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Unavoidable Trends : From Merchant Lock-in to the Meta Cloud

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Abstract:

The cloud computing paradigm has achieved widespread adoption in recent years. Its success is due largely to customers' ability to use services on demand with a pay-as-you go pricing model, which has proved convenient in many respects. Low costs and high flexibility make migrating to the cloud compelling. Despite its obvious advantages, however, many companies hesitate to "move to the cloud," mainly because of concerns related to service availability, data lock-in, and legal uncertainties.

1 Lock in is particularly problematic. For one thing, even though public cloud availability is generally high, outages still occur.

2 Businesses locked into such a cloud are essentially at a standstill until the cloud is back online. Moreover, public cloud providers generally don't guarantee particular service level agreements (SLAs)

3 That is, businesses locked into a cloud have no guarantees that it will continue to provide the required quality of service (QoS). Finally, most public cloud providers' terms of service let that provider unilaterally change pricing at any time. Hence, a business locked into a cloud has no mid- or long term control over its own IT costs. At the core of all these problems, we can identify a need for businesses to permanently monitor the cloud they're using and be able to rapidly "change horses" — that is, migrate to a different cloud if they discover problems or if their estimates predict future issues.

Keywords:- cloud computing, meta cloud, provider independence, resource management, service provisioning, automated deployment

INTRODUCTION

The Greek myths tell of creatures plucked from the surface of the Earth and enshrined as constellations in the night sky. Something similar is happening today in the world of computing. Data and programs are being swept up from desktop PCs and corporate server rooms and installed in ―the compute cloud‖ . In general, there is a shift in the geography of computation.

What is cloud computing?

An emerging computer paradigm where data and services reside in massively scalable data centers in the cloud and can be accessed from any connected devices over the internet Like other definitions of topics like these, an understanding of the term cloud computing requires an understanding of various other terms which are closely related to this. While there is a lack of precise scientific definitions for many of these terms, general definitions can be given. Cloud computing is an emerging paradigm in the computer industry where the computing is moved to a cloud of computers. It has become one of the buzz words of the industry. The core concept of cloud computing is, quite simply, that the vast computing resources that we need will reside somewhere out there in the cloud of computers and we‘ll connect to them and use them as and when needed.

Computing can be described as any activity of using and/or developing computer hardware and software. It includes everything that sits in the bottom layer, i.e. everything from raw compute power to storage capabilities. Cloud computing ties together all these entities and delivers them as a single integrated entity under its own sophisticated management. Cloud is a term used as a metaphor for the wide area networks (like internet) or any such large networked environment. It came partly from the cloud-like symbol used to represent the complexities of the networks in the schematic diagrams. It represents all the complexities of the network which may include everything from cables, routers, servers, data centres and all such other devices.

Computing started off with the mainframe era. There were big mainframes and everyone connected to them via ―dumb‖ terminals. This old model of business computing was frustrating for the people sitting at the dumb terminals because they could do only what they were ―authorized‖ to do. They were dependent on the computer administrators to give them permission or to fix their problems. They had no way of staying up to the latest innovations. The personal computer was a rebellion against the tyranny of centralized computing operations. There was a kind of freedom in the use of personal computers. But this was later replaced by server architectures with enterprise servers and others showing up in the industry. This made sure that the computing was done and it did not eat up any of the resources that one had with him. All the computing was performed at servers. Internet grew in the lap of these servers. With cloud computing we have come a full circle. We come back to the centralized computing infrastructure. But this time it is something which can easily be accessed via the internet and something over which we have all the control.

Cloud computing is a way of providing various services on virtual machines allocated on top of a large physical machine pool which resides in the cloud. Cloud computing comes into focus only when we think about what IT has always wanted - a way to increase capacity or add different capabilities to the current setting on the fly without investing in new infrastructure, training new personnel or licensing new software. Here ‗on the fly‘ and ‗without investing or training‘ becomes the keywords in the current situation. But cloud computing offers a better solution.

We have lots of compute power and storage capabilities residing in the distributed environment of the cloud. What cloud computing does is to harness the capabilities of these resources and make available these resources as a single entity which can be changed to meet the current needs of the user.

The basis of cloud computing is to create a set of virtual servers on the available vast resource pool and give it to the clients. Any web enabled device can be used to access the resources through the virtual servers. Based on the computing needs of the client, the infrastructure allotted to the client can be scaled up or down.

From a business point of view, cloud computing is a method to address the scalability and availability concerns for large scale applications which involves lesser overhead. Since the resource allocated to the client can be varied based on the needs of the client and can be done without any fuss, the overhead is very low.

Characteristics of Cloud Computing:

1. Self-Healing:

Any application or any service running in a cloud computing environment has the property of self-healing. In case of failure of the application, there is always a hot backup of the application ready to take over without disruption. There are multiple copies of the same application - each copy updating itself regularly so that at times of failure there is at least one copy of the application which can take over without even the slightest change in its running state.

2. Multi-tenancy:

With cloud computing, any application supports multi-tenancy - that is multiple tenants at the same instant of time. The system allows several customers to share the infrastructure allotted to them without any of them being aware of the sharing. This is done by virtualizing the servers on the available machine pool and then allotting the servers to multiple users. This is done in such a way that the privacy of the users or the security of their data is not compromised.

3. Linearly Scalable:

Cloud computing services are linearly scalable. The system is able to break down the workloads into pieces and service it across the infrastructure. An exact idea of linear scalability can be obtained from the fact that if one server is able to process say 1000 transactions per second, then two servers can process 2000 transactions per second.

4. Service-oriented:

Cloud computing systems are all service oriented - i.e. the systems are such that they are created out of other discrete services. Many such discrete services which are independent of each other are combined together to form this service. This allows re-use of the different services that are available and that are being created. Using the services that were just created, other such services can be created.

5. SLA Driven:

Usually businesses have agreements on the amount of services. Scalability and availability issues cause clients to break these agreements. But cloud computing services are SLA driven such that when the system experiences peaks of load, it will automatically adjust itself so as to comply with the service-level agreements. The services will create additional instances of the applications on more servers so that the load can be easily managed.

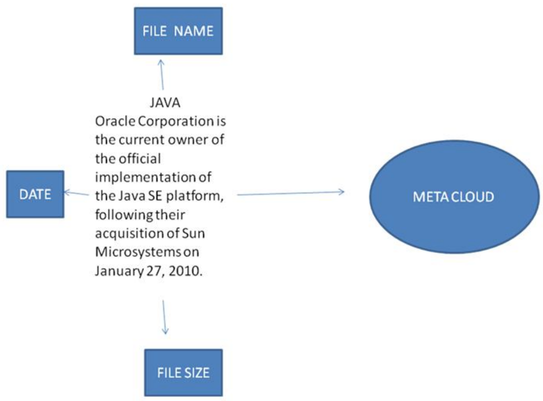
6. Virtualized:

The applications in cloud computing are fully decoupled from the underlying hardware. The cloud computing environment is a fully virtualized environment.

7. Flexible:

Another feature of the cloud computing services is that they are flexible. They can be used to serve a large variety of workload types - varying from small loads of a small consumer application to very heavy loads of a commercial application.

Architecture:-



3.0 LITERATURE REVIEW

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy n company strength. Once these things r satisfied, ten next steps are to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration are taken into account for developing the proposed system.

A Meta Cloud Use Case:

Let's come back to the sports application use case. A meta-cloud-compliant variant of this application accesses cloud services using the meta cloud API and doesn't directly talk to the cloud-provider-specific service APIs. For our particular case, this means the application doesn't depend on Amazon EC2, SQS, or RDS service APIs, but rather on the meta cloud's compute, message queue, and relational database service APIs. For initial deployment, the developer submits the application's resource template to the meta cloud. It specifies not only the three types of cloud services needed to run the sports application, but also their necessary properties and how they depend on each other. For compute resources, for instance, the developer can specify CPU, RAM, and disk space according to terminology defined by the meta cloud resource template DSL. Each resource can be named in the template, which allows for referencing during deployment, runtime, and migration. The resource specification should also contain interdependencies, such as the direct connection between the Web service compute instances and the message queue service. The rich information that resource templates provide helps the provisioning strategy component make profound decisions about cloud service ranking. We can explain the working principle for initial deployment with a Web search analogy, in which resource templates are queries and cloud service provider QoS and pricing information represent indexed documents. Algorithmic aspects of the actual ranking are beyond this article's scope. If some resources in the resource graph are only loosely coupled, then the meta cloud will be more likely to select resources from different cloud providers for a single application. In our use case, however, we assume that the provisioning strategy ranks the respective Amazon cloud services first, and that the customer follows this recommendation.

After the resources are determined, the meta cloud deploys the application, together with an instance of the meta cloud proxy, according to customer-provided recipes. During runtime, the meta cloud proxy mediates between the application components and the Amazon cloud resources and sends monitoring datato the resource monitoring

component running within the meta cloud.
Monitoring data helps refine the application's resource template and the provider's overall QoS values, both stored in the knowledge base. The provisioning strategy component regularly checks this updated information, which might trigger a migration. The meta cloud could migrate front-end nodes to other providers to place them closer to the application's users, for example.

Another reason for a migration might be updated pricing data. After a price cut by Rackspace, for example, services might migrate to its cloud offerings. To make these decisions, the provisioning strategy component must consider potential migration costs regarding time and money. The actual migration is performed based on customer-provided migration recipes. Working on the meta cloud, we face the following technical challenges. Resource monitoring must collect and process data describing different cloud providers' services such that the provisioning strategy can compare and rank their QoS properties in a normalized, provider independent fashion. Although solutions for deployment in the cloud are relatively mature, application migration isn't as well supported. Finding the balance between migration facilities provided by the meta cloud andthe application is particularly important.

According to Gallego Martín, Miguel. (2020) In the last years, with the success of Internet and the rapid development of storage and processing technologies computing resources have become cheaper, more available and powerful. This technological development has triggered the emergence of Cloud Computing, a new paradigm for services over the internet. In Cloud Computing resources can be rented to users following an on-demand payment model through Internet, this payment model is very attractive to enterprises because they do not have to care about maintenance or provisioning, availability or connectivity, neither binding contracts, they can begin with a small amount of resources and resize them immediately in order to supply an increase in the incoming traffic, following the business evolution. Because of these advantages nowadays a lot of companies are adopting the Cloud Computing paradigm, mainly enterprises that realised that exchanging the initial costs for a pay-per-use model was worth it, in addition to others that offer on-premise services installations and desire to increase their reach and expand horizons. This is just the case that we are dealing with here, 2Mares Demil, S.L. 2Mares has been 22 years working on technological specialized innovations, manufacturing intelligent software products for Contact Centers. They are leaders in Spain in their sector, serving the largest companies and now they want reach small entities, but there are a few problems about this, the on-premise installation cost is too much for this companies, and for 2Mares the maintenance cost in terms of support staff in comparison with the incoming benefit is not admissible. These are the main reasons because 2Mares decided jump to the Cloud Computing environment, initial installation costs would be removed and the need for support staff greatly reduced, in this way reaching small entities would be possible.

According to Opara-Martins, Justice, Reza Sahandi, and Feng Tian (2016) Cloud computing offers an innovative business model for organizations to adopt IT services at a reduced cost with increased reliability and scalability. However organizations are slow in adopting the cloud model due to the prevalent vendor lock-in issue and challenges associated with it. While the existing cloud solutions for public and private companies are vendor locked-in by design, their existence is subject to limited possibility to interoperate with other cloud systems. In this paper we have presented a critical review of pertinent business, technical and legal issues associated with vendor lock-in, and how it impacts on the widespread adoption of cloud computing. The paper attempts to reflect on the issues associated with interoperability and portability, but with a focus on vendor lock-in. Moreover, the paper demonstrates the importance of interoperability, portability and standards applicable to cloud computing environments along with highlighting other corporate concerns due to the lock-in problem. The outcome of this paper provides a foundation for future analysis and review regarding the impact of vendor neutrality for corporate cloud computing application and services.

As per the research conducted by Chernyshov, Artyom, et al(2016) During the last years the concept of publicity accessible services and application interacting to one another has become quite popular. In this connection the majority of specialists and especially business integrators and B2B (business to business) application users often experience some diffi-culties while running necessary services and application. So that we are going to introduce a new approach based on RESTful web-services composition and a program system which would au-tomatically search and unify semantic web-services. The basis of this method is usage WSMO-lite (Web Service Modeling Ontology) for semantic descriptions and different methods of web-services composition depending on client demands. We also are going to compare the developing system to its analogues.

According to Beri, Rydhm, and Veerawali Behal (2015) The internet is marvelous technology of the computing world. The most exhaustive technology that internet dispense, is the Cloud Computing. It provides instrumental values to the customers and cloud service providers. With the advent of cloud computing the client uses the resources like hardware, software or storage, that are offered by other organization, instead of buying their own resources. However, these cloud services are provided by the cloud service providers by means of virtual machines. This study proposed the various aspects related to cloud computing technology. This paper includes the service model that reveals the various cloud services provides to different types of clients according to their requirements. This study provides the details of the layers in the architecture of cloud computing. Moreover, this study also includes the information about the various types of clouds.

As per the research conducted by Kratzke, Nane (2014) To overcome vendor lock-in obstacles in public cloud computing, the capability to define transferable cloud-based services is crucial but has not yet been solved satisfactorily. This is especially true for small and medium sized enterprises being typically not able to operate a vast staff of cloud service and IT experts. Actual state of the art cloud service design does not systematically deal with how to define, deploy and operate cross-platform capable cloud services. This is mainly due to inherent complexity of the field and differences in details between a plenty of existing public and private cloud infrastructures. One way to handle this complexity is to restrict cloud service design to a common subset of commodity features provided by existing public and private cloud infrastructures. Nevertheless these restrictions raise new service design questions and have to be answered in ongoing research in a pragmatic manner regarding the limited IT-operation capabilities of small and medium sized enterprises. By simplifying and harmonizing the use of cloud infrastructures using lightweight virtualization approaches, the transfer of cloud deployments between a variety of cloud service providers will become possible. This article will discuss several aspects like high availability, secure communication, elastic service design, transferability of services and formal descriptions of service deployments which have to be addressed and are investigated by our ongoing research.

According to Silva, Gabriel Costa, Louis M. Rose, and Radu Calinescu(2013) The heterogeneity of cloud semantics, technology and interfaces limits application and platform portability and interoperability, and can easily lead to vendor lock-in. We identify, analyse and classify existing solutions to cloud vendor lock-in, and highlight unresolved challenges. Our survey is based on a systematic review of 721 primary studies that describe the state-of-the-art in managing cloud lock-in, portability and interoperability. 78 of these primary studies were selected and used for a thorough analysis of cloud standards, commercial products and academic work related to cloud lock-in. Our review shows that most solutions proposed so far are platforms, APIs or architectures addressing infrastructure-as-a-service (IaaS) interoperability. From our review, we identify a need for: (i) exploiting established solutions from areas that are closely related to cloud computing, (ii) increasing empirical evidence to raise confidence in existing solutions, and (iii) addressing the socio-technical and business challenges related to cloud lock-in.

According to Koperek, Paweł, and Włodzimierz Funika (2011) Cloud computing infrastructures are in the spotlight of modern computer science. They offer flexibility and on-demand resource provisioning. The automatic scalability feature enables cloud-based systems to seamlessly adjust to the constantly changing environment of the Internet. Despite their usefulness there is still much space for improvements. In this paper we introduce an approach to automatic infrastructure scaling, based on observation of business-related metrics. An implementation of a tool based on this concept, using the previously developed SAMM system, is also presented. Finally, we discuss evaluation results.

According to Funika, Wlodzimierz, and Pawel Koperek (2011) Currently cloud infrastructures are in the spotlight of computer science. Through offering on-demand resource provisioning capabilities and high flexibility of management cloud-based systems can seamlessly adjust to the constantly changing environment of the Internet. They can automatically scale according to a chosen policy. Despite the usefulness of the currently available tools in this area there is still much space for improvements. In this paper we introduce a novel approach to automatic infrastructure scaling, based on the observation of business-related metrics. We present details on a tool based on this concept, which uses a semantic-based monitoring and management system, called SAMM. At the end we discuss the capabilities of the new mechanisms.

As per the Research conducted by Vincent, Hugues, et al (2010) The Internet has been growing at a impressive rate in many aspects such as size, heterogeneity, and usage. This growth forces the continuous improvement of Internet infrastructure technologies. The Future Internet concept magnifies the required shift for Internet technologies, which shall allow supporting the continuously growing scale of the converging networking world together with new generations of services made available to and brought by the broad mass of end users. The CHOReOS project positions itself in this vision of the Future Internet, whilst focusing on the Future Internet of Services. This research project aims at assisting the engineering of software service compositions in this novel networking environment by devising a dynamic development process, and associated methods, tools and middleware, to sustain the composition of services in the form of large-scale choreographies for the Internet of the future

4.1.1 EXISTING SYSTEM:

Cloud providers are flooding the market with a confusing body of services, including computer services such as the Amazon Elastic Compute Cloud (EC2) and VMware v Cloud, or key-value stores, such as the Amazon Simple Storage Service (S3). Some of these services are conceptually comparable to each other, whereas others are vastly different, but they're all, ultimately, technically incompatible and follow no standards but their own. To further complicate the situation, many companies not (only) build on public clouds for their cloud computing needs, but combine public offerings with their own private clouds, leading to so-called hybrid clouds.

4.1.2 PROPOSED SYSTEM:

Here, we introduce the concept of a meta cloud that incorporates design time and runtime components. This meta cloud would abstract away from existing offerings' technical incompatibilities, thus mitigating vendor lock-in. It helps users find the right set of cloud services for a particular use case and supports an application's initial deployment and runtime migration.

9.1 Modules with Description

Modules :

1. **Registration**
2. **Login**
3. **File Upload**
4. **Migrate Cloud**
5. **Send Mail**

Modules Description

Registration:

In this module if an User or Owner or TTP(trusted third party) or CSP(cloud service provider) have to register first, then only he/she has to access the data base.

Login:

In this module, any of the above mentioned person have to login, they should login by giving their username and password .

File Upload:

In this module Owner uploads a file(along with meta data) into cloud, before it gets uploaded, it subjects into Validation by TTP. Then TTP sends the file to CSP.CSP decrypt the file by using file key. If CSP tries to modify the data of the file, He cant modify it. If he made an attempt the alert will go to the Owner of the file. It results in the Cloud Migration.

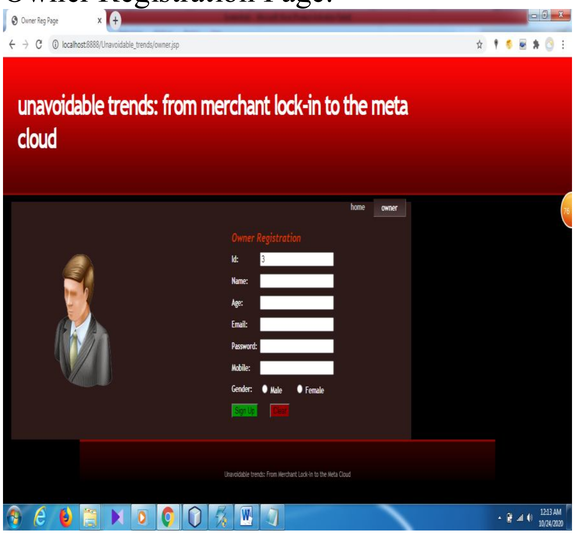
Migrate Cloud:

The advantage of this meta cloud is ,if we are not satisfy with one CSP, we can switch over to next cloud. so that we are using two clouds at a time. In second cloud, their cant modify/corrupt the real data, if they made an attempt, the will fail.

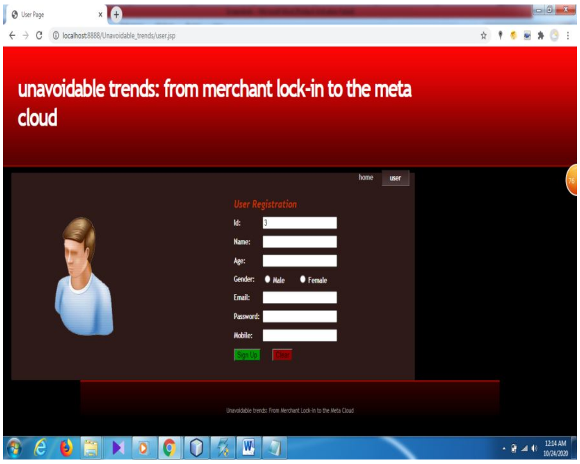
Send Mail:
The Mail will be sent to the end user along with file decryption key, so as to end user can download the file. Owner send the mail to the users who are registered earlier while uploaded the file into the correct cloud.

10. OUTPUTSCREENS

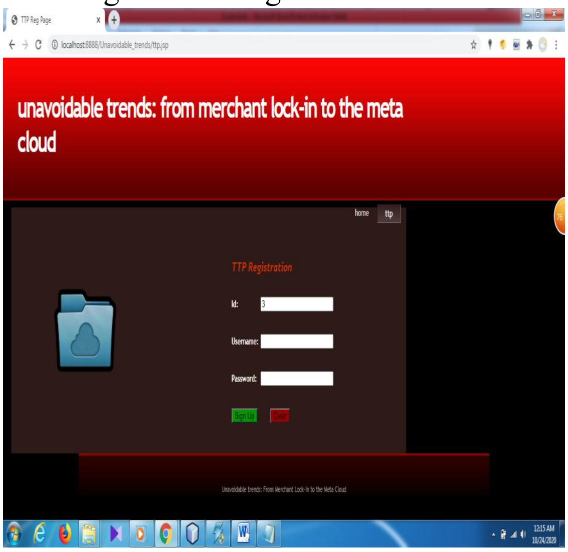
Owner Registration Page:



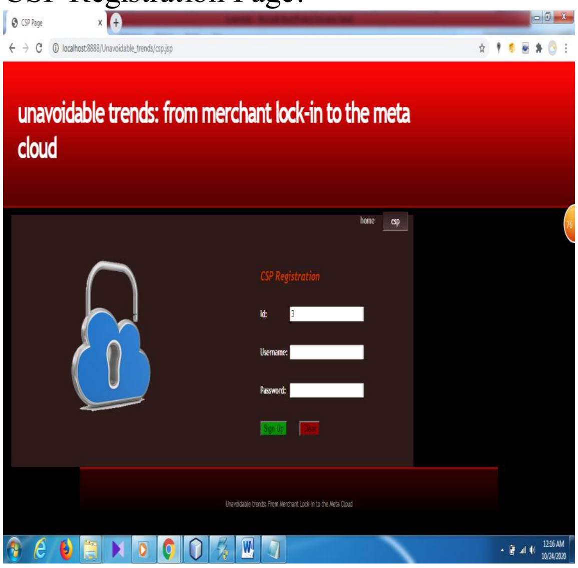
User Registration Page:



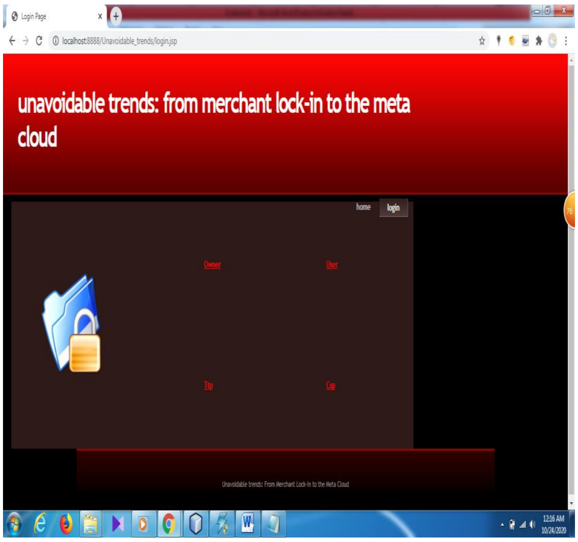
TTP Registration Page:



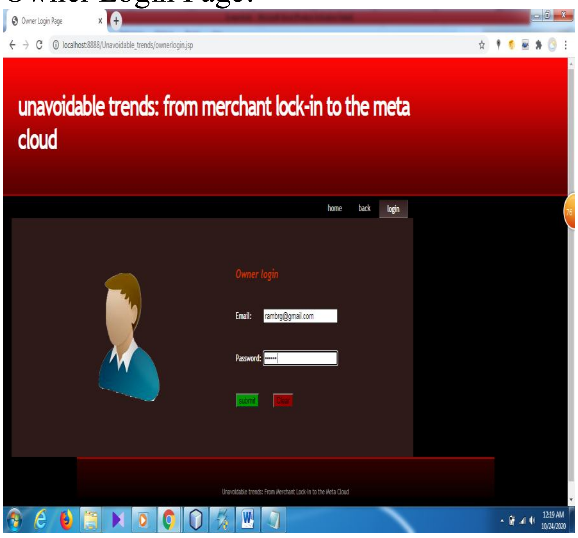
CSP Registration Page:



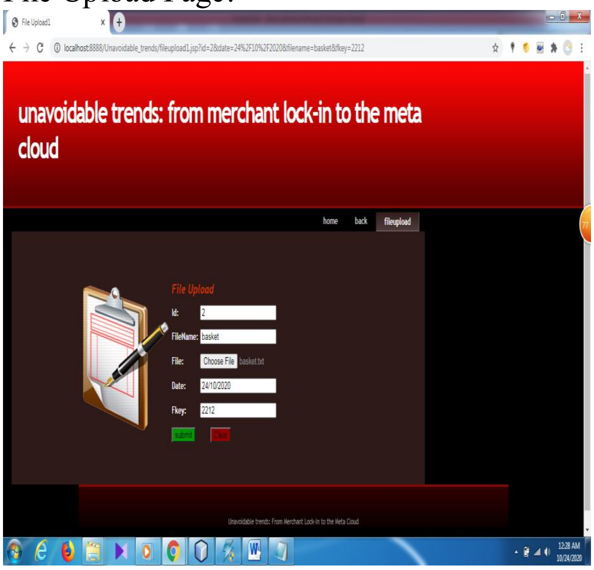
Login Page:

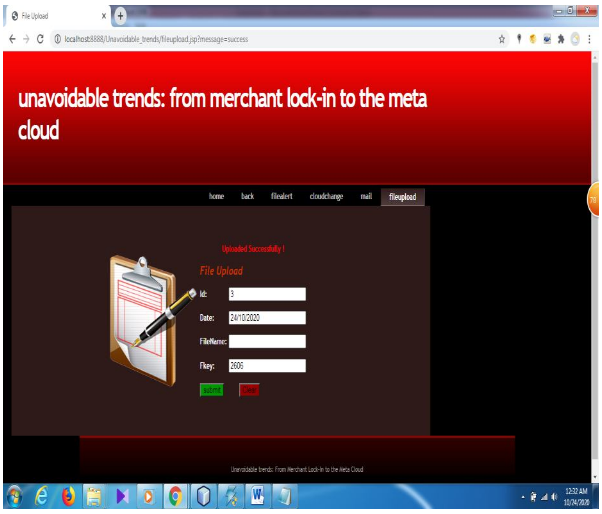


Owner Login Page:

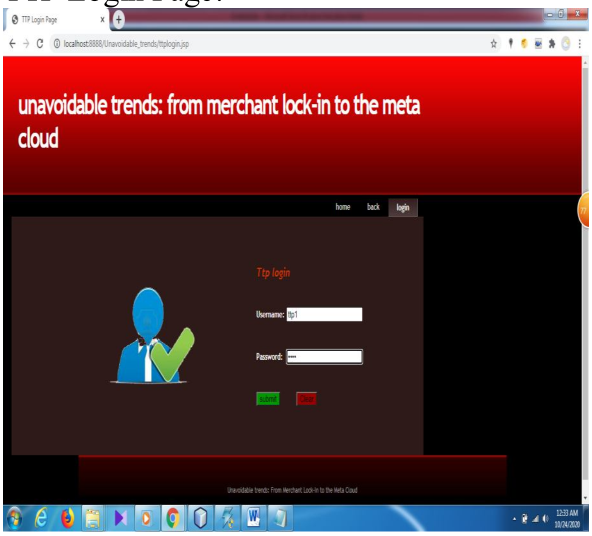


File Upload Page:

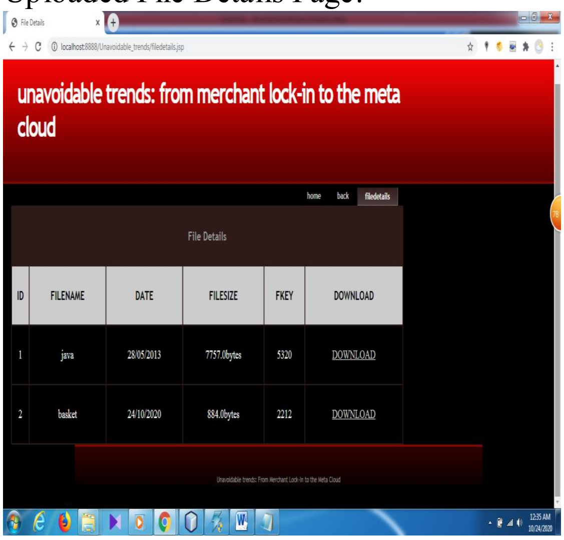




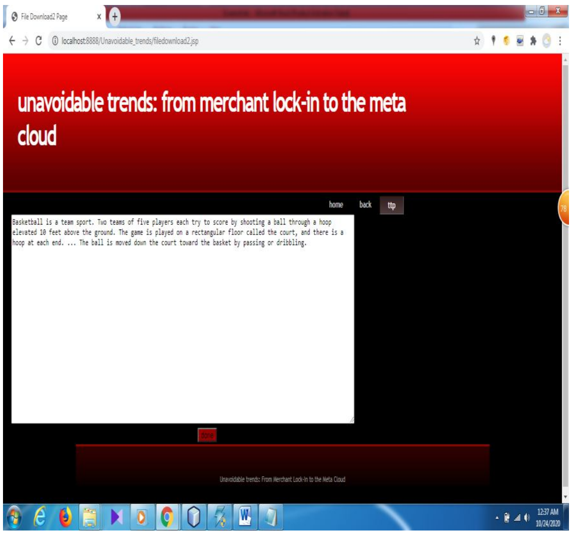
TTP Login Page:



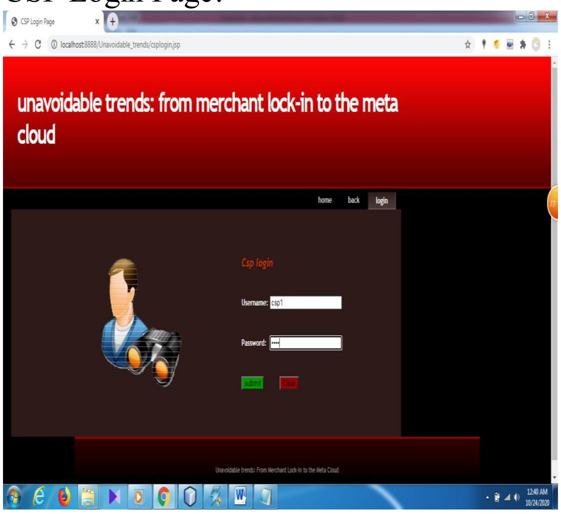
Uploaded File Details Page:



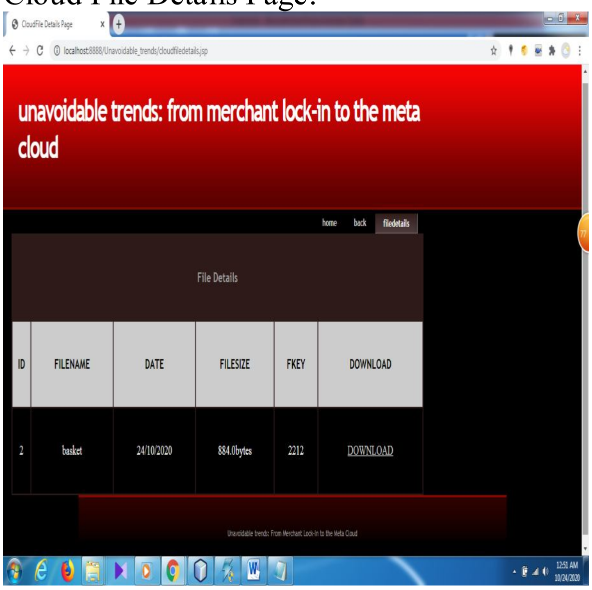
File Download Page:



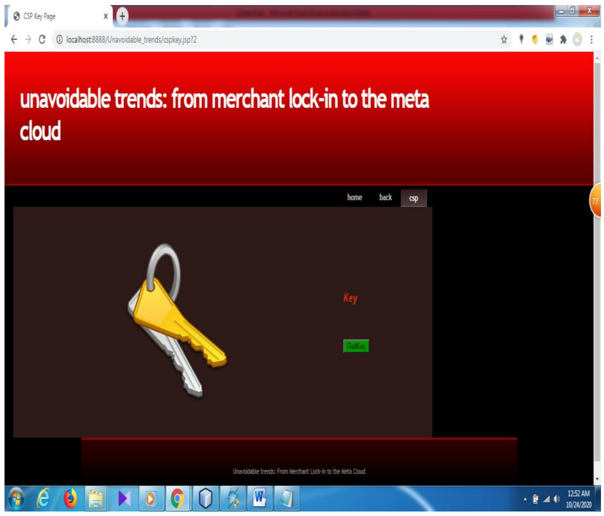
CSP Login Page:

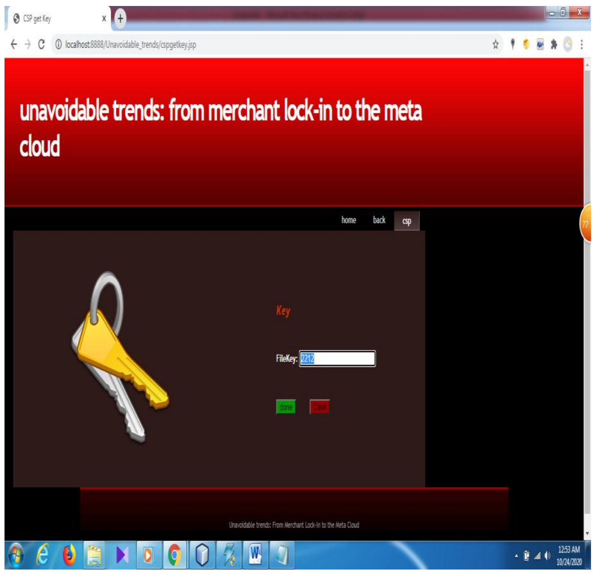


Cloud File Details Page:

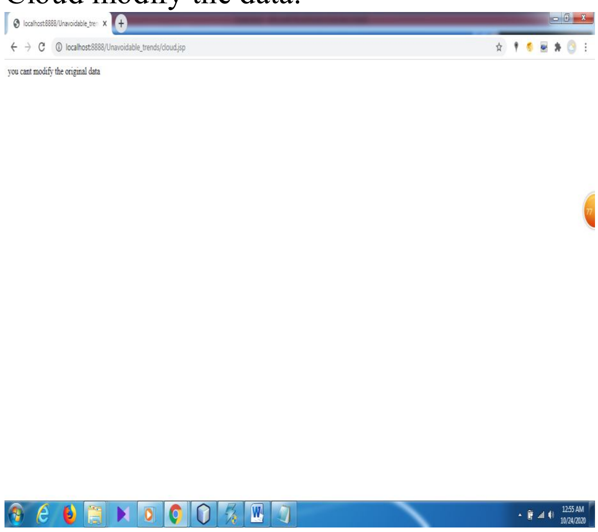


CSP geykey:

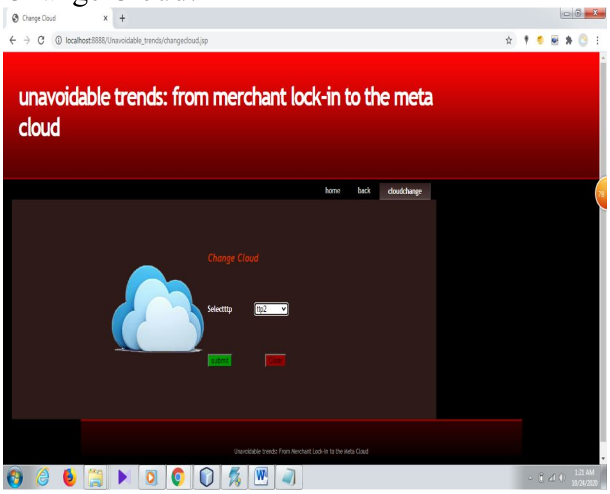




Cloud modify the data:



Change Cloud:



Conclusion:

The meta cloud can help mitigate vendor lock-in and promises transparent use of cloud computing services. Most of the basic technologies necessary to realize the meta cloud already exist, yet lack integration. Thus, integrating these state-of-the-art tools promises a huge leap toward the meta cloud. To avoid meta cloud lock in, the community must drive the ideas and create a truly open meta cloud with added value for all customers and broad support for different providers and implementation technologies.

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