



Cost of Traditional and Cloud Framework for e-Governance (Comparative Case Study)

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Abstract: *This paper will analyze the cost and benefits of cloud computing framework over traditional PC workstations. We will do this by performing a case study. We are studying a government office with the maximum number of 20 traditional workstations. We will compare their implementation and running cost with Cloud framework and then analyze the result based on this comparison.*

Keywords: *Cloud-framework, Cost-benefit, Traditional-framework, cloud-benefit, Cost drivers*

I. INTRODUCTION

The Cloud framework provides many benefits over traditional workstations used in most government offices. Cost is one of the important characteristic that needs to be study in order to apply any framework. According to studies [3] cloud has an upper hand in cost benefit. The comparative study is taken by the author in order to check the actual cost benefit in the cloud framework.

II. OBJECTIVES

The objective of this paper is to compare the traditional framework and cloud framework in a government office. This paper will also find the approximate (initializing and running) cost of both the framework and also compare them to find out the benefit/loss.

III. RESEARCH METHODOLOGY

Authors choose exploratory studies to find what is happening with the hope of getting new insights in the field of cloud computing and e-Governance and also find the scope of implications for adopting cloud computing in e-Governance. Of the different principle ways of finding the data, in order to obtain detailed information, in-depth we consulted various vendors who provide hardware and software to the different government departments. We have also collected data from different websites. Through different vendors/websites in the market we came to know about the cost of various devices used in an office. They also provide the information about various software's cost and their implementation.

IV. CLOUD BENEFITS OVER TRADITIONAL WORKSTATIONS

There are several benefits of Cloud implementation in an Office, and cost is most important of them. We will limit the focus of this study to Cost only. Cloud computing represents a "pay-as-you-go" and "pay-per-use" approach to ICT, rather than an incremental capital expenditure approach. Initial expenditures are comparatively low. Operating expenses go up or down depending on usage. Additional investments are made only when they are needed. Cloud computing offers a great advantage in immediate as well as long term cost savings [3]. According to a survey by the U.S.-based Public Technology Institute (PTI), 45% of local governments in the U.S. are using some form of cloud computing. PTI reported a common reason for local governments to turn to cloud was for resource savings (for example, staff time, and maintenance and support costs). A former United States Chief Information Officer also estimated, in his Federal Cloud Computing Strategy, that by using a cloud computing model, U.S. federal datacenter infrastructure costs can drop by 30 per cent, amounting to approximately \$7.2 billion in total savings. In India, too, adoption of cloud computing in large projects such as the Aadhar project of the Unique Identification Authority of India (UIDAI) and employment schemes under the National Rural Employment Guarantee Act (NREGA) can result in significant cost savings for the government [3]. In cloud based e-government system, public organizations do not need to purchase and install the ICT equipments and software on their own premises, which normally they do in traditional e-government system. The public sector organizations use applications provided to them by the cloud service providers which eliminates the upfront capital expenditure. The cost of ICT services for public organizations and individuals also reduces in cloud based e-government systems because they lease ICT resources and services according to their needs instead of investing in these resources [4].

V. ANALYSIS & RESULTS

A. Identification of Cost drivers that will affect the Cost analysis:

The various drivers that need to be analyzed for the proper identification of the cost in traditional and Cloud are [8]

Cost Drivers	Traditional On-Premises Software	Cloud Application
Capital Expenses	<ul style="list-style-type: none"> • Upfront purchase of software and hardware • May require network infrastructure enhancements, facilities • Need to support third-party monitoring, test tools, security products 	<ul style="list-style-type: none"> • None • Pay-as-you-go subscription pricing • All inclusive: maintenance, support, training, and upgrades all hardware, networking, storage, database, administration
Design and Deployment	<ul style="list-style-type: none"> • May take months to deploy • Professional services can cost up to 3X the initial software purchase • Difficult for vendor to build best practices • Requires staff or contract labor to research, design, integrate, test, tune, launch, and train 	<ul style="list-style-type: none"> • Deploy in weeks • Lower cost using consistent set of best practices
Ongoing Infrastructure	<ul style="list-style-type: none"> • Ongoing software maintenance, upgrades • Ongoing hardware replacement once every three years • Requires network monitoring and management tools • May require additional networking equipment and bandwidth to accommodate incremental traffic 	<ul style="list-style-type: none"> • Vendor provides as part of subscription
Ongoing Ops, Training, Support	<ul style="list-style-type: none"> • Requires resources to operate, monitor, support, and upgrade the application • Need to hire, train and certify support personnel 	<ul style="list-style-type: none"> • Vendor provides as part of subscription • There may be some training fees • Customer must ensure adequate Internet access and bandwidth

Table 1

B. Cost of Traditional Workstations

(Fixed / One Time /Initializing Cost)

No	Description of Cost Element	Unit Cost (Rs.)	Units	Total Cost (Rs.)
1	Computers (desktops, laptops or other types)	20, 000	20	4, 00, 000
2	Computer Server to provide file/resource sharing and networking services. (IBM x3500 M4) [6]	1, 65, 350 (approx.)	1	1, 65, 350 (approx.)
3	Printers, scanner	10, 000	20	2, 00, 000
4	UPS for uninterruptable power supply.	2, 000	21	42, 000
5	Networking hardware to connect the computers together to form a network to share files, printers and access the Internet.	1, 000	21	21, 000
6	Installing and configuring the equipment and software so the system is working properly.	1000	21	21, 000
7	Software for the computers including: Operating System, a basic office suite, antivirus/ antimalware, utilities, and other software used at Office level.	50, 000 (approx.)	21	10, 50, 000 (approx.)
8	Windows Server 2012	54, 684	1	54, 684

9	SQL-SERVER	3,72,000	1	3, 72, 000
10	Furniture for the new computers to make it possible to use the computers effectively	2, 000	21	42, 000
11	The cost to establish a connection to the Internet. This may be as simple as buying a modem and the cables needed to get connected.	3, 000	1	3, 000
12	The cost to provide staff with initial training to use the computers and other equipment.	50, 000 (approx)	-	50, 000
TOTAL				24, 21, 034 (approx)

Table 2

(Running/ Annually Cost)

No	Description of Cost Element	Unit Cost per year(Rs.)	Units	Total Cost (Rs.)
1	The estimated cost for electricity to operate the computers and other equipment.	4	1200* 12(months)= 14400	57, 600 (approx)
2	The monthly fee for Internet access.	3, 000 *12 (months)	1	36, 000
3	Approximate cost of decreasing hardware life, upgrading hardware etc. (Annual Maintenance cost (AMC)– increasing year by year)	2,00, 000	1	2, 00, 000
4	Cost of Updating/Upgrading/Licensing the Software i.e. Windows OS, SQL Server, Antivirus etc.	1, 00, 000 (approx)	-	1, 00, 000 (approx)
TOTAL per Year				3, 93, 600 (approx)

Table 3

C. Cost of Cloud Architecture in the same (above) scenario

(Fixed / One Time /Initializing Cost) (Rented from the IAAS provider)

No	Description of Cost Element	Unit Cost per year (Rs.)	Units	Total Cost (Rs.)
1	Network Infrastructure	1, 000	21 nodes	21, 000
2	Terminals to use cloud	10,000 approx	21	2, 10, 000
3	SQL SERVER 2012	3,72,000	1	3, 72, 000
4	The cost to provide staff with initial training to use the computers and other equipment.	Free and arranged by the cloud provider		
TOTAL				6 , 03, 000 (approx)

Table 4

(Running Cost - Pay as you go)

No	Description of Cost Element	Unit Cost per year (Rs.)	Units	Total Cost (Rs.)
1	Cost of Annual Internet Access	3,000 *12 (months)	1	36,000
2	Cloud Server Hosting (Windows Server 2012, CPU – 2, RAM – 10GB, Storage – 1TB, Data Transfer/month – 100GB)[7]	20,000 *12 (months)	1	2,40,000 (approx)
3	The estimated cost for electricity to operate the computers and other equipment.	4	800 (terminals with less power)* 12(months)= 9600	38,400 (approx)
4	Cost of Office package, Antivirus, Firewall and other basic software	Included in hosting package		
5	Cost of Updating/Upgrading/Licensing the Software i.e. Windows OS, Antivirus, Firewall etc. and hardware.	Included in annual hosting renewal		
TOTAL				3,14,400 (approx)

Table 5

D. Comparisons

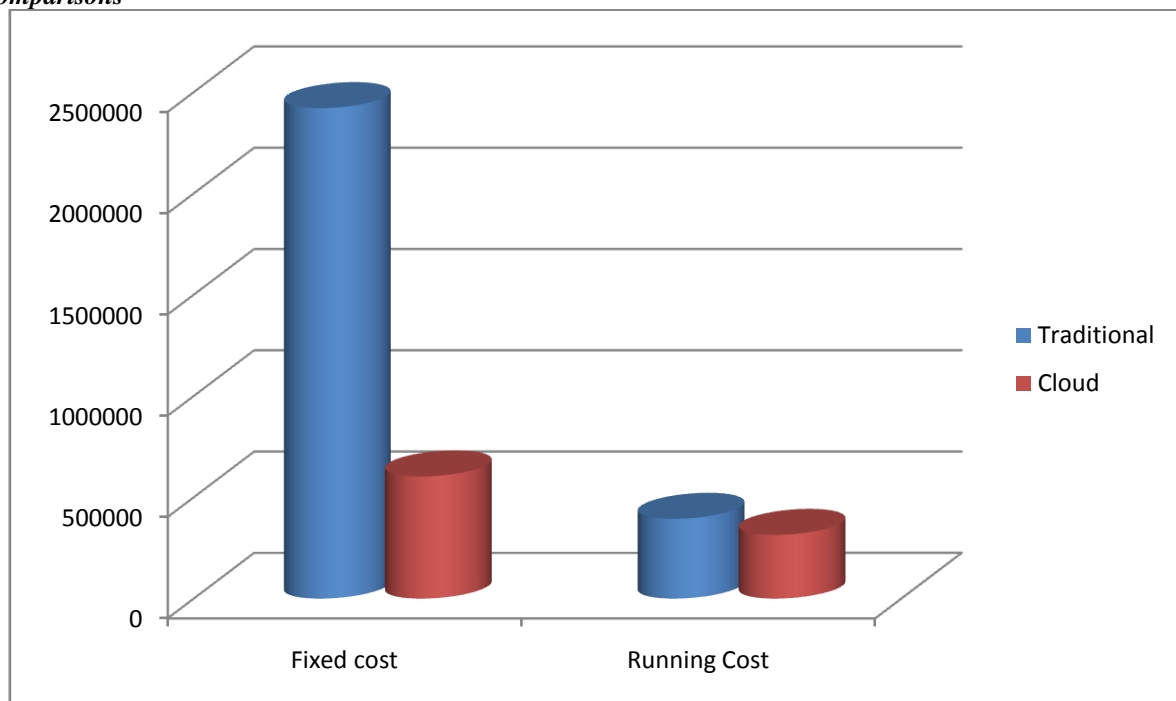


Fig 1: Comparison chart of cost based on section 6 (B), 6 (C)

The comparison (Fig1) shows that Traditional Workstation includes almost 4 times more cost than in Cloud framework as far as fixed/one time investment cost is concern. We also find from above comparison that running cost in both the framework remains almost same; with cloud having upper edge as in cloud, cost can vary because it depends upon the total usage calculated in hours and also running cost in traditional computing always increases because the hardware always depreciates with the time.

E. Comparison Outcomes & benefits (Tangible and Intangible)

After analyzing the above figures we found that cost reduction is the main benefit of cloud computing and many companies are adopting cloud computing to reduce their company's expenditure. For example, if company want to buy all services and applications by themselves, in later stages there must be a need of updating all applications, services, servers and hardware, that will cost more. If companies adopt cloud computing, they do not need to take the stress of updating the software and hardware as they can get the latest and updated resources and services relatively in less time.

The consumer does not need to worry about the configuration of the system, storage capacity and capability while using the local system because all these handled and maintained by the cloud provider. Similarly, after using cloud service there is no need of someone to monitor the services regularly not only the software, hardware part but also the servers running with application.

F. Conclusion & Recommendation

This study shows that there is quite substantial difference in both the environment.

The findings of this case study show that cloud computing can be a significantly cheaper alternative to purchasing and maintaining system infrastructure in-house. Furthermore, cloud computing could potentially eliminate many support-related issues since there would be no(or very less) physical infrastructure to maintain. Cloud computing gives more flexibility to adjust quickly to any occurrence and to grow and shrink as required. It helps the small business focus on their business and not there IT. However implementing Cloud totally in a system is quite a dream in India. As there are other areas which need to be worked before moving to the cloud, one such area is Internet speed. Studies are going and in near future we will see the more advancement and decrease in price for cloud computing.

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