Cloud Computing Assure High Accessibility, Scalability and Processing Power with Windows Azure

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ABSTRACT
A cloud-computing raised area facilitates applications to be grouped in an Internet-accessible conceptual environment that brings in the necessary software, hardware, network, and storage capacities which provides for security and reliability, in turn, gets rid from much load of hardware and software purchase-maintenance internally. In the cloud, we can't only develop, install, and run our applications but also integrate these services to our on-premising applications. We have to pay only for the instance, and then the resources and capacity we get is extent up to grip according to the business varying requirements. In this paper, I will inspect the typical cloud platform architecture and some common architectural patterns, along with their performance on the Microsoft's Windows Azure.

Keywords
Cloud computing, Cloud platform architecture, Windows Azure Platform and Cloud Pattern.

1. INTRODUCTION
In the earlier epoch, the delinking of interfaces from performance, scalable hosting models, service orientation, subscription-based computing, and increased social alliance became the objectives of distributed systems. At present, Internet-hosted distributed applications with connectivity to internal applications frequently referred as Software plus Services (S+S) which gaining popularity now days. Organizations are pulling data-centers hosted by third parties to build up their strength of hardware, software, reliability, and scalability. These are just some of the new architecture trends that help us build interoperable applications that reduce capital expenditure and improve reliability. Cloud computing bid many of these rewards.

2. CLOUD COMPUTING

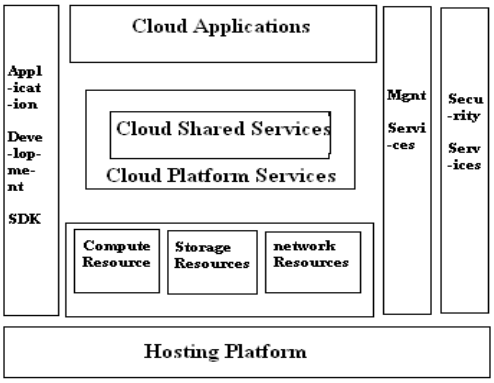

Fig 1: Cloud computing platform architecture

On the peak of architectural diagram, each layer portrays the layer below it. There is no hard dependency between any layers and each layer provides Plug and Play architecture with services from other layers. Each layer provides the horizontal scalability as per requirement.
As we can see in Fig 1, a cloud platform is composed of a several subsystems. Let's look at each one subsequently.

2.1 A Hosting Platform
The very first layer is hosting platform which provides the physical, virtual and software assets. These resources include physical machines, operating systems, network systems, storage systems, power management, and virtualization software. Bare metal and other operational resources are abstracted as virtual resources to the layers above.

2.2 Cloud Infrastructure Services
The most significant role of Cloud infrastructure services layer is to abstract the hosting platform as a set of virtual resources and manages those resources as per scalability and availability necessitate. Basically, this layer provides three kinds of abstract resources: compute, storage, and network which exposes a set of APIs to access and handle these resource abstractions. Thus we gain way in to the underlying physical resources without knowing the details of the core hardware and software. Thus we can control these systems resourcefully through configuration. Services offered by this subsystem are often known as Infrastructure as a Service (IaaS). [2]

2.3 Cloud Platform Services
Developing and managing software for cloud computing is difficult. It becomes really complex when we combine on-premise software with hosted services. Platform services offer a set of capabilities exposed as services to help with such integration. For example, in the Azure Services Platform, Microsoft .NET Service Bus helps with discovery and access while the Microsoft .NET Access Control Service helps role-based and rule-based claims transformation and mapping. Availability of platform services may differentiate one cloud provider from another. Services provided by Cloud Platform Services layer are referred to as Platform as a Service (PaaS).

2.4 Cloud applications
Cloud applications expose Web interfaces and Web Services for end users, facilitating multi-occupant hosting models. Some functions include connecting distinct systems and pulling cloud storage infrastructure to store documents. Cloud applications layer place the applications that are build for cloud computing. These services fall under the Software as a Service(SaaS).

2.5 Security Services

Security services ensure token stipulation, identity federation, and claims transformation. These services are built on the open standards, WS-Security, WS-Trust, WS-Federation, SAML protocols, and Open ID, for greater interoperability.

2.6 Management services

Management edge cut across all the layers depict above. Management interfaces and agents for automated scalability and availability administration leverages by hosting platform. Even though the cloud is hosted and managed in a datacenter, customers may need functions that allow them to easily control their application and post deployment configurations, get analytics about service usage, and connect their enterprise management systems.

2.7 Tools

Tools assist us to build up, test and install applications into the cloud. These tools may be expansion of existing tools (e.g. Visual Studio Tools for Windows Azure) or hosted tools from a specific cloud provider. For Users and providers of cloud computing, there are three groups of users in cloud computing: cloud platform providers, cloud consumers and end users.

Cloud platform providers offer the hosting platform and cloud infrastructure services. Cloud consumers configure the cloud platform and build up applications and services to be consumed by end users.

Cloud consumers organize applications for scalability, availability and security purpose.

End users control the services offered by cloud consumers. These users might be human, organization or machine and may be hosted anywhere.

In view of that, Azure provides a cloud platform while cloud consumers pull this platform to build applications. Ex. Live Mesh data synchronization platform leverages the Azure Services Platform and Windows Azure to develop and host S+S services for end users. [2]

3. WINDOWS AZURE SERVICES PLATFORM

Operating system for the cloud i.e. Windows Azure, is the groundwork of Microsoft's cloud platform offering. As shown in Fig 2, Azure Services Platform provides a set of shared services: SQL Data Services, .NET Services, and Live Services, which can be used individually or collectively. Figure2 maps the Azure Services platform to the layered architecture in Figure1. This platform provides a set of services to application developers. These services can be used both by applications running in the cloud and by applications running on local systems. Even though, Microsoft proposed various cloud applications including Exchange Online, SharePoint Online, and CRM Online, here, however, the focus is only on the Windows Azure operating system and related patterns.

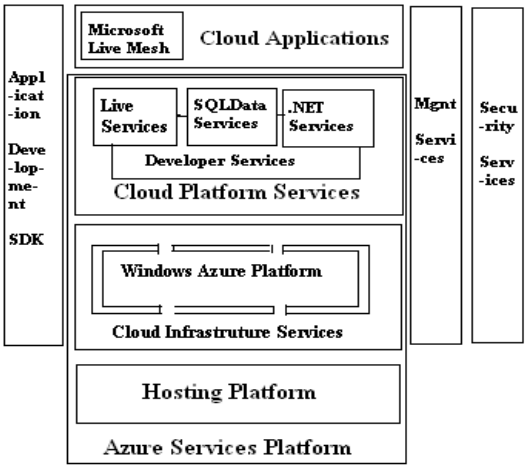

Fig 2: Azure services platform mapped to layered architecture.

4. WINDOW AZURE PERFORMANCE

Windows Azure supply storage capabilities to host on-request. Also it manages the Web applications and services on the Internet hosted in Microsoft data-centers.

Windows Azure offers those features that consumer of cloud services necessitate. For example, physical hardware resources are exposed as compute resource, which is prepared to be employing by cloud applications. Physical storage is abstracted with storage resources and exposed through well-defined storage interfaces. A common Windows fabric abstracts the physical hardware and software platform and exposes virtualized compute and storage resources. In addition, each illustration of the application is monitored for availability and scalability and then automatically managed. Ex. Using limited impact to end users, if an application in an occurrence goes down, the Fabric controller (see Figure 3) becomes attentive and another occurrence in another virtual machine (VM) will be instantiated. When writing our code, we need to make sure that we don't make any best guess about the state of the machine hosting our application just because of the amount of virtualization. In Windows Azure our service probably get easy to be moved to a new virtual machine. Windows Azure follows a model-driven service management design with Azure Fabric Controller responsible for mapping declarative service specifications to available resources and managing the lifecycle of the services.

At this moment we can create .NET applications, ASP.NET applications, and WCF-based Web services, using tools supported in Visual Studio. By default most of the applications developed in .NET may possibly be hosted in Azure with some precise boundaries on biased trust models, data storage, and inter-application communication. A rich developer SDK and programming tools help us to get leaning toward such platform.

Windows Azure now proposed two developing methods - Web role and Worker role (as we see in Figure 3). Each role carries out on a separate virtual machine and corresponds with Azure Fabric all the way through an agent. The agent gathers resource metrics and node metrics including virtual machine usage, application status, logs, resource usage, exceptions, and failure conditions. It should be noted that each virtual machine may be executed on a single physical host or on a Windows 2008 hypervisor virtual machine. Windows Azure detected the specific runtime host configuration, depending on the service-level agreement and other business/technical requirements. A Web role hosts and an interactive Web

application offers in-bound and out-bound connections (request-response prototype). In-bound calls are assemble through Azure load balancers to provide high availability. As we have observed, these assent that each Web role occurrence be stateless so that fabric can route the requests to any Web role in the group.

In the background the worker role is a specialized application executing a .NET application. These applications don't have in-bound connectivity from external applications. On the other hand they can send messages to external services. Using the Windows Azure Queue storage service, Worker roles send/receive messages while interacting with Web roles. An additional feature is the scale-out capability of the roles. An application deployment administrator can decide how many occurrence of any role may be required in the configuration and then Fabric will settle on running these occurrences depending on the system scale-out requirements. In an additional, Windows Azure presents a scheduled, on-demand deployment and failure handling phase.

As yet I've enclosed the common perception about Cloud platforms and specific features of Windows Azure, now subsequently; I will commence some core cloud application types and architecture patterns that we should be familiar when to mount applications for cloud platforms.

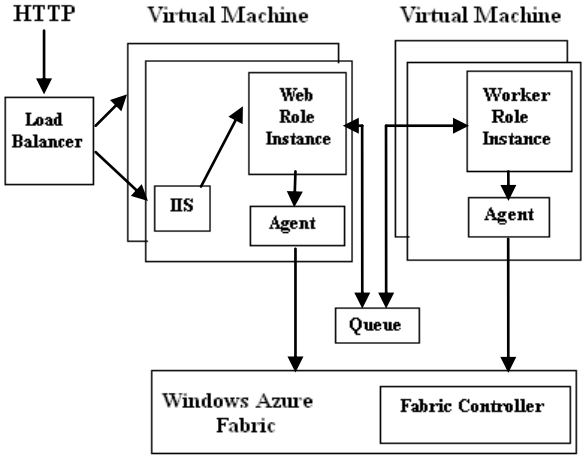

Fig 3: Windows Azure and Roles

5. CLOUD DESIGN PATTERNS

The several architecture and design patterns help us to pick a cloud platform and employ cloud services and applications. These patterns come under four categories: compute, storage, communication, and management.

5.1 Compute patterns

We ought to select the appropriate compute pattern if we come to know which application type we are compacting with. As I have earlier point out, the Web role is used for developing interactive application patterns and the Worker role is used for developing background and scheduler tasks; in some conditions we may need both features. The essential deliberation is when we planning out our work to execute those tasks to avoid moving large amounts of data around.

5.2 Storage patterns

This pattern design is suitable to support a large variety of application requirements. Cloud storage brings in the remote storage and abstracts the storage medium away from the users. Azure addresses two patterns of cloud storage: *table storage* and *blob storage*. The table storage pattern allows the applications to store key/value pairs following a table structure and the blob storage pattern can be allows to store any type of data.

5.3 Communication patterns

We have to think about the partial trust models and the stateless nature of the application when implementing communication patterns. Such patterns deal with message exchange. Azure technology insists Windows Communication Foundation (WCF) and REST APIs for Web service communication.

5.4 Administration patterns

This pattern differs in two main aspects of service management: service deployment and service-level-management.

5.5 Deployment patterns

This pattern manages service definition, configuration, and monitoring whereas other patterns deal with service-level management and regular operational maintenance.

Now let's look at cloud application types in detail. I will classify cloud application types into three categories based on the types of scenarios each addresses. The first category is Web applications. These include traditional hosted Web applications, emerging composed applications that may utilize two or more data sources and services. These applications need automatic scale-out and scale-down capabilities. An application like Face book is a good example. In such scenarios the organization may be a startup that wants to spend little capital on infrastructure while being able to handle increasing demand.

Next there are the analytical applications whose main function is to run processor-intensive operations and data mining, often over the same data many times and thus they require access to a great deal of storage capacity and processor availability all at once. There is no need to pay for such huge capacity twenty-four hours a day, seven days a week, however, so cloud services are appealing.

Finally, there are the parallel computing applications that need to perform multiple tasks in parallel so that a huge project can be executed in a short period of time. Again, paying for the one-time-only large capacity that cloud computing can provide is a cost-effective solution.

Not all applications are suitable for running on the cloud platform. The obvious limiting factors include data security, potential lock-in with a cloud provider, open interfaces for communications, trust model limitations, efficiency of moving data in and out of the cloud, integration with existing services outside of the cloud platform, and legal/privacy concerns. [1]

6. SERVICE IMPLEMENTATION

Windows Azure services Deployment is quite simple. However, we have to first choose that what kind of information is to comprise in the service definition file (i.e. within application configuration information) versus service configuration file (environment requirements) and how to correspond with the application when we want to leverage existing tools to create and upload packages and how to accumulate our packages in the cloud storage to further deploy it with Azure.

7. CONCLUSION

Accessibility, scalability & processing power are the imperative aspects for the performance of running any type of application. In recent report of IDC, a premier global market intelligence firm stated that spending on Cloud services would be grown o IT sector have to pay for cloud services in coming 2 to 4 years. [4] If it would happen, then it will be the key swing for IT industries & related companies in the making up

for performance around as the vendor will be in major shift along with the corporate sector that will see a cutback of hardware asset.

As a result, the service provider expected more rigid & powerful strength from Cloud Infrastructure itself which will ensure about its high accessibility, scalability & performance and this can be made easy by Window Azure. Windows Azure is especially designed to assist quickly and easily develop, manage and deploy the Web Application and services.

8. REFERENCES

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