



Image Source: <https://g.foolcdn.com/editorial/images/494617/cloud-computing-blue-background.jpg>

CLOUD COMPUTING

Then, Now, and the Future

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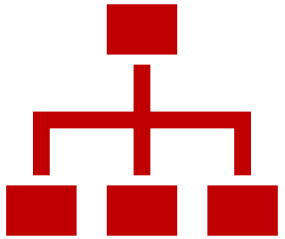


“COMPUTER UTILITIES” VISION: IMPLICATIONS OF THE INTERNET

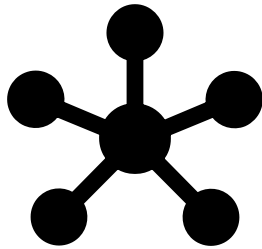
1969 – Leonard Kleinrock, ARPANET project

- “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 and telephone utilities, will service individual homes and offices across the country”.
- During the last 51 years, several advances have taken place in both “computing” and “communications” areas that are turning the vision of “Computer Utilities” into a reality.

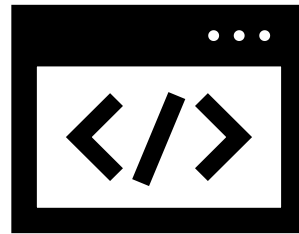
EVOLUTION OF CLOUD COMPUTING



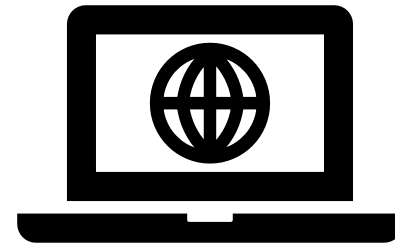
Cluster Computing
1960s



Grid Computing
1990s



Utility Computing
Late 1990s



SOA
Early 2000s



Cloud Computing
Early 2000s

CLUSTER COMPUTING

Cluster computing is a form of computing in which a group of computers are linked together so they can act like a single entity.

It is the technique of linking two or more computers into a network (usually through a local area network) in order to take advantage of the parallel processing power of those computers.

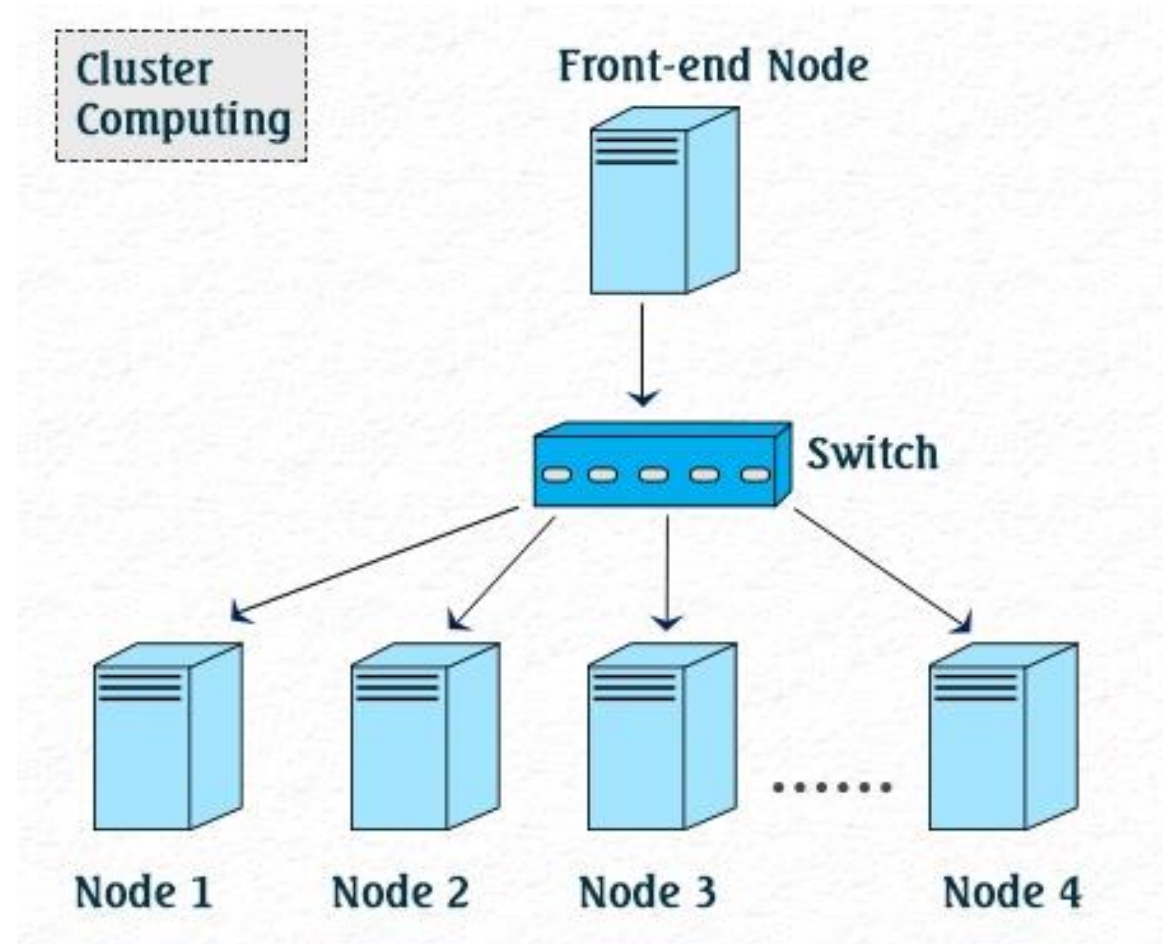
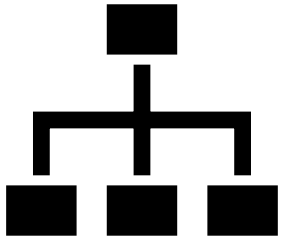
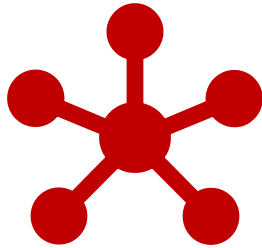


Image Source: <https://techspirited.com/differences-similarities-between-grid-cluster-computing>

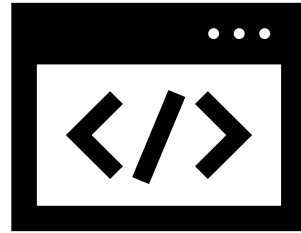
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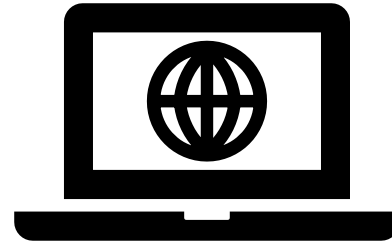
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GRID COMPUTING

- Grid computing involves connecting geographically remote computers into a single network to create a virtual supercomputer by combining the computational power of all computers on grid.
- Grid Computing is a distributed computing resource to accomplish a common goal. It is connected by parallel nodes that form a computer cluster and runs on an operating system.
- Its common uses are ATM banking, back-end infrastructure, and scientific marketing research.

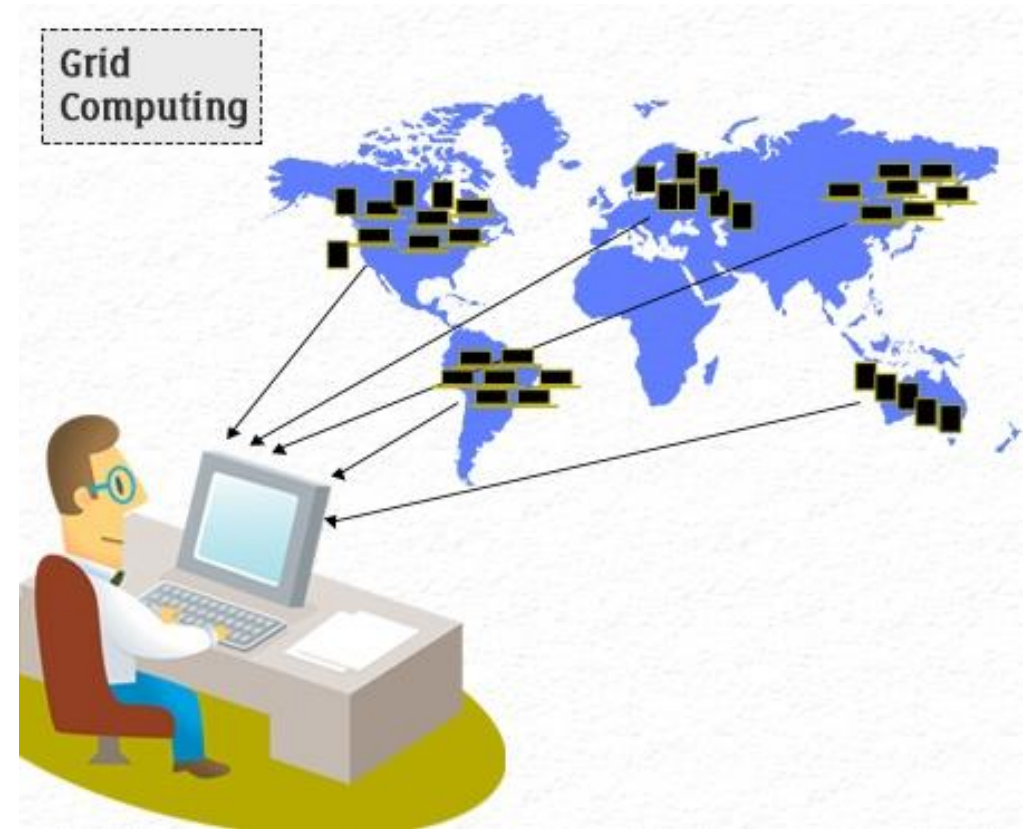
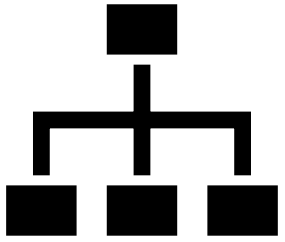
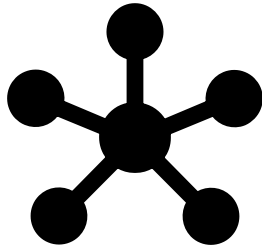


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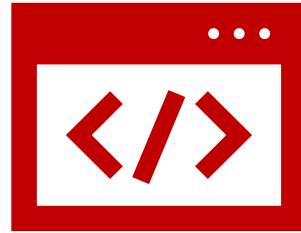
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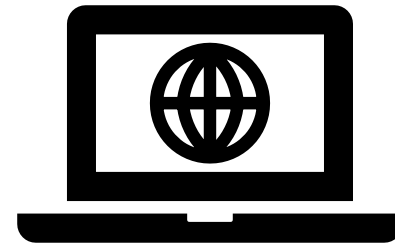
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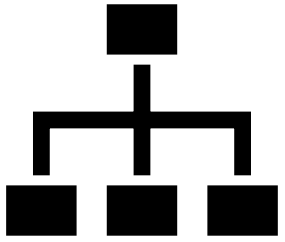


Cloud Computing
Early 2000s

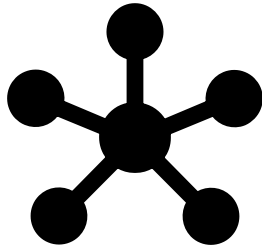
UTILITY COMPUTING

- Utility computing is a **service provisioning model**, which, provides computing resources and infrastructure management to the customer as per their demand.
- The customers are charged for them as you go basis without any upfront cost. The utility model maximizes the efficient use of resources while minimizing the associated cost.

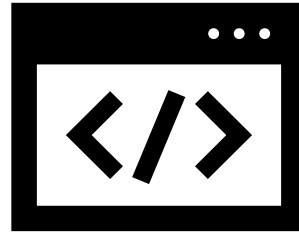
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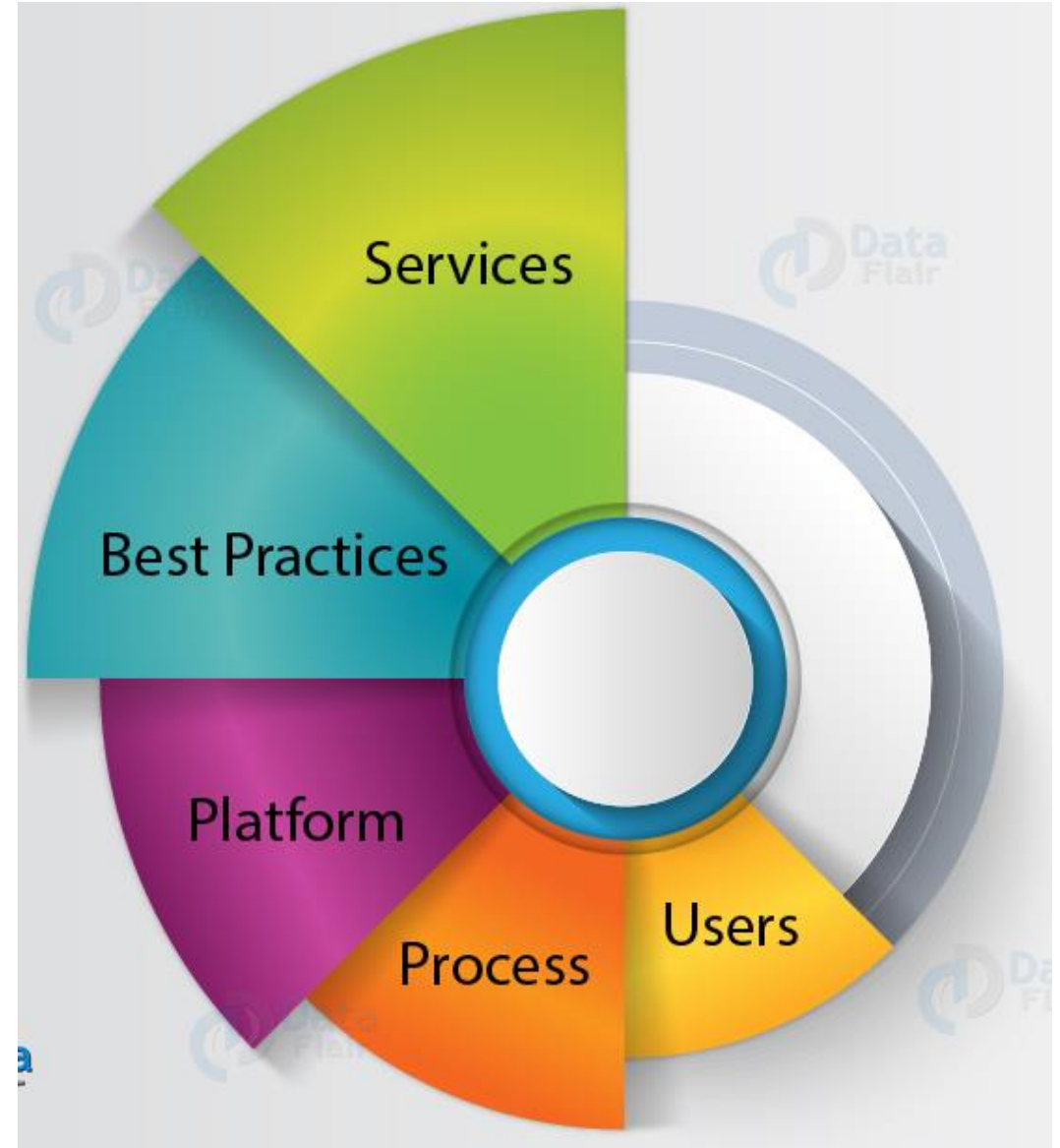
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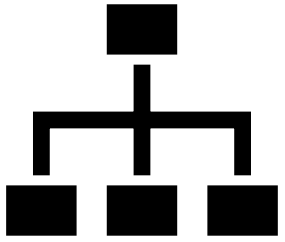
Cloud Computing
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SERVICE ORIENTED ARCHITECTURE (SOA)

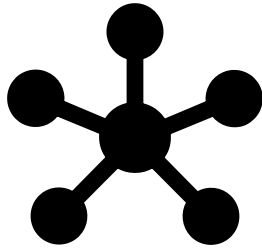
- Service Oriented Architecture (SOA) is a group of services, which can transfer data within each other. This data transfer can be either simple data processing or some activities.
- The *Service-Oriented Architecture* is also known as *application structure*, which **divides the business application into business procedures** and functions.



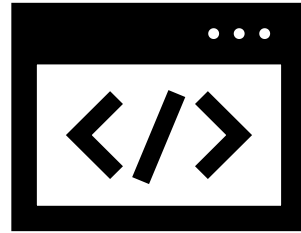
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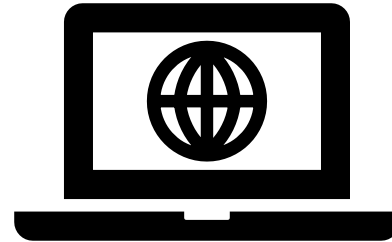
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CLOUD COMPUTING : DEFINITION

“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.

- The NIST Definition of Cloud Computing

“Cloud is a **parallel** and **distributed computing system** consisting of a collection of **inter-connected** and **virtualised computers** that are **dynamically provisioned** and presented as one or more unified computing resources based on **service-level agreements** (SLA) established through negotiation between the service provider and consumers.”

- Prof Rajkumar Buyya, University of Melbourne, Australia

CLOUD COMPUTING ENABLERS

- Virtualization
- Web
- Data Centres
- High-capacity networks
- Low cost computers and storage
- Autonomic and utility computing

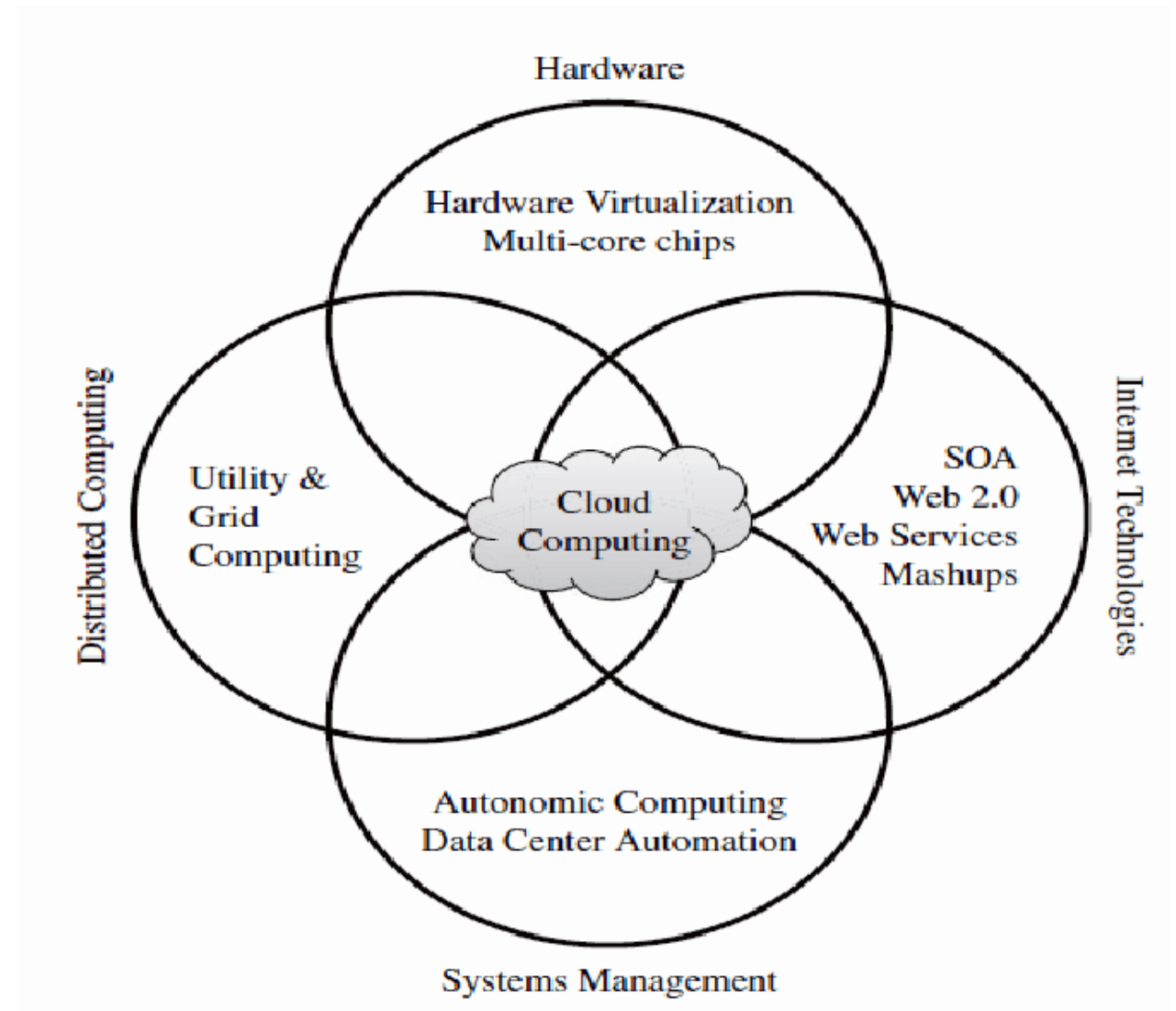


Image Source:

https://www.researchgate.net/profile/Amol_Adamuthe2/publication/308747055/figure/fig1/AS:533713320255488@1504258579482/Convergence-of-various-advances-leading-to-the-advent-of-cloud-computing-Taken-from.png

CLOUD COMPUTING CHARACTERISTICS

- **On-demand self-service:** individuals can set themselves up without needing anyone's help
- **Ubiquitous network access:** available through standard Internet-enabled devices
- **Location independent resource pooling:** processing and storage demands are balanced across a common infrastructure with no particular resource assigned to any individual user
- **Rapid elasticity:** consumers can increase or decrease capacity at will
- **Pay per use:** consumers are charged fees based on their usage of a combination of computing power, bandwidth use and/or storage
- **Wide range of resource types**
- **Attractive cost models**

CLOUD COMPUTING — DELIVERY MODELS

Software as a Service (SaaS)

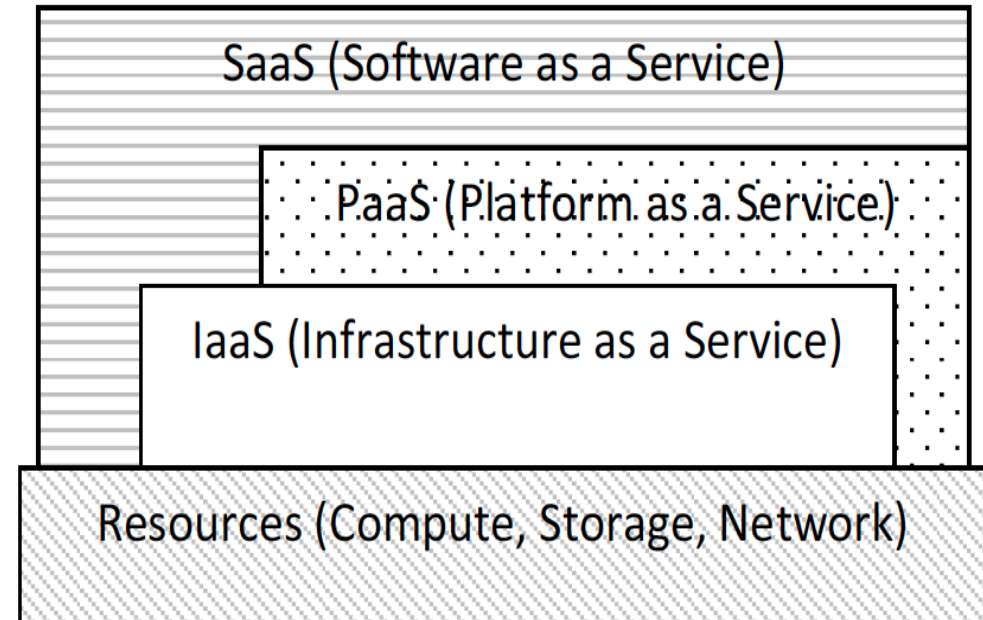
- It provides applications and software to the customer in utility-based model
- Accessible from a thin client interface such as a Web browser
- Example: Salesforce.com
 - Customer relationship management (CRM) as a service.

Platform as a Service (PaaS)

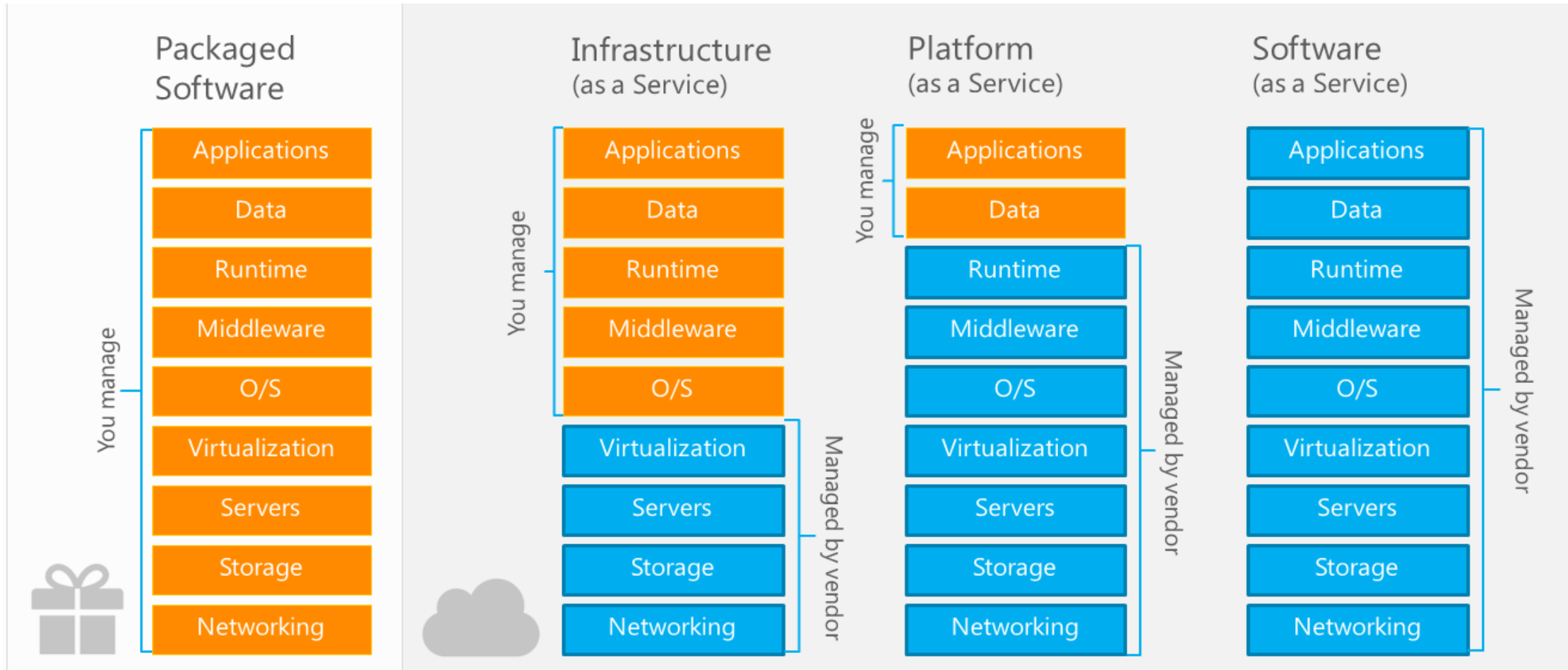
- It provides programming languages and tools to
deploy application onto the cloud infrastructure
- Example: Google App Engine
 - facilities to build an reliable and scalable application

Infrastructure as a Service (IaaS)

- It provides capabilities for the customers to provision computational resources such as processing, storage, network, and other fundamental computing resources
- Virtual Machines (VMs)
- Example: Amazon EC2/S3



CLOUD COMPUTING — DELIVERY MODELS



CLOUD COMPUTING — DEPLOYMENT MODELS

Private cloud: The cloud infrastructure is owned or leased by a single organization and is operated solely for that organization.

Community cloud: The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations).

Public cloud: The cloud infrastructure is owned by an organization selling cloud services to the general public or to a large industry group.

Hybrid cloud: The cloud infrastructure is a composition of two or more clouds (internal, community, or public) that remain unique entities but are bound together by standardized or proprietary technology).

Fog computing is a term created by Cisco that refers to extending cloud computing to the edge of an enterprise's network. Also known as Edge Computing or fogging, fog computing facilitates the operation of compute, storage and networking services between end devices and cloud computing data centers.

CLOUD COMPUTING — DEPLOYMENT MODELS

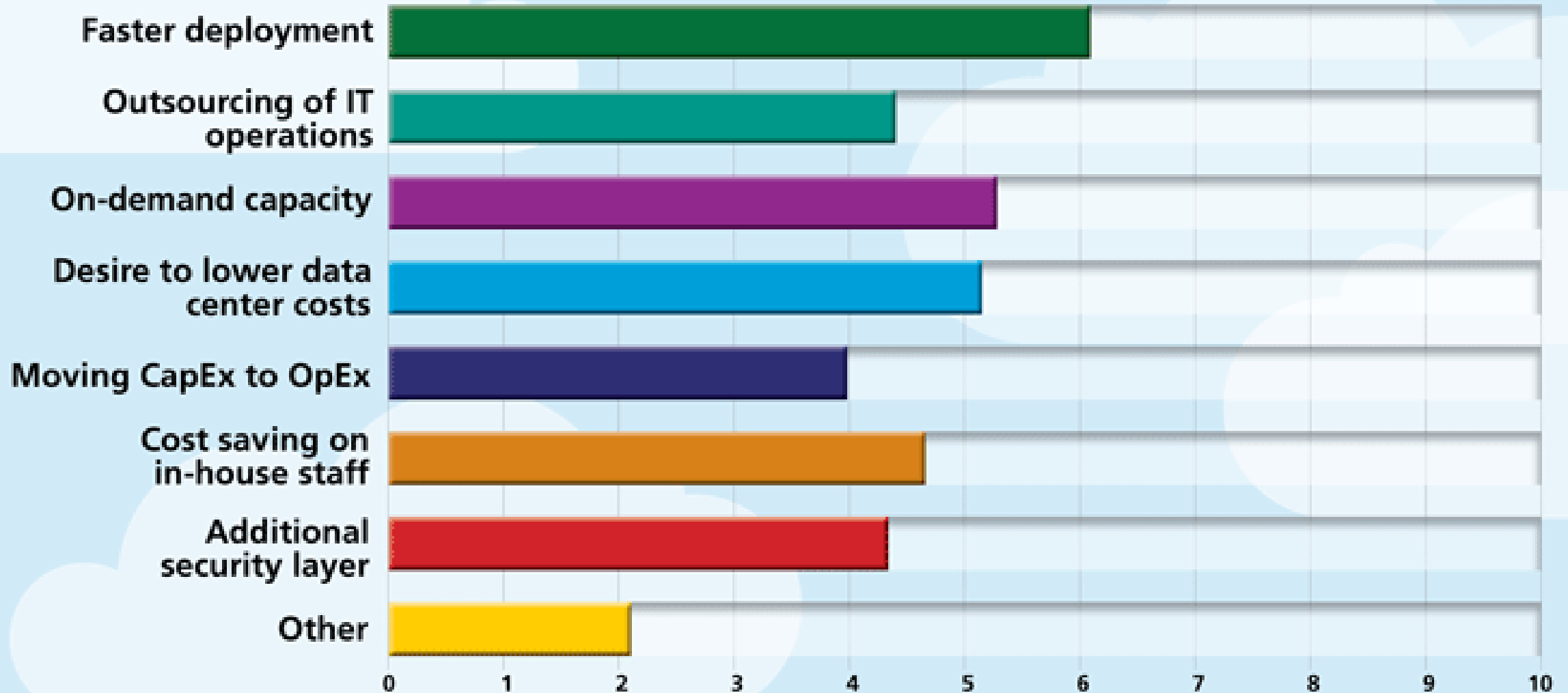
Multicloud is the use of multiple cloud computing and storage services in a single heterogeneous architecture. This also refers to the distribution of cloud assets, software, applications, etc. across several cloud-hosting environments.

Distributed Cloud : Distributed cloud refers to the distribution of public cloud services to locations outside the cloud provider's physical data centers, but which are still controlled by the provider.

In distributed cloud, the cloud provider is responsible for all aspects of cloud service architecture, delivery, operations, governance and updates.

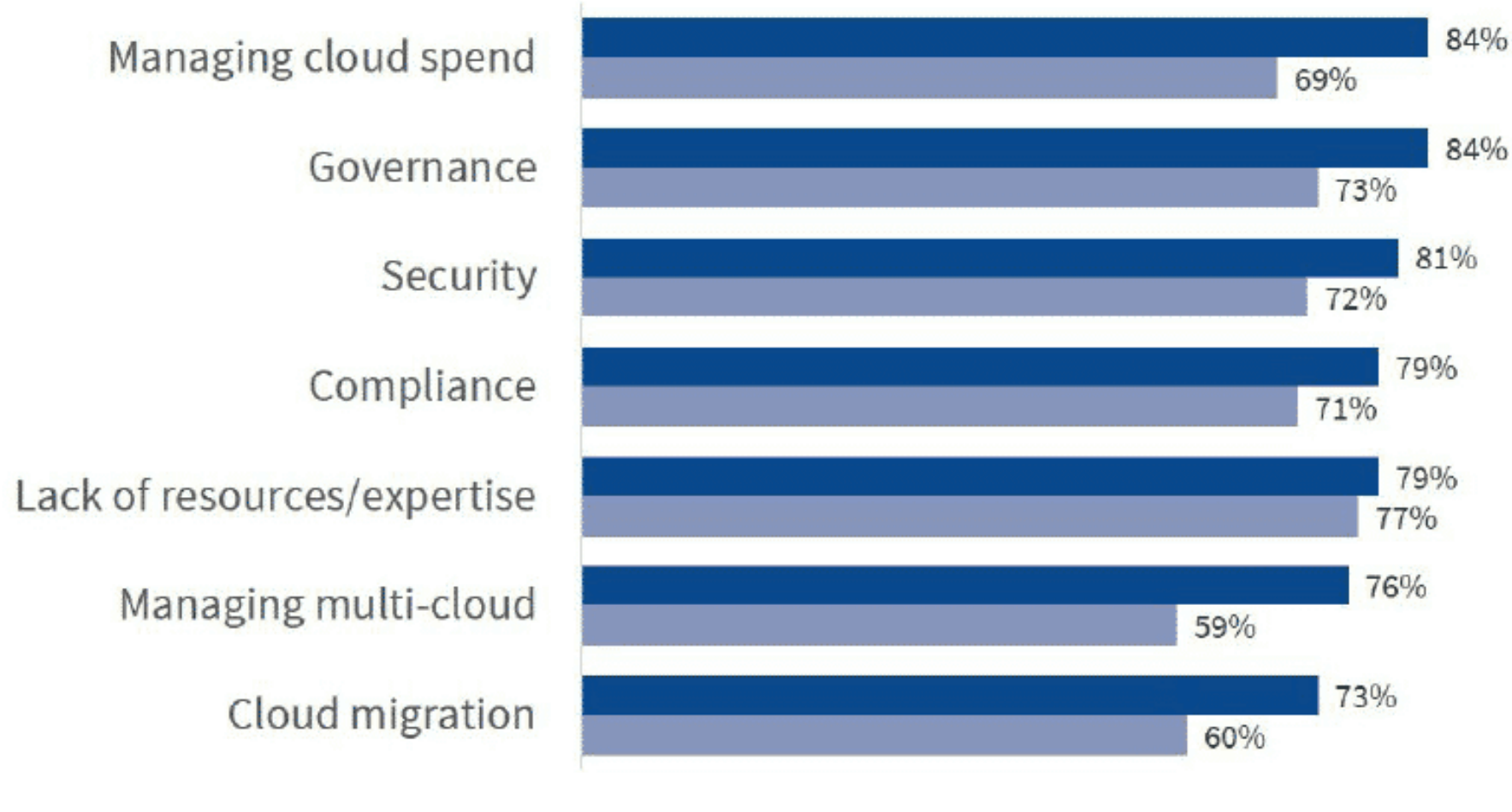
Federated Cloud: is where you have multiple Cloud Service Providers operating together in a federation.

What Potential Benefits Prompted Your Company To Start Using Cloud Computing?



Cloud Challenges by Company Size

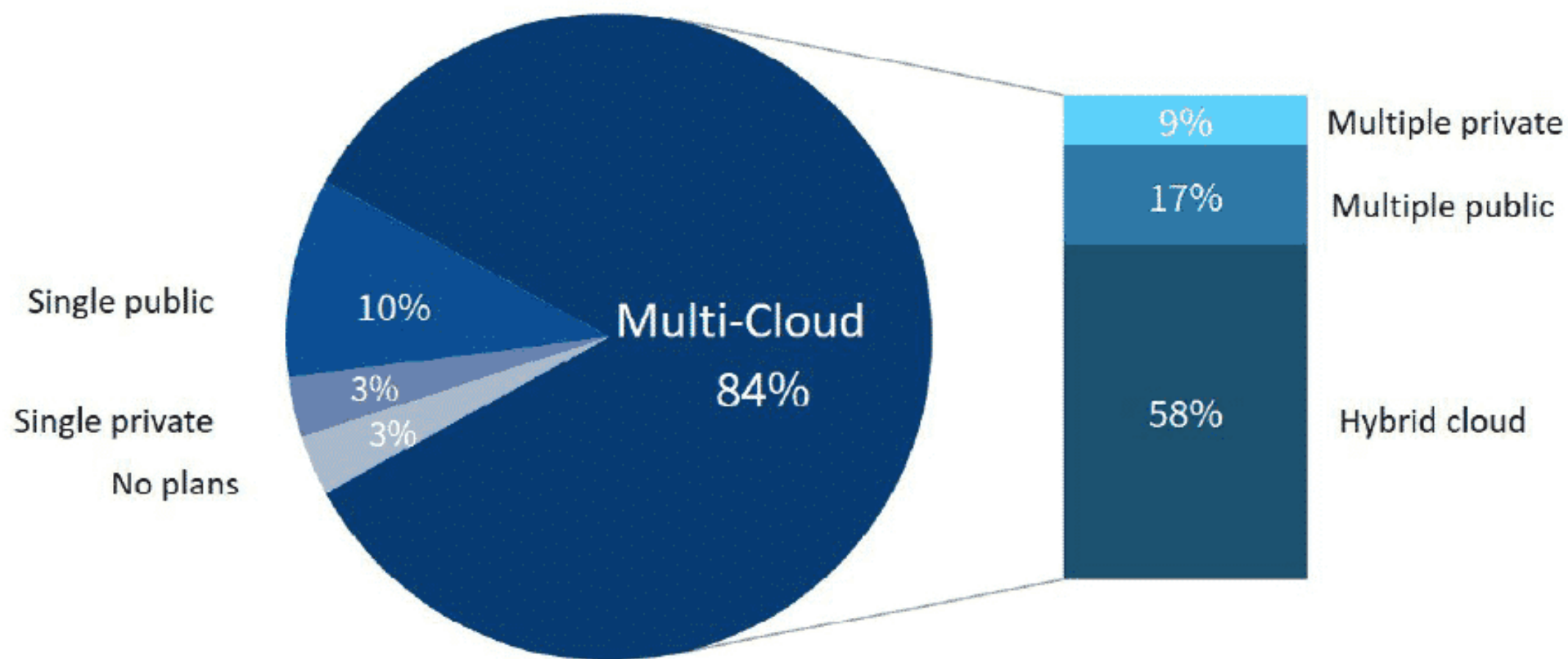
% of Respondents



Source: RightScale 2019 State of the Cloud Report from Flexera

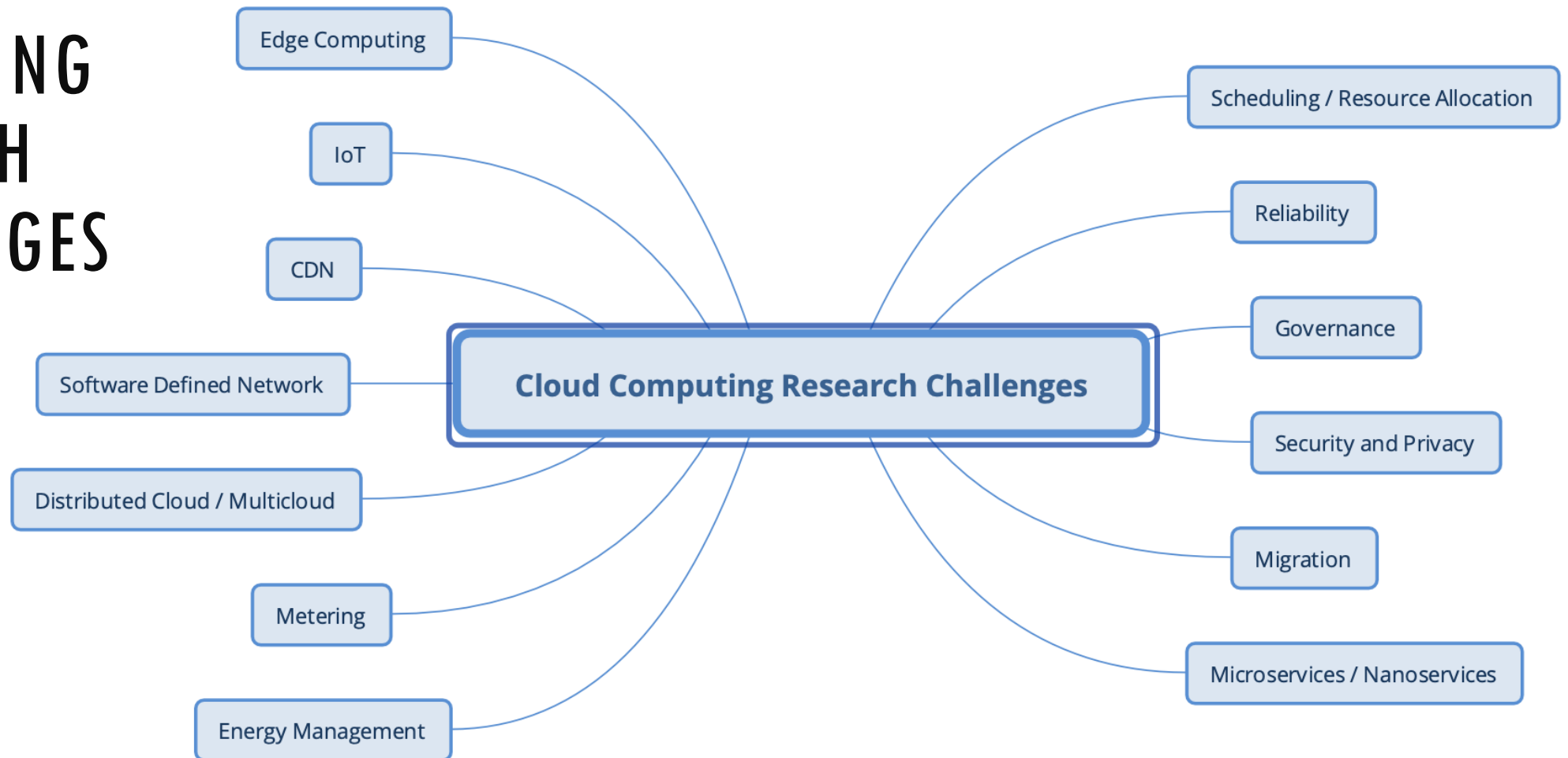
Enterprise Cloud Strategy

1000+ Employees

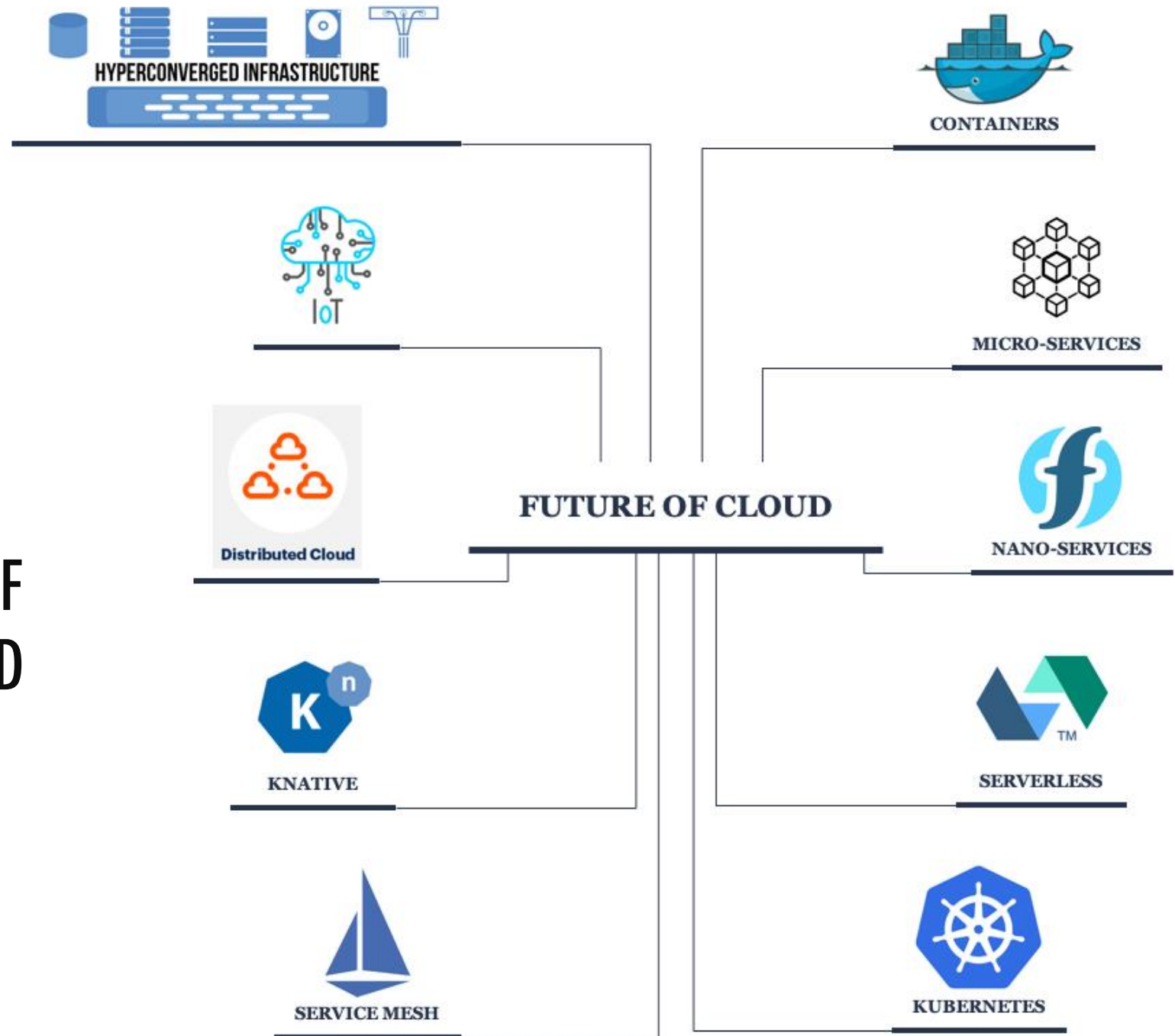


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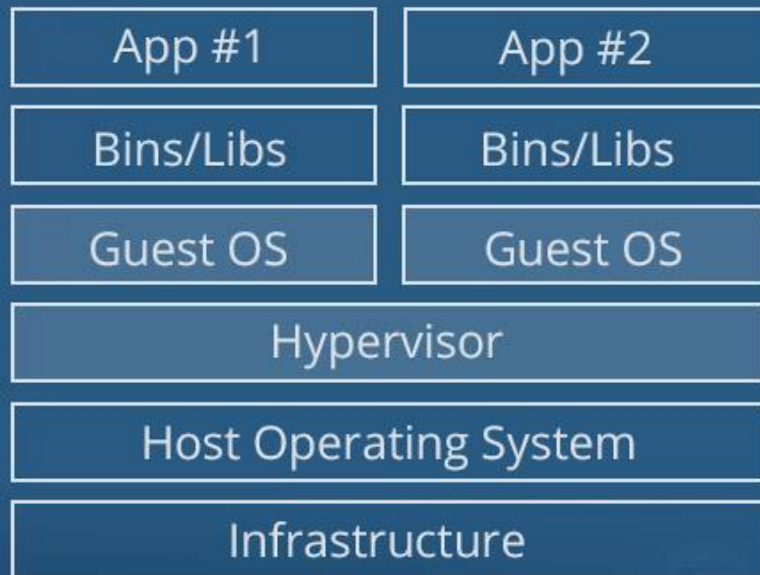
CLOUD COMPUTING RESEARCH CHALLENGES



THE FUTURE OF CLOUD

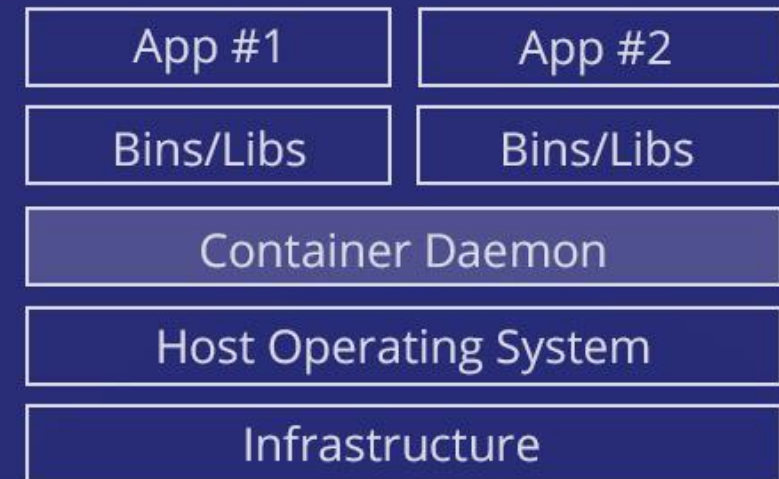


VIRTUAL MACHINES



WHATS
—*the*—
DIFF?

CONTAINERS



IEEE CCEM 2020

PRE CONFERENCE WORKSHOP

29th February 2020 📍 Bengaluru, India

A Prelude to the 9th IEEE INTERNATIONAL CONFERENCE ON CLOUD COMPUTING FOR EMERGING MARKETS to be held on 6th & 7th November 2020

Important Dates for Pre Conference Workshop - 2020

27th January 2020

Deadline for PCW Submissions

10th February 2020

Acceptance Notification

29th February 2020

Pre Conference Workshop

Important Dates for Main Conference - 2020

Technical Research Papers

23rd August 2020

Deadline for Submission

15th September 2020

Acceptance Notification

21st September 2020

Early Bird Registration

30th September 2020

Camera Ready submissions

Student Project Showcase

20th September 2020

Deadline for Submission

5th October 2020

Acceptance Notification

6th & 7th November 2020:

9th IEEE CCEM Conference

