

CLOUD COMPUTING CONCEPT FOR DIGITAL CONSUMERS

Pavel Beňo^{1,2}

Trnava university in Trnava¹
Center of information systems
Hornopotočná 23, 918 43 Trnava
Slovakia

Tomas Bata university in Zlín²
Faculty of Applied Informatics
Nad Stráněmi 4511, 760 05 Zlín
Czech Republic

e-mail¹: pavel.beno@truni.sk

Abstract

This item handles about using Cloud computing platform for providing Remote laboratories. This work show, how is possible to save money if we use centralized system for more consumers. These consumers must be digital and computing positive, because our system is provided via Internet and we using more novelty. Every consumer can use access to centralized portal in the Cloud computing from Consortium REMLABNET. All of this item is focused on environs of universities, where this cloud is existing and this we want use for remote labs. This is item from practice knowledge and experiences about system function and managing virtual platform and next construction this proposal.

Keywords: *cloud computing, virtual platform, datacenter, disaster recovery, backup, networking, availability, remote labs*

JEL Classification: *L86, D85, L63*

1 Introduction

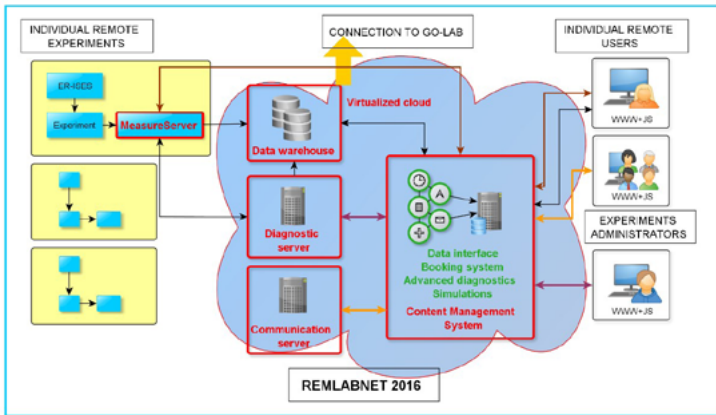
IT departments in companies and certainly in universities are permanently under pressure to provide high quality services with reduced budget. On the other side, costs of energy for datacenters (DTCs) running and cooling call for radical changes in their organization compared to classic datacenters. Few years ago we were using a prevailing standard in the decentralization and fractionating of services

to several physical devices. This approach is nowadays under severe changes in direction to consolidation of datacenters denoted under cumulative term of virtualization. Virtualization has to offer decrease in energy consumption and increase in system performance without compromise on security of DTCs [01]

The last decade has seen the rise of the DTC computing practically in every application domain. The move to DTC has been powered by two separate trends. In parallel, functionality and data usually associated with personal computing have moved into the DTC; users continuously interact with remote sites while using local computers, either running intrinsically online applications, such as email, chat, or manipulating data traditionally that are stored locally, such as documents, spreadsheets, videos and photos. In effect, modern architecture is converging towards cloud computing, a paradigm where the whole user activity is funneled into the large DTC via high-speed networks. Simply speaking, cloud computing is a set of computers, services or infrastructure. Delivering services means reducing the work of users (clients) every day, as well as service providers and IT specialists. Cloud computing allows more access services as it reduces infrastructure delivery time from weeks to hours and it offers reimbursement for provided sources and services only [02].

Main idea of our work and this paper is in using new methods how providing remote laboratories for consumers. On the figure 1 we can see primary idea of this system. On the left side we can see individual remote laboratories, experiments, with HW and SW equipment, connected to our virtualized cloud. Core of our cloud is management system for monitoring, diagnosing and administrating remote experiments and users, or our consumers. Our consumers are everybody, who wants use experiments for education or research. This management system is named Remote Laboratory Management System (RLMS) and it is consist of few modules. For example diagnostic server, data warehouse and content management system (with schedule and calendar, communication server,...).

Figure 1 block diagram of REMLABNET



2 Cloud Computing concept

Of course, our work is primary oriented for remote laboratories, but our new idea is providing remote laboratories like cloud computing service. We are first on the world, who is providing remote laboratories via this technology. A new concept of our cloud computing is figured on the Figure 2, where we can see all interesting parts of this idea.

First, we can see main parts of cloud computing. Each cloud is based on three primary services for use [03]:

IaaS – Infrastructure as a service is a standard service for providing all infrastructures;

PaaS – Platform as a service is a standard service for providing VMs with operating systems;

SaaS – Software as a service is a standard service for providing SW features for consumers;

Virtualized DTC contains physical and virtual servers which serve a variety of services including web services, file services etc. The advantages of DTC are enabling application isolation since malicious or greedy applications cannot impact other applications co-located on the same physical server. Perhaps the biggest advantage of employing virtualization is the ability that it flexibly remaps physical resources to virtual servers in order to handle workload dynamics.

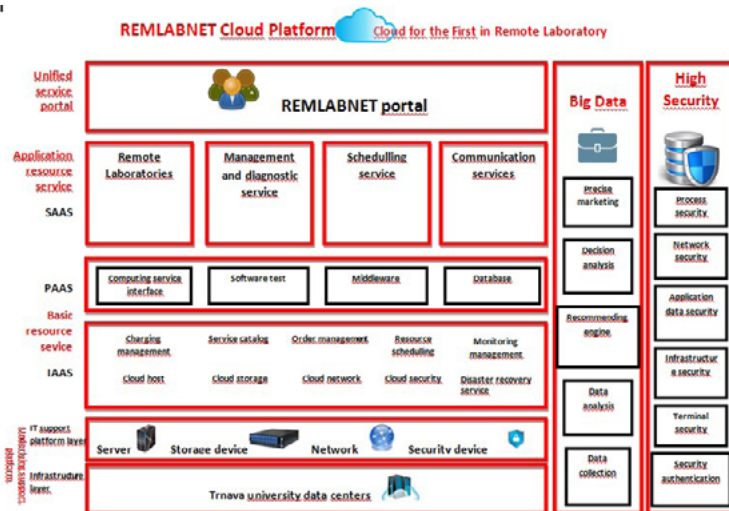
Server resources in a data center are multiplexed across multiple applications and each server runs one or more applications. These applications are usually

business critical applications with Quality-of-Service (QoS) requirements. The resource allocation needs to not only guarantee that a virtual container always has enough resources to meet its application’s performance goals but also prevent over provisioning in order to reduce cost and allow the concurrent hosting of more applications.

And this is one of the aims. To construct really stable and dynamically expandable Cloud computing for using remote laboratories. To create VMs and linkage for all parts in cloud, create communication links, virtual network for cloud computing inside, and all needed parts for Cloud computing concept. The goal of our work is new and acute topic of providing a new service for the consumers - completely functioning “Remote laboratory as a service” (RLaaS) [04].

It is very important for all consumers of the Remote laboratories, where they can find this cloud concept and every remote laboratories. We are creating Consortium named REMLABNET and this is consortium of the three universities Trnava university in Trnava (Slovakia), Tomas Bata university in Zlin (Czech Republic) and Charles university in Prague (Czech Republic). REMLABNET portal is on domain name or web site www.remlabnet.eu [05].

Figure 2 Cloud computing concept for digital consumers in Remote laboratory area



3 Benefits for the our digital consumers

Here are main benefits of the use cloud computing model [06]:

- Chop cost – pay just what is need (pay as you go model)
- High availability – just for one server is using benefits knows from big solution
- Lower impact on environment – modern technology are reduce demand on power sources
- Warrant level of provide services – availability, reaction on request
- Rate of load – solution available soon or just in few minutes

Benefits before are only for our using and our first group of the consumers. This first group are consumers, which using our system for monitoring, diagnosing and administrating they remote laboratories. Cloud computing offer very easy and very cheaper administration. Next group of our consumers are students, teachers or brainpowers, where are our experiments and our system used for education or science. Benefits for this group is primary in using experiments, possibility of the measuring on the experiments without need build it, save the measured data, using own credentials and accounts, schedule some experiment in the date and time, etc.

4 Conclusions

Our idea use Cloud computing was attesting and discussing with experts in this research part. Way of our work is good and have a big progress. We can provide new service, Remote laboratory as a Service (RlaaS) in our cloud system. Our university network providing many communications in many different protocols for different consumers, with different privileges, etc. Our consumers are primary teachers, students and brainpower of the universities and high schools, but access is possible for all consumers via Internet. This show, how is university network very overcast for communication and traffic. This claim, that network must be without failure and latency. And be secured too for management and research data protection. Security on the network is very important part, but it is without frame of this paper.

In this paper we were show our idea of construct Cloud computing system with important parts. Our work is oriented for save money in education and research with build own Remote laboratories. Many laboratories we have connected from Trnava university, Charles university and other in the world. This way providing experiments and laboratories from world to one system without

consumer's knowledge where physical experiments are. Our work is in simple terms „Bring Technology to Service!“.

Next work

In these days, we work on the new subsystem of the REMLABNET with name REMLABGRAB. This system is based on our Cloud Computing and this will be gate for everybody, who want build own learning sites for our remote experiments and like extensions for build virtual reality above our laboratories.

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