Dr . SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE
COIMBATORE

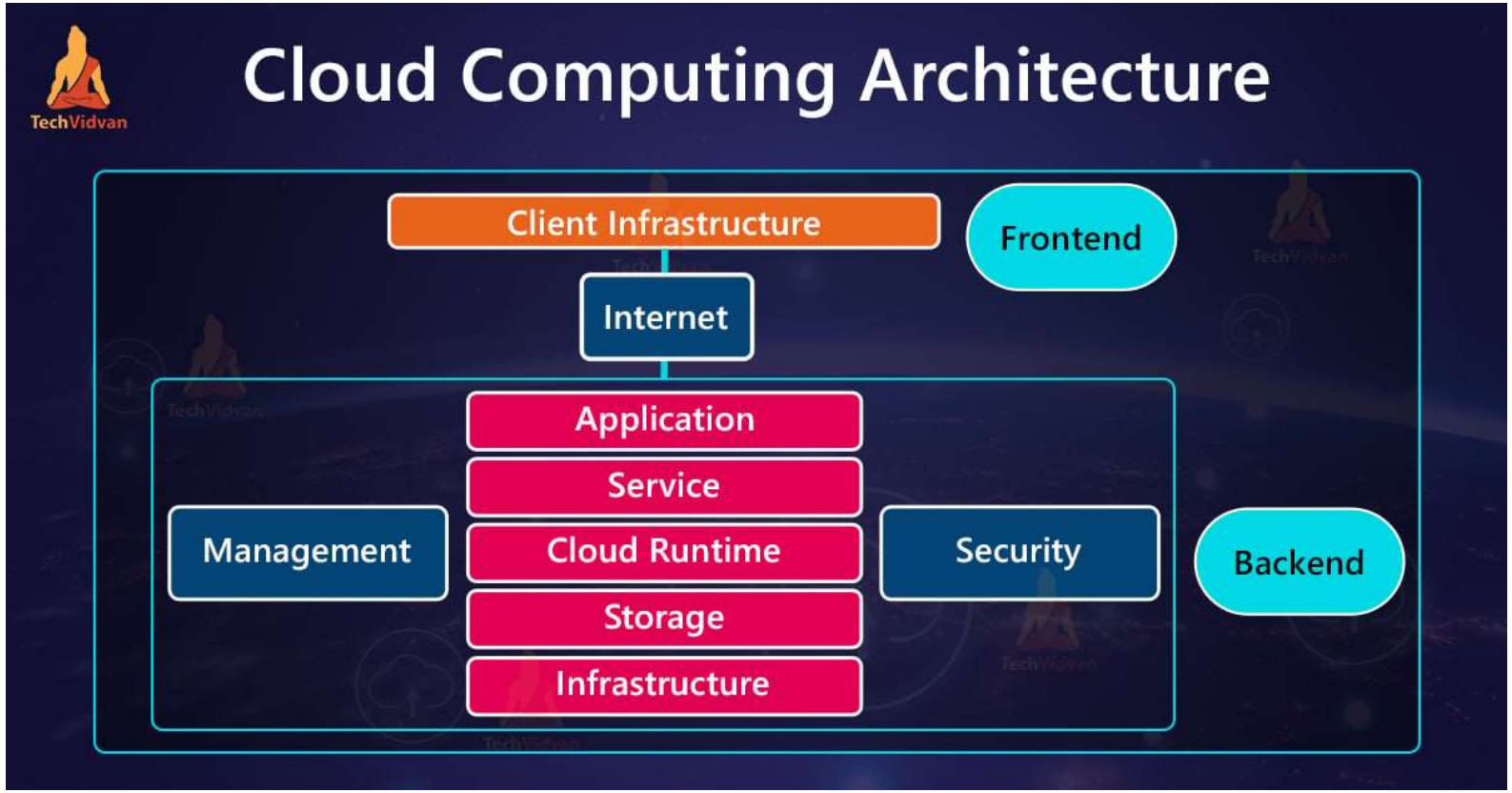
CLOUD COMPUTING ARCHITECTURE

Mr .C .RAJKUMAR
Department of Computer Applications

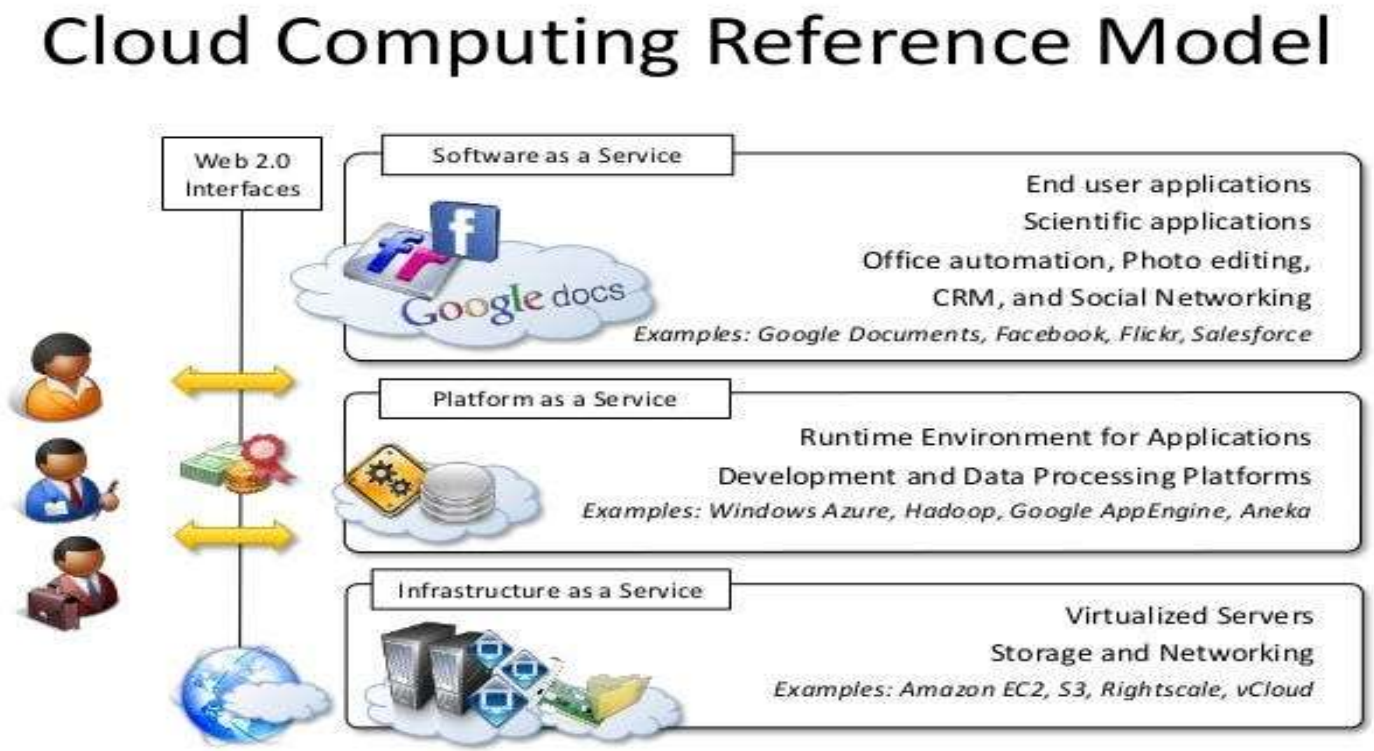
UNIT – 02: CLOUD ARCHITECTURE

INTRODUCTION:

Cloud computing architecture is the design and structure of the components and systems that make up a cloud computing environment. It encompasses the organization of resources, services, and layers involved in delivering computing capabilities over the internet, including infrastructure, platforms, and software. The architecture facilitates on-demand access, scalability, and efficient management of computing resources for users and organizations.

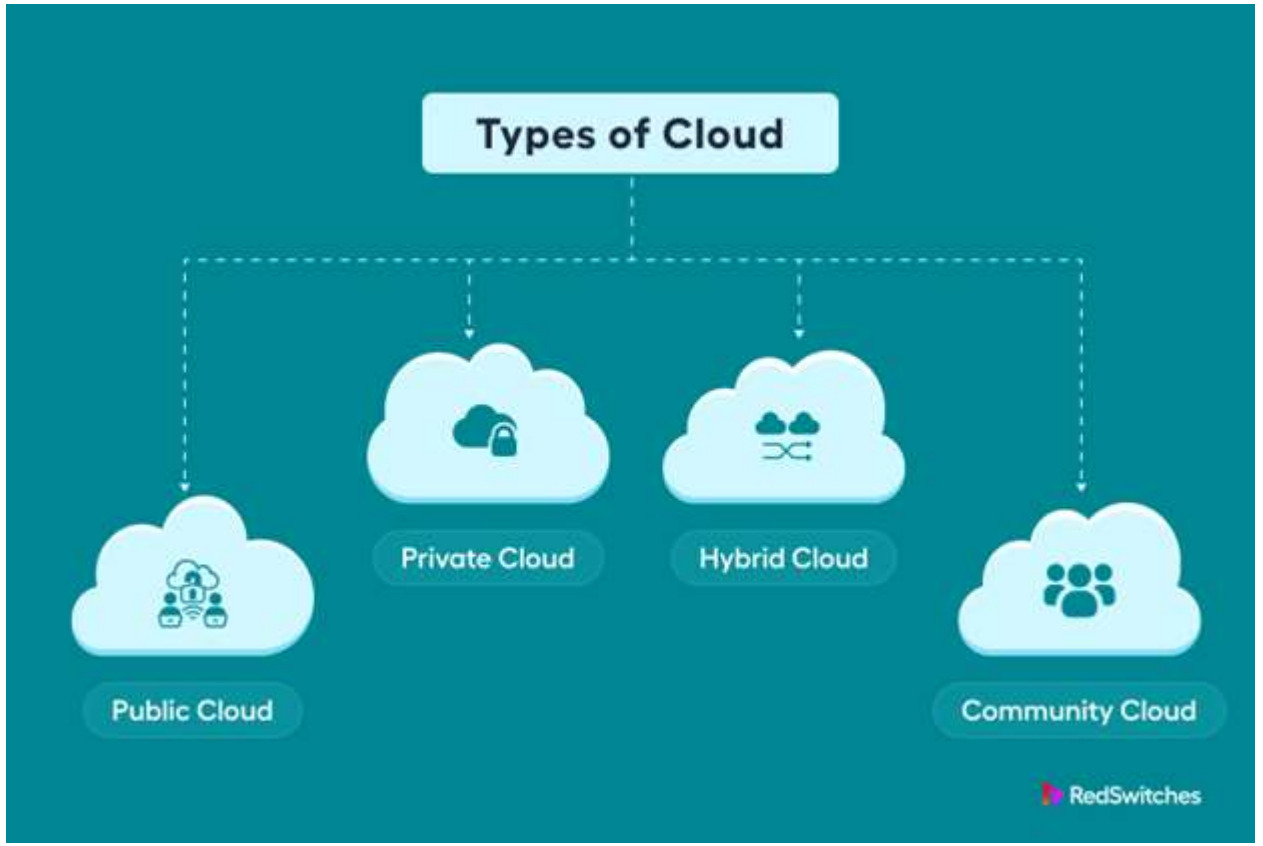


CLOUD REFERENCE MODEL:



The cloud reference model provides a conceptual framework for understanding and categorizing cloud computing services. It defines key components, relationships, and interactions within the cloud ecosystem, outlining essential layers such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). This model guides the design and deployment of cloud solutions, offering a standardized approach to describe and analyze cloud computing architectures.

TYPES OF CLOUD COMPUTING:



1) PUBLIC CLOUD:

Services and infrastructure are provided by third-party cloud service providers and are made available to the general public. Users access resources on a pay-as-you-go basis. Examples include AWS, Azure, and Google Cloud.

2) PRIVATE CLOUD:

Cloud infrastructure is used exclusively by a single organization. It can be managed by the organization itself or a third party and provides greater control over security and customization. Private clouds are often used by enterprises with specific regulatory or data governance requirements.

3) HYBRID CLOUD:

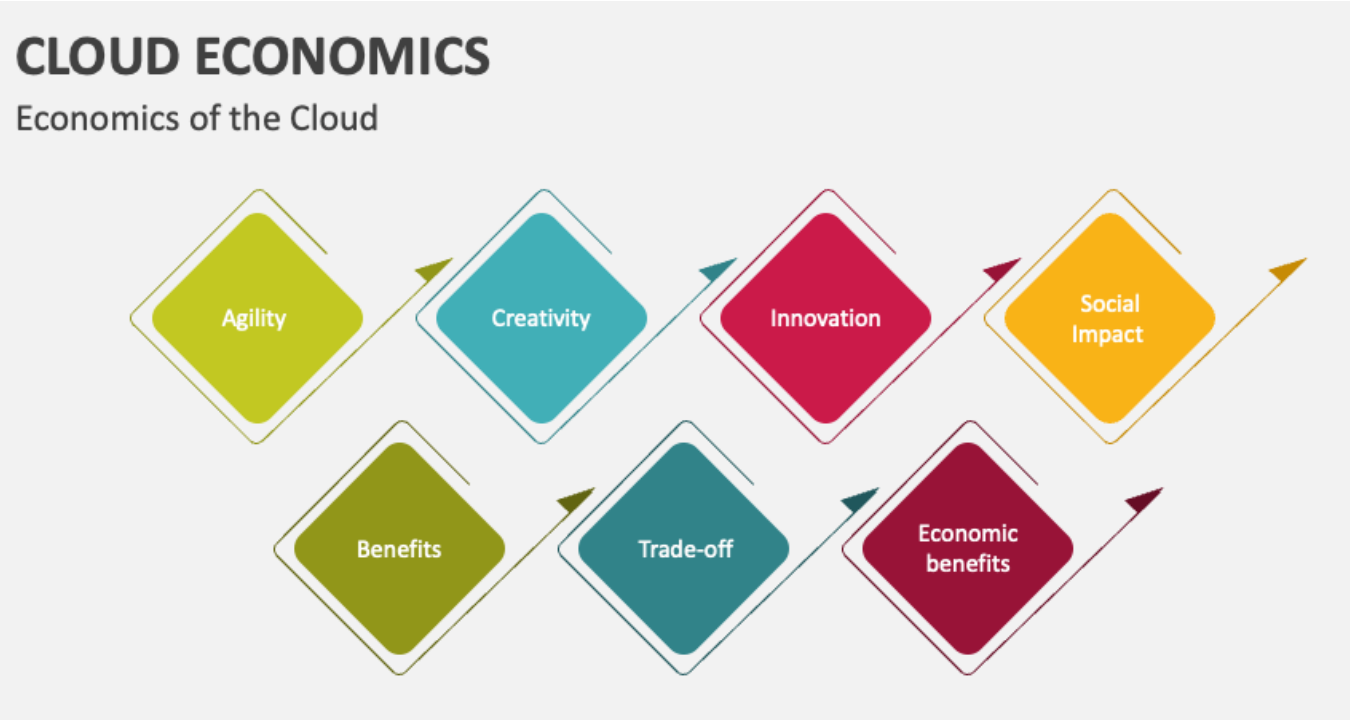
A combination of public and private clouds. This model allows data and applications to be shared between them. It provides more flexibility and optimization of existing infrastructure while maintaining control over sensitive data.

4) COMMUNITY CLOUD:

Infrastructure is shared by several organizations with common concerns (e.g., security, compliance) that form a community. This allows them to meet their shared objectives more effectively than with other deployment models.

ECONOMICS OF THE CLOUD:

The economics of cloud refers to the financial considerations and benefits associated with adopting cloud computing services. It involves cost savings through pay-as-you-go models, economies of scale, and reduced operational expenses. Additionally, it encompasses strategic advantages such as scalability, flexibility, and the ability to focus on core competencies, contributing to innovation and improved time-to-market for organizations.



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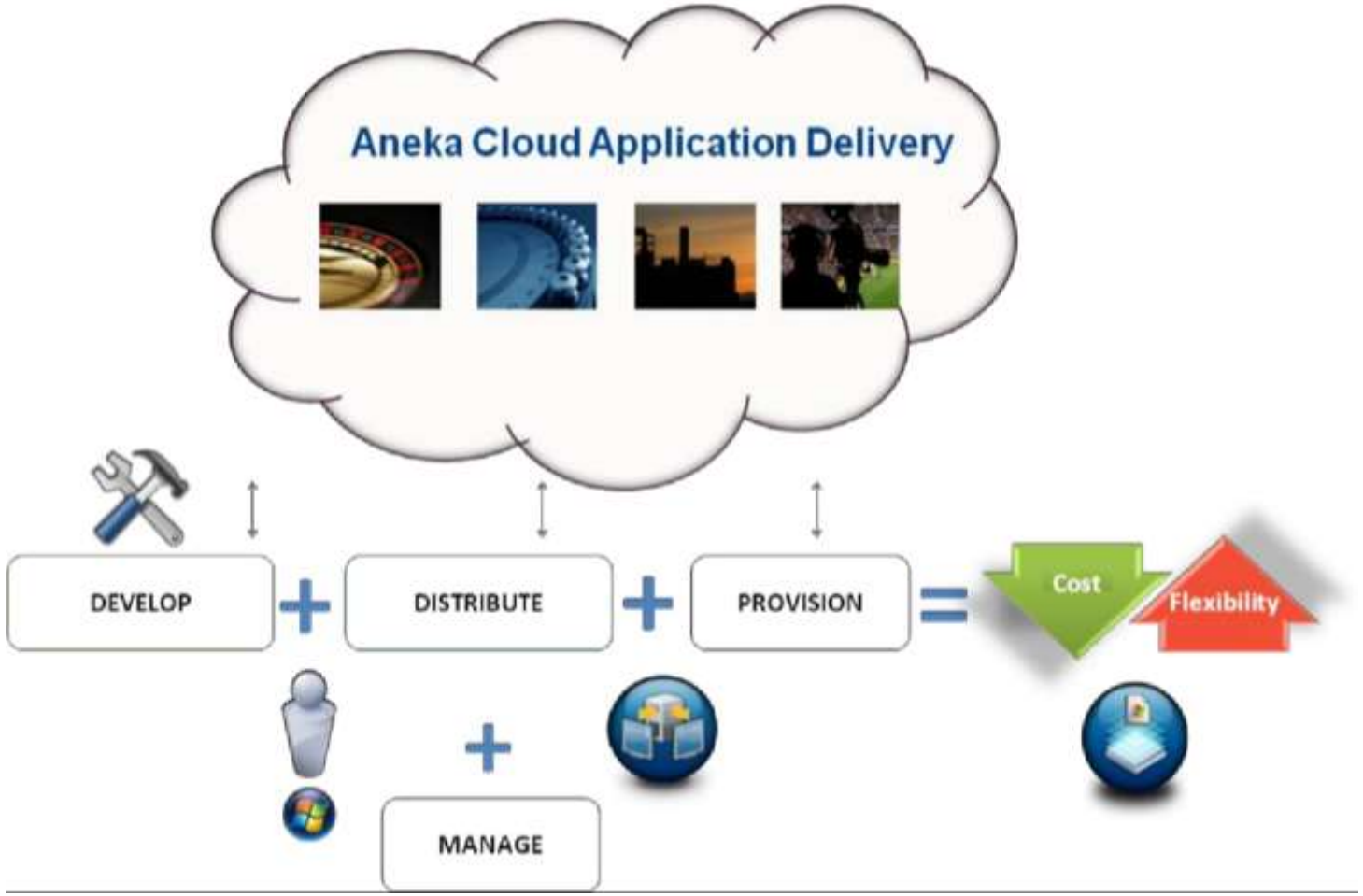
OPEN CHALLENGES OF CLOUD:

"Open challenges in cloud computing" refers to the current and persistent difficulties and issues that the field of cloud computing faces. These challenges represent areas where further research, development, and innovation are needed to enhance the effectiveness, security, efficiency, and reliability of cloud computing services. Open challenges often span technical, operational, and policy aspects, and addressing them is crucial for the continued growth and adoption of cloud computing technologies. Examples include issues related to security, data management, performance optimization, cost management, and compliance with regulations. These challenges evolve over time as technology advances and new demands arise, requiring ongoing attention and collaborative efforts from researchers, industry professionals, and policymakers to find viable solutions.

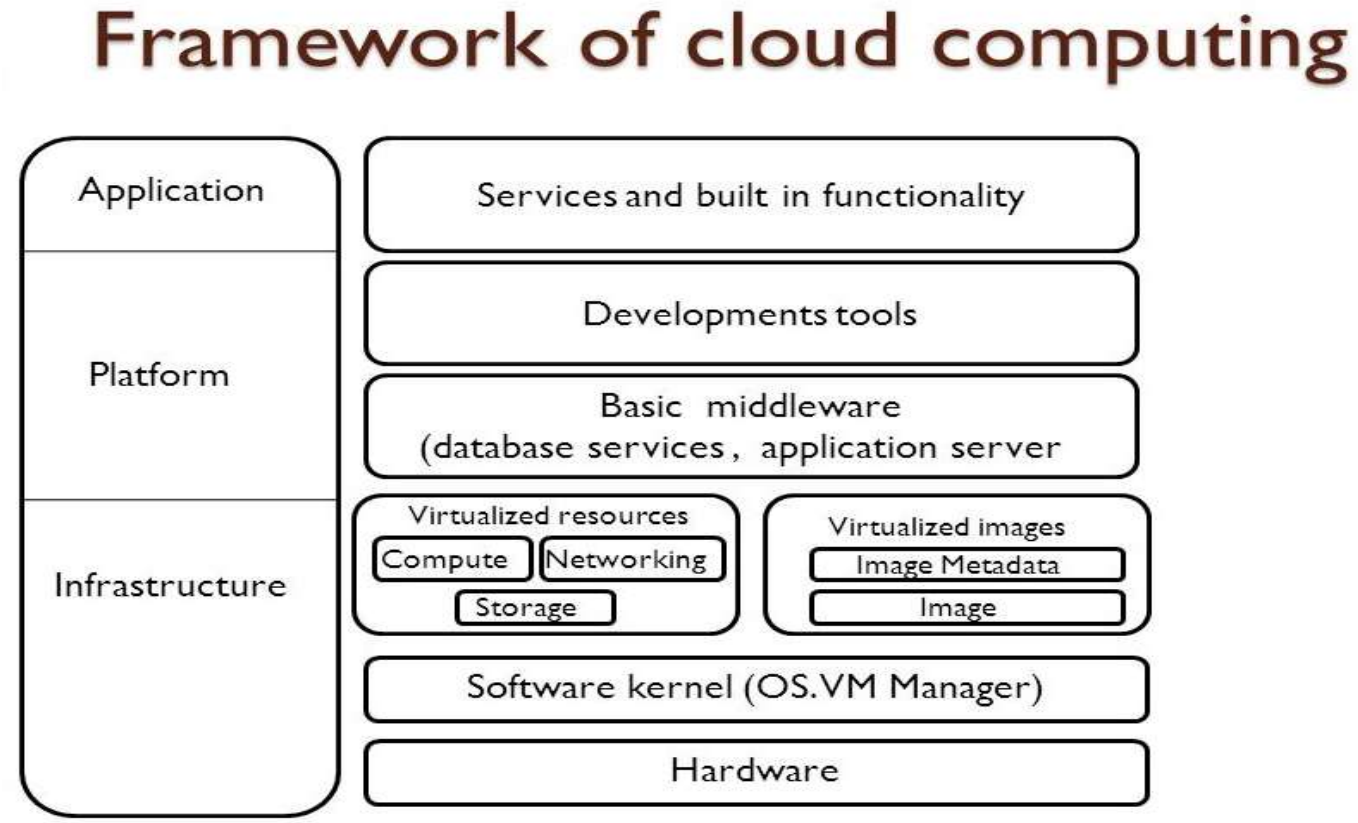
ANEKA PLATFORM:

As of my last knowledge update in January 2022, "Aneka" refers to a cloud application platform developed by Manjrasoft. Aneka is designed to enable the development and deployment of applications on various cloud computing infrastructures. It provides a middleware layer that abstracts the underlying complexity of diverse cloud environments, allowing developers to focus on building and deploying applications without being tied to a specific cloud provider.



FRAMEWORK OVERVIEW:

The context of cloud computing, a "framework" generally refers to a set of tools, libraries, and conventions that provides a structure and foundation for developing, deploying, and managing applications in the cloud. Cloud computing frameworks help developers and organizations streamline the development process, ensure consistency, and leverage best practices in designing and deploying cloud-based solutions. These frameworks often abstract the complexities of underlying infrastructure, making it easier for developers to focus on building and deploying applications rather than dealing with low-level infrastructure details.



ANATOMY OF THE ANEKA CONTAINER:

Anatomy of the Aneka Container

- For Container, it is possible to identify four major groups of services:
  - Fabric Services
  - Foundation Services
  - Execution Services
  - Transversal Services

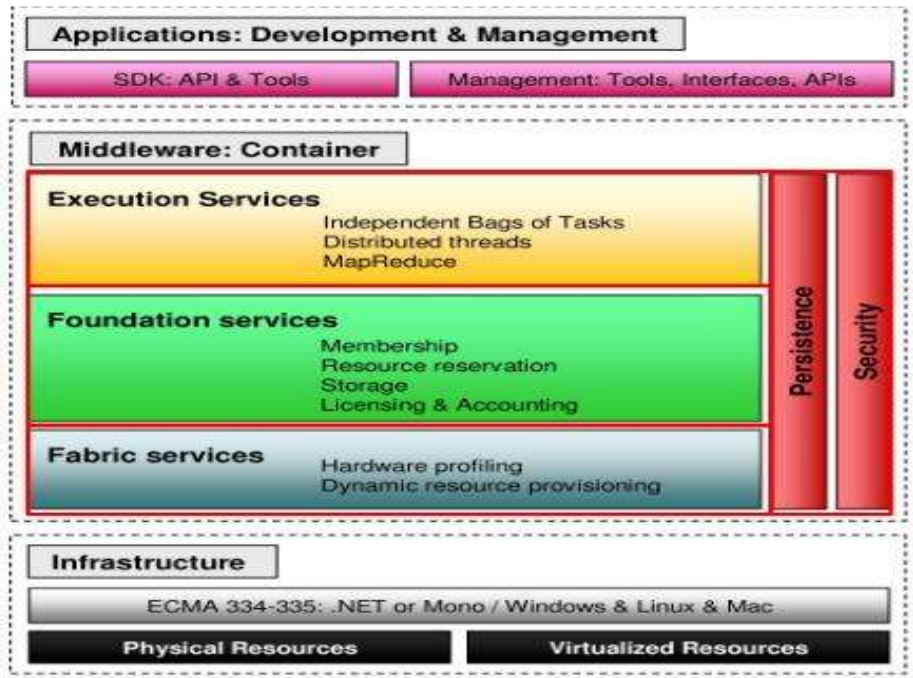
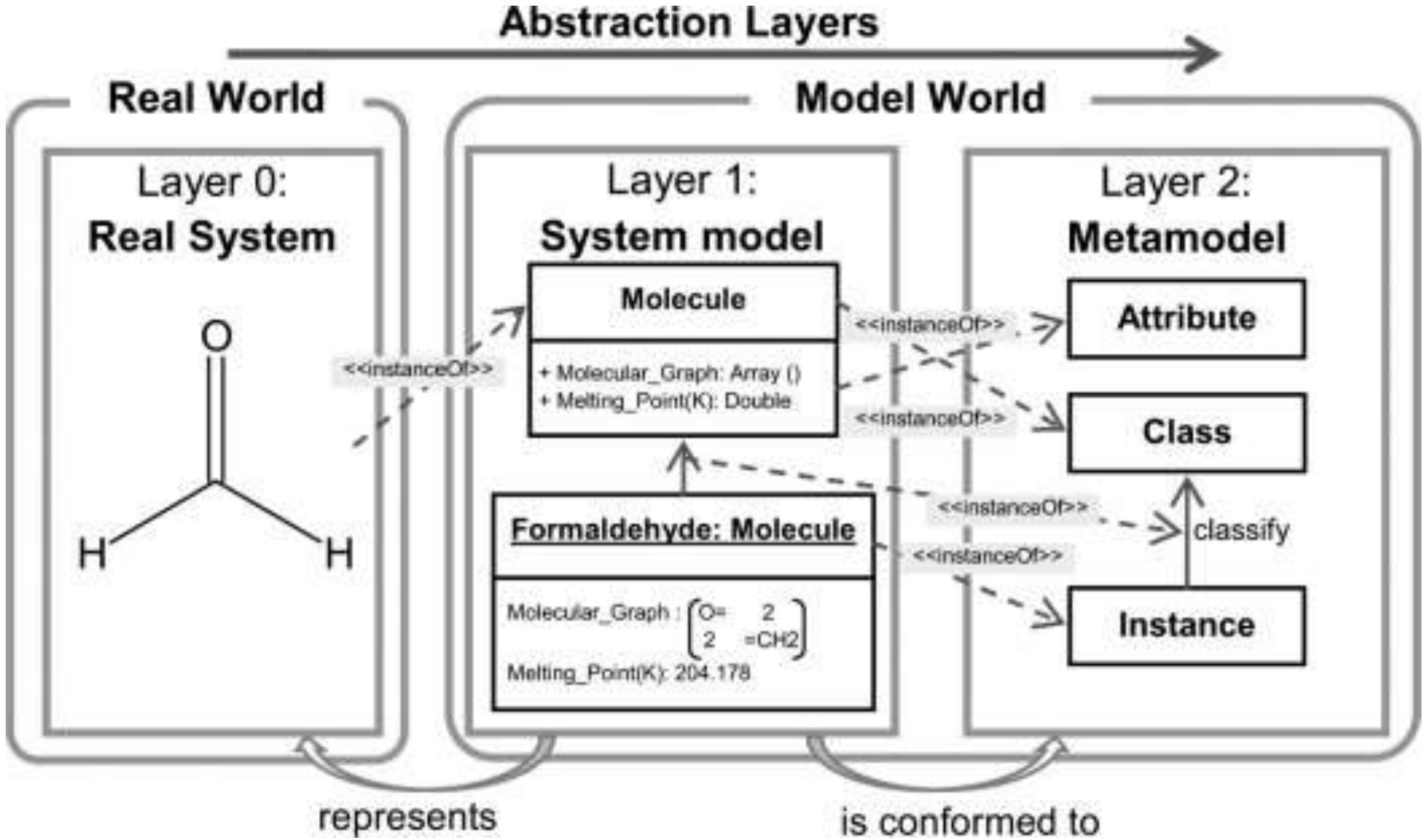


Figure 3. Overview of the Aneka framework.

PLATFORM ABSTRACTION LAYER:



FABRIC SERVICES:

Fabric Services

- Fabric services define the lowest level of the software stack representing the Aneka Container.
  - So fabric services directly interface with the hosting resource and are responsible for low level operations.
- Fabric services contain:
  - The resource provisioning subsystem
  - The hardware profiling services

FOUNDATION SERVICES:

Foundation Services - Licensing, Accounting, and Pricing

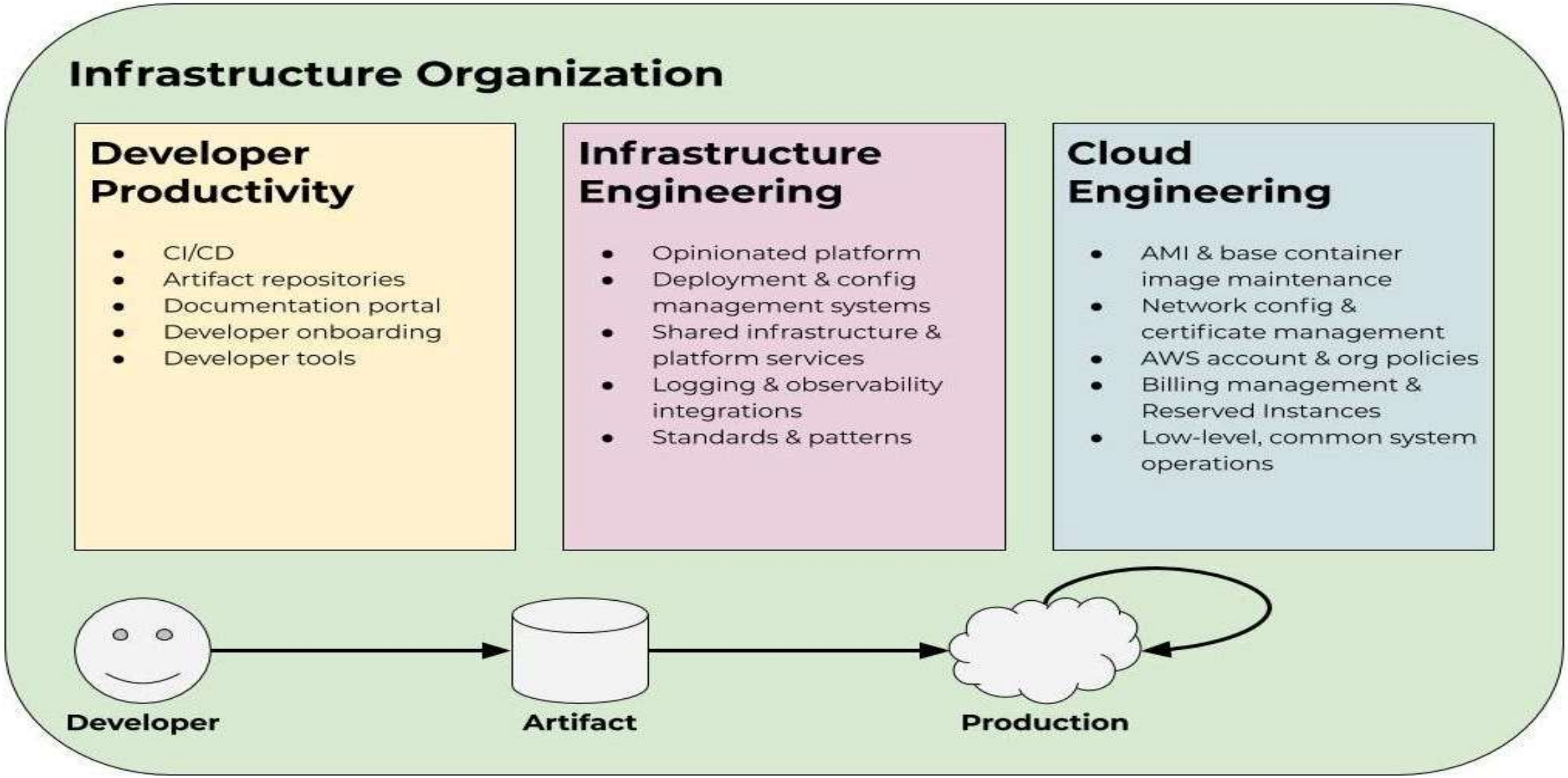
- The Licensing Service provides the very basic resource controlling feature that protects the system from misuse.
  - Restricts the number of resources that can be used for a certain deployment.
    - number of maximum nodes in Aneka.
    - a specific set of services hosted by the container
  - Every container that wants to join the Aneka Cloud is subject to verification against the license installed in the system.

APPLICATION SERVICES:

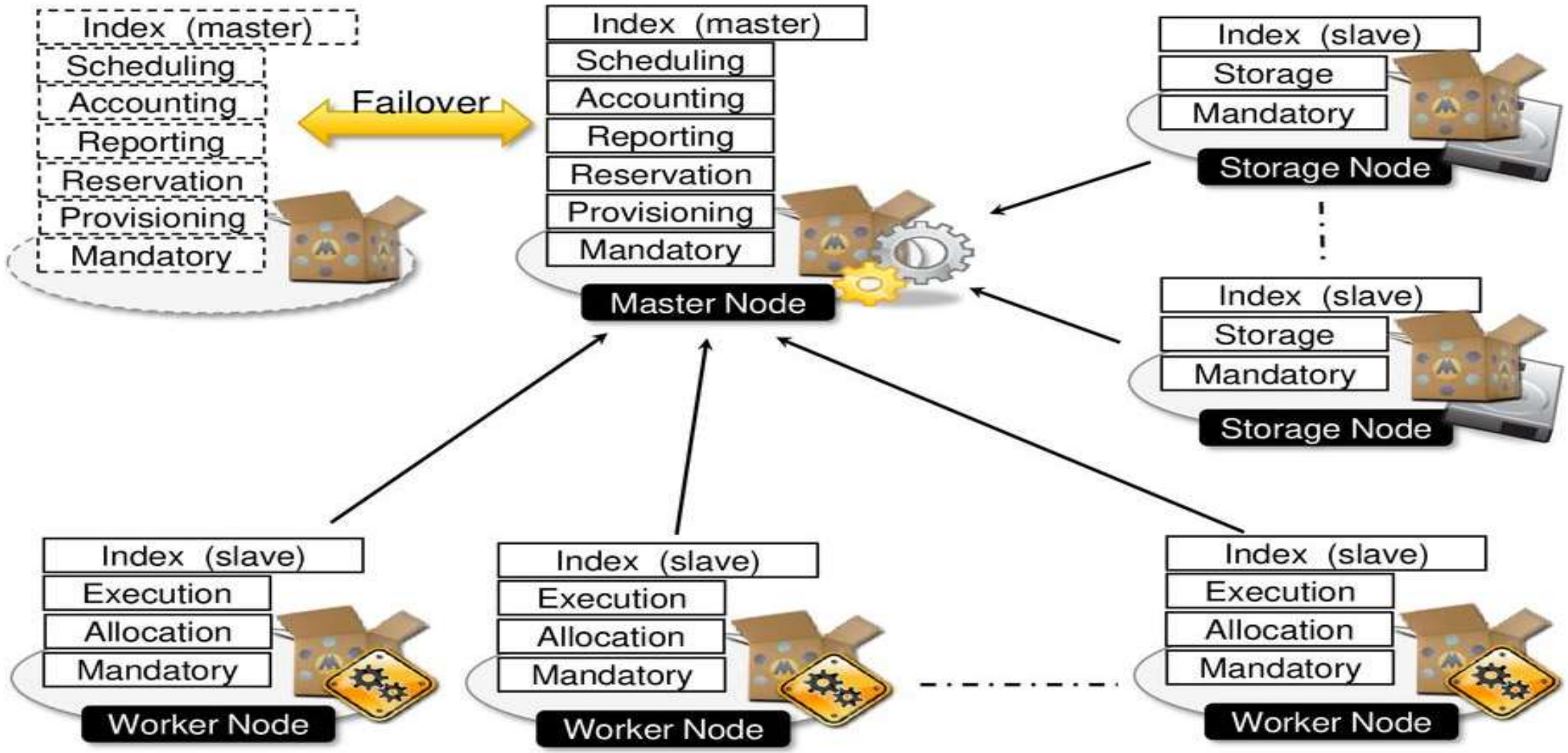
BULIDING ANEKA CLOUDS:

Building Aneka clouds refers to the process of creating and configuring cloud computing environments using the Aneka platform. Aneka is a cloud application platform developed by Manjrasoft, designed to facilitate the development and deployment of applications on various cloud infrastructures. Building Aneka clouds involves setting up and configuring the Aneka framework to create a cloud environment where applications can be seamlessly developed, deployed, and managed.

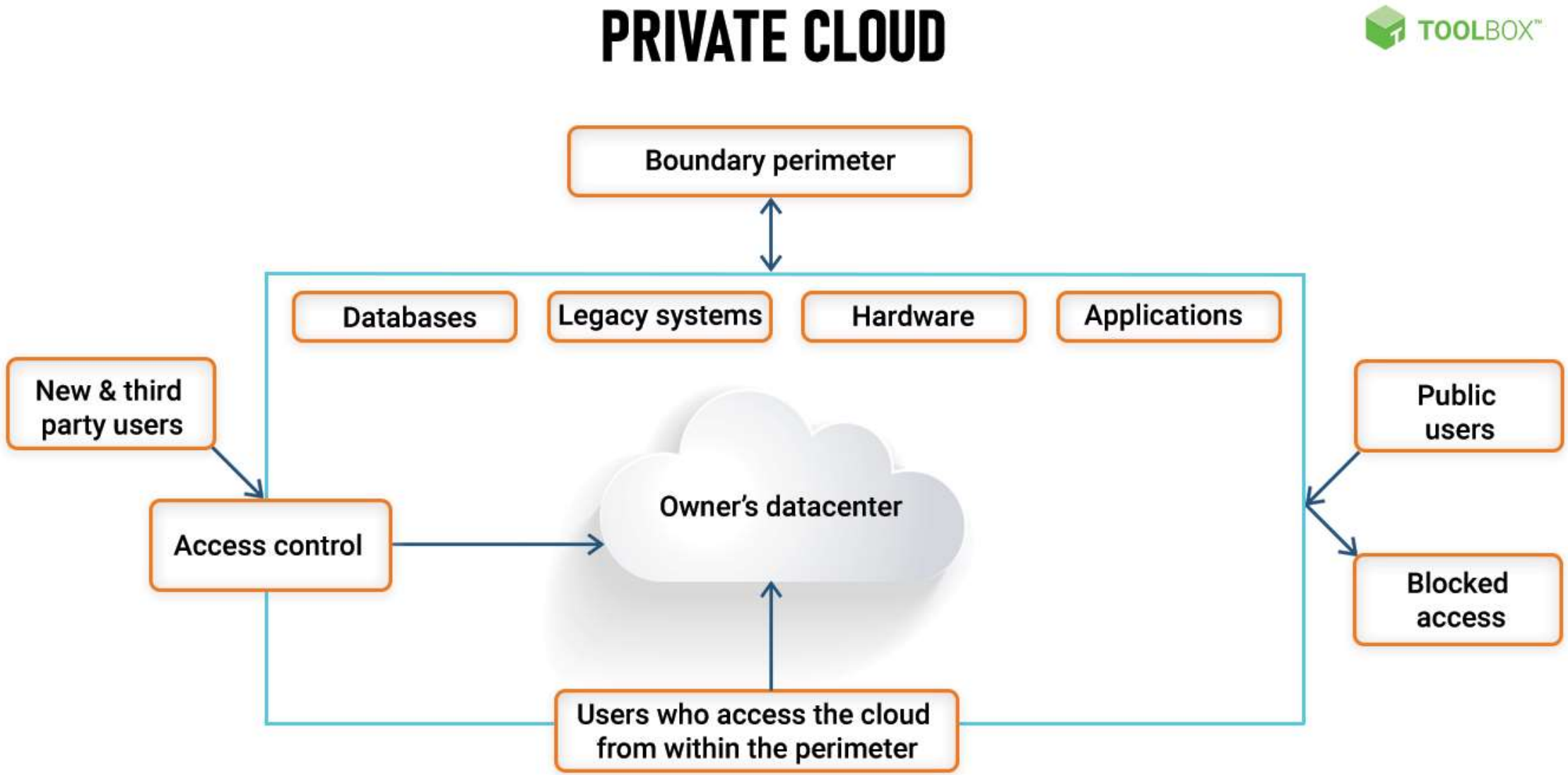
INFRASTRUCTURE ORGANIZATION:



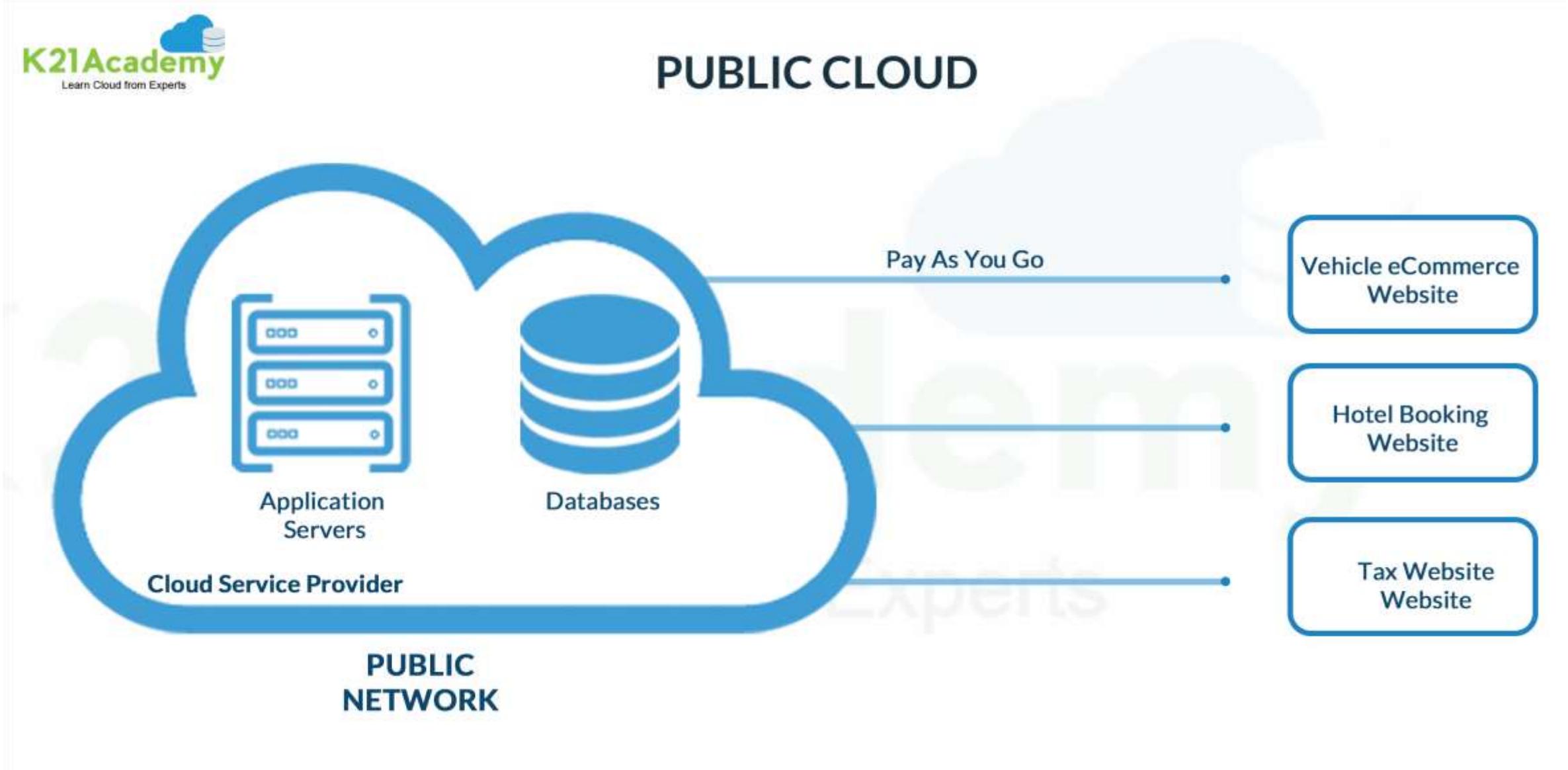
LOGICAL ORGANIZATION:



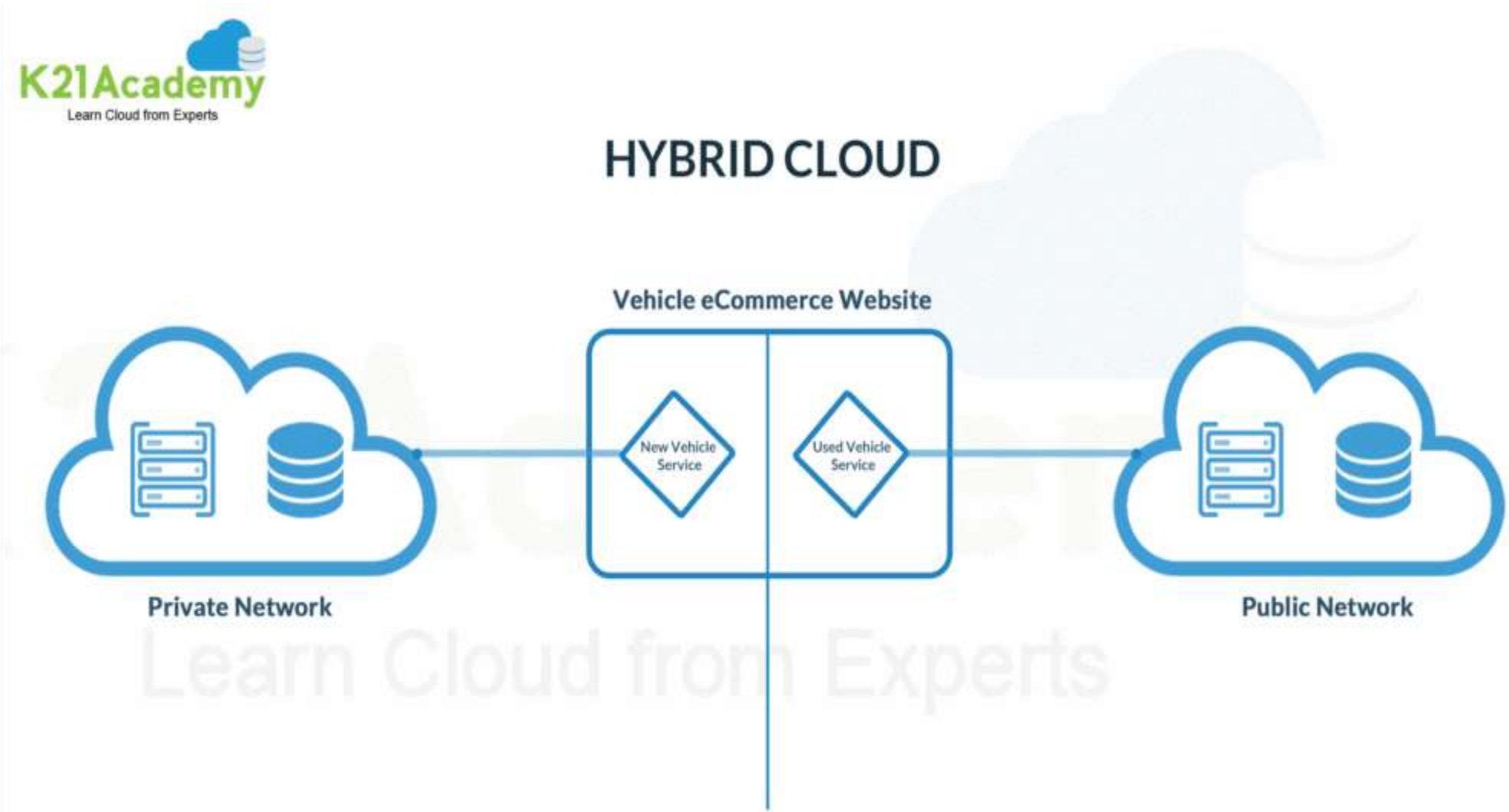
PRIVATE CLOUD DEPLOYMENT MODEL:



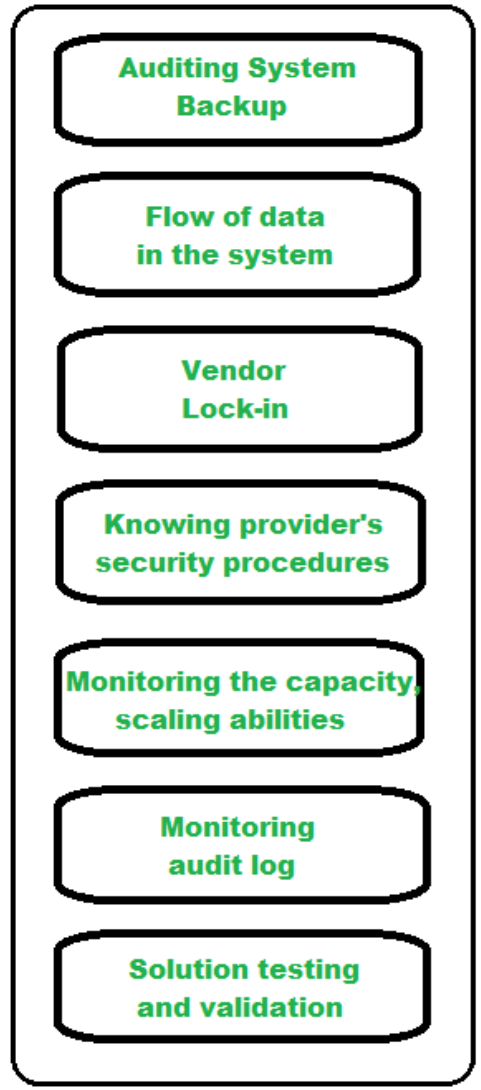
PUBLIC CLOUD DEPLOYMENT MODEL:



HYBRID CLOUD DEPLOYMENT MODEL:



CLOUD PROGRAMMING AND MANAGEMENT:



ANEKA SDK:

- Aneka provides APIs for developing applications on top of existing programming models, implementing new programming models, and developing new services to integrate into the Aneka Cloud.
- The development of applications mostly focuses on the use of existing features and leveraging the services of the middleware, while the implementation of new programming models or new services enriches the features of Aneka.
- The SDK provides support for both programming models and services by means of the Application Model and the Service Model.
- The former covers the develop- ment of applications and new programming models; the latter defines the general infrastructure for service development.

MANAGEMENT TOOLS :

Cloud management tools refer to a set of software solutions and platforms designed to facilitate the administration, monitoring, optimization, and automation of cloud infrastructure and services. These tools are crucial for organizations using cloud computing to efficiently manage their resources, ensure security, control costs, and streamline various operational aspects. Cloud management tools span a wide range of functionalities to address the diverse needs of cloud users.

UNIT-02: COMPLETED