

# Study of Windows based .NET ANEKA in Cloud Computing

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**Abstract** - Cloud computing is one of the demanding technologies that can provide computing services such as servers, databases, networking, software etc over the Internet. Companies offering these computing services are called cloud providers and typically they charge for cloud computing services based on usage. If we use an online service to send email, edit documents, watch movies or TV, listen to music, play games or store pictures and other files, it is likely that cloud computing is making it all possible behind the scenes. Aneka is a Application Development Platform (CAP) for developing and running compute and data intensive applications. There are three programming models in Aneka and a set of APIs and tools that allow you to build new applications or run existing legacy code. Aneka provides developers with a rich set of APIs for transparently exploiting such resources and expressing the business logic of applications. Aneka allows different kind of applications to be executed on the same Grid/Cloud infrastructure. In order to support such flexibility it provides different abstractions. This paper discusses the possibilities and usage of Microsoft Windows based cloud computing software as we called ANEKA.

**KEYWORDS** — CLUSTER, RESOURCE, CLOUD, GRID COMPUTING, IMAGE PROCESSING

## I. INTRODUCTION

Cloud is a popular buzzword among industry journalists. Like its namesake the concept of a cloud is indefinite and at the moment is changing faster than most of us can keep up. Anyway, computing has the promise of providing a massive surge of growth in a industry that is struggling to grow up. Cloud computing is a practical approach to experience direct cost benefits and it has the potential to transform a data center from a capital intensive set up to a variable priced environment. The idea of cloud computing is based on a very fundamental principal of re-usability of IT capabilities. The difference that cloud computing brings compared to traditional concepts of “grid computing”, “distributed computing”, “utility computing”, or “autonomic computing” is to broaden horizons across organisational boundaries[9]. Manjrasoft, a leading software company has created an innovative software

technology for simplifying the development and deployment of applications on private or public Clouds. Aneka plays the role of Application Platform as a Service for Cloud Computing. Aneka supports various programming models involving Task Programming, Thread Programming and MapReduce Programming and tools for rapid creation of applications and their seamless deployment on private or public Clouds to distribute applications. 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.

## II. ANEKA

Aneka is known as a window based cloud computing software. Most of the cloud softwares are Linux open source. Aneka platform will deploy and develop applications on top of cloud infrastructure. It provides a runtime environment and a set of APIs that allow developers to build .NET applications that leverage their computation on either public or private clouds. Aneka can support multiple programming models that are ways of expressing the execution logic of applications by using specific abstractions [1]. Aneka is an Application Platform-as-a-Service (PaaS) for Cloud Computing. which offers a runtime environment and a set of APIs that enable developers to build customised applications by using multiple programming models such as Task Programming, Thread Programming and Map Reduce Programming. Aneka provides a number of services that allow users to control, auto-scale, reserve, monitor and bill users for the resources used by their applications. Aneka is its support for provisioning resources on different public Cloud providers such as Amazon EC2, Windows Azure[1]

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.

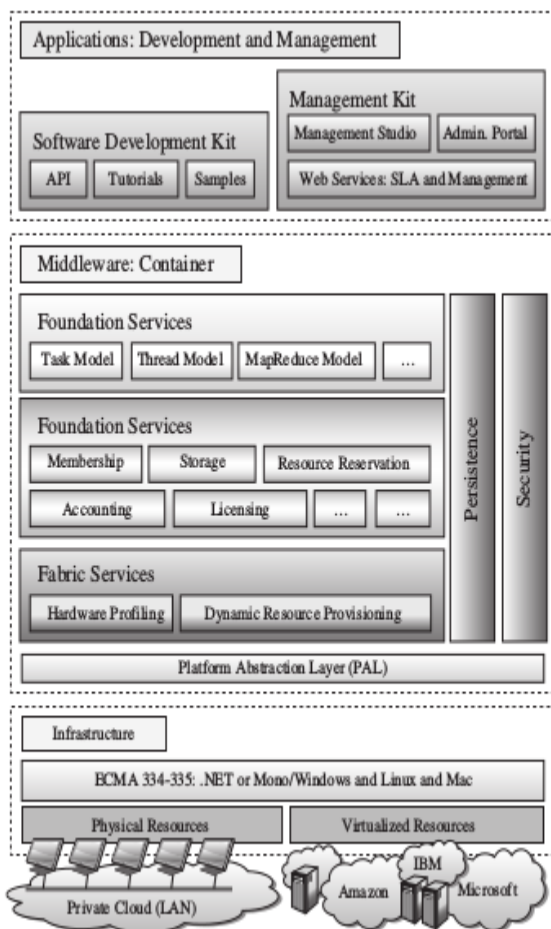


Fig: 2.1

The Fig: 2.1 shows the architecture of Aneka. The heart of this infrastructure is the Aneka Container which represents the basic deployment unit of Aneka based clouds. The network of containers defining the middleware of Aneka forms a the runtime environment hosting the execution of distributed applications. Aneka powerfully relies on a Service Oriented Architecture and the Container is a lightweight component providing basic node management features[3]. All the other operations that are needed by the middleware are implemented as services. The different services are as follows.

**Fabric Services** - It defines the lowest level of the software stack representing the Aneka Container. They provide access to the resource supplying subsystem and to the hardware of the hosting machine. Resource supplying services are in charge of dynamically providing new nodes on demand by relying on virtualization technologies,

while hardware profile services provide a platform independent interface for collecting performance information and querying the properties of the host operating system and hardware. These services rely on the Platform Abstraction Layer (PAL) that allows the Container to be completely independent from the hosting machine and the operating system and the whole framework to be portable over different platforms.

**Foundation Services**- It represent the core of the Aneka middleware on top of which Container customization takes place. Foundation services constitute the pillars of the Aneka middleware and are mostly concerned with providing runtime support for execution services and applications. The core of Aneka addresses different issues Resource reservation; Storage management; Licensing, accounting, and pricing.

### III. IMPLEMENTATION

After setting up Aneka Daemon on selected machines our next step is to create an Aneka Cloud. As described earlier, an Aneka Cloud is composed of Master Container and group of Worker Containers. All Workers are to be registered to the Master, which acts as a gateway to the Cloud. The Master accepts the application submitted by the endusers and than schedules them to Workers. we must first decide on the machine to host the Master Container that are capable of processing requests from a number of clients even while managing a large number of Workers. The machine capability is depended on the size of the cloud and the expected usage. In order to install the Master Container, select Install Container from the context menu on the selected machine, This brings up the Container installation Wizard[9].

#### Step 1 – Container Type and Port Configuration

On start up the Aneka Installation wizard verify whether the port is free or not by automatically probing the default Container port, 9090. If it is not free, it indicates that it is being used by another program, it must be either ensured that it becomes free, or assign a new port number for the Container. We can verify whether a port is free, by pressing the Probe button again. After making sure that the selected Container Type is Master , click Next button to proceed.

#### Step 2 – Security Configuration

Security configuration is mainly done to provide security for the cloud. It is being recommended to enable security in a production environment. It is necessary to disable security for testing or evaluation purposes . Enabling secured communication ensures that no more users could enter into the Aneka Cloud[8] without providing

username and password. It ensures that the Master and Workers authenticate each other and all traffic exchanged between them is encrypted.

The Secret Key is a shared security key between the Master and Worker Containers for authentication and encryption. It is mandatory to generate a key if we need to enable secure communication. It is also recommended to add this key to the Key Store with a friendly name, since we need it later while configuring a Worker Container. The Key Store is written to the Management Studio's configuration file and is restored during later sessions.

### Step 3 – Persistence Configuration

An Aneka Cloud maintains data for different purposes including user management, application and job management, resource management, accounting, billing and monitoring . This step enable us to setup the persistence requirements for the cloud. There are two Persistence Modes, Relational Database and Memory. It is highly recommended to choose Relational Database for production environments. Memory persistence is typically useful for testing or evaluation purposes, and will store all data in volatile memory which will be lost when the container restarts or crashes[5].

This allows us to select the list of services that we wish to host on the Worker Container. We may leave the default selection intact for the most common service configuration for Worker Containers. The list of services provided are give below:

- Logging Service
- Monitoring Service
- Task Execution Service
- Thread Execution Service
- Map Reduce Executor

To configure the properties of each to the listed services, select the service and then edit the properties in the property box below. The final step of the Wizard is summary of the installation settings. Browse through the settings to ensure that everything is correct. In order to change any of the settings we may click Previous button until we reach the final step of the Wizard. To start installing the Container click Finish.

After the completion of installation, inorder to see a list of all new Workers connected to the Master Container, click on the Master Container in Cloud Explorer . Fig: 3.1 shows the sharpening of

an image. Here the work is carried out by the aneka cluster computers. The actual workload is shared among the computers. The processing power required to do any task can be distributed. The dialog box in the figure shows the participated computer's IP address. The advantage of aneka is really impressing in big applications which requires a huge computing power.

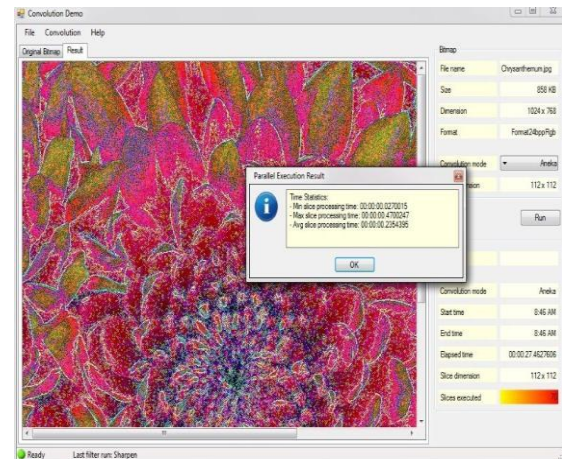


Fig: 3.1

## IV. CONCLUSION

Aneka, a framework providing a platform for cloud computing applications. As discussed in the introduction Aneka is an implementation of the Platform as a Service approach. The framework is based on an extensible and service oriented architecture that simplifies the deployment of clouds and their maintenance and provides a customizable environment that supports different design patterns for distributed applications. This paper has focussed on the implementation and use of Aneka with image sharpening example. The application of Aneka can be extended to large scale applications and as a result the execution time and the resource availability and fault tolerance can be increased in a great extent.

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