

NUTAN COLLEGE OF ENGINEERING & RESEARCH (NCER)
Department of Computer Science & Engineering (CSE)

Experiment No. 11

Title: Design and analyze architecture of Aneka / Eucalyptus / KVM identify different entities to understand the structure of it

Objective: To analyze and understand the structure and different entities of Aneka.

Tools used: Not specified.

Prerequisite: Basic understanding of cloud computing and virtualization.

Theory:

Cloud computing has revolutionized the way we think about and interact with computing resources. It has brought about a paradigm shift by providing on-demand access to a shared pool of configurable computing resources. This page will delve into the theory behind three key tools used in cloud computing: Aneka, Eucalyptus, and KVM.

Aneka, Eucalyptus, and KVM are all cloud computing platforms that provide a range of services for building, deploying, and managing applications and services in the cloud. To design and analyze the architecture of these platforms, it is important to identify the different entities that make up their structure.

Aneka: Aneka is a platform and framework for developing distributed applications on the cloud. The architecture of Aneka consists of several components, including the Aneka Cloud Manager, Aneka Cloud Console, Aneka Cloud Nodes, and Aneka Cloud Services. It provides a flexible and extensible framework that supports multiple programming models, including Task Programming, Thread Programming, and MapReduce. Aneka's architecture is composed of three main layers: the Fabric Layer, the Foundation Layer, and the Application Layer. These layers work together to provide a robust and scalable platform for cloud computing.

Multiple containers can be classified into three major categories:

- 1. Textile services**
- 2. Foundation Services**
- 3. Application Services**

1. Textile Services:

Fabric Services defines the lowest level of the software stack that represents multiple containers. They provide access to resource-provisioning subsystems and monitoring features implemented in many.

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2. Foundation Services:

Fabric Services are the core services of Many Cloud and define the infrastructure management features of the system. Foundation services are concerned with the logical management of a distributed system built on top of the infrastructure and provide ancillary services for delivering applications.

3. Application Services:

Application services manage the execution of applications and constitute a layer that varies according to the specific programming model used to develop distributed applications on top of Aneka.

There are mainly two major components in multiple technologies:

The SDK (Software Development Kit) includes the Application Programming Interface (API) and tools needed for the rapid development of applications. The Anka API supports three popular cloud programming models: Tasks, Threads and MapReduce;

And

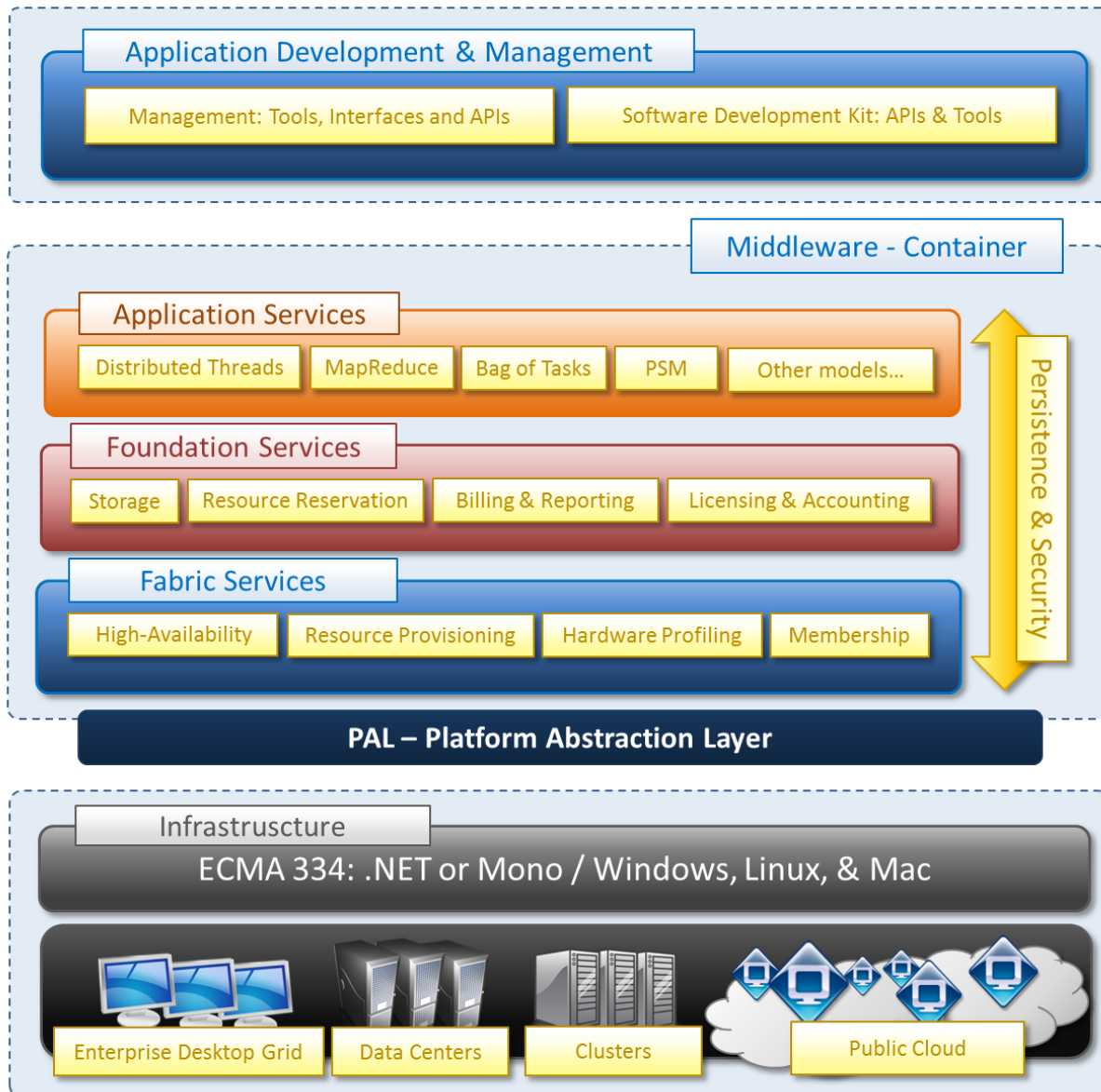
A runtime engine and platform for managing the deployment and execution of applications on a private or public cloud.

One of the notable features of Aneka Pass is to support the provision of private cloud resources from desktop, cluster to a virtual data center using VMware, Citrix Zen Server, and public cloud resources such as Windows Azure, Amazon EC2, and GoGrid cloud service.

Aneka's potential as a Platform as a Service has been successfully harnessed by its users and customers in three different areas, including engineering, life sciences, education, and business intelligence.

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Architecture of Aneka:



Aneka in Cloud Computing: Aneka is a platform and framework for developing distributed applications on the Cloud. It uses desktop PCs on-demand and CPU cycles in addition to a heterogeneous network of servers or datacenters. Aneka provides a rich set of APIs for developers to transparently exploit such resources and express the business logic of applications using preferred programming abstractions.

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System administrators can leverage a collection of tools to monitor and control the deployed infrastructure. It can be a public cloud available to anyone via the Internet or a private cloud formed by nodes with restricted access.

A multiplex-based computing cloud is a collection of physical and virtualized resources connected via a network, either the Internet or a private intranet. Each resource hosts an instance of multiple containers that represent the runtime environment where distributed applications are executed. The container provides the basic management features of a single node and takes advantage of all the other functions of its hosting services.

Services are divided into clothing, foundation, and execution services. Foundation services identify the core system of Anka middleware, which provides a set of infrastructure features to enable Anka containers to perform specific and specific tasks. Fabric services interact directly with nodes through the Platform Abstraction Layer (PAL) and perform hardware profiling and dynamic resource provisioning. Execution services deal directly with scheduling and executing applications in the Cloud.

One of the key features of Aneka is its ability to provide a variety of ways to express distributed applications by offering different programming models; Execution services are mostly concerned with providing middleware with the implementation of these models. Additional services such as persistence and security are inverse to the whole stack of services hosted by the container.

A common deployment of Aneka is presented at the side. An Aneka based Cloud is constituted by a set of interconnected resources that are dynamically modified according to the user needs by using resource virtualization or by harnessing the spare CPU cycles of desktop machines. If the deployment identifies a private Cloud all the resources are in house, for example within the enterprise. This deployment is extended by adding publicly available resources on demand or by interacting with other Aneka public clouds providing computing resources connected over the Internet.

Eucalyptus:

Eucalyptus is an open-source software infrastructure for implementing cloud computing on clusters. It provides an Infrastructure as a Service (IaaS) platform that is compatible with Amazon's EC2 cloud and S3 storage service. The architecture of Eucalyptus is modular and hierarchical, consisting of five high-level components: Cloud Controller, Walrus, Cluster Controller, Storage Controller, and Node Controller. These components interact to provide scalable and efficient cloud services.

KVM:

Kernel-based Virtual Machine (KVM) is a full virtualization solution for Linux on x86 hardware. It allows for the running of multiple virtual machines (VMs) on a single physical machine, each with private virtualized hardware. KVM's architecture includes a loadable kernel module, `kvm.ko`, that provides the core virtualization infrastructure, and a processor-specific module, `kvm-intel.ko`

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or kvm-amd.ko. These modules work together to provide a high-performance and secure virtualization solution.

Understanding the architecture of these tools is crucial for anyone working in the field of cloud computing. It provides insight into how these systems are designed and operate, enabling the development of more efficient and effective cloud applications.

Conclusion: By the end of this experiment, i have a clear understanding of the architecture of Aneka. I understood how these tools leverage different components and services to provide efficient and scalable cloud computing solutions. This knowledge will be beneficial in designing and deploying effective cloud computing applications, designing and analyzing the architecture of Aneka is an important task for understanding how these cloud computing platforms work. By identifying the different entities that make up their structure, you can gain a better understanding of how these platforms can be used to develop and deploy applications and services in the cloud.