Aneka: Cloud Application Platform

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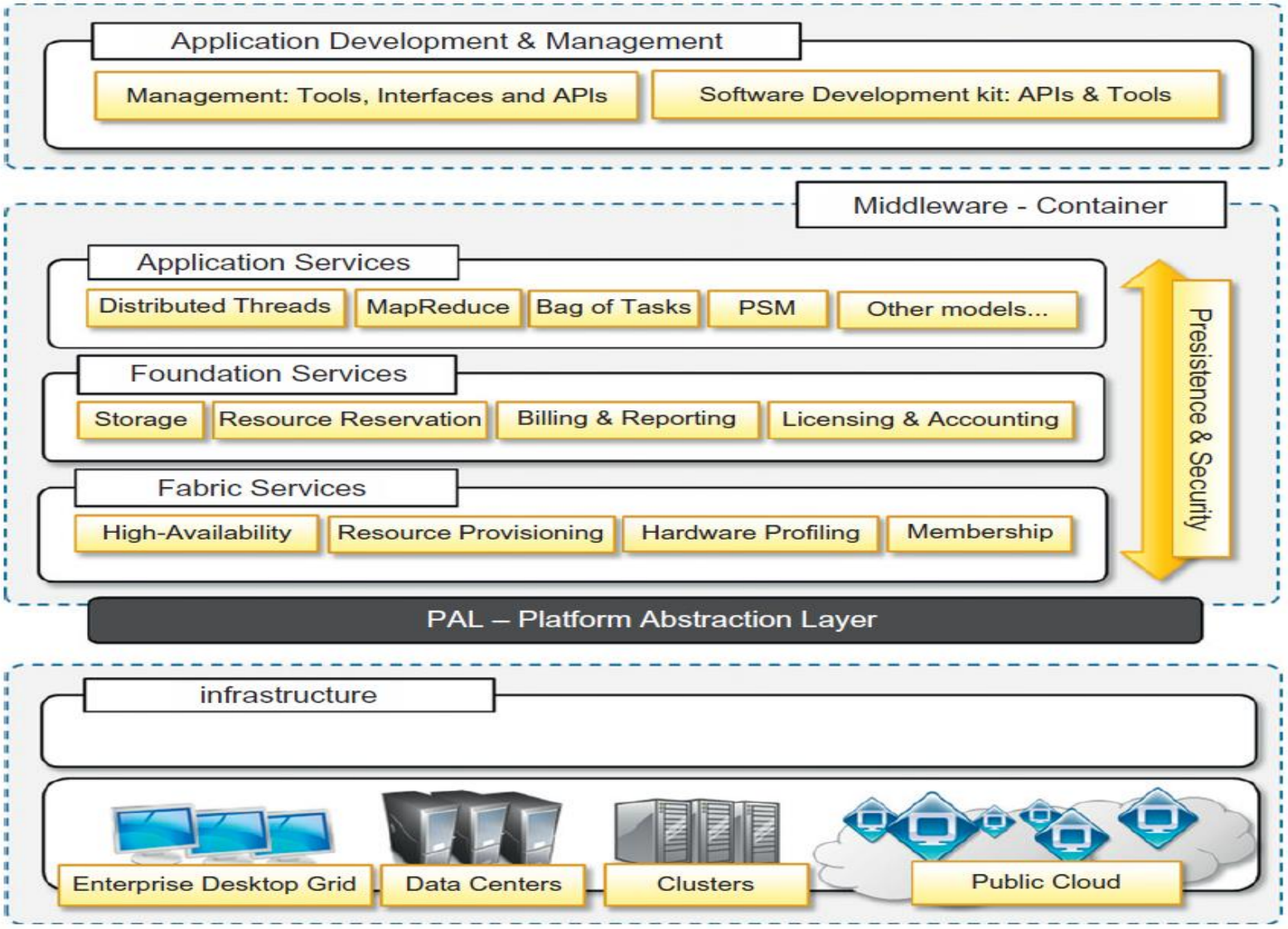
Introduction

- Aneka is Manjrasoft Pty. Ltd.'s solution for developing, deploying, and managing cloud applications
- Aneka consists of a scalable cloud middleware that can be deployed on top of heterogeneous computing resources
- It offers an extensible collection of services coordinating the execution of applications, helping administrators monitor the status of the cloud, and providing integration with existing cloud technologies
- One of Aneka's key advantages is its extensible set of application programming interfaces (APIs) associated with different types of programming models—such as Task, Thread, and MapReduce—used for developing distributed applications, integrating new capabilities into the cloud, and supporting different types of cloud deployment models: public, private, and hybrid

Framework Overview

- Aneka is a software platform for developing cloud computing applications
- It allows harnessing of disparate computing resources and managing them into a unique virtual domain—the Aneka Cloud—in which applications are executed
- According to the Cloud Computing Reference Model, Aneka is a ***pure PaaS*** solution for cloud computing
- Aneka is a cloud middleware product that can be deployed on a heterogeneous set of resources: a network of computers, a multicore server, datacenters, virtual cloud infrastructures, or a mixture of these
- The framework provides both middleware for managing and scaling distributed applications and an extensible set of APIs for developing them

Framework Overview



Framework Overview

- Aneka implements a service-oriented architecture (SOA), and services are the fundamental components of an Aneka Cloud
- Services operate at container level and, except for the platform abstraction layer, they provide developers, users, and administrators with all features offered by the framework
- Services also constitute the extension and customization point of Aneka Clouds: The infrastructure allows for the integration of new services or replacement of the existing ones with a different implementation
- The framework includes the basic services for infrastructure and node management, application execution, accounting, and system monitoring; existing services can be extended and new features can be added to the cloud by dynamically plugging new ones into the container

Framework Overview

- Within an Aneka Cloud environment, there are different aspects involved in providing a scalable and elastic infrastructure and distributed runtime for applications. These services involve:
- **Elasticity and scaling:** By means of the dynamic provisioning service, Aneka supports dynamically upsizing and downsizing of the infrastructure available for applications
- **Runtime management:** The runtime machinery is responsible for keeping the infrastructure up and running and serves as a hosting environment for services. It is primarily represented by the container and a collection of services that manage service membership and lookup, infrastructure maintenance, and profiling

Framework Overview

- **Resource management:** Aneka is an elastic infrastructure in which resources are added and removed dynamically according to application needs and user requirements. To provide QoS-based execution, the system not only allows dynamic provisioning but also provides capabilities for reserving nodes for exclusive use by specific applications
- **Application management:** A specific subset of services is devoted to managing applications. These services include scheduling, execution, monitoring, and storage management
- **User management:** Aneka is a multitenant distributed environment in which multiple applications, potentially belonging to different users, are executed. The framework provides an extensible user system via which it is possible to define users, groups, and permissions. The services devoted to user management build up the security infrastructure of the system and constitute a fundamental element for accounting management

Framework Overview

- **QoS/SLA management and billing** : Within a cloud environment, application execution is metered and billed. Aneka provides a collection of services that coordinate together to take into account the usage of resources by each application and to bill the owning user accordingly
- All these services are available to specific interfaces and APIs on top of which the software development kit (SDK) and management kit are built
- The SDK mainly relates to application development and modeling; it provides developers with APIs to develop applications with the existing programming models and an object model for creating new models
- The management kit is mostly focused on interacting with the runtime services for managing the infrastructure, users, and applications

Anatomy of the Aneka Container

- The Aneka container constitutes the building blocks of Aneka Clouds and represents the runtime machinery available to services and applications
- The container, the unit of deployment in Aneka Clouds, is a lightweight software layer designed to host services and interact with the underlying operating system and hardware
- The main role of the container is to provide a lightweight environment in which to deploy services and some basic capabilities such as communication channels through which it interacts with other nodes in the Aneka Cloud
- Almost all operations performed within Aneka are carried out by the services managed by the container
- The services installed in the Aneka container can be classified into three major categories:
    - Fabric Services
    - Foundation Services
    - Application Services

Anatomy of the Aneka Container

- The services stack resides on top of the Platform Abstraction Layer(PAL), representing the interface to the underlying operating system and hardware. It provides a uniform view of the software and hardware environment in which the container is running
- Persistence and security traverse all the services stack to provide a secure and reliable infrastructure