



CLLOUD COMPUTING WITH MICROSOFT WINDOWS AZURE

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Abstract: *This paper evaluates the future aspects of cloud computing, the advantages and disadvantages of cloud computing and its implementation using Microsoft Azure. Cloud computing refers to a future computing technology after grid computing. In cloud computing, whole data is saved in the cloud along with the various softwares and platforms. The interesting fact is that the user is unaware about the location of the storage of their data in the cloud. Cloud computing is the need of the hour as it is quite economical and saves the small enterprises from buying all the software needed in the working of the enterprise and the overhead of updating them timely. Cloud computing is a better way to run your business. Instead of running your apps yourself, they run on a shared data center. The actual term "cloud" borrows from telephony in that telecommunications companies, who until the 1990s primarily offered dedicated point-to-point data circuits, began offering "VIRTUAL PRIVATE NETWORK (VPN)" services with comparable quality of service but at a much lower cost. The cloud symbol was used to denote the demarcation point between that which was the responsibility of the provider from that of the user. Cloud computing extends this boundary to cover servers as well as the network infrastructure. Cost is claimed to be greatly reduced and capital expenditure is converted to operational expenditure. Device and location independence enable users to access systems using a web browser regardless of their location or the device they are using. The Windows Azure platform, owned by Microsoft is a flexible cloud-computing platform that lets you focus on solving business problems and addressing customer needs.*

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1. INTRODUCTION

1.1 Cloud Computing: Cloud computing is a computing technique in which all the data is stored in the cloud. All the SDKs and databases are stored in the cloud only. A Cloud is primarily a platform that allow execution in various forms across multiple resources and potentially across enterprise boundaries. A Cloud is an infrastructure that enables execution of codes(applications, services, etc.) in a managed and elastic fashion, here the meaning of managed is reliability according to pre-defined quality parameters which are automatically ensured and elastic here means that the resources are used according to the current actual requirements. Cloud fits the client-server model, and so far the typical cloud client is the same as the typical enterprise client (i.e. single desktop or laptop computer), some observers have a tendency to stop at this level of analysis. But of course, the real action in the cloud happens on the server side and that's where things get interesting.

1.2 Microsoft Windows Azure:Windows Azure is a cloud services operating system that serves as the development, service hosting and servicemanagement environment for the Windows Azure platform. Windows Azure provides developers with on-demand compute and storage facility to host, scale, and manage web applications on the internet through Microsoft datacenters.Windows Azure is a flexible platform that supports multiple languages and integrates with your existing on-premises environment. To build applications and services on Windows Azure, developers can use their existing Microsoft Visual Studio expertise. In addition, Windows Azure supports popular standards, protocols and languages including SOAP, REST, XML, Java, PHP and Ruby. Windows Azure is now commercially available in 40 countries.

2. TYPES OF CLOUDS

2.1 PrivateCloud:Theyare typically owned by the respective enterprise and / or leased. Functionalities arenot directly exposed to the customer, though in some cases services with cloud enhanced featuresmay be offered. This is similar to (Cloud) Software as a Service from the customer point of view. Private cloud (also called internal cloud or corporate cloud) is a marketing term for a proprietary computing architecture that provides hosted services to a limited number of people behind a firewall. Advances in virtualization and distributed computing have allowed corporate network and datacenter administrators to effectively become service providers that meet the needs of their "customers" within the corporation.



Example: eBay.

2.2 Public Cloud: Enterprises may use cloud functionality from others, respectively offer their own services to users outside of the company. Providing the user with the actual capability to exploit the cloud features for his / her own purposes also allows other enterprises to outsource their services to such cloud providers, thus reducing costs and effort to build up their own infrastructure.

Example: Amazon, Google Apps, Windows Azure.

2.3 Hybrid Cloud: Though public clouds allow enterprises to outsource parts of their infrastructure to cloud providers, they at the same time would lose control over the resources and the distribution / management of code and data. In some cases, this is not desired by the respective enterprise. *Hybrid clouds* consist of a mixed employment of *private* and *public cloud* infrastructures so as to achieve a maximum of cost reduction through outsourcing whilst maintaining the desired degree of control over e.g. sensitive data by employing local private clouds. Example: IBM and Juniper.

3. CLOUD SERVICE MODELS

Infrastructure as a Service (IaaS): This is the base layer of the cloud stack. It serves as a foundation for the other two layers, for their execution. The keyword behind this stack is Virtualization. Amazon EC2 is a good example of an IaaS. In Amazon EC2 (Elastic Compute Cloud) your application will be executed on a virtual computer (also known as an instance). You have your choice of virtual computer, meaning that you can select a configuration of CPU, memory and storage that is optimal for your application. The IaaS provider supplies the whole cloud infrastructure viz. servers, routers, hardware based load-balancing, firewalls, storage and other network equipment. The customer buys these resources as a service on an as needed basis.

Platform as a Service (PaaS): It provides computational resources via a *platform* upon which applications and services can be developed and hosted. PaaS typically makes use of dedicated APIs to control the behaviour of a server hosting engine which executes and replicates the execution according to user requests (e.g. access rate). As each provider exposes his / her own API according to the respective key capabilities, applications developed for one specific cloud provider cannot be moved to another cloud host – there



are however attempts to extend generic programming models with cloud capabilities (such as MS Azure). Examples: Force.com, Google App Engine, Windows Azure (Platform).

(Clouds) Software as a Service (SaaS): also sometimes referred to as Service or Application Clouds are offering implementations of specific business functions and business processes that are provided with specific cloud capabilities, i.e. they provide applications / services using a cloud infrastructure or platform, rather than providing cloud features themselves. Often, kind of standard application software functionality is offered within a cloud.

Examples: Google Docs, Salesforce CRM, SAP Business by Design.

4. APPLICATION SCENARIOS OF WINDOWS AZURE

Windows Azure is a service that allows developers to run applications and store data on servers owned and operated by Microsoft. These cloud applications can be targeted at businesses, consumers or both. Some examples are:

- 4.1 Enterprises that use Windows Azure to run their own line-of-business, batch processing or large-volume computations.
- 4.2 An independent software vendor (ISV) that creates a SaaS application targeted towards business users. Perform large-volume storage, batch processing, intense or large-volume computations
- 4.3 An ISV that creates a SaaS application targeted towards consumers.

5. UTILITY COMPUTING SCENARIOS

- 5.1 Outsource Your Infrastructure
- 5.2 Occasional Need for Massive Computation
- 5.3 No Need to Build to Peak Capacity
- 5.4 Cloud-Bursting
- 5.6 Software as a Service
- 5.6 Data Close To Your Customer
- 5.7 Internet Scale

6. GETTING STARTED WITH AZURE

Though Azure development can use PHP or Java, the platform that's best supported is .NET. The first step is to install the Azure SDK. There are two ways to do this, there is a standalone SDK, and a package containing the SDK along with Visual Studio 2008 and Visual Studio 2010



integration. The Azure services for management and storage offer a REST API using HTTP and XML. The SDK contains a set of client classes that provide a nice managed .NET API that abstracts away the details of the HTTP and XML communication that goes on behind the scenes. With these client libraries, the SDK contains a local deployment environment made up of two parts; the "Development Fabric," into which applications are deployed, and "Development Storage," which provides a mock-up of Azure's cloud storage services. The Development Fabric has convenient features like spewing logs out to a console; there's no easy access to them once in the cloud. During normal development, you'll be deploying and debugging using this development environment. For the most part, your applications won't notice the difference, though the Development Storage system is a bit more restrictive than real Azure Storage. Visual Studio integration is a must. The Visual Studio integration provides new Azure project types, F5 deployment into and debugging of the Development Fabric, and the ability to upload applications into the cloud and run them on paid Azure services.

7. BENEFITS

- *Agility:* Take advantage of development tools, automated service management and global datacenter presence to respond faster to customer needs, focus on your competitive differentiators, and reach new markets.
- *Efficiency:* Windows Azure improves productivity and increases operational efficiency by lowering up-front capital costs. Customers and partners can realize a reduction in Total Cost of Operations of some workloads by up to 30 – 40% over a 3 year period . The consumption based pricing, packages and discounts for partners lower the barrier to entry for cloud services adoption and ensure a predictable IT spend. See Windows Azure pricing.
- *Focus:* Focus on delivering services and value to your customers – and not on managing technology infrastructure. Windows Azure enables you to spend less time on operational hurdles and more time focusing on your competitive differentiators.
- *Simplicity:* Utilize your existing skills in familiar languages such as .NET, Java and PHP to create and manage web applications and services.
- *Trustworthy:* Enterprise class service backed by a reliable service level agreements and a rich online services experience.



CLOUD COMPUTING ADVANTAGES

1. Less Cost and Capital Expenditure

Cloud computing largely helps in significant savings for a company. By purchasing the necessary infrastructure, support equipment and communication costs only once, the expenses on the capital are reduced to a large extent. Although vendors and service providers keep dictating about the cost of the services, but with a little window shopping, one can surely make a wise decision.

2. Scalability

Adding more equipment to a growing company and storing and analyzing the increasing information by internal and external users becomes a constant headache for the information technology department of any company. Initiating cloud computing into the company saves a lot of money and energy in rectifying the situation by simply replacing the equipment that is under contract and expanding it.

3. Easy Start Up

All applications and infrastructure are attached to the cloud. Hence, to access any of the items, one just has to dial into the cloud. Moreover, the entire thing is very time efficient as all the programs do not have to be installed on every computer.

4. Flexibility

Cloud computing is virtual. Thus, a company can easily change the amount of bandwidth, the number of users connected to the cloud, and the number of applications available to them at any time as per their convenience.

CLOUD COMPUTING DISADVANTAGES

1. SLA Agreements

The contracts that you make with your service provider are the SLA Agreements. Since these agreements are very detailed, it is essential to verify all the services being defined in the contract. Nonetheless, it is very important to understand the amount that you are paying for the quality of services you are receiving. Any discrimination should be immediately attended to.



2. Performance

Usually, performance guarantees are listed somewhere in the SLA Agreements. However, you have to make sure that the kind of performance you are expecting is guaranteed by the contract and the cloud is able to deliver the same performance. As opposed to this, if the cloud is not capable enough to support the traffic, the company would be directly affected, especially the revenues and company's reputation.

3. Security Issues

Leaking out confidential data and information through the cloud computing system can cause great loss and risks to the company. Thus, security issues is another major demerit of cloud computing.

4. Making False Promises

Every cloud computing service provider that you come across will promise to deliver your demanded services. However, the reality is that they provide different levels of quality and services when it comes to actually installing them. Thus, finding a reliable service provider is a tiring and time-consuming job.

8. SUMMARY

Non-functional aspects represent *qualities* or *properties* of a system, rather than specific technological requirements. Implicitly, they can be realized in multiple fashions and interpreted indifferent ways which typically leads to strong compatibility and interoperability issues between individual providers as they pursue their own approaches to realize their respective requirements, which strongly differ between providers. Non-functional aspects are one of the key reasons why "clouds" differ so strongly in their interpretation. Economic considerations are one of the key reasons to introduce cloud systems in a business environment in the first instance. The particular interest typically lies in the reduction of cost and effort through outsourcing and / or automation of essential resource management. As has been noted in the first section, relevant aspects thereby to consider relate to the cut-off between loss of control and reduction of effort. With respect to hosting private clouds, the gain through cost reduction has to be carefully balanced with the increased effort to build and run such a system. Obviously, technological challenges implicitly arise from the non-functional and economical aspects, when trying to realize them. As opposed to these aspects, technological challenges typically imply a specific



realization – even though there may be no standard approach as yet and deviations may hence arise. In addition to these implicit challenges, one can identify additional technological aspects to be addressed by cloud system, partially as a pre-condition to realize some of the high level features, but partially also as they directly relate to specific characteristics of cloud systems.

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