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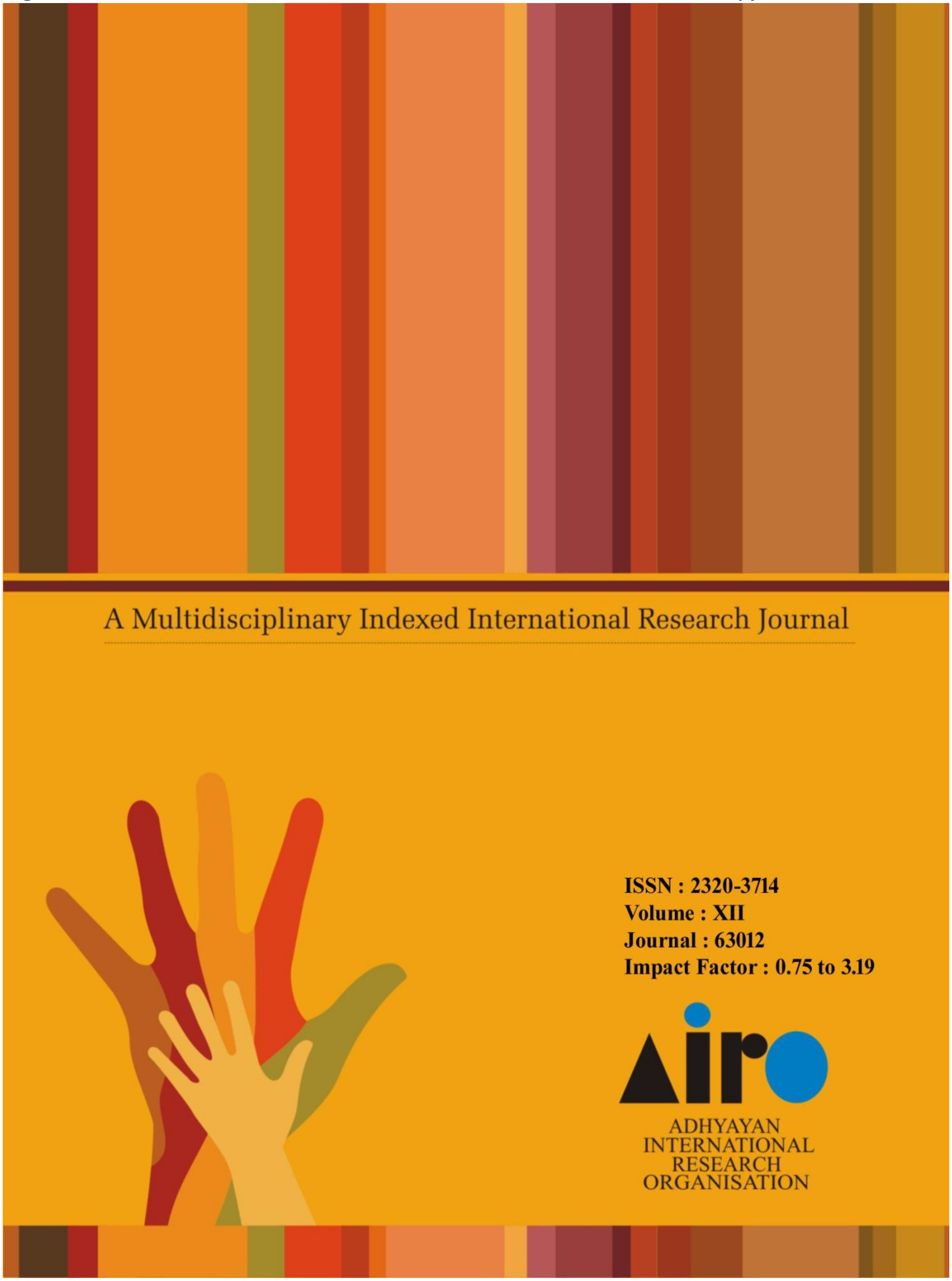

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ROLE OF CLOUD COMPUTING IN IT COMPANIES

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ABSTRACT

Computing became more pervasive within the organization, the increasing complexity of managing the whole infrastructure of disparate information architectures and distributed data and software has made computing more expensive than ever before to an organization. For small and medium businesses that their capital and cash flow is very limited and they hardly afford investment for IT infrastructure, it is a bad news. Nevertheless, the promise of cloud computing is to deliver all the functionality of existing information technology services, even as it dramatically reduces the upfront costs of computing that deter many organizations from deploying many cutting-edge IT services.

KEYWORDS: *Technology, Information, Cloud*

INTRODUCTION

Growing IT infrastructure needs more support human resource and even using different technology and tools need different expertise, which costs more and makes it complicated. By decreasing IT budget, it was obvious that cost effective solutions would become hot topics. The philosophy behind cloud computing is very simple. Get rid of any IT burden. Utility computing is another definition, which makes it clear that it would become 5th utility.

In a "Cloud Migration: A Case Study of Migrating an Enterprise IT System to IaaS", Khajeh-Hosseini et al. talked about the third party cloud infrastructure. According to them if the third party cloud infrastructure is introduced then it presents many opportunities for enterprises to improve the management of income and outgoings for both finance staff and customers. It also helps the easing of cash-flow management for finance stuff as the cloud-pricing model has minimal upfront cost and monthly billing and it lessens the variability of expenditure on electricity. These are the benefits comparing to the in-house data center, as it can be costly to buy hardware and cash flow can be slow and difficult from clients. Along with that, energy costs will also go down; as you are not running, your own data center and third party cloud will be responsible for that. The Cloud infrastructure is also very helpful for the finance department of the company to reduce the administrative burden. Third party cloud infrastructure solutions offer new pricing models, which help in managing income for customers, sales and marketing staff.

Economics, simplification and convenience of the way computing-related services are delivered seem to be among the main drivers of cloud computing.

Dorey and Leite mentioned the cost reduction as one of the items that drive the IT environment to go for cloud computing. In providing a future perspective of cloud computing, Lillard et al announced that supplying on demand computing power in a very low-cost fashion was the main driver of cloud computing emergence. Furthermore, Marston et al highlighted the lower cost of entry for small business as one of key advantages of cloud computing not only for IT companies but for third world countries as well. Cloud computing represents a huge opportunity to many third-world countries that have been so far left behind in the IT revolution. Also they pointed out that cloud computing does not need heavy upfront capital investment as another benefits offering by cloud computing.

In today's economic environment, the ability to respond to rapidly changing customer needs is a key competitive differentiator. However, Agility for IT companies is not only a competitive advantage rather it is vital for them to survive in nowadays-fast changing business environment. By enabling businesses to rapidly adjust processes, products and services to meet the changing needs of the market, cloud increase agility of business. By the help of cloud, enterprises can offload three kinds of low-level administrations. First is system infrastructure which includes hardware maintenance, spare parts, adding new machines and infrastructure software is taken care by cloud. Second, once the enterprises define the backup policy, cloud provider is responsible to execute it. Lastly, a single application becomes available to all authorized users. Though the management of the application i.e. application support, upgrade issues and user management is not included as moving to cloud does not change much in these tasks.

Outsourcing those kinds of low-level maintainability and keeping infrastructure operational brings the agility to firms to focus on their business processes and improve them. Cloud computing can lower IT barriers to innovation, as can be witnessed from the many promising start-ups, from the ubiquitous online applications such as Facebook and YouTube to the more focused applications. Get rid of unnecessary IT related concerns increase the opportunity of facilitating business processes and operations with innovative solutions.

Knowing highlighted benefits above, researchers and practitioner address more advantages for using cloud computing such as scalability of services, different billing types. Cloud computing also makes possible new classes of applications and delivers services that were not possible before. Such as mobile interactive applications that are location-, environment- and context-aware and that respond in real time to information provided by human users, nonhuman sensors e.g. humidity and stress sensors within a shipping container. Another type of new applications that cloud computing made possible is parallel batch processing that allows users to take advantage of huge amounts of processing power to analyze huge amount of data for relatively small periods. Business analytics that can use the vast amount of computer resources to understand customers, buying habits, supply chains and so on from voluminous amounts of data is another application that storing data in cloud made it easier and more applicable. In addition, cloud computing offers offloading sophisticated technical IT related tasks and management that needs deep knowledge and skills to maintain IT infrastructure. By hiding those complexities, while it attract any one to approach it and benefit IT advantages, end user can produce sophisticated products or services without need to high level IT knowledge. Establishing a fair competition environment and lowering the barriers is another benefit of cloud invent.

RESEARCH WORK

In the past, large corporations have had an advantage over small corporations in their access to capital and their ability to leverage their existing human, software, and hardware resources to support new marketing and strategic initiatives. However, since the advent of cloud computing, the barriers to entry for a particular market or market segment for a start-up company have been dramatically reduced and cloud computing may have tipped the balance of strategic advantage away from the large established corporations towards much smaller or start-up companies. These facts are relevant to developing countries or poor countries that their situation in terms of available capital, resources and skilled human resource is like IT companies.

Another benefit that is available by cloud computing is green computing. These days that environmental issues are considering more and business care more about running firms in green way. Electricity usage by servers and cooling devices in data centers should decrease to help earth. Cloud vendors can do much better than the typical on premise computing centers, or even institutional data centre, based on better management of voltage conversions, cooler climates and better cooling, and lower electricity rates. They also often locate where they can do cooling easier and with less energy consumption. In conventional systems, system resource utilization is low, estimated at 15–20% for data centers; other estimates are lower. In contrast, clouds smooth these effects across many customers, and today may attain 40% utilization, with higher values plausible in clouds e.g., as load sharing over time zones becomes more mature and exploiting more diverse user bases. One virtual server seems likely to do the work of at least 2.5 typically utilized servers. Consequently, higher utilization means less power usage that helps the environment to keep safe. In 2012, IBM did more than 30 energy assessments around the world and found that 60–70% of the energy used in the data centers was used for indirect purposes such as cooling and lighting the facilities with only 30–40% of the energy being used directly by the computing hardware. Public cloud providers locate their data centers where bandwidth, cheap energy, abundant water for cooling, and proximity to markets are optimal. They have focused on creative approaches to efficient resource usage including not only electricity usage but also water recycling and equipment recycling upon disposal.

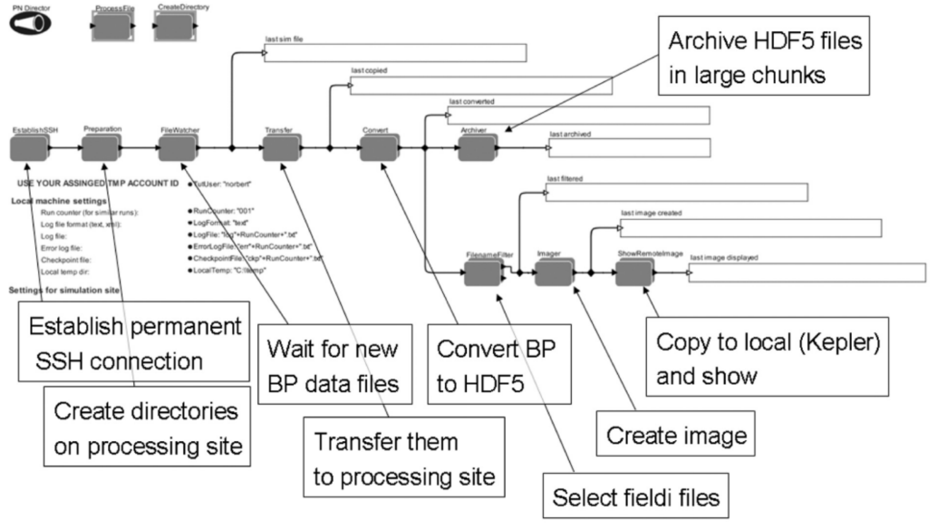
A workflow can be represented by a directed graph of data flows that connect loosely and tightly coupled and often asynchronous processing components.

In the context of "cloud computing", the key questions should be whether the underlying infrastructure is supportive of the workflow oriented view of the world. This includes on demand and advance-reservation-based access to individual and aggregated computational and other resources, autonomics, ability to group resources from potentially different "clouds" to deliver workflow results, appropriate level of security and privacy, etc.

Virtualization is another very useful concept. It allows abstraction and isolation of lower level functionalities and underlying hardware. This enables portability of higher level functions and sharing and/or aggregation of the physical resources.

The virtualization concept has been around in some form since 1960s e.g., in IBM mainframe systems. Since then, the concept has matured considerably and it has been applied to all aspects of computing – memory, storage, processors, software, networks, as well as services that IT offers. It is the combination of the growing needs and the recent advances in the IT architectures and solutions that is now bringing the virtualization to the true commodity level. Virtualization, through its economy of scale, and its ability to offer very advanced and complex IT services at a reasonable cost, is poised to become, along with wireless and highly distributed and pervasive computing devices, such as sensors and personal cell-based access devices, the driving technology behind the next wave in IT growth.

Not surprisingly, there are dozens of virtualization products, and a number of small and large companies that make them. Some examples in the operating systems and software applications space are VMware, Xen – an open source



DISCUSSION

Cyber infrastructure developers who are responsible for development and maintenance of the Cloud framework. They develop and integrate system hardware, storage, networks, interfaces, administration and management software, communications and scheduling algorithms, services authoring tools, workflow generation and resource access algorithms and software and so on. They must be experts in specialized areas such as networks, computational hardware, storage, low level middleware, operating systems imaging, and similar. In addition to innovation and development of new "cloud" functionalities, they also are responsible for keeping the complexity of the framework away from the higher level users through judicious abstraction, layering and middleware.

Service authors are developers of individual base-line "images" and services that may be used directly, or may be integrated into more complex service aggregates and workflows by service provisioning and integration experts. In the context of the VCL technology, an **"image"** is a tangible abstraction of the software stack. It incorporates a. any base-line operating system, and if virtualization is needed for scalability, a hypervisor layer,

b. any desired middleware or application that runs on that operating system and

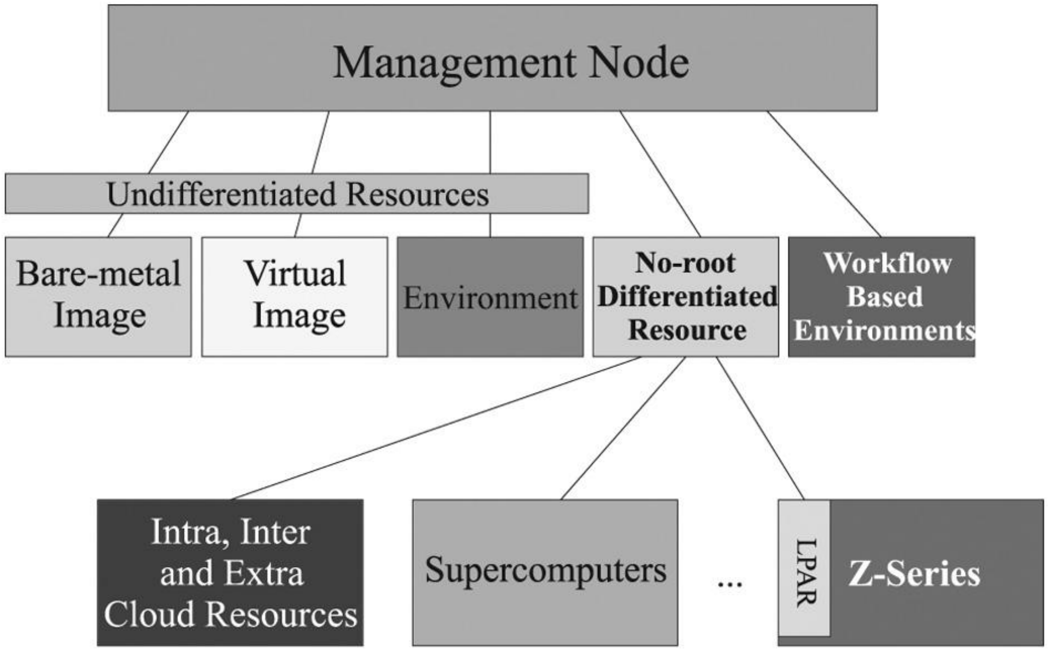
c. any end-user access solution that is appropriate e.g., ssh, web, RDP, VNC, etc.

Images can be loaded on "bare-metal", or into an operating system/application virtual environment of choice. When a user has the right to create an image, that user usually starts with a “NoApp” or a base-line image e.g., Win XP or Linux) without any except most basic applications that come with the operating system and extends it with his/her applications. Similarly, when an author constructs composite images (aggregates of two or more images we call environments that are loaded synchronously), the user extends service capabilities of VCL. An author can program an image for sole use on one or more hardware units, if that is desired, or for sharing of the resources with other users.

Scalability is achieved through a combination of multi-user service hosting, application virtualization, and both time and CPU multiplexing and load balancing. Some of the functionalities a cloud framework must provide for them are image creation tools, image and service management tools, service brokers, service registration and discovery tools, security tools, provenance collection tools, cloud component aggregations tools, resource mapping tools, license management tools, fault-tolerance and fail-over mechanisms and so on.

It is important to note that the authors, for the most part, will not be cloud framework experts, and thus the authoring tools and interfaces must be appliances: easy-to-learn and easy-to-use and they must allow the authors to concentrate on the “image” and service development rather than struggle with the cloud infrastructure intricacies.

Similarly, services integration and provisioning experts should be able to focus on creation of composite and orchestrated solutions needed for an end-user. They sample and combine existing services and images, customize them, update existing services and images, and develop new composites. They may also be the front for

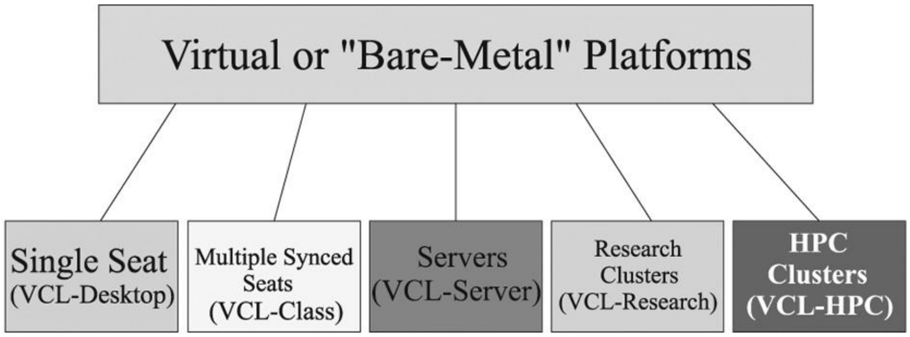


delivery of these new services e.g., an instructor in an educational institution, with "images" being cloud-based in-lab virtual desktops, they may oversee the usage of the services, and may collect and manage service usage information, statistics, etc. This may require some expertise in the construction of images and services but for the most part, their work will focus on interfacing with end-users and on provisioning of what end-users need in their workflows.

Their expertise may range from workflow automation through a variety of tools and languages, to domain expertise needed to understand what aggregates of services, if any, the end-user needs, to management of end-user accounting needs and to worrying about inter-,intra- and extra-cloud service orchestration and engagement, to provenance data analysis.

SIGNIFICANCE OF THE STUDY

End-users of services are the most important users. They require appropriately reliable and timely service delivery, easy-to-use interfaces, collaborative support, information about their services, etc. The distribution of services, across the network and across resources, will depend on the task complexity, desired schedules and resource constraints. Solutions should not rule out use of any network type (wire, optical, wireless) or access mode (high speed and low speed). However, VCL has set a lower bound on the end-to-end connectivity throughput, roughly at the level of DSL and cable modem speeds. At any point in time, users' work must be secure and protected from data losses and unauthorized access.



For example, the resource needs of educational end-users may range from single seat desktops ("computer images") that may deliver any operating system and application appropriate to the educational domain, to a group of lab or classroom seats for support of synchronous or asynchronous learning or hands on sessions, one or more servers supporting different educational functions, groups of coupled servers or environments, e.g., an Apache server, a database server, and a workflow management server all working together to support a particular class, or research clusters and high-performance computing clusters. Figure shows the current basic services (resources) delivered by VCL. The duration of resource ownership by the end-users may range from a few hours, to several weeks, a semester, or an open-ended period of time.

CONCLUSION

The first goal is accomplished by incorporating the novel design by performing the semantic evaluation of energy consumption that is primarily focused on monitoring Service Level Agreement (SLA) violation. The process is accomplished by using DVFS in the schema for energy saving approach with dual benefits e.g. i) Resource Throttling: it can scrutinize resource utilization, memory, and wait time on both peak and off hours ii) Dynamic Component Deactivation: This technique will allow to deactivate the cloud components when in idle mode for leveraging the workload variability. However, the performance loss is scaled using network model that uses broker design and cloudlet ID mainly. And By incorporating the newly established design of energy optimization using DVFS aimed for massive task execution.

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