

A Survey on Aneka Cloud Application and Integration with Windows Azure

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Abstract – Aneka is a framework used to implement Platform as a service for cloud computing. Using Aneka features, any complex applications can be easily deployed with benefits either in public or private clouds. Aneka supports all types of cloud providers such as Amazon EC2, Windows Azure and GoGrid. The paper presents how aneka integrates with azure. This integration of both the platforms makes a powerful impact by running more number of compute instances parallel. The advanced features of Aneka platform such as its programming paradigms like programming models, scheduling, Management services, application execution services, accounting and pricing services and dynamic provisioning services. Finally we will determine how aneka works for Amazon EC2 and GoGrid.

Keywords— Cloud computing, Platform as a service, Aneka, Azure, Cloud application development

I. INTRODUCTION

Cloud Computing is a model for enabling on demand network access to a shared pool of configuration that can be rapidly released. The resources that cloud computing provide various tools like data storage, servers, databases, networks and software's. Current businesses have seen Clouds [2, 7] as a monetary motivation for extending their IT foundation with less complete expense of possession (TCO) and better yield of speculation (ROI). By supporting virtualization and dynamic provisioning of assets on interest, Cloud registering worldview permits any business, from little and medium venture (SMEs) to huge associations, to all the more admirably and safely plan their IT uses. They will actually want to react quickly to varieties in the market interest 2 for their Cloud administrations. IT cost investment funds are acknowledged by methods for its arrangement "membership situated" foundation and administrations on a pay-more only as costs arise premise. There is no more need to put resources into repetitive and exceptionally issue open minded equipment or costly programming frameworks, which will Lose their incentive before they will be paid off by the produced income. Distributed computing presently permits paying for what the business need at right now and to deliver it when these assets are not, at this point required. The practice of leasing IT frameworks and administrations has become so engaging that it is not just utilized to incorporate extra assets and flexibly scale existing programming frameworks into half and half Clouds, yet additionally to update the current IT foundation to upgrade the utilization of the inner IT, along these lines prompting the introduction of private Mists. To viably and proficiently tackle Cloud processing, specialist organizations and application engineers need to manage a few difficulties, which include: application programming

models, asset the executives and checking, cost-mindful provisioning, application booking, and energy effective asset usage. The Aneka Cloud Application stage, along with other virtualization and Cloud figuring innovations means to deliver these difficulties and to improve on the plan furthermore, organization of Cloud Computing frameworks.

Aneka is a .NET-based application improvement Platform-as-a-Service (PaaS), which offers a runtime climate and a bunch of APIs that empower engineers to fabricate redone applications by utilizing numerous programming models, for example, Task Programming, Thread Programming and MapReduce Programming, which can influence the figure assets on one or the other public or private Clouds [1]. Also, Aneka gives various administrations that permit clients to control, auto-scale, save, screen and bill clients for the assets utilized by their applications. One of key qualities of Aneka PaaS is to help provisioning of assets on open Clouds for example, Windows Azure, Amazon EC2, and GoGrid, while additionally outfitting private Cloud assets going from work areas and groups, to virtual datacenters when expected to help the exhibition of utilizations, as demonstrated in Figure

1. Aneka has effectively been utilized in a few industry sections and application situations to meet their quickly developing registering requests.

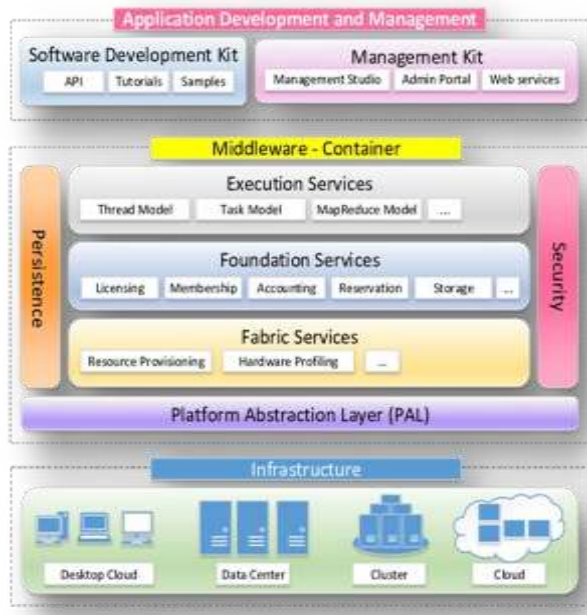


Figure 1: Aneka framework

In this section, we will present Aneka Cloud Application Platform (Aneka PaaS) what's more; portray its joining with public Cloud stages especially zeroing in on the Windows Azure Platform. We will show in detail, how a versatile, extensible and adaptable Cloud stage can help upgrade the presentation and effectiveness of applications by saddling assets from private, public or crossover Clouds with insignificant programming exertion. The Windows Azure Platform is a Cloud Services Stage offered by Microsoft [5]. We will likely incorporate the Aneka PaaS with Windows Azure Platform, so Aneka PaaS can use the processing assets offered by Windows Azure Platform. The mix underpins two kinds of arrangements. In the primary case, our goal is to convey Aneka Worker Containers as cases of Windows Azure Worker Role, while the Aneka Master Container runs locally on-premises, empowering clients of Aneka PaaS to utilize the processing assets offered by Windows Azure Platform for application execution. What's more, in the subsequent case, the whole Aneka Cloud is sent on Windows Azure with the goal that Aneka clients don't need to fabricate or arrangement any registering assets to run Aneka PaaS. This section reports the plan and usage of the sending of Aneka holders on Windows Azure Worker Role and the joining of two stages.



Figure 2: Basic Architecture of Aneka

The figure shows the fundamental engineering of Aneka. The framework incorporates four key parts, including Aneka Master, Aneka Worker, Aneka Management Console, furthermore, Aneka Client Libraries [1]. The Aneka Master and Aneka Worker are both Aneka Containers which addresses the essential arrangement unit of Aneka based Clouds. Aneka Containers have extraordinary sorts of administrations relying upon their job. For example, notwithstanding required administrations, the Master runs the Scheduling, Accounting, Reporting, Reservation, Provisioning, and Storage administrations, while the Workers run execution administrations. For versatility reasons, a portion of these administrations can be facilitated on independent Containers with various jobs. For instance, it is ideal to send a Storage Container for facilitating the Capacity administration, which is answerable for dealing with the capacity and move of records inside the Aneka Cloud. The Master Container is answerable for dealing with the whole Aneka Cloud, planning the execution of uses by dispatching the assortment of work units to the register hubs, while the Worker Container is responsible for executing the work units, checking the execution, and gathering and sending the results

1. Fast and Simple: Task Programming Model

The task programming model offers the ability of developers to express applications as a set of individual assignments. Each assignment can perform various tasks. Operations, or the same operation on various data, and can be carried out in any order by the atmosphere at runtime. This is a condition in which a lot of scientific applications are used. Fit in and make Grid Computing a very common model.

2. Concurrent Applications: Thread Programming Model

String Programming Model offers designers the ability of running multithreaded applications on the Aneka Cloud. The primary deliberation of this model is the idea of string which impersonates the semantics of the basic nearby string however is executed distantly in a dispersed climate. This model offers better control on the execution of the individual segments (strings) of an application however requires more the executives when contrasted with Task Programming, which depends on a "submit and disregard" design. The Aneka Thread bolsters practically the entirety of the tasks accessible for customary nearby strings. All the more explicitly an Aneka string has been intended to reflect the interface of the System.Threading.Thread .NET class, so designers can undoubtedly move existing multi-strung applications to the Aneka stage with negligible changes. In a perfect world, applications can be straightforwardly ported to Aneka just by subbing neighborhood strings with Aneka Threads and acquainting insignificant changes with the code. This model covers all the application situations of the Task Programming and tackles the extra difficulties of giving a conveyed runtime climate to neighborhood multi-strung applications.

3. Data Intensive Applications: MapReduce Programming Model

MapReduce Programming Model [9] is a usage of the

MapReduce model proposed by Google [9], in .NET on the Aneka stage. MapReduce has been intended to handle colossal amounts of information by utilizing straightforward tasks that removes helpful data from a dataset (the guide capacity) and totals this data together (the lessen work) to deliver the end-product. Designers give the rationale for these two tasks and the dataset, and Aneka will wrap up, making the results available when the application is finished.

II. OVERVIEW OF MICROSOFT AZURE

As opposed to other public Cloud stages, for example, Amazon EC2 and GoGrid, Windows Azure as of now doesn't give an IaaS (Infrastructure-as-a-Service). All things being equal, it gives a PaaS (Platform as a Service) arrangement, limiting clients from direct access with regulatory advantages to basic virtual framework. Clients can just utilize the Web APIs uncovered by Windows Azure to arrange and utilize Windows Azure administrations. A part on Windows Azure alludes to a discrete adaptable segment worked with oversight code. Windows Azure as of now bolsters three sorts of jobs [4], as demonstrated in Figure 3.

- A. Web Role: a Web job is a job that is altered for Web application programming as is upheld by IIS 7.
- B. Worker Role: a laborer job is a job that is valuable for summed up turn of events. It is intended to run an assortment of Windows-based code.
- C. VM Role: a virtual machine job is a job that runs a client gave Windows Worker 2008 R2 picture.

A Windows Azure help should incorporate in any event one job of one or the other sort, yet may comprise of quite a few Web jobs, laborer jobs and VM jobs. Besides, we can dispatch quite a few occurrences of a specific job. Each case will be run in an autonomous VM and offer a similar paired code and design record of the job.

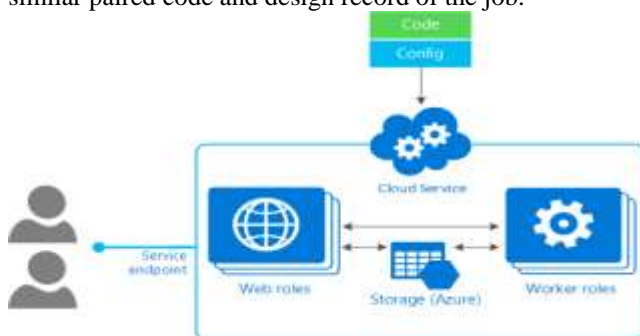


Figure 3: Windows Azure overview

Regarding the correspondence uphold, there are two sorts of endpoints that can be characterized: input and inside. Information endpoints are those are presented to the Internet, and interior endpoints a utilized for correspondence inside the application inside the Azure climate. A Web job can characterize a solitary HTTP endpoint and a solitary HTTPS endpoint for outer clients, while a Worker Role and a VM job may relegate up to five inside or outside endpoints utilizing HTTP, HTTPS or

TCP. There exists an inherent load balancer on top of every outer endpoint which is utilized to spread approaching demands across the cases of the given job. Also, all the job occasions can make outbound associations with Internet assets through HTTP, HTTPS or TCP. Under the present condition, we can send Aneka Container as cases of Windows Purplish blue Worker Role which gains admittance to assets on the Windows Azure climate through the Windows Azure Managed Library.

III. INTEGRATION AND FEATURES OF TWO PLATFORMS

Features from Windows Azure

For the clients of Aneka Platform, the incorporation of the Aneka PaaS and Windows azure assets implies they don't need to assemble or arrangement the foundation required for Aneka Cloud. They can dispatch quite a few examples on Windows azure Cloud Platform to run their application in corresponding to acquire proficiency.

Features from Aneka Cloud Application Development Platform

For the clients of Windows Azure Application, the incorporation of Aneka PaaS and Windows Azure Platform permits them to accept the high level highlights from Aneka PaaS:

- Multiple Programming Models. As talked about in Section 2.1, the Aneka PaaS furnishes clients with three various types of cloud programming models, which includes Task Programming, Thread Programming, and MapReduce Programming to cover distinctive application situations, significantly diminishing the time required in creating Cloud- mindful applications, as demonstrated in Figure 3.
- Scheduling and Management Services. The Aneka PaaS Scheduling Service can dispatch the assortment of occupations that make an Aneka Application to the figure hubs in a totally straightforward way. The clients don't have to deal with the booking and the administration of the application execution.
- Execution Services. The Aneka PaaS Execution Services can play out the execution of dispersed application and gather the outcomes on the Aneka Worker Holder runtime climate.
- Accounting and Pricing Services. Bookkeeping and Pricing administrations of Aneka PaaS empower charging the last client for utilizing the Cloud by monitoring the application running and giving adaptable valuing methodologies that are of advantage to both the last clients of the application and the specialist co-ops.
- Dynamic Provisioning Services. In current valuing model for Windows Azure, clients will be charged at an hourly rate contingent upon the size of the process example. In this way it bodes well to powerfully add occurrences to ascending at runtime as indicated by the heap and necessity of the application. Also examples can be powerfully diminished or the whole arrangement can be erased when not being effectively used to stay away from charges. One of the key highlights of Aneka is its help for

dynamic provisioning which can be utilized to influence assets powerfully for scaling here and there Aneka Clouds, controlling the lifetime of virtual hubs.

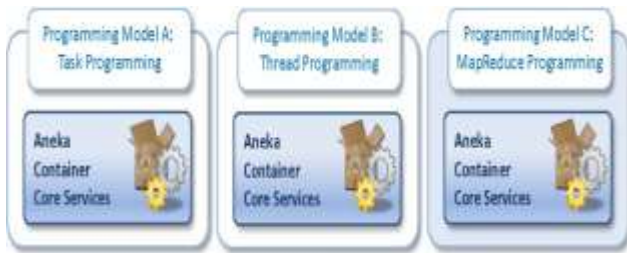


Figure 4: Aneka programming models

As we intend to send Aneka Container as examples of the Windows Azure Worker Part, there exists a circumstance where the Aneka Master is outside the Windows Azure Cloud and attempts to send messages to a particular Aneka Worker inside the Windows Azure Cloud. Since the heap balancer is liable for sending these messages, there is a decent chance that the message might be shipped off an Aneka Worker Container other than the predetermined one. Thus, to stay away from the message being moved to some unacceptable Aneka Worker Container, two potential arrangements are accessible:

Forward Messages among Aneka Worker Containers.

At the point when a Container gets a message that doesn't have a place with it, it will advance the message to the right Container as indicated by the Internal Endpoint address encoded in the NodeURI of Target Node of the Message. The upside of this arrangement is the consistency of the engineering of Aneka PaaS since no new segments are acquainted with the engineering. The drawback, in any case, is that the execution of Aneka Worker Containers will be prevented because of the overhead of sending message.

Deploy a message intermediary between the Aneka Worker Containers and Expert to dispatch approaching outer messages. The Message Proxy is an uncommon sort of Aneka Worker Container which doesn't have any execution administrations.

At the point when the Windows Azure Aneka Cloud fires up, all Aneka Worker Containers in Windows Azure encode the inside endpoint address into the NodeURI. At the point when the Message Proxy gets a message from the Master, it dispatches the message to the privilege Aneka Worker Container as per the encoded NodeURI determined in the Target Node of Message. The burden of this arrangement is that it costs extra since Windows Azure charges as per the quantity of cases dispatched. Nonetheless, taking into account conceivable execution issues, the subsequent arrangement is liked. More subtleties on the organization of the Message Proxy Role are presented above.

DESIGN

The design part of deploying aneka containers on windows

azure is to provide services and to explore windows azure storage as a file storage system for aneka PaaS in detail. There are two types in deployment. One is to deploy aneka worker containers on windows azure while the aneka master container is run on local or private clouds. Other type is to deploy entire aneka PaaS including aneka master container and worker container on azure.



Figure 5: Deployment of master and worker aneka containers

The figure 5 shows two sorts of jobs being sent on the Windows Azure Cloud: one occurrence of Aneka Master Role facilitating the Aneka Master Container, and in any event one occasion of the Aneka Worker Role facilitating the Aneka Worker Container. The Aneka Expert Container and Aneka Worker Containers communicate with one another. Through an interior endpoint, while the customer and Aneka Master Container interface by means of an outside endpoint of the Aneka Master occasion.

File Transfer System

In the current variant of Aneka Cloud, the FTP convention is utilized to move information documents from the customer to the Aneka Master (or a different Storage Container) and between the Aneka Master and Aneka Worker Containers. In any case, because of the constraint of a limit of 5 systems administration ports permitted on every Windows Azure Role example, we Burden Balancer Aneka Worker can at this point don't utilize the FTP administration to help document moves on the Windows Azure Cloud. All things being equal, we can use Windows Azure Storage to help document moves in Aneka. All in all, as represented in Figure 10, two sorts of Windows Azure Storage will be used to actualize the Aneka File Transfer System: Blobs and Queues. Masses will be utilized for moving information documents, and Queues with the end goal of notice. When Aneka clients present the application, if the exchange of information records is required, the File Transfer Manager part will transfer the information documents to the Windows azure and advice the beginning and end of the record move to Aneka's Storage Service by means of Windows Azure Queue. Additionally, the Aneka Worker will download the related input information document from Windows Azure Blob, and the beginning and end of the record move will be told through Windows Azure Queue. At the point when the execution of the work unit is finished in the Aneka Worker, if the exchange of yield information records is required, the File Transfer Manager segment of Aneka

PaaS will transfer the yield information documents to the Windows Azure Blob to empower Aneka clients to download from it.

IV. RESULTS AND DISCUSSION

To send an Aneka Cloud on Windows Azure, prior to transferring the Windows Azure Aneka Cloud Package into Windows Azure Cloud, we need to arrange the Windows Azure Service Configuration record identified with the Windows Purplish blue Aneka Cloud Package. To be more explicit, as demonstrated in the Figure 6, we need to determine the qualities beneath:

1. **DiagnosticsConnectionString:** The association string for interfacing with the Windows Azure Storage Service which is utilized to store diagnostics information.
2. **DataConnectionString:** The association string for interfacing with Windows Purplish blue Storage Service which is utilized to actualize the File Transfer System.
3. **SharedKey:** The security key divided among Aneka Master and Aneka Specialist.
4. **SubscriptionID:** The Subscription ID of Windows Azure Account.
5. **HostedServiceName:** The name of the Windows Azure Hosted Service.
6. **CertificateThumbprint:** The thumbprint of the X509 Certificate which has been transferred to Windows Azure Service Portal. The estimation of thumbprint in the Certificate Property ought to likewise be set.
7. **AdoConnectionString:** The association string used to interface with an ADO social data set if social data set is utilized to store tenacious information.

All the more significantly, we need to characterize the Instance Number of Aneka Workers running on Windows Azure Cloud, which is indicated in the "check" property of "Occurrence" property.

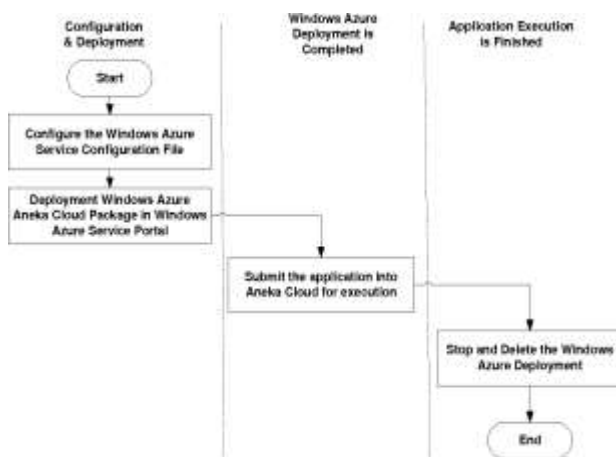


Figure 6: lifecycle of aneka deployment Related work

Windows Azure has been received in numerous tasks to assemble superior figuring applications [7, 8, 9]. Augustyn

and Warchał [7] introduced a thought and usage on the most proficient method to utilize Windows Azure processing administration to tackle the issue utilizing Barnes-Hut Algorithm. All calculations are worked in equal on Windows Azure Worker Role examples. Lu et al. [8] conveyed a contextual analysis of creating Azure Blast, an equal BLAST motor running on Windows Azure Stage, which can be utilized to run the BLAST, a notable and both information escalated and computational serious bioinformatics application. Li et al. [9] exhibited how to assemble the MODIS Satellite Data Reprojection and Reduction Pipeline on Windows Azure. In these cases, the entire usage is begun without any preparation, which implies the engineers need to deal with application organization, task booking, and correspondence furthermore, connection between job occurrences, and the capacity administration access. The Aneka PaaS mix with Windows Azure Platform can accelerate the whole turn of events for superior application running on top of Windows Azure by utilizing the programming models controlled by Aneka. Plus, like Aneka, Cloud is an execution structure which gives work in highlights such as undertaking planning, line handling and application organization, and permits clients to characterize a bunch of administrations to be run in Windows Sky blue Worker Role cases. By and by, not quite the same as the Aneka PaaS, Cloud is simply intended to run applications on top of Windows Azure. It is worth referencing that Aneka PaaS is intended to run applications on private Cloud too as on open Clouds, for example, Windows Azure and Amazon EC2. Aneka PaaS can be utilized to incorporate private Clouds with public Clouds by powerfully provisioning assets on open Clouds, for example, Windows Azure when nearby assets can't meet the processing prerequisite. In addition, Aneka upholds three sorts of programming models, the Task Model, Thread Model and MapReduce Model, to meet the prerequisites of various application Aneka Workers on Windows Azure. In the subsequent advance, we sent the Aneka Master Container on Windows Azure as a case of Worker Role and the whole Aneka PaaS ran totally on the Windows Azure Platform. This permits clients to run Aneka Cloud applications without requiring any nearby foundation. The message move overhead furthermore, the exchange cost will diminish significantly. This is useful to both Service Suppliers who utilizes Aneka PaaS to convey their administrations and the last clients who devour the administrations.

V. CONCLUSION AND FUTURE SCOPE

In this part, we have presented the Aneka Cloud Application Development Stage (Aneka PaaS), introduced and examined the foundation, plan and usage of the joining of the Aneka PaaS and Windows Azure Platform. The Aneka PaaS is based on a strong .NET help situated engineering permitting Consistent reconciliation between open Clouds and standard applications. The center capacities of the structure are communicated through its extensible and adaptable engineering just as its amazing application models including support for a few circulated

and equal programming ideal models. These highlights upgrade the improvement experience of programming engineers permitting them to quickly model flexibly versatile applications. Applications going from the media and media outlet, to designing, training, wellbeing and life sciences and a few others have been demonstrated to be suitable to the Aneka PaaS. Honestly, the reconciliation of two stages would give various advantages to not just the clients of Aneka PaaS yet in addition the clients of Windows Azure Platform, empowering them to accept the upsides of Cloud processing regarding more processing assets, simpler programming model, and more proficiency on application execution at lower cost and lower organization overhead. In the principal stage, we conveyed the Aneka Worker Container as cases of Windows Sky blue Worker Role, just as help for dynamic provisioning of Areas.

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