



# Cost Analysis and Estimation Application for Usage of Cloud Services

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**Abstract**— Cloud Computing has taken commercial computing by storm. However, adoption of cloud computing platforms and services by the scientific community is in its infancy as the performance and monetary cost-benefits for scientific applications are not perfectly clear. This is especially true for desktop grids (aka volunteer computing) applications. We compare and contrast the performance and monetary cost-benefits of clouds for desktop grid applications, ranging in computational size and storage.

**Index Terms**—Cloud Computing, VDC- Virtual data center, VMI- Virtual machine instance, VM- Virtual Machine, AWS- Amazon web services, EC2- Elastic Cloud Compute 2.

## I. INTRODUCTION

Much is being written and spoken about cloud computing, by IT analysts, industry and business leaders and others. Some believe it is a disruptive trend representing the next stage in the evolution of the Internet. Others believe it is hype, as it uses long established computing technologies. So, what is cloud computing? From a user perspective, cloud computing provides a means of acquiring computing services without requiring understanding of the underlying technology. From an organizational perspective, cloud computing delivers services for consumer and business needs in a simplified way, providing unbounded scale and differentiated quality of service to foster rapid innovation and decision making. It is a service acquisition and delivery model for IT resources and, if properly used within an overall IT strategy, can help improve business performance and control the costs of delivering IT resources to the organization.

In a world where almost anyone and anything can connect to the Internet, the exponential increase in the volume of information and connected devices creates a dilemma: IT complexity increases as does demand for simplicity. Organizations are facing accelerating business change, global and domestic competitive pressure and social responsibility demands. They are striving to reach their full potential by rapidly implementing innovative business models while simultaneously lowering the IT barriers to driving innovation and change. These challenges call for a more dynamic computing model that enables rapid innovation for applications, services and service delivery. Cloud computing can be one element of such a model. The underlying

technologies associated with cloud computing can also be part of an innovative computing approach focusing on creation of a more dynamic enterprise, as applications and the services they support are no longer locked to a fixed, underlying infrastructure and can adjust quickly to change.

## II. AIM AND OBJECTIVES

“Need of the Hour” expects the evolution of cloud-delivered technology through numerous hardware, software and services offerings, and continuing investments in research and development. There is a need to create cloud computing environments for organizations, for its own use and for the public. In the present work we argue that the objectives to be designed for a cloud environment, that operates successfully on given the challenges of a Cloud Computing World.

- Deploy an enterprise cloud to dynamically manage resources and improve utilization of the infrastructure.
- Implement a tool to analyze the Billing and do Cost Management to estimate and plan AWS costs, receive alerts if your costs exceed a threshold that you set, assess biggest investments in AWS resources, and, Work with multiple AWS accounts, provide options that will help simplify accounting:
- Cost Visualization: The analytics tool ui should include the no-cost Cost Explorer for viewing AWS spend data as a graph. With Spend graphs for linked account, one can view the linked account line items for which there is increase in cost.
- Developers can access the infrastructure cloud from any device with network connectivity, whenever and for however long needed at little to no cost to the developer.

## III. TECHNOLOGY BEHIND CLOUD COMPUTING

Technology behind cloud computing Cloud computing, whether public, private or a combination, will typically demonstrate the following technology attributes:

- **Services focused**—Cloud computing is about providing services to any authorized user, anywhere, from any device. For this reason, cloud computing must be built on a service-oriented architecture and deployed with industry best practices for service management. As Irving Wladawsky-Berger, Chairman Emeritus, IBM Academy of Technology has



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stated, “SOA is to cloud computing as HTML is to the internet.”

- **Shared, highly scalable, networked infrastructure**—New IT infrastructure, application and business process services are made available leveraging the Internet paradigm\*. This means standardized, highly efficient, shared, virtualized compute resources (servers, storage, network, data, middleware, applications and business processes) can be rapidly scaled up and down with elasticity through automated workload management in a secure way to deliver high-quality service. Some coin this “massive scalability.”

- **Automated service delivery**—Service Management is request-driven and strives for near-zero incremental labor costs. Cloud computing supports business processes, applications and IT infrastructure collaboratively and cohesively. It can allocate services, dynamically move and optimize workloads and data across the shared infrastructure and integrate added resources to scale with very little, if any, intervention by the cloud service provider personnel. These same resources are returned to the cloud environment and are immediately made available to others when they are no longer needed. The service management supporting the cloud service also tracks usage for purposes of billing or usage chargeback.

- **Enhanced, standardized user experience**—Easy-to-use interfaces and straightforward information access are provided to the user to fulfill his or her computing requirement.

## IV. AMAZON WEB SERVICES

Amazon provides a fantastic suite of web services that enables developers to create dynamic and robust applications. Deploying on AWS can save you time, money and manpower compared to building and maintaining more traditional systems. Amazon Web Services delivers a number of benefits for IT organizations and developers alike, including:

1. **Cost-effective:** Pay only for what you use, as you use it, with no up-front commitments. As the Amazon Web Services cloud grows, our operations, management and hardware costs shrink, and we pass the savings onto you.

2. **Dependable:** Utilize a battle-tested, web-scale infrastructure that handles whatever you throw at it. The Amazon Web Services cloud is distributed, secure and resilient, giving you reliability and massive scale.

3. **Flexible:** Build any application you want using any platform or any programming model. You control the resources you consume and fit them into your application as you see fit.

4. **Comprehensive:** Don't start from scratch. Amazon Web Services gives you a number of services you can incorporate into your applications. From databases to payments, these services help you build great applications cost effectively and with less up-front investment.

**Amazon Simple Storage Service (S3):** Amazon S3 is storage for the Internet. It is designed to make web-scale computing easier for developers. Amazon S3 provides a

simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web. It gives any developer access to the same highly scalable, reliable, fast, inexpensive data storage infrastructure that Amazon uses to run its own global network of web sites. The service aims to maximize benefits of scale and to pass those benefits on to developers.

Amazon S3 is intentionally built with a minimal feature set.

- Write, read, and delete objects containing from 1 byte to 5 gigabytes of data each. The number of objects you can store is unlimited.

- Each object is stored in a bucket and retrieved via a unique, developer-assigned key.

- A bucket can be stored in one of several Regions. You can choose a Region to optimize for latency, minimize costs, or address regulatory requirements. Amazon S3 is currently available in the US Standard, EU (Ireland), US West (Northern California) and Asia Pacific (Singapore) Regions. The US Standard Region automatically routes requests to facilities in Northern Virginia or the Pacific Northwest using network maps.

- Objects stored in a Region never leave the Region unless you transfer them out. For example, objects stored in the EU (Ireland) Region never leave the EU.

Authentication mechanisms are provided to ensure that data is kept secure from unauthorized access. Objects can be made private or public, and rights can be granted to specific users.

**Amazon CloudWatch:** Amazon CloudWatch is a web service that provides monitoring for AWS cloud resources, starting with Amazon EC2. It provides customers with visibility into resource utilization, operational performance, and overall demand patterns—including metrics such as CPU utilization, disk reads and writes, and network traffic. To use Amazon CloudWatch, simply select the Amazon EC2 instances that you'd like to monitor; within minutes, Amazon CloudWatch will begin aggregating and storing monitoring data that can be accessed using the AWS Management Console, web service APIs or Command Line Tools.

**Amazon CloudFront:** Amazon CloudFront is a web service for content delivery. It integrates with other Amazon Web Services to give developers and businesses an easy way to distribute content to end users with low latency, high data transfer speeds, and no commitments. Amazon CloudFront delivers your static and streaming content using a global network of edge locations. Requests for your objects are automatically routed to the nearest edge location, so content is delivered with the best possible performance. Amazon CloudFront works seamlessly with Amazon Simple Storage Service (Amazon S3) which durably stores the original, definitive versions of your files. Like other Amazon Web Services, there are no contracts or monthly commitments for using Amazon CloudFront – you pay only for as much or as little content as you actually deliver through the service.

**Creating AWS Account:** To access any web service AWS offers, you must first create an AWS account at

http://aws.amazon.com. An AWS account is simply an Amazon.com account that is enabled to use AWS products; you can use an existing Amazon.com account login and password when creating the AWS account. Note that creating an AWS account is free of charge. They ask for your payment details only when you try to use any service. AWS provides some access credentials for easy usage of all their services. Go to account and then security credentials located on the top right of the AWS homepage. Save your access key and create and download a X.509 certificate for future use.

Standard On-Demand Instances	Linux/UNIX Usage	Windows Usage
small (Default)	\$0.085 per hour	\$0.12 per hour
large	\$0.34 per hour	\$0.48 per hour
extra Large	\$0.68 per hour	\$0.96 per hour
High-Memory On-Demand Instances		
extra Large	\$0.50 per hour	\$0.62 per hour
double Extra Large	\$1.20 per hour	\$1.44 per hour
quaduple Extra Large	\$2.40 per hour	\$2.88 per hour
High-CPU On-Demand Instances		
medium	\$0.17 per hour	\$0.29 per hour
extra Large	\$0.68 per hour	\$1.16 per hour

ricing is per instance-hour consumed for each instance type, from the time an instance is launched until it is terminated.

Figure 1: On-Demand Instances Prices Table

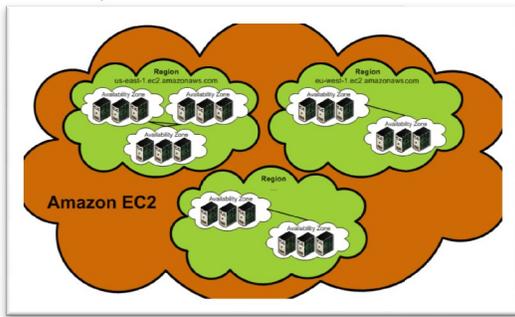


Figure 2: Regions and Availability Zones

## V. IMPLEMENTATION

### 1. Modules

#### a. User module

In this module, user can add cloud accounts and edit cloud accounts. With the help of account credentials obtained i.e. access key and secret access key. We login to the S3 account and access the bucket to obtain the CSV file.

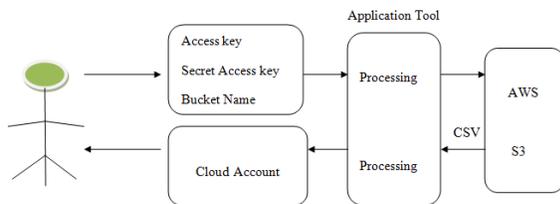


Figure 2: User Module

#### b. Cloud / peer account module

Here the user can manage the cloud account / peer account. Each cloud/peer account id can be identified by using

peer id. In each cloud account; user can have multiple linked accounts.

#### c. Linked Account

The linked accounts are the accounts which are tagged for each VM'S created inside the peer accounts. So, in this module we are going to present the spend overview for each linked account.

#### d. Linked Account production details

The proposed system analyses the spent made on each linked account for every day and also predicts the estimated cost for the end of the month and also compares the expense made with the previous month day. So, this is an aligant way to track the cost spent for each day and each month. Here we try to visualize in the form of fusion chart graph for spend obtained for each linked account.

#### e. Line Items module

The linked account cost analysis is an aggregate of the cost applied for line items used inside the linked account. So these line item cost analysis is difficult for end user to figure out and analyze the spent. Here we obtain the cost spent for each line item for each day for each linked account.

## 2. ER-DIAGRAM

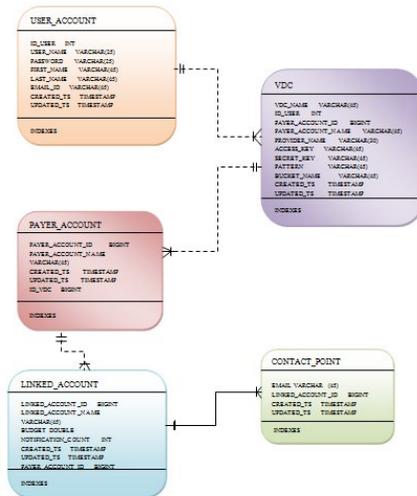


Figure 3: Showing ER diagram.

### User\_Account

Main table to hold user credentials. This is the table that holds authentication information to access the portal.

### VDC\_Account

Holds details about AWS Master Account, including IAM credentials , S3 bucket info etc.

1 User Account can have many VDC Accounts



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## Payer Account

This is redundant. Holds AWS Master Account number only. Should be removed.

There is a 1 to 1 mapping between VDC\_Account and Payer\_Account

## Linked Account

Holds details of each linked account within the AWS Master acct.

There is a 1 to Many relationship between a VDC\_Account acct and Linked\_Account.

## Contact Point

Notification information for each Linked account.

There is a 1 to 1 relationship between a Linked\_Account acct and a Notification. However, multiple Emails are comma separated.

## VI. RESULTS

The result carried out has following constraints. The Project is applied for one Cloud User with multiple linked accounts. The scope of the project is not limited to one cloud user. We can add any number of cloud accounts and add any number of linked accounts for each Payer accounts. The results represent the cost estimation for individual linked accounts and also have facility to display line items with cost increase.

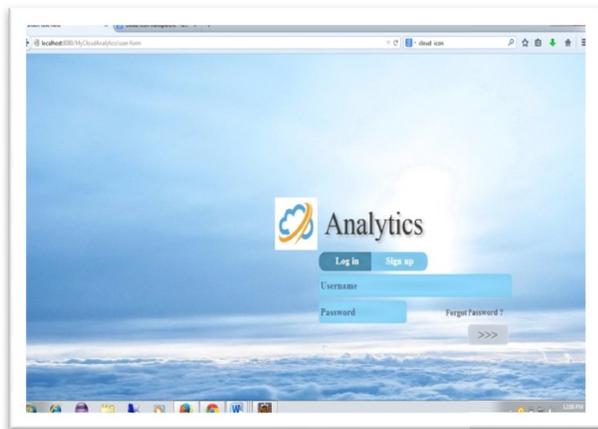


Figure 4: Login Module for Cost Analysis Application

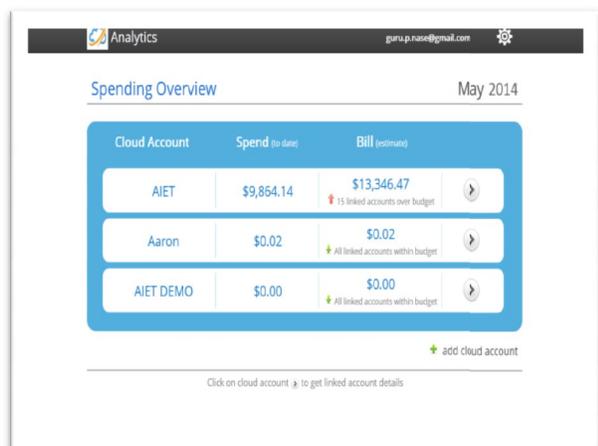


Figure 5: Cloud Account Module for Cost Analysis Application

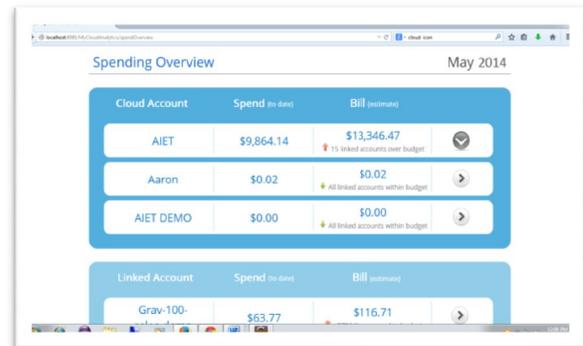


Figure 6: Cloud Account's list of linked Accounts for Cost Analysis Application

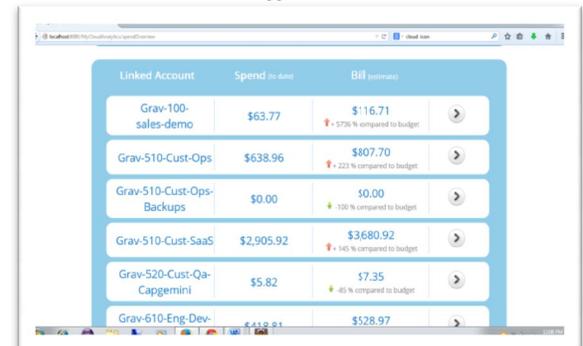


Figure 8: Linked Account Spending Summary Screen for Cost Analysis Application

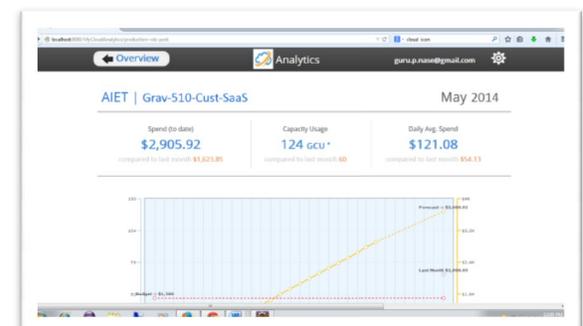


Figure 10: Cost Analysis and Estimation for Linked Account-Cost Analysis Application



Figure 7: Spend Graph and Estimation for Linked Account-Cost Analysis Application

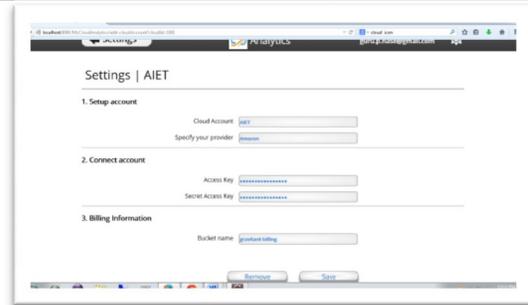


Figure 13: Configuration settings of particular cloud account.



Figure 9: Gross Capacity Unit Graph for Linked Account - Cost Analysis Application

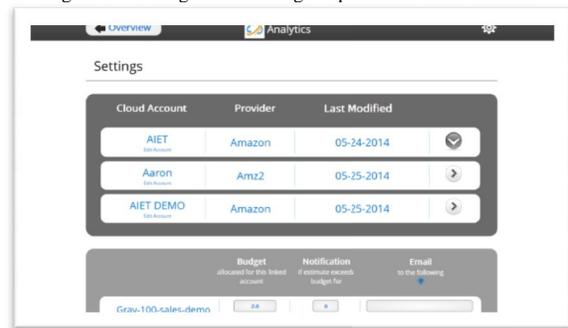


Figure 14: Linked account budget and notifications.

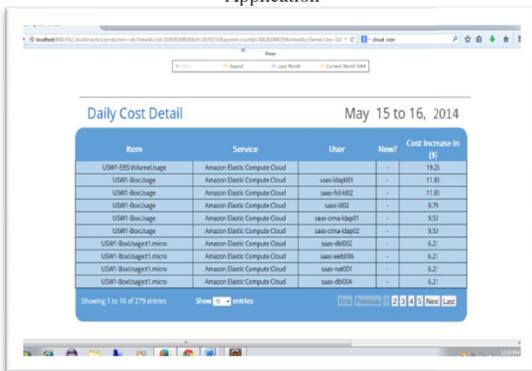


Figure 11: Linked Account Line Item and its cost usage

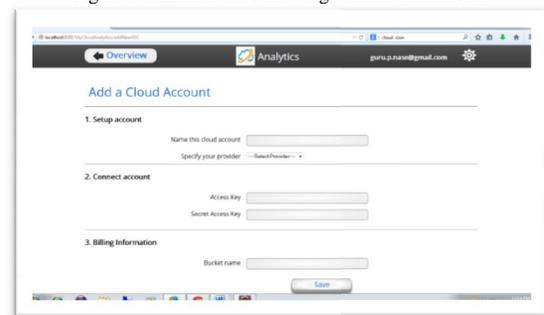
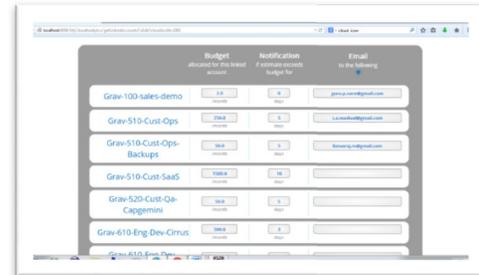


Figure 15: Addition of new cloud account

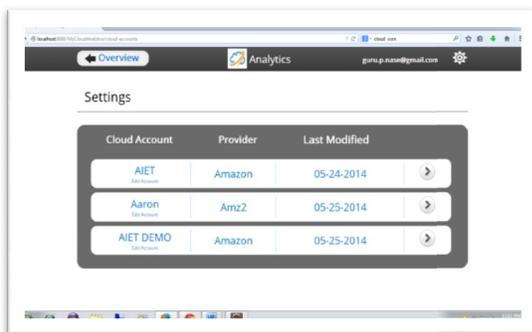


Figure 12: Overview of Cloud accounts

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