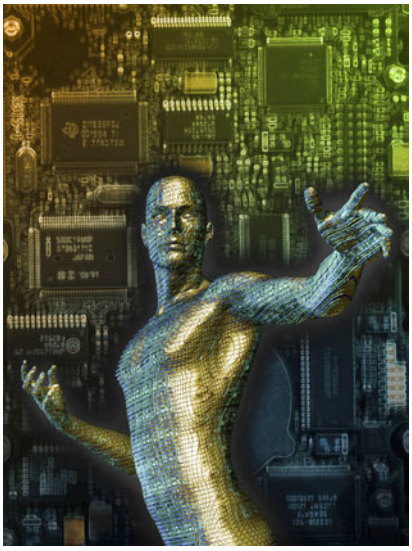
Manjrasoft

Market Oriented Cloud Computing Platform

Innovative Solutions for 3D Rendering

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.



For **3D Rendering**, Aneka enables you to complete your jobs in a fraction of the usual time using existing office computers without having to do any programming.

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 .NET, 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. This enables you to complete your 3D rendering job in a fraction of the usual time using existing office computers without any programming.

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

For Management of Rendering, we provide a custom Graphical User Interface (GUI) providing ability to set various Maya rendering (batch mode) parameters which generates Aneka tasks. The GUI also monitors submitted Aneka tasks and collects the final rendered image.

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BUILD

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For **building solution to accelerate 3D rendering**, you can use Aneka's Design Explorer tool. The Design Explorer uses parameter sweep to express the rendering job over multiple computers without having to do any programming. The Design Explorer takes existing applications like 3D Rendering and sends different parameter sets provided by Maya in form of command line to produce multiple distributed executions on the same application.

The Design Explorer is a visual environment that helps users to quickly create parameter sweeping applications and run it in few steps. More precisely, the Design Explorer provides a wizard allowing users to:

- Identify the executable required to run the application;
- Define the parameters that control application execution and their domains;
- Provide the required input files for running the application;
- Define all the output files that will be produced by the application and made available to the user;
- Define the sequence of commands that compose the task template that will be run remotely;

The Aneka SDK includes some ready to use task classes that provide the basic operations for composing the task template: execute an application, copy, rename, and delete a file. It also provides an interface that allows developers to create task classes supporting parameter sweeping.

Once the template is complete, the Design Explorer allows the user to directly run it on Aneka Clouds by using the parameter sweeping APIs. Different visualisations are provided and statistics collected by the environment in order to monitor the progress of the application.

The single solution developed using the Design Explorer can be run on different types of Run-time environments like

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

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).

For **Accelerating 3D Rendering results**, Aneka speeds development, deployment and execution time by hiding away the complexity and making it easy.

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 .NET 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

Management includes 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.

For **Management of Rendering**, we provide a custom Graphical User Interface (GUI) providing ability to set various Maya rendering (batch mode) parameters which generates Aneka tasks. The GUI also monitors submitted Aneka tasks and collects the final rendered image.

The Aneka Management Studio also assists with the following:

- Quick setup of computing clouds;
- Remote installation and configuration of nodes;
- Remote control of containers;
- 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.
- Dynamic Capacity Management – 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 is a platform and a framework for developing distributed applications on the Cloud.

ANEKA ARCHITECTURE

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.

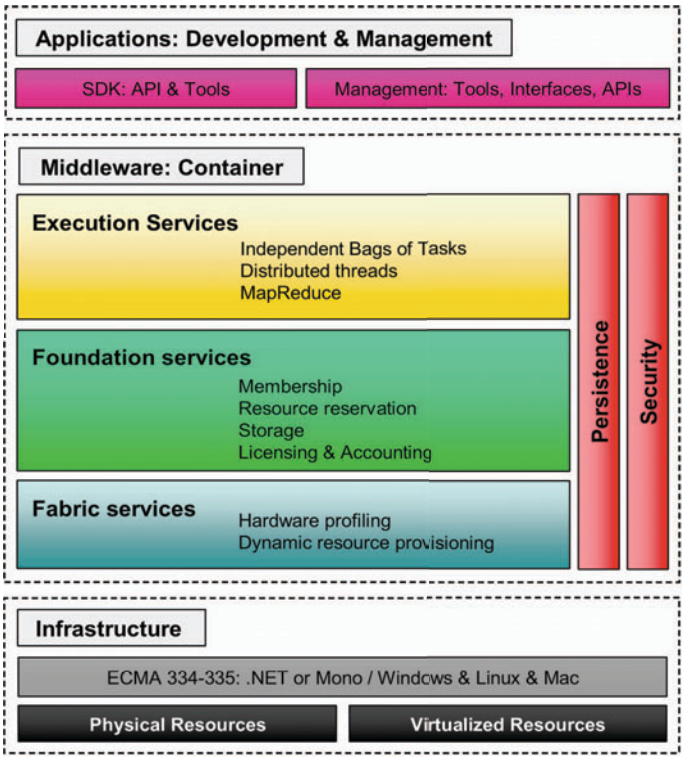

Figure 1. Overview of Aneka Framework

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.

A common deployment for 3D Rendering is presented in Figure 2. An Aneka based Cloud is

ANEKA ARCHITECTURE

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.

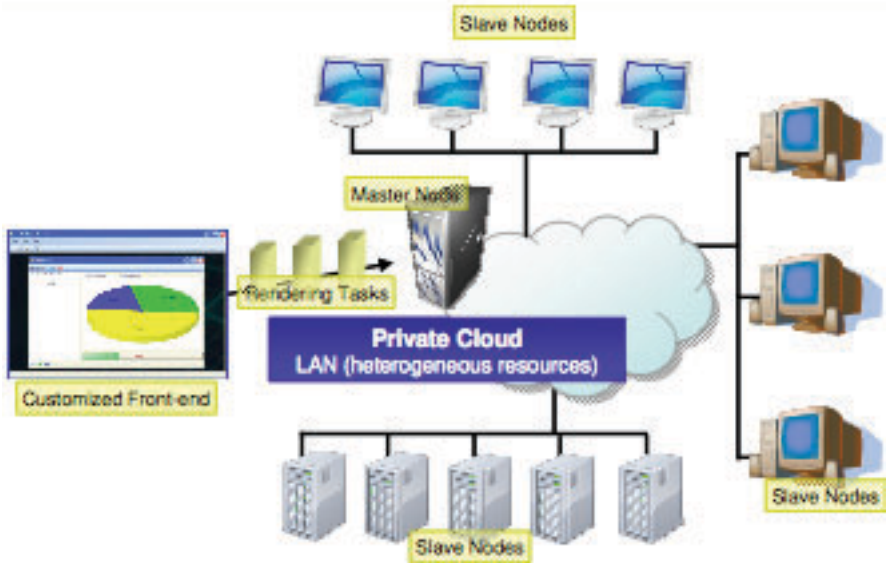

Figure 2

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