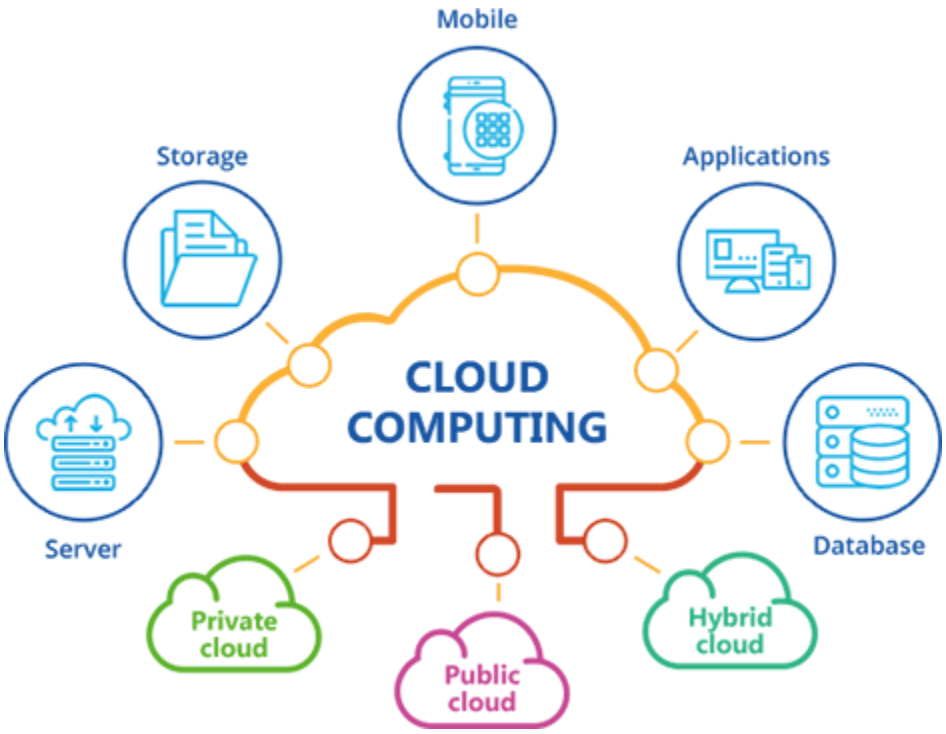
1. Cloud Computing

Slide 1.1 - Overview

Cloud computing delivers computing services like servers, storage, databases, and software over the internet on a pay-per-use basis. It allows businesses and individuals to access and scale resources without owning or maintaining physical infrastructure, offering flexible, scalable solutions that reduce operational costs.



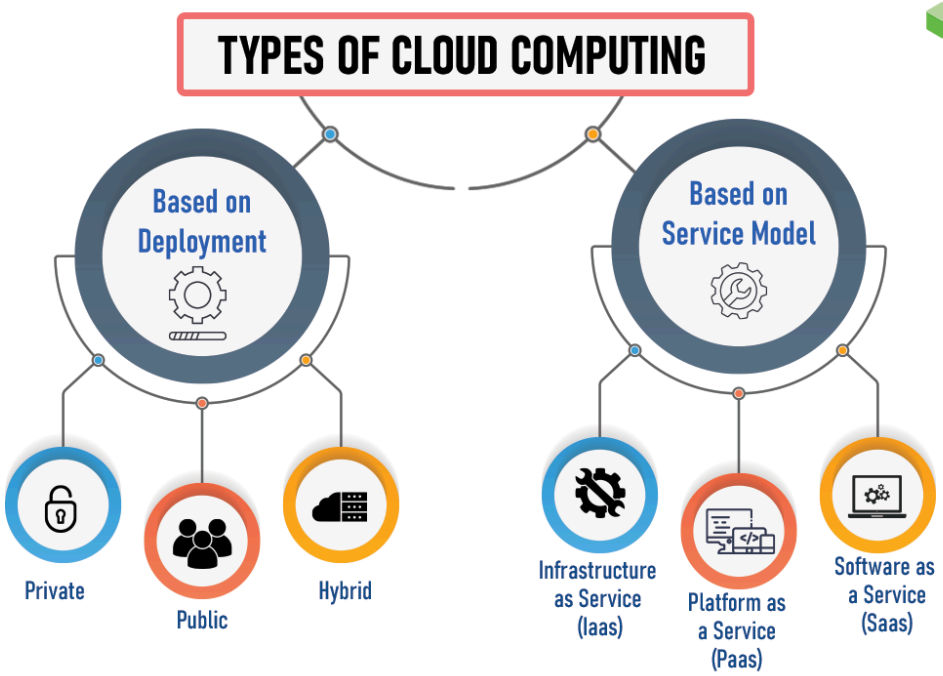
>> Mention example

2. How it Works

Slide 2.1 - Overview

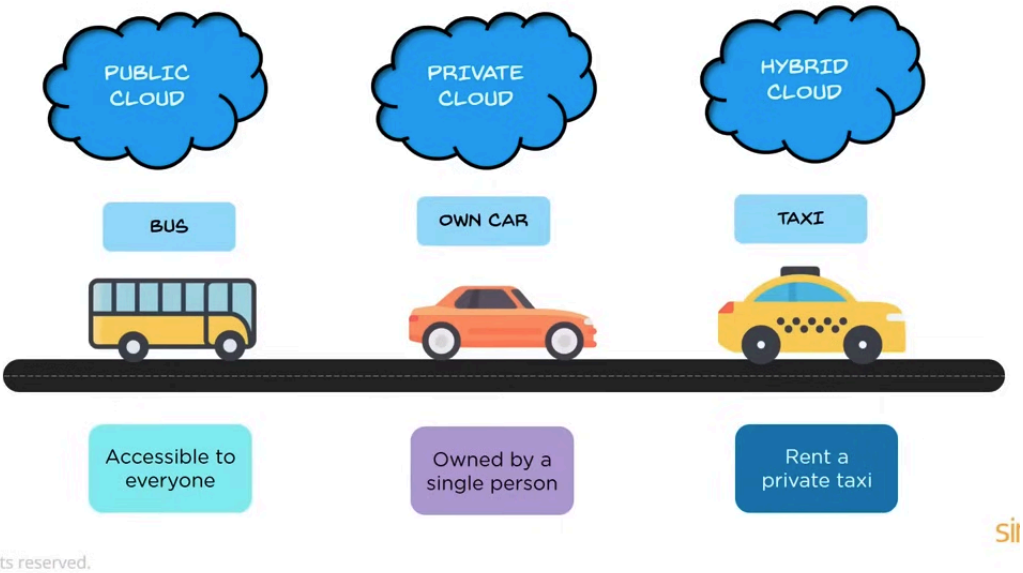
Introduction: Cloud computing allows organizations to rent access to infrastructure, storage, and applications from service providers, rather than owning and maintaining their own data centers. It operates through a front end (the client's applications and network) and a back end (the servers, storage, and cloud infrastructure).

Say: Users access cloud services via the internet. Resources are accessed & managed through deployment methods, and services are delivered through delivery models.



Slide 2.2 Deployment Methods - Public, Private, and Hybrid

A deployment model is the way cloud infrastructure is set up and made available to users. It determines where the cloud resources are hosted, who manages them, and how users can access them.



Public Cloud Slide:

Public clouds are owned by third-party providers and offer on-demand compute, storage, and network resources to the general public.

Examples: AWS, Microsoft Azure, IBM Blue Cloud, Sun Cloud

Private Cloud Slide:
Private clouds are operated by a single organization, either on-premise or off-premise, offering control, security, and shared resources for internal use.

Examples: AWS, VMware

Hybrid Cloud Slide:
Hybrid clouds combine public and private models, enabling secure, compliant private cloud use alongside public cloud services.

Examples: Federal agencies use private clouds for sensitive data and public clouds for sharing information.

Slide 2.3 Delivery Models - IaaS, Paas, and SaaS (Gabi)

Overview:
A delivery model in cloud computing defines the type of cloud service a provider offers, determining the level of control, management, and responsibility a user has over infrastructure and applications. It impacts how resources are accessed, managed, and paid for.

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1. IaaS - Infrastructure as a Service

- Rent servers, storage, & networking from providers
- No need to own or manage infrastructure
- Provider manages servers, updates, and network security
- **User Responsibility:** Operating system, applications, and data management

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2. PaaS - Platform as a Service

- Provides cloud platforms for developing, testing, and managing applications
- Software developers deploy apps without handling infrastructure
- **Users:** Software Developers

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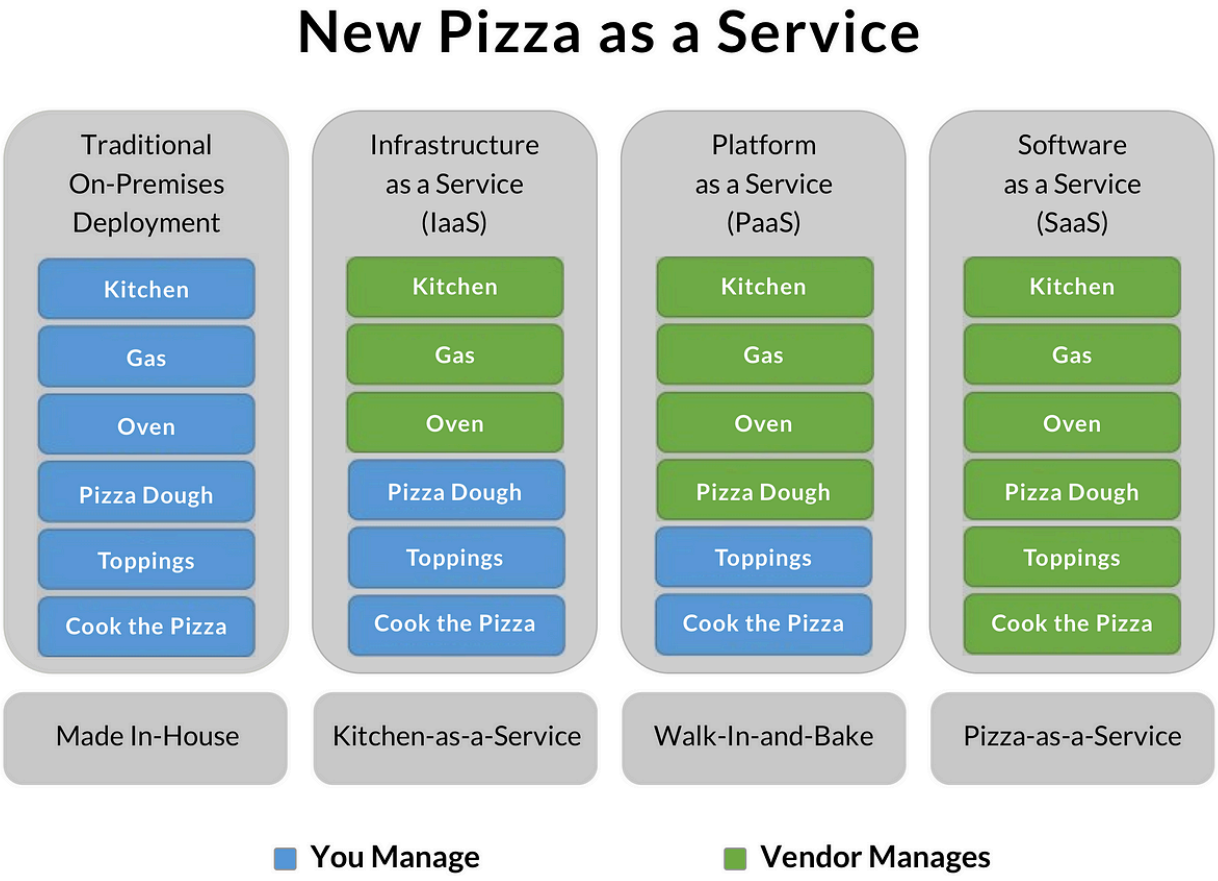
3. SaaS - Software as a Service

- Cloud providers host and manage software applications on a pay-as-you-go basis
- No maintenance required from users
- **Users:** End Customers

Slide 2.3.1 Delivery Models - Picture



3. Benefits of Cloud Computing

Side 3.1 Key Benefits

1. **Cost Efficiency**
    - Pay-as-you-go model reduces upfront costs (Salesforce, Oracle).
    - Lowers operating expenses and improves budgeting (ResearchGate).
2. **Scalability & Flexibility**
    - On-demand resources for fluctuating workloads (Google Cloud, Oracle).
3. **Collaboration & Accessibility**
    - Real-time data sharing and remote access for hybrid teams (Salesforce, ResearchGate).
4. **Enhanced Performance**
    - High-speed infrastructure with global reach (Digital Realty, Oracle).
5. **Data Security & Recovery**
    - Advanced encryption and disaster recovery solutions (ResearchGate, Digital Realty).

6. **Sustainability**
    - Shared resources reduce carbon footprints (Oracle, Google Cloud).
7. **Innovation & Agility**
    - Access to AI, ML, and big data technologies (Google Cloud, ResearchGate).
8. **Global Reach**
    - Deploy solutions closer to customers for better experience (Salesforce, Digital Realty).

4. Real World Application

Slide 4.1 Scenario: A Pizza Delivery App for a Growing Business

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Problem:
You've been hired by a growing pizza chain to build a scalable app where customers can place orders, track delivery in real-time, and earn loyalty points. The app needs to handle high traffic during lunch and dinner peaks, process payments securely, and provide personalized promotions based on customer behavior.

Why Cloud for This App?

- **Scalability**: Handle peak traffic efficiently.
- **Cost Efficiency**: Pay only for resources used.
- **Real-Time Updates**: Low latency for smooth user experience.
- **Advanced Analytics**: AI-driven recommendations to boost sales and engagement.

Slide 4.2 Data Engineer Perspective(Gabi)

Key Responsibilities:

- Build and maintain data pipelines for analysis and insights.
- Ensure efficient storage and processing of structured and unstructured data.

Data Engineer

Real-Time Analytics and Reporting:
Process live order data using **cloud-based data processing** tools.
Why?: Helps management adjust staffing levels and promotions dynamically without investing in hardware upfront.

Loyalty Program Data Management:
Store and manage loyalty points in a scalable database and process customer data through **data integration services**.
Why?: Ensures a seamless experience for loyalty program participants making sure data is always accessible without interruptions.

Historical Data for Machine Learning:
Store historical order data in a **data storage solution** and use **machine learning platforms** for analysis.
Why?: Enables predictive insights such as popular pizza combinations or customer behavior trends.

Slide 4.3 Software Engineer(AL)

Backend for Pizza Ordering System
Task: Build an API for placing and tracking orders.
Why?: Ensures the system can handle requests, update inventory, and notify customers, scaling efficiently during high traffic periods.

Real-Time Delivery Tracking
Task: Implement geolocation for tracking delivery drivers.
Why?: Provides live tracking of drivers without having to maintain real-time communication between drivers, the app, and users.

Hosting and Deployment of the App
Task: Host the pizza app and ensure reliable performance.
Why?: Automates scaling and minimizes downtime, ensuring the app functions seamlessly even during high-traffic events. Cloud services also typically provide uptime guarantees, automated backups, and patching, reducing the operational burden.

Payment Processing
Task: Integrate secure payments.

Why?: Simplifies integration with external payment systems while ensuring secure, compliant transaction processing.

5. Trends in Cloud Computing

- **AI as a Service (AIaaS):** Cloud-based AI solutions, like pre-trained models and APIs, help businesses integrate AI without investing in infrastructure, reducing costs and accelerating innovation.
- **Hybrid and Multi-Cloud Strategies:** Companies use multiple cloud providers to optimize costs, increase resilience, and enhance disaster recovery.
- **Edge Computing:** Processing data closer to its source reduces latency and supports real-time decision-making, benefiting industries like IoT, healthcare, and gaming.
- **Sustainable Cloud Practices:** Cloud providers focus on energy-efficient solutions, such as carbon-neutral data centers, to align with sustainability goals.
- **Serverless Computing:** Eliminates server management, allowing developers to focus on building and deploying scalable applications cost-effectively.
- **Cloud-Native Development:** Using cloud-native architectures and DevOps methodologies, businesses build scalable, resilient apps with tools like Kubernetes and Docker.
- **Quantum Computing:** Early-stage, but cloud-based quantum computing promises breakthroughs in cryptography, drug discovery, and logistics.

6. Conclusion

Recap of Cloud Computing

Cloud computing transforms how businesses operate by offering scalable, cost-effective, and flexible solutions for diverse needs. It enables organizations to innovate and grow without the burden of maintaining physical infrastructure.

Key Takeaways

- Deployment models (Public, Private, Hybrid) allow tailored cloud setups.
- Delivery models (IaaS, PaaS, SaaS) cater to varying levels of control and functionality.
- Real-world applications, such as scalable apps for businesses, highlight its transformative potential.
- Emerging trends like AIaaS, serverless computing, and sustainability emphasize its forward-looking impact.

Call to Action

Consider how cloud computing can solve challenges and drive innovation in your organization. Stay informed about evolving trends to leverage its full potential.

7. Quote

“The cloud services companies of all sizes…The cloud is for everyone. The cloud is a democracy.” –Marc Benioff, founder, CEO and Chaiman of Salesforce, pioneer of Cloud Computing