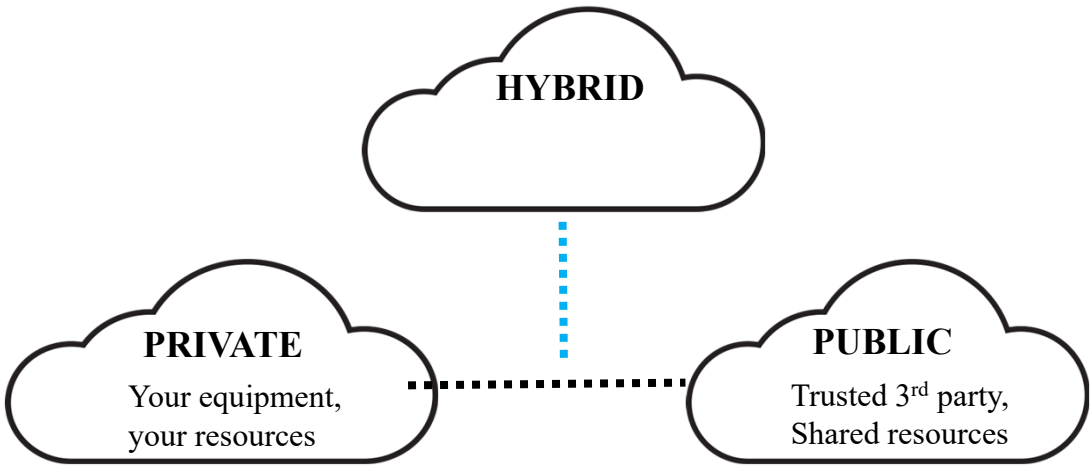
Cloud computing environments (Deployment models)



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Cloud Provider – Major Activities

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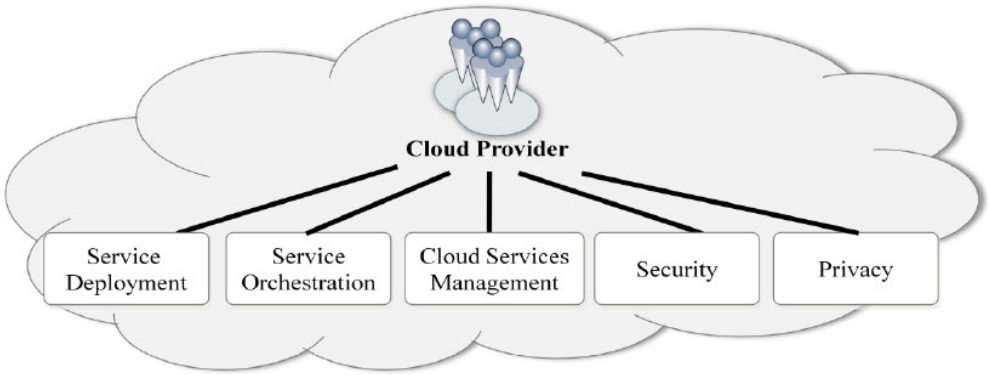

Source: NIST

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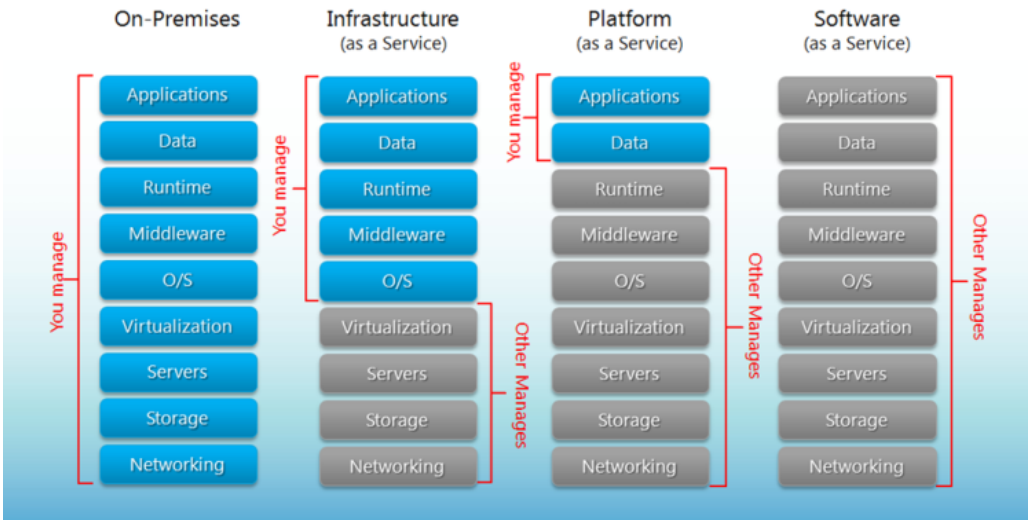
(Basic) Cloud Service Models



https://blogs.technet.microsoft.com/kevinremde/2011/04/03/saas-paas-and-iaas-oh-my-cloudy-april-part-3/

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Computing infrastructure / Virtualization / Cloud (2)

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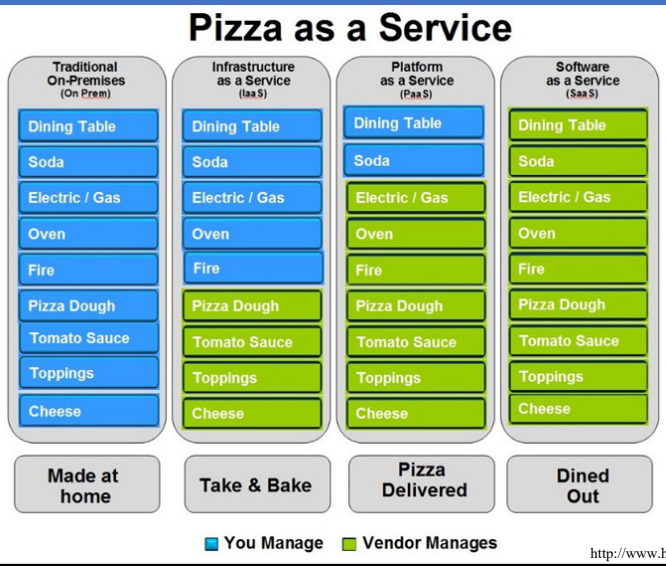

http://www.hostingadvice.com/how-to/iaas-vs-paas-vs-saas/

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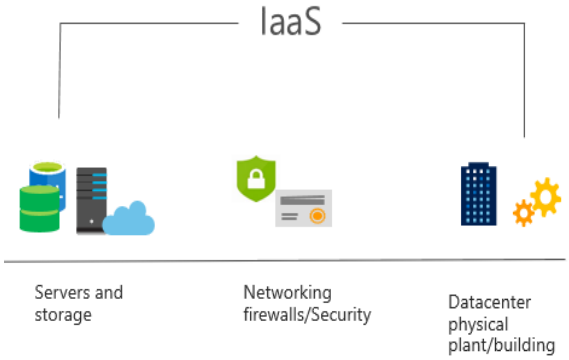
Infrastructure as a Service (IaaS)

Build pay-as-you-go IT infrastructure by renting servers, virtual machines, storage, networks, and operating systems from a cloud provider.



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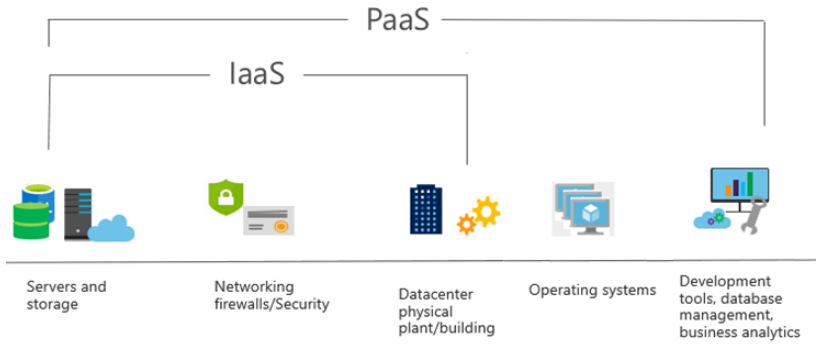
Platform as a Service (PaaS)

Provides environment for building, testing, and deploying software applications; without focusing on managing underlying infrastructure.



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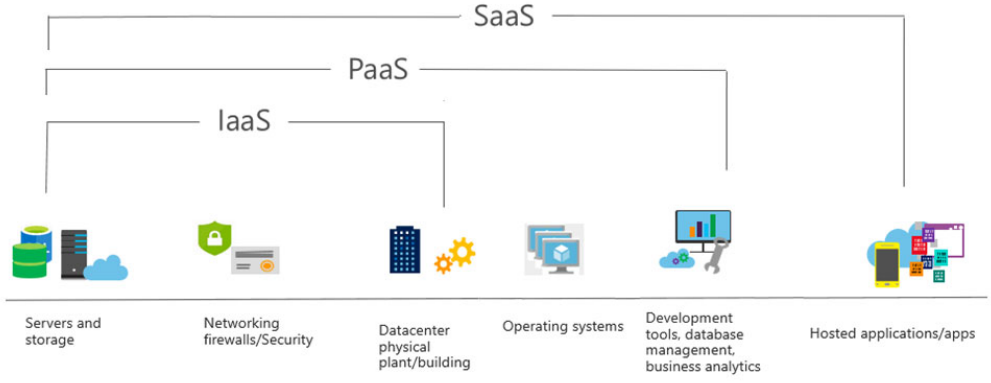
Software as a Service (SaaS)

Users connect to and use cloud-based apps over the internet: for example, Microsoft Office 365, email, and calendars.



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(Basic) Cloud Service Models

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- IaaS: Infrastructure as a Service
  - Provider hosts hardware, servers, storage on behalf of the users
    - Scalable resources on demand
    - Pay for what you use
- PaaS: Platform as a Service
  - User has control over the deployed applications and possibly configuration settings
- SaaS: Software as a Service
  - SaaS uses the web to deliver applications to the user that are managed by the cloud service provider on infrastructure controlled by the provider

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Serverless Computing

With **serverless computing applications**, the cloud service provider automatically provisions, scales, and manages the infrastructure required to run the code.

Azure Functions is code running your service and not the underlying platform or infrastructure. It creates infrastructure based on an event**.**

Azure Logic Apps is a cloud service that helps you automate and orchestrate tasks, business processes, and workflows when you need to integrate apps, data, systems, and services.

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APPLICATIONS & SERVICES

COMPUTE NETWORK STORAGE

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Modern Cloud Services

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- AWS
  - https://aws.amazon.com/products/
- Microsoft
  - https://azure.microsoft.com/en-us/services/
- Google
  - https://cloud.google.com/products/

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Main resources provided by cloud services and/or datacenters

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- **Compute** (Computational Resources)
  - The capability to process information and perform computations
- **Network** (Networking services)
  - Access via a network (public/private) to the resources in the cloud/datacenter
  - The capability to "expose" customized applications and or services to external or internal users
- **Storage**
  - The capability to have information accessible at any time in the future until it is intentionally deleted

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Compute (Computational Resources)

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- CPU (Central Processing Unit)
  - Executes the instructions of a computer program
  - Performs computations, memory management, control of computer hardware (input/output devices)
    - Sometimes uses specialized processing units to perform these functions
      - Delegates but supervises
- Characterization
  - Clock speed
  - Cache
  - Cores (Number of "internal" processor)
  - Others:
    - Density (fabrication process), system bus speed
- Do not confuse with GPU

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Network (Networking services)

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- Network infrastructure provides connectivity between systems
- Network services facilitate connectivity in different ways and may also provide security
  - IP address assignment
  - DNS
  - Proxy
  - Firewalls
- Characterization:
  - Speed (connectivity speed / data rate)
  - Security (encrypted traffic, private routing, etc).
  - …

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Networks: Internet System Architecture

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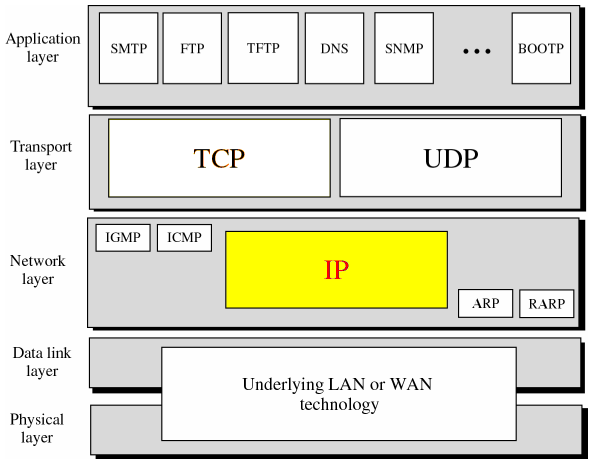

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Storage

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- Storage capabilities provide a mechanism to have "persistent" bundles of information
  - Database records
  - Photos, documents, music, video, etc.
- Characterization:
  - Size (amount of storage space)
  - Input/Output (Read/Write) speed
  - Technology (FCP, SSD, etc)

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Cloud computing – Concepts recap (so far)

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https://www.youtube.com/watch?v=M988_fsOSWo

Up to minute 5

Optional

- https://www.youtube.com/watch?v=P6rqTlNdVFg

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To do:

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- Recommended material
  - Networking Foundations review
    - Short course, available in LinkedInLearning:
      - https://su-jsm.atlassian.net/wiki/spaces/ITHELP/pages/159941448/LinkedIn+Learning+at+Syracuse+University
      - Search for the *Networking Foundations* course
        - full name of course = Networking Foundations: Networking Basics
      - Cover sections 1 to 5 at a minimum
- Obtain the Microsoft Visual Studio Enterprise Subscription !

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