



Aneka

Aneka is a market oriented Cloud development and management platform with rapid application development and workload distribution capabilities. Aneka is an integrated middleware package which allows you to seamlessly build and manage an interconnected network in addition to accelerating development, deployment and management of distributed applications using Microsoft .NET frameworks on these networks. It is market oriented since it allows you to build, schedule, provision and monitor results using pricing, accounting, QoS/SLA services in private and/or public (leased) network environments.

Aneka is a workload distribution and management platform that accelerates applications in Microsoft .NET framework environments. Some of the key advantages of Aneka over other GRID or Cluster based workload distribution solutions include:

- rapid deployment tools and framework,
- ability to harness multiple virtual and/or physical machines for accelerating application result
- provisioning based on QoS/SLA
- support of multiple programming and application environments
- simultaneous support of multiple run-time environments
- built on-top of Microsoft .NET framework, with support for Linux environments through Mono



Build

Aneka includes a **Software Development Kit (SDK)** which includes a combination of **APIs** and **Tools** to enable you to express your application. Aneka also allows you to build different run-time environments and build new applications.



Accelerate

Aneka supports **Rapid Development** and **Deployment** of Applications in Multiple Run-Time environments. Aneka uses physical machines as much as possible to achieve maximum utilization in local environment.



Manage

Management includes a Graphical User Interface (GUI) and APIs to set-up, monitor, manage and maintain remote and global Aneka compute clouds. Aneka also has an accounting mechanism and **manages priorities** and scalability based on **SLA/QoS** which enables **dynamic provisioning**.



BUILD



Aneka includes a **Software Development Kit (SDK)** which includes a combination of **APIs** and **Tools** to enable you to express your application. Aneka also allows you to build different run-time environments and build new applications.

Aneka provides APIs and tools that enable applications to be virtualized over a heterogeneous network.

Supported APIs include:

- Task Model for batch and legacy applications
- Thread Model for applications that use object oriented thread
- MapReduce Model for data intensive applications like data mining or analytics.
- Others such as MPI (Message Passing) and Actors (Distributive Active Objects/Agents) can be customized

Supported Tools include:

- Design Explorer for Parameter Sweep applications. Built on-top of task model with no additional requirements for programming.
- Work Flow applications. Built on-top of task model with some additional requirements for programming.

Build different types of Run-time environments:

- PC Grids (also called Enterprise Grids)
- Data Centres (Clusters)
- MultiCore Computers
- Public and/or private networks
- Virtual Machine or Physical

Use APIs and Tools to **build new applications** or **enable existing applications** over different Run-time environments.



ACCELERATE



Aneka supports **Rapid Development** and **Deployment** of Applications in Multiple Run-Time environments. Aneka uses physical machines as much as possible to achieve maximum utilization in local environment. As demand increases, Aneka provisions VMs via private clouds (Xen or VMWare) or Public Clouds (Amazon EC2).

How we **accelerate** Development and Deployment:

- 1) Rapid Deployment includes support of Parameter Sweep using Design Explorer Tool. Parameter sweep takes existing applications that are controlled by a set of parameters passed as a command line and produces multiple distributed executions of the same application with different parameter sets.
- 2) Building on-top of Microsoft .NET framework allows multiple programming languages to be supported, thereby making it faster to get existing applications running.
- 3) Develop Application once and run in multiple environments simultaneously. Support for Multiple Run-time environments saves you time in programming your applications. Aneka supports Virtual Machine and Physical hardware in private and public networks.
- 4) Optimized for networked multi-core computers, Aneka effectively virtualizes your application which allows you to harness the power of multiple computers for the same workload. This gives you results in near real-time allowing you to make faster decisions.
- 5) Aneka Scheduler allows you to run multiple applications on same Run-time environment either concurrently (simultaneously) or in a queue arrangement.

Jixiong Sun, Vice Director of IT, GoFront Group (China Southern Railways) said “ANEKA technology not only improves the overall productivity of our product design, but also it gives us a fantastic opportunity to utilise our existing desktop resources which achieves the maximum utilisation of our existing investment



MANAGE



Aneka Management includes a **Graphical User Interface (GUI)** and **APIs** to set-up, monitor, manage and maintain remote and global Aneka compute clouds. Aneka also has an accounting mechanism and **manages priorities and scalability** based on SLA/QoS which enables **dynamic provisioning**.

Briefly, the set of operations that are performed through the Management Studio are the following:

- Quick setup of computing clouds;
- Remote installation and configuration of nodes;
- System load monitoring and tuning.
- Monitor aggregate dynamic statistics and probing individual nodes for CPU and memory load
- Extensible framework – add new features and services by implementing management plug-ins

Other management features include:

- Accounting and Pricing services provide flexible pricing strategies and keeping track of applications, reservations and users.
- Capacity Management – Dynamically provisioning to elastically scale up and down according to application requirements.
- Service Oriented allowing discovery of services and available nodes
- Automatic overflow and Failover giving high availability based on SLA

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ANEKA ARCHITECTURE

Aneka is a platform and a framework for developing distributed applications on the Cloud. It harnesses the spare CPU cycles of a heterogeneous network of desktop PCs and servers or data centers on demand. Aneka provides developers with a rich set of APIs for transparently exploiting such resources and expressing the business logic of applications by using the preferred programming abstractions. System administrators can leverage on a collection of tools to monitor and control the deployed infrastructure. This can be a public cloud available to anyone through the Internet, or a private cloud constituted by a set of nodes with restricted access.

The Aneka based computing cloud is a collection of physical and virtualized resources connected through a network, which are either the Internet or a private intranet. Each of these resources hosts an instance of the Aneka Container representing the runtime environment where the distributed applications are executed. The container provides the basic management features of the single node and leverages all the other operations on the services that it is hosting. The services are broken up into fabric, foundation, and execution services. Fabric services directly interact with the node through the Platform Abstraction Layer (PAL) and perform hardware profiling and dynamic resource provisioning. Foundation services identify the core system of the Aneka middleware, providing a set of basic features to enable Aneka containers to perform specialized and specific sets of tasks. Execution services directly deal with the scheduling and execution of applications in the Cloud.

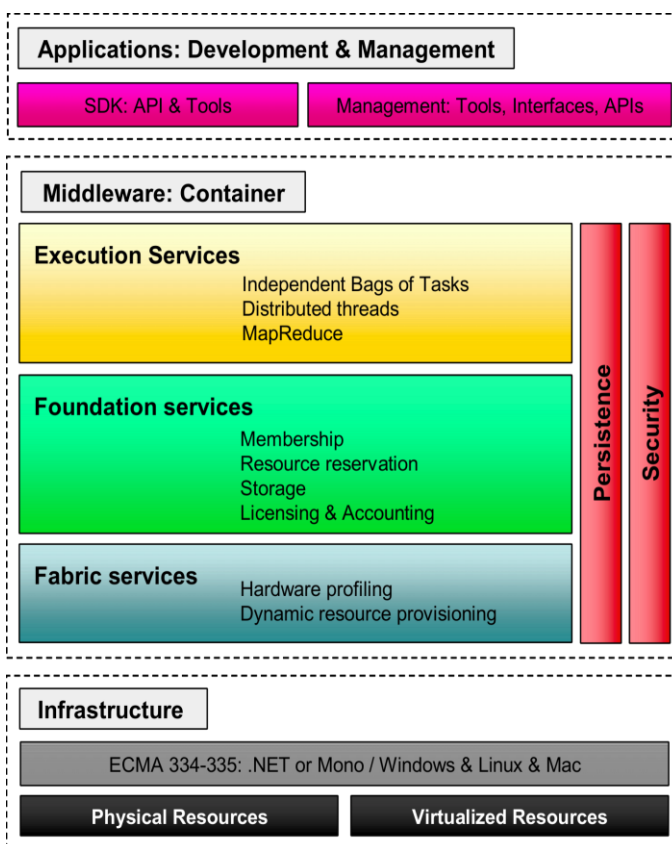


Figure 1. Overview of Aneka Framework

One of the key features of Aneka is the ability of providing different ways for expressing distributed applications by offering different programming models; execution services are mostly concerned with providing the middleware with an implementation for these models. Additional services such as persistence and security are transversal to the entire stack of services that are hosted by the Container. At the application level, a set of different components and tools are provided to: 1) simplify the development of applications (SDK); 2) porting existing applications to the Cloud; and 3) monitoring and managing the Aneka Cloud.



ANEKA ARCHITECTURE

A common deployment of Aneka is presented in Figure 2. 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.

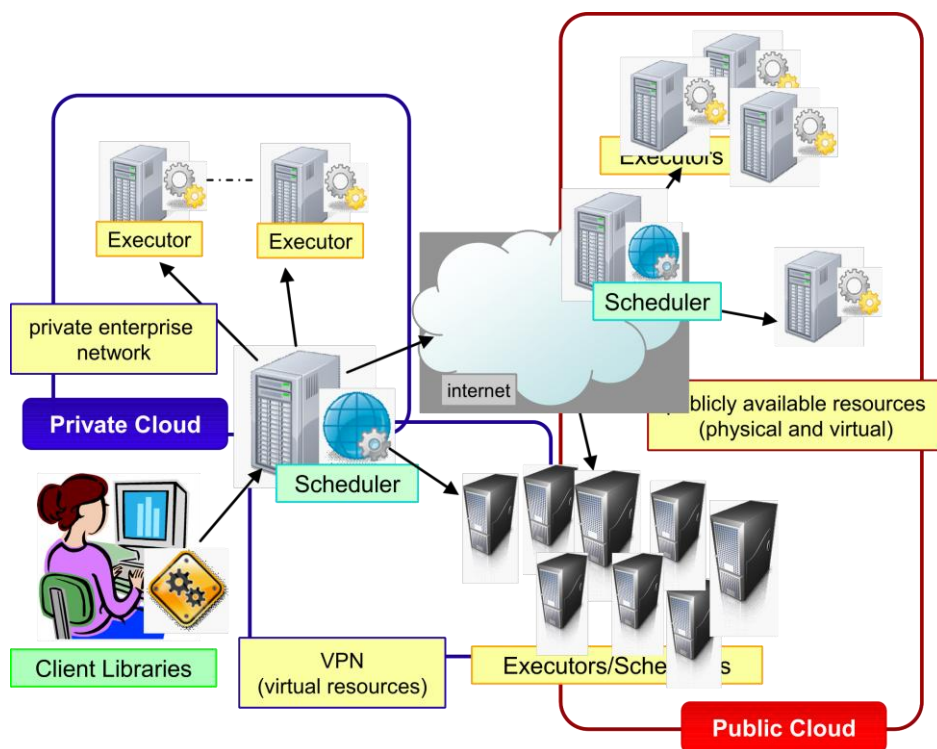


Figure 2: Typical Aneka Cloud Deployment

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