Enterprise Cloud Computing - Proposal to Migrate the On-premise data center to Cloud platform

Santhosh Kumar Thirumalai

07/15/2019

Introduction

- www.getbooks.com, is a rapidly growing online store which sells books. It is planning to expand its business by going digitally, so that the users can rent or buy digital copies of books and read in their devices.

- It uses traditional inhouse data centers which comprises database and application servers and storage devices which are used across the Enterprise and the current infrastructure is maxing out and was not able to handle the peak load and it has limited CAPEX and cannot invest furthermore on procuring IT infrastructure.
- The plan to launch the digital book rentals may further cause the user traffic to increase and hence the management is looking for proposal from the IT team to address this.
- This presentation is prepared to propose migrating the existing infrastructure to a Hybrid Cloud computing platform and discusses the advantages, disadvantages and Financial implications.

Executive Summary

- Cloud computing is the buzzword nowadays and many organizations are moving from their traditional IT model to Cloud. But many of us may have a question on what Cloud computing actually is and how will it benefit the growth of the organization?

- Cloud computing is a modern way of computing, with Servers, Storages, Applications and Development platforms over the Internet rather than housing them on premise and can be classified as Public, Private and Hybrid cloud based on the deployment model.

- The Cloud enables an enterprise to configure their IT infrastructure within minutes, rather waiting for months, with Human efforts and CAPEX, to create a data center on-premise.

- It increases the productivity of a Firm by focusing on product development and R&D and not on Server maintenance and downtime, Since the provider will take care of those.

- An organization might think of the data privacy and security over the Cloud, but by adapting to best practices and by enforcing careful compliance that can be mitigated.

Executive Summary - Continued

- This proposal will explain in detail on how our organization will benefit by migrating from the traditional infrastructure to Hybrid Cloud, so that the new product which facilitates the users to rent or own the books digitally, can be launched faster and without compromising the quality.

- This also provides an apple to apple comparison between the on-premise IT configuration against the AWS Cloud platform and a savings of 33% on the total cost of ownership which is equivalent to 3.3 Million Dollars over a period of 3 years as ROI.

- Along with that, a detailed explanation of other benefits such as time to market the product, Continuous deployment and Integration of changes and agility, are also covered.

- In addition, the presentation documents the Functional and Non-Functional requirements for the new product and discusses the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis which will prove the organization must move towards Cloud.

Cloud computing

- Cloud computing - overview
- Cloud computing - capabilities
- Advantages and Disadvantages of Cloud Computing.
- IT Budgeting On-premise and Cloud - overview

Cloud Computing – Overview

- Cloud computing is a modern way of computing, with Servers, Storages, Applications and Development platforms over the Internet rather than housing them on premise.
- There are two models in Cloud Computing
  - Services Model
  - Deployment Model
- The Services model provides Software (SaaS), Platforms (PaaS) and Infrastructure (IaaS) as Services and In addition Database, Communication etc., also provided as services termed as (XaaS).
- The Public, Private, Hybrid and Community cloud falls under Deployment models.

Cloud Computing – Capabilities

- The Cloud Computing employs a concept called “Virtualization” thru which a pool of resources such as servers and storages can be utilized and shared to various Cloud subscribers for usage as if it were dedicated for them exclusively.
- The Cloud platform provides agility which enhances continuous Integration and Deployment of applications without impacting the Infrastructure in the background.
- It provides rapid scaling of application during peak loads and facilitates application availability and increases the quality of the product.
- The Cloud Platform helps the organization to focus on the productivity since the infrastructure and maintenance are owned by the provider and the organization, as a subscriber can utilize their workforce to focus on R&D and application enhancement.

Advantages of Cloud Computing

- The Initial capital expenses such as procuring the tangible (Hardware, Servers, Software, Networking equipment), Intangible assets (Licenses), real estate to house the data center, Cooling systems and duct work, Power supply and Power backup, Human resource costs to make the data center operational, Time taken to build an operational data centers, can totally be avoided and the computing power can be purchased from the cloud provider and the operations can be started very soon, compared to the On-Premise model.
- The resources can be scaled dynamically. For instance, if the peak traffic to the application increases the server resources can be scaled up immediately and if the traffic is low the minimum resources subscribed can be utilized. This term is called “Elasticity”.
- The Cloud computing can be termed as an “Utility model”, since the consumer has to pay only for the usage of resources and services from the Cloud provider.
- The cloud provider will be responsible for policies, controls, procedures and technologies that secures the data center and the consumers applications.
- The Business continuity and disaster recovery can be comparatively easy in Cloud than in On-Premise model, since the traffic for the data centers which are down can be routed to another data center, as Cloud has data replication.
- Apart from financial advantages, migrating to cloud platform may decrease the time to market the product and hence increases the productivity of IT staffs.

Disadvantages of Cloud Computing

- The consumer might not know where their actual data is stored and it may potentially lead to data privacy violations.
- The service disruptions in the providers data centers may impact the business.
- The security breaches can be a threat which is not in control of the consumer.
- The consumer loses the control over the IT infrastructure and have to rely on the provider.
- The subscribers may go into “Vendor Lock” in which the provider may monopolize the system.
- To overcome the disadvantages, An organization must form a Cloud COE (Center of Excellence) to analyze the Legal agreements and Data privacy compliance from the Cloud providers and to formulate rules, compliance and best practices for the Enterprise while adapting to Cloud.

Analysis of Economic Implications

On-Premise vs Cloud - Cost comparison

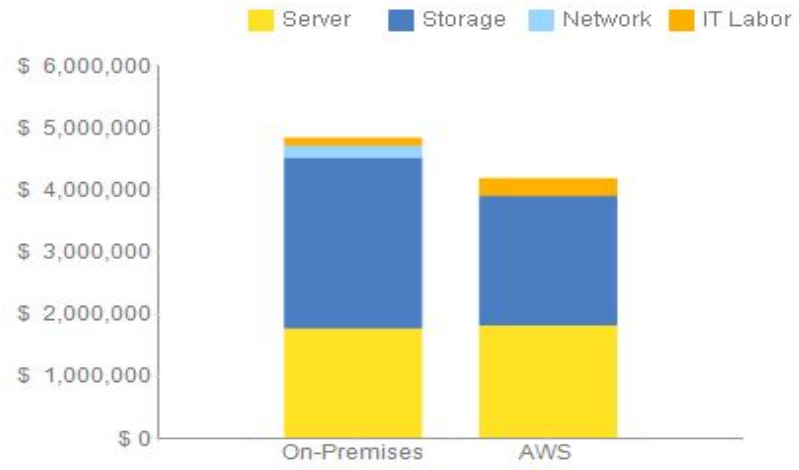
- At present, The organization uses the following infrastructure on-premise.
  - 20 Database servers with 16 cores and 128 GB RAM in each.
    - 10 Servers runs on ORACLE SE
    - 10 Servers runs on Mysql.
  - 200 Non-DB servers with 8 cores and 64 GB RAM in each and all the servers runs on LINUX.
  - 200 TB of Object Storage. with 25% infrequently accessed.
  - 500 TB of NAS Storage.
  - 1000 TB of SAN Storage.
- The following slides will show the Total cost of ownership comparison of the same configuration on Amazon Web Services cloud model.

On-Premise vs Cloud - TCO on AWS

On-Premises vs. AWS Summary

You could save **14%** a year by moving your infrastructure to AWS.
Your three year total savings would be **$ 654,268**.

3 Years Cost Breakdown



3 Yr. Total Cost of Ownership		
	On-Premises	**AWS**
Server	$ 1,788,456	$ 1,834,934
Storage	$ 2,741,636	$ 2,082,576
Network	$ 194,175	$ -
IT-Labor	$ 109,350	$ 261,839
Total	**$ 4,833,616**	**$ 4,179,348**

AWS cost includes business level support

On-Premise vs Cloud - Comparison Details

- The table below shows the Estimated savings on moving to AWS.

Line Item	On-Premise Model costs (Per Year)	Cloud Model costs (Per Year)	Savings (-) / Expenses (+)
Data Center Real estate	$191,424	$0	-$191,424.00
Data center telecommunication and cooling	$294,932	$0	-$294,932.00
Server & Rack space costs	$239,345	$561,422	$322,077.00
Storage Cost	$809,680	$694,192	-$115,488.00
Network	$129,450	$0	-$129,450.00
Software License Acquisition	$77,140	$77,140	$0.00
Hardware Maintenance	$86,596	$0	-$86,596.00
Software Maintenance	$19,140	$0	-$19,140.00
IT Staffing - Data center staff	$100,000	$0	-$100,000.00
IT Staffing - Network Engineers	$400,000	$0	-$400,000.00
IT Staffing - NOC	$400,000	$0	-$400,000.00
IT Staffing - Server and Storage Engineers	$400,000	$0	-$400,000.00
IT Staffing - Application and Database Engineers	$400,000	$0	-$400,000.00
IT Staffing - Cloud Engineers	$0	$600,000	$600,000.00
IT Staffing - Security Engineers	$500,000	$100,000	-$400,000.00
Cloud Hosting Professional Services	$0	$67,540	$67,540.00
Risks: SLA Payments	$500,000	$2,500,000	$2,000,000.00
Risks: Security Breaches	$5,000,000	$2,000,000	-$3,000,000.00
Savings: Improved Agility to Business. Needs to grow Revenue	$0	-$200,000	-$200,000.00
Total	$9,547,707	$6,400,294	-$3,147,413
Savings in %	33		

- This is an estimated savings for an year over 3 years of promotional period and the savings may decrease based on the costing after 3 years.
- There is an additional $0.86 for an hour usage of the On-Demand Server instances when the infrastructure is scaled up.

Requirement Analysis

Functional Requirements

- The new users need to create a profile online before accessing the books.
- Option must be provided to the user to buy or rent the book for a week.
- A search option should facilitate the user to find the book he needs.
- The preview of the books need to be displayed to the user before ordering.
- The users must be allowed to review and rate the books.
- The system should automatically recommend books based on the search criteria.
- The users while checking the book out, they must enter the payment method which must be a credit, debit or Online banking account.
- The system should ask the user to save the payment method in the profile for future use.
- The system should display and get the acceptance from the users on legal and privacy rules on their personal data stored in the system.
- The users can access the book digitally on any device.
- A monthly report of sales and trend analysis must be available for business to review
- The users must not be allowed to print the books when they are renting.
- The users must be allowed to bookmark a page.

Non - Functional Requirements

- The response time for the search should not exceed 2 milliseconds.
- The application must be available anytime for the user to access.
- The system must handle any number of users any time.
- The system must be scaled up and down based on the user traffic.
- The user must be authenticated by two factor protocol and the payment must be processed securely.
- The personal data of the user must be encrypted and stored.
- The disaster on the data center must not impact the business continuity and performance of the system.

SWOT Analysis

Strengths and Weaknesses - Internal
Opportunities and Threats - External

Strengths

1. Trained IT resources available for Cloud migration.
2. Solid customer base.
3. Prices of the books are comparatively cheaper than competitors.

Opportunities

1. Paperback readers are moving towards digital books.
2. No digital book rental option is available online.
3. Competitors are still in traditional online sale model and not in Digital business so far.
4. Launch new products based on Cloud Infrastructure.

Weaknesses

1. Not available digitally.
2. System unavailability during peak traffic.
3. Capital expense budget is limited.

Threats

1. Competitors may grab the customer base if they go digitally online.
2. Failing to adapt to new technology may wipeout the business.

Conclusion

- The cloud platform avoids the initial CAPEX to setup data centers and the IT team can focus on developing and launching the product which saves time to Market.
- Since the Cloud storage and servers comes with replication, the availability of the application will be increased and hence the business continuity will not be impacted.
- The existing IT Inhouse data center can be used to house the user profiles and payment details and the user traffic can be routed to public cloud to rent and buy books digitally.
- The Cloud platform provides on-demand option to dynamically scale the applications so that any number of users can access the system seamlessly.
- Machine learning techniques can be introduced by leveraging the power of Cloud computing to generate business trend analysis and recommendation systems as requested in the functional requirement.
- Migrating to cloud will also allow the users to access the service from any device they use.
- It is clearly a win for the organization cost wise, since a 33% of capital and operating expenses can be saved by moving to Cloud over a period of 3 years.
- A Cloud-COE must be formed to monitor the Legal and data privacy compliance and to devise best practices to be followed internally by the organization to avoid overspending on Cloud.