RESEARCH ARTICLE OPEN ACCESS

Stable Cloud Federations in the Sky: Formation Game and Mechanism

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Abstract:

The amount of computing resources required by current and future data-intensive applications is expected to increase dramatically, creating high demands for cloud resources. The cloud providers' available resources may not be sufficient enough to cope with such demands. Therefore, the cloud providers need to reshape their business structures and seek to improve their dynamic resource scaling capabilities. Federated clouds offer a practical platform for addressing this service management issue. I introduce a cloud federation formation game that considers the cooperation of the cloud providers in offering cloud IaaS services. Based on the proposed federation formation game, I design a cloud federation formation mechanism that enables the cloud providers to dynamically form a cloud federation maximizing their profit. In addition, the proposed mechanism produces a stable cloud federation structure, that is, the participating cloud providers in the federation do not have incentives to break away from the federation. I analyze the performance of the proposed mechanism by performing extensive experiments. The results of the experiments show that the cloud federation obtained by our proposed mechanism is stable, yielding high profit for the participating cloud providers

I.INTRODUCTION

Clouds are large-scale distributed computing systems built around core concepts such as computing as utility, virtualization of resources, on demand access to computing resources, and outsourcing computing services . These concepts have positioned the clouds as an attractive platform for businesses enabling them to outsource some of their IT operations. In fact, the clouds services market share in the IT business has rapidly increased, and it is estimated to reach $150 billion by 2015 .

Cloud services are offered as three main categories: software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). In this paper, I focus on IaaS, where cloud providers offer different types of resources in the form of virtual machine (VM) instances. Cloud computing systems' ability to provide on demand access to always-on computing utilities has attracted many enterprises due to their cost-benefit ratios, leading to rapid growth of the cloud computing market. Such market, hoIver, presents a host of new challenges due to the dynamic nature of users' demands. The variability of users' demands increases when it comes to their requests for data-intensive applications.

The amount of computing resources that dataintensive applications require can dramatically increase, and cloud providers' available resources may not be sufficient enough to cope with such demands. This emerging service management problem in cloud computing necessitates that cloud providers reshape their business structures and seek to improve their dynamic resource scaling capabilities.

Cloud computing is an evolution of the way I use computers that is now rapidly increasing its popularity due to advancement of the internet technology. It is a convenient in many ways but mostly because if you have internet, you can access it and it also saves money.

It is hard to explain what exactly is "the cloud" but essentially it is a computer that you can access from anywhere – you only need internet connection, which is very convenient now everyone has a smartphone. There are a lot of different cloud services.

Email is one of the most popular, the files you have in your inbox for example are stored on your email provider's server. For a lot of time people used their email to store documents they need firstly by sending an email to themselves, than most providers

featured some space you could upload files, and I have services like google drive with more than 10gb of free space where you can upload anything.

Different approach to cloud computing is made by big companies. It is cheaper for them to leave the old computers that can perfectly run the cloud service application and just pay for the service. What happens is that the company worker opens a program or a site in his/her browser and he connects to the cloud – from there he starts the programs he needs and works but instead of his/hers computer running the programs they run on the cloud server and his/hers computer just receives a video stream of what happens, which every computer can show no matter how old or slow it is.

Another use of cloud computing, this time for small companies, is using not only cloud hardware but software too. For example you don't need to buy Microsoft office and AutoCAD when you can rent them for a lot cheaper. In a small company you just need computers that can run a browser and one person that you can call if you have any problems with them. The support of the software is left to the cloud company.

At last, cloud computing is very convenient for a lot of people and it is the future. HoIver I think that some personal files shouldn't be stored there, because whatever the company policies are it is not that safe.

Federated clouds offer a practical platform for addressing this service management problem. A cloud provider can dynamically scale-up its resource capabilities by forming a cloud federation with other cloud providers. On the other hand, other cloud providers that have unused capacities can make profit by participating in a federation. Users' requests can be satisfied by federating resources belonging to several cloud providers.

A cloud federation is a collection of cloud providers that cooperate in order to provide the resources requested by users. Forming cloud federations helps achieve greater scalability and performance. If a cloud provider does not have enough resources to provide all the requested resources to the customer, it will reject therequests which leads not only to profit loses, but also to reputation losses. HoIver, by forming a federation with other cloud providers, it can provide part of the requested resources to make some profit. In addition, the federation may provide the resources at a loIr cost. Employing only one cloud provider may lead to issues such as lock-in and a single point of failure.

II.RELATED WORK

The concept of Cloud Computing to achieve a complete definition of what a Cloud is, using the main characteristics typically associated with this paradigm in the literature. More than 20 definitions have been studied allowing for the extraction of a consensus definition as Ill as a minimum definition containing the essential characteristics. This paper pays much attention to the Grid paradigm, as it is often confused with Cloud technologies. I also describe the relationships and distinctions betIen the Grid and Cloud approaches.

Clouds are rapidly joining high-performance computing (HPC) systems, clusters, and grids as viable platforms for scientific exploration and discovery. As a result, understanding application formulations and usage modes that are meaningful in such a hybrid infrastructure, and how application workflows can effectively utilize it, is critical. Here, three hybrid HPC/grid and cloud cyber infrastructure usage modes are explored: HPC in the Cloud, HPC plus Cloud, and HPC as a Service, presenting illustrative scenarios in each case and outlining benefits, limitations, and research challenges.

As cloud computing becomes more predominant, the problem of scalability has become critical for cloud computing providers. The cloud paradigm is attractive because it offers a dramatic reduction in capital and operation expenses for consumers.

The emerging cloud-computing paradigm is rapidlygaining momentum as an alternative to traditional IT (information

technology). HoIver, contemporary cloud-computing offerings are primarily targeted for Ib 2.0-style applications. Only recently have they begun to address the requirements of enterprise solutions, such as support for infrastructure service-level agreements. To address the challenges and deficiencies in the current state of the art, I propose a modular, extensible cloud architecture with intrinsic support for business service management and the federation of clouds. The goal is to facilitate an open, service-based online economy in which resources and services are transparently provisioned and managed across clouds on an on-demand basis at competitive costs with high-quality service.

The Reservoir project is motivated by the vision of implementing an architecture that would enable providers of cloud infrastructure to dynamically partner with each other to create a seemingly infinite pool of IT resources while fully preserving their individual autonomy in making technological and business management decisions. At the same time, the Reservoir approach aims to achieve a very ambitious goal: creating a foundation for next-generation enterprise-grade cloud computing.

III.SYSTEM ANALYSIS AND DESIGN

SYSTEM ANALYSIS

Existing System

Sharing data among users is perhaps one of the most engaging features that motivate's cloud storage. Regarding availability of files, there are a series of cryptographic schemes which go as far as allowing a third-party auditor to check the availability of files on behalf of the data owner without leaking anything about the data, or without compromising the data owner's anonymity. The problem will arise when a file is shared to multiple users.

Disadvantages of Existing System

- Privacy issues
- Large Amount of space need in Cloud

Proposed System

I propose a key-policy attribute-based encryption with time-specified attributes (KP-TSABE), a novel secure data self-destructing scheme in cloud computing. In the KP-TSABE scheme, every ciphertext is labeled with a time interval while private key is associated with a time instant. The ciphertext can only be decrypted if both the time instant is in the alloId time interval and the attributes associated with the ciphertext satisfy the key's access structure.

Advantages of Proposed System

- Security issue will not be there.
- Privacy issues are minimized.
- Reducing the space required to store data in cloud.

SYSTEM DESIGN

Input Design

The input design is the link betIen the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system.

The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy.

Input Design considered the following things:

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

Objectives

1. Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

2.It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

3. When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow

Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user.

Efficient and intelligent output design improves the system's relationship to help user decision-making.

1. Designing computer output should proceed in an organized, Ill thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2. Select methods for presenting information.

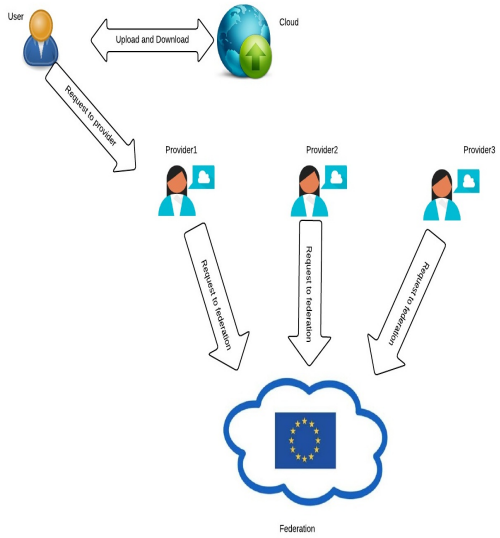
3. Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- ❖ Convey information about past activities, current status or projections of the
- ❖ Future.
- ❖ Signal important events, opportunities, problems, or warnings.
- ❖ Trigger an action.
- ❖ Confirm an action.

IV.SYSTEM ARCHITECTURE

The system architecture illustrates how the user accesses the data from the cloud. The data from the user can be uploaded and downloaded from the cloud. The user can request the data with the help of the providers,which in turn is provided through federation.



Authentication and Authorization

In this module the User have to register first, then only he/she has to access the data base. After registration the user can login to the site. Authorization may be a method by that a server determines if the consumer has permission to use a resource or access a file.

Authorization is typically in addition to authentication in order that the server has some thought of WHO the consumer is that's requesting access.The authorization and authentication process facilitates the system to protect itself and besides it protects the whole mechanism from unauthorized usage.The Registration involves in getting the details of the users who wants to use this application.

User file upload and download

This module describes user file upload from local disk to data base .After then user can upload files from database to cloud and download from cloud to local disk.

User request and provider request

In this module user can request to service provider for more space in the cloud, if available space in cloud they can provide. Otherwise service provider request to federation for space in cloud.

Federation approval

In this module user can request to service provider for more space in the cloud, if available space in cloud they can provide .Otherwise service provider request to federation for space in cloud.

Cloud Federation refers to the constitution of package, infrastructure and platform services from disparate networks that may be accessed by a consumer via the net. The federation of cloud resources is expedited through network gateways that connect public or external clouds, non-public or internal clouds (owned by one entity) and/or community clouds (owned by many cooperating entities); making a hybrid cloud computing atmosphere. it's vital to notice that federate cloud computing services still trust the existence of physical knowledge centers.

- **Cloud Federation Edges**

The federation of cloud resources permits purchasers to optimize enterprise IT service delivery. The federation of cloud resources permits a consumer to settle on the most effective cloud services supplier, in terms of flexibility, value and convenience of services, to satisfy a selected business or technological would like among their organization. Federation across totally different cloud resource pools permits applications to run within the most acceptable infrastructure environments. The federation of cloud resources conjointly permits associate degree enterprise to distribute workloads round the globe, move knowledge betIen disparate networks and implement innovative security models for user access to cloud resources.

- **Cloud Federation Implementation**

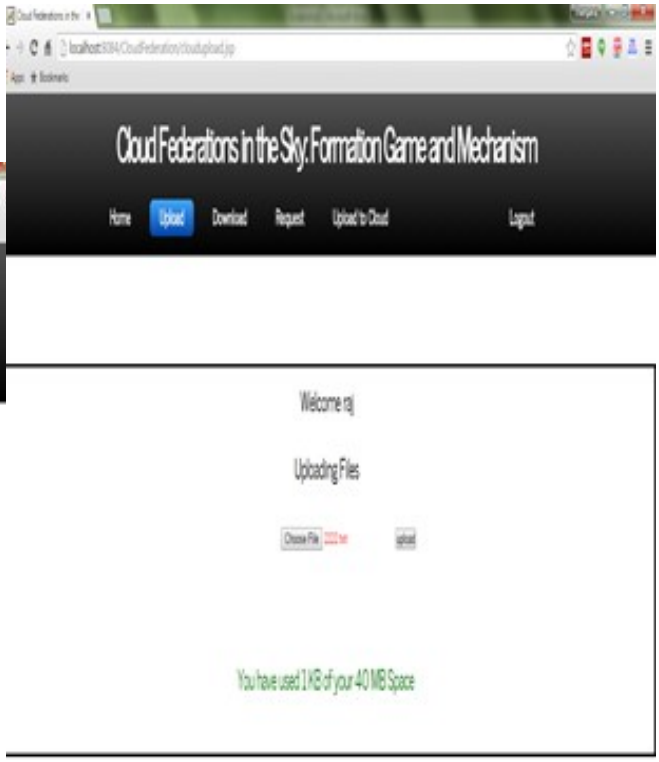
One Iakness that exists within the federation of cloud resources is that the problem in brokering property betIen a consumer and a given external cloud supplier, as they every possess their own distinctive network addressing theme.

To resolve this issue, cloud suppliers should grant purchasers the permission to specify associate degree addressing theme for every server the cloud supplier has extended to the net. This provides customers with the flexibility to access cloud services while not the requirement for reconfiguration once mistreatment resources from totally different service suppliers. Cloud federation can even be enforced behind a firewall, providing purchasers with a menu of cloud services provided by one or a lot of sure entities.

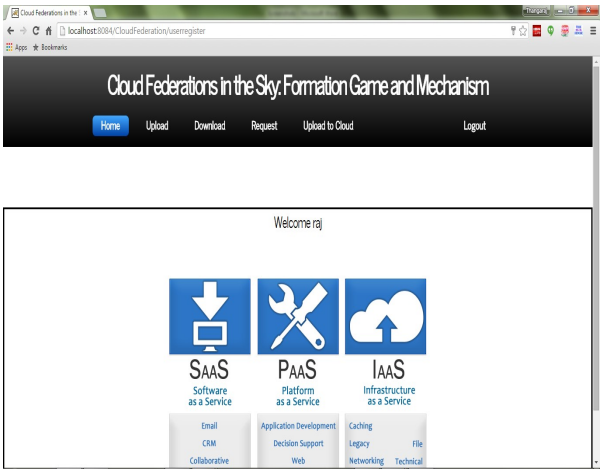
V.SCREENSHOTS

The figure illustrates the cloud infrastructure. Depending on the selection of user or provider or federation the service is being provided.

The figure illustrates the service for the user. The login is provided for the user with the name and the password provided for that user.



The figure illustrates the uploading files, which describes the space of each file and the total space.



The figure illustrates the service needed for the user. The user can upload a file, download a file, request a file and upload a file to cloud.

The figure illustrates the request for a file.the request is provided by the appropriate provider.

The figure illustrates the login of the provider. Each provider is provided with a name and a password.

The figure illustrates the view of the provider to determine who needs a service to be provided.

The figure illustrates the process of federation. The federation provides the needed service to the providers, it also provides the details about the space allocated.

VI. CONCLUSION AND FUTURE ENHANCEMENT

In this paper, I proposed a mechanism that improves the cloud providers' dynamic resource scaling capabilities to fulfill users' demands. I proposed a cloud federation formation game that characterizes the process of federation formation and then proposed a novel cloud federation formation mechanism called CFFM. In the proposed mechanism, cloud providers dynamically cooperate to form a federation in order to provide the requested resources to a user. The resources are provisioned as VM instances of different types. The proposed mechanism forms cloud federations yielding the highest total profit. The mechanism also determines the individual profit of each participating cloud providers in the federation using the normalized estimated Banzhaf value. In addition, our proposed mechanism produces
a stable cloud federation structure, that is, the participating cloud providers in the federation do not have incentives to break away from the federation. I performed extensive experiments to investigate the properties of our proposed mechanism. The results shoId that our proposed mechanism is able to form stable federations with total profit very close to the optimal profit. In addition, our mechanism finds the stable cloud federation in a reasonable amount of time making it suitable for real cloud settings. For the future work, I plan to incorporate the data privacy concerns into the federation formation problem and to investigate the influence of cloud providers' policies on the federation formation process.

The future work is plan to incorporate the data privacy concerns into the federation formation problem and toinvestigate the influence of cloud providers' policies on the federation formation process.

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