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## **A NEW APPROACH TO HYBRID CLOUD**

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### **Abstract**

Hybrid computing systems have received considerable attention recently as an approach to significant performance gains in many problem domains. In order to succeed with hybrid cloud approach, there are a few challenges that must be addressed such as application complexity and security. As one of the first public cloud solutions, Amazon's EC2 has strongly contributed to this development. However, not only the cloud community is growing rapidly, but also the number of critiques is increasing. Especially in terms of data security and privacy, but also in other topics (such as availability, vendor lock-in, cost, or interoperability), public clouds carry inherent risks. An obvious yet not trivial solution to these issues is the use of both private and public delivery models, and combining them to a hybrid cloud.

**Keywords: - Cloud, IaaS, AmazonEC2, Hybrid**

### **1.0 INTRODUCTION [1]**

Cloud computing is a solution in which computing resources such as hardware, software, networks and storage are provided to users on demand. The main principle behind designing this type of solution is to provide the users and enterprises with the computation and storage resources they require, while allowing the customers to pay only for the amount they use. Cloud computing is not something new and its history can be traced back to the early 1960s when computing pioneer John McCarthy proposed his vision of 'utility computing' in which companies provided computing power for specific services or applications. Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. The National Institute of Standards and Technology's (NI ST) Information Technology Laboratory recognizes that cloud computing is an "evolving paradigm." As such, its definition attributes, and characteristics are still being debated by the public and private sectors, and are certain to continue to evolve in the near future.



Figure 1.1:-Cloud Computing Overview

Nevertheless, initial steps have been taken toward constructing a universally accepted explanation of cloud computing key characteristics, as well as definitions for the various deployment and service models. These definitions have been widely reported but are worth repeating, particularly in a field that is still rapidly developing. The nature of the cloud technology implies completely different concepts when compared with traditional models offered by the service providers. [2]

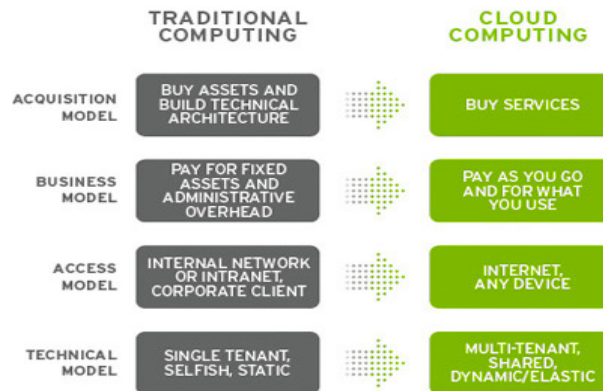


Figure 1.2: - Advantage of Cloud Computing

Traditional models are highly-dependent on hardware availability and calculation capacity (memory and CPU cycles available). Cloud computing services are based in the following concepts:

- Capacity to grow unlimited
- Distributed responsibility
- Interactive applications
- Parallel batch processing
- Elasticity [6]

## 2.0 WHAT IS A HYBRID CLOUD? [5]

In its simplistic definition, a hybrid cloud is a combination of both public and private clouds. If we apply the definition from the National Institute of Standards and Technology (NIST), “a hybrid cloud is a combination of public and private clouds bound together by either standardized or proprietary technology that enables data and application portability.” It could be a

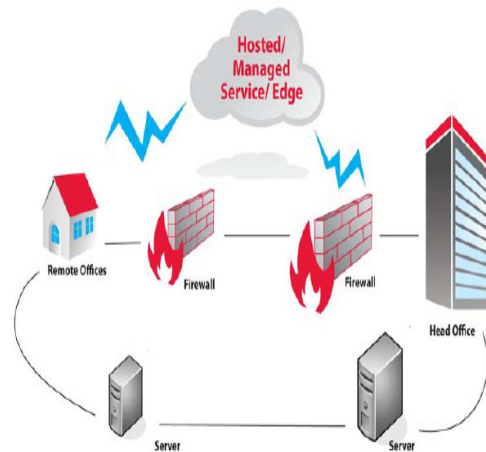


Figure 2.1:-Hybrid Cloud

combination of a private cloud inside an organization with one or more public cloud providers or a private cloud hosted on third-party premises with one or more public cloud providers. Trend Micro, a cloud security company, recently conducted a survey which indicated that public cloud services fail to meet IT and business requirements of some of the business organizations. A hybrid cloud environment can help meet their needs. In some ways, hybrid clouds can be considered an intermediate stage as enterprises prepare to move most of their workloads to public clouds. Public clouds have become increasingly popular in the recent few years. Without having to maintain a data center, the public cloud allows almost instant resource provision and fast scaling. Amazon’s EC2 which is a product of Amazon has strongly contributed to the development of public cloud and is also considered as one of the first public cloud solution. However, not only the cloud community is growing rapidly, but also the number of critiques is increasing. Especially, not only in terms of data security and privacy, but also in other topics (such as availability, vendor lock-in, cost, or interoperability), public clouds carry inherent risks. An obvious yet not trivial solution to these issues is the use of both private and public delivery models, and combining them to a hybrid cloud.

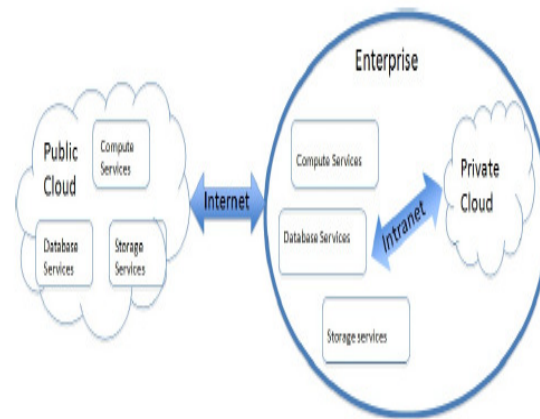


Figure 2.2:-Hybrid Cloud Infrastructure [2]

## 2.1 OPPORTUNITIES [4]

In a hybrid cloud, a company maintains its own private cloud, i.e. a virtualized data center, and can scale out to a public cloud if needed. Moving from a traditional data center to a hybrid cloud approach brings many benefits to businesses.

- **Optimal utilization:** in typical data centers, only 5% to 20% of the available server resources are actually used. Because peak loads are up to ten times higher than the average load, servers are mostly idle generating unnecessary costs. Hybrid clouds can increase server utilization by scaling out to public resources to handle ash crowds.
- **Data center consolidation:** instead of having to provide capacity for worst-case scenarios, a private cloud only requires resources for the average case. The option to burst out allows server consolidation and hence the reduction of operating costs. In particular, this includes the costs for hardware, power, cooling, maintenance, and administration.
- **Risk transfer:** while the companies themselves are responsible for keeping their data center and private cloud up and running, the public cloud provider has to ensure a high uptime for its service. Using a hybrid cloud model, the risk of mis-estimating workload is shifted from the service operator to the cloud vendor"
- **Availability:** ensuring high availability in the corporate data center is difficult and expensive, because it requires redundancy, backups, and geographic dissemination. Especially in companies where IT is not the core business, the expertise in this area is rather limited. In a hybrid cloud environment, the public cloud can scale up or take over operations completely if the company's data center is unavailable due to failures or DDoS attacks.

## 2.2 CHALLENGES AND ISSUES [4]

Even though hybrid clouds over a great value proposition and enable many opportunities, the number of challenges and issues is also very high. Especially due to its still evolving nature,

cloud computing has many unsolved economic and technical issues. The following sections discuss the most important issues briefly.[2]

- **Cost:-**One of the most obvious obstacles, and certainly the most important one from the business perspective, is the fact that hybrid cloud infrastructures require both a local data center and additional remote resources from a cloud provider. That is, the often mentioned benefit of cloud computing {the independence of a data center} does not hold true for hybrid environments. In fact, hybrid cloud infrastructures have to factor in the setup and operating cost for a data center (e.g. hardware, power, cooling, and maintenance) as well as the usage-based costs of the cloud provider. Depending on utilization, data center cost and the costs of the cloud provider, businesses have to decide whether or not moving to the cloud is profitable.
- **Power, cooling and physical plant costs:** depending on how expensive the private data center is local applications have to factor in the costs for power, cooling and other plant expenses.
- **Operations costs:** cloud environments have lower hardware operations costs, because data centers are virtualized and the risks of outages can be moved to external providers. The operations costs of software management, however, stay the same in IaaS environments and decreases the with an increase in the abstraction level (lower costs in SaaS environments).

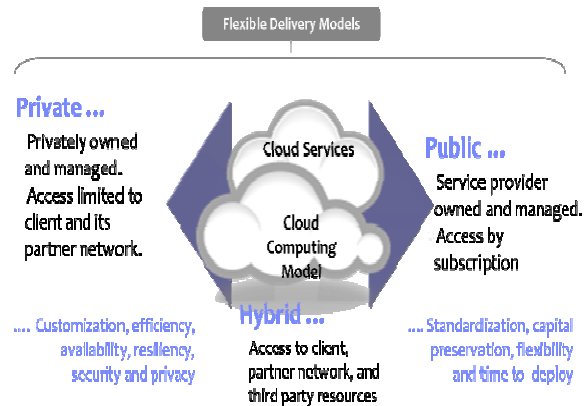


Figure 2.2.3: - Hybrid Cloud point of View

- **Utilization:** profits and costs strongly correlate with the degree of data center utilization. While external cloud providers include operations costs in the usage costs, the local data center costs must be set in relation to the utilization.

### 2.3 HYBRID CLOUD:-HARDWARE REQUIREMENTS:-[3]

The hardware requirements of cloud solutions are very different in most cases, and depend not only on the used hypervisor, but also on the cloud management software. The non-commercial projects do not explicitly define supported hardware, but instead simply specify minimal hardware requirements such as memory or CPU speed. These requirements often include CPU

virtualization technologies such as Intel VT/VT-x or AMD-V. Depending on the hypervisor and the type of virtualization, the host system's processors must provide these virtualization extensions to function. Besides CPU compatibility, especially the commercial cloud solutions rely on a very specific hardware configuration and topology. Some products require certain network layouts, or other components to be present. VMware's vSphere only supports live migration for a limited set of processors: administrators have to make sure that the source and destination hosts have compatible processors. While the big vendors have very high requirements, they can at least guarantee that the system works as expected if the listed hardware is used. For the open source projects, however, compatibility between hosts requires a trial-and-error approach.

### **3.0 CONCLUSION**

Hybrid clouds offer a greater flexibility to businesses while offering choice in terms of keeping control and security. Hybrid clouds are usually deployed by organizations willing to push part of their workloads to public clouds either for cloud bursting purposes or for projects requiring faster implementation. Because hybrid clouds vary based on company needs and structure of implementation, there is no one-size-fits-all solution. Since hybrid environments involve both on-premise and public cloud providers, some additional infrastructure security considerations come into the picture, which are normally associated with public clouds. Any businesses planning to deploy hybrid clouds should understand the different security needs and follow the industry best practices to mitigate any risks.

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