Investigating the Effects of Cloud Computing on Accounting and Its Comparison with Traditional Models

Amir Azadi Marand, Elham Azadi Marand and Mahmoud Lari Dashtebayaz

1,3 Accounting Departments, Islamic Azad University - Qayenat Branch, Qayenat, Iran
2 Computer Engineering Departments, Islamic Azad University-Shabestar Branch, Shabestar, Iran

ABSTRACT

With advances in information technology (IT), there is a need to do computational tasks everywhere and every time. Since accounting has considerably changed in recent years, main accounting institutes with professional services that use IT for gathering and storing information, support their professional activities in developing management information technology services to handle heavy loads of calculations without expensive hardware and software. Cloud computing is the latest answer to such needs. Since cloud computing is a hot issue in accounting world at the moment, the advantages and disadvantages of it are mentioned and compared with traditional models in this paper.

INTRODUCTION

At the moment, developmental trend of calculations is in a way that it is considered as the fifth main element after water, electricity, gas, and telephone. In such conditions, users try to reach it based on their needs not the location and ways of service delivery. Various samples of calculation systems are offered that try to offer such services to the users. Some clusters include: cluster computing, grid computing, and the most recent one is cloud computing [15]. Two groups of such calculation systems including grid and cluster computing are used in applications requiring high amounts of calculations. But, third group, cloud computing, has a completely different structure.

In cluster computing:

A cluster computer collection is a group of computers working together. The components of these cluster computers are connected through the net. Clusters are configured for increasing speed, continues accessibility, and securing situation during error occurrence.

Grid computing:

Grid computing which is mostly mistaken by cloud computing is a different things. It uses the resources of several computers in a net for working on a problem. It is used when a scientific or technical issue is concerned. A famous sample in this field is searching for supernatural intelligence in SETI@home Project. In this project, people allowed their computers to be used in free times searching for using supernatural intelligence [3].

Cloud computing:

Cloud computing refers to cloud calculations and processing. It has a cloud-like structure that allows users to have access to applied programs from different parts of world. Thus, cloud computing can be regarded as a new method for creating dynamism of new generation of data centers, using netted virtual machines. In this way, computation world goes toward developing software which is accessible for millions of consumers as a service instead of execution on a single computer [15]. For not mistaking grid and cloud computations, a comparison of both is offered in the next section.

Comparison of grid and cloud computations:

The main difference of grid and cloud computations is that in grid computation a mass project is divided into several computers to use their resources.

Corresponding Author: Amir Azadi Marand, Accounting Departments, Islamic Azad University- Qayenat Branch, Qayenat, Iran
E-mail: amir.azady2009@yahoo.com
Fig. 1: Overview of Grid Computing [18].

But, in cloud computation, some small computers are allowed to be performed on several computers simultaneously.

Fig. 2: A view of cloud computing [18].

Grid computation can be applied for the programs with the capability of parallel execution. But, in cloud computing there is no limitation in this field. Generally, the goal of cloud computing is offering the highest services to the final users; but, grid computing aims to perform a heavy load of calculations. You can create calculations on a grid cloud but the opposite of that is not possible [3,15].

Acceptances of different computations. Popularity of 3 computation types was evaluated by Google. The results are shown in Fig.3. Cluster computing is less popular that two others. Grid computing is at second rank while cloud computing is increasingly becoming attention center.

Fig. 3: Evaluation of the acceptability of the Google system and cluster, grid and cloud in the years 2008 and 2009[16].

Attention to this technology is spreading day by day in different organizations, opening a way in business and accounting world. Thus, this paper aims to examine the effect of cloud computing on accounting.
Other sections of the study are as follows; Section 2 examines cloud computing. Section 3 probes the technologies of cloud computing in accounting. Section 4 evaluates and compares technological models; and Section 5 is conclusion and suggestions.

What is cloud computing?

For the growing spread of computer and our dependence on digital data, companies attempt to accelerate and improve their services for the customers. Naturally, the company which is faster in offering services wins the competition. Cloud computing is a method which is followed by small and large companies and they have invested on it extensively. Before every attempt, the term "cloud" needs clarification. Cloud is a metaphoric expression referring to Internet [6] and is a distributed and parallel system consisting of a set of connected and physical computers offering different service levels as one or some calculation resources based on agreements between service providers and consumers [16]. Cloud is an abstraction from a huge network and a bulk with unknown volume made of unknown processing resources. Time and place dimensions of its components are not clear and the place of hardware and software is unknown.

Since this phenomenon is at its elementary level of development, there is no consensus on its scientific definition. Based on Wikipedia, "Cloud computing is based on a big computer network such as Internet providing a new pattern for supply, consumption and delivery of technology services (hardware, software, information, and other shared computer resources) through Internet [4]. Cloud computing offers some mechanisms similar to public industries (water, telephone, electricity, and etc) for offering IT services. You don't need to have an electricity generator or other equipments for using it at home. You pay a rent for using it. If your consumption increases or decreases, you pay high or low cost for that without a knowledge of hardware and infrastructures of these services [10, 16].

National institute of standard and technology (NIST) defines computing cloud as a model for having easy access to a set of process able and configurable resources (e.g. nets, servers, storage space, applied programs, and services) which is provided or released without labor or intervention of service providers. This cloud pattern improves accessibility and includes 5 important features, 3 service models, and 4 settlement patterns [14, 4].

Computing features:
Computing features include service selection based on demand, wide access to network, resource coalition, fast flexibility, agility, high scalability, and confidentiality [18].

Service models:
Service models are resources given to the users via Internet. All cloud computing are classified based on these resources. Based on NIST, there are 3 types of such services: SaaS (software as the service), PaaS (platform as the service), and IaaS (infrastructure as the service) [14].

SaaS:
Services of applied cloud programs deliver software on Internet and remove the need to installing it, simplifying maintenance and support issues. Since customers don’t manage or control cloud infrastructures, network, servers, infra storage space, and even applied software, they are known as business software [18].

PaaS:
Services of cloud platform offer computer platforms as the service. In this way, software can be developed without bearing costs and complexity in shopping and managing main software's, hardware's and providing facilities of web hosting. Also software developers don’t need extra costs for developing new programs and extending previous programs.

IaaS:
Cloud infrastructure services (in the form of a virtual or physical platform) offer services for the customers. Instead of shopping software, hardware, data center space or network equipment, users buy them via outsourcing. Service bills are issued like public services based on consumption rate. Thus, costs reflect consumption rate [3].
Fig. 4: forms of cloud computing services[6].

Different forms of offering cloud services in Figure 4 are computer models trying to make the access of users easy based on their demand of information and computer resources.

Settlement pattern of cloud computing:

Cloud computing offers demand-based services for the final users. Clouds are used in physical infrastructures, where interface clouds are used for delivering services to the customers. Such infrastructures and interfaces differ at services, executive fields, and users' access. Thus, cloud settlement is divided into 3 types including general cloud, private cloud, and combined cloud [17].

General cloud:

General cloud is the most common used pattern. Data centers built by providers of general clouds are large, consisting of high speed web and thousands of servers. These clouds are created for supporting thousands of servers in a general area. Some general clouds include Amazon Web Services, Google Apennine, and Microsoft Azure. In such cases, general clouds services are accessible via payment per usage rate. Each general cloud can offer 3 services of IaaS, PaaS, and SaaS.

Private cloud:

While general clouds are common and provide important solutions for reducing IT costs, there may be scenarios in which organizations may want to keep their own private cloud to meet their own needs. For example, health care industry preserves many confidential data that can't be saved in general infrastructures. Thus, private clouds are used in an organization to provide IT services for internal users offering more control over infrastructures. Developing security and flexibility improves services because its access is limited to one or some organizations. Such private services impose necessary limitations or inaccessibility for developing scalability based on demands for the software of final users; while this is done by a general cloud. An organization can buy more machines based on the needs of its users but this doesn’t lead to accelerating general cloud. This issue leads to the advent of combined clouds that provide advantages of both private and general clouds.

Combined cloud:

Combined cloud is a mixture of private and general clouds but their tasks will differed based on each context. Combining different cloud services, users can have transfer to general clouds without previous limitations with control over security and infrastructure system. In this model, infrastructures and computers mounted on a cloud environment can consist of two or three private and general clouds, able to be transferred with data centers of other data [14].

According to mentioned points, it is found that cloud computing model aims to increase information accessibility with cost decrease and minimum need to human resources, meeting users’ different expectations.

Area of cloud computing applications:

Although cloud computing is a new concept, it is omnipresent since it has impressed all corners of human life such as education, telecommunication, banking, Internet orders, reservations, shopping's, video downloads, chat, web searches, computer games, university researches, and etc. It has revolved web content, documents management, email and financial arrangements, e-business, and accounting areas with creating functional shifts in them. Accordingly, this study examines cloud computing in accounting.
The effects of cloud computing on accounting:

One definition of accounting is given as follows:

Accounting:

Accounting is business language since it provides necessary information about economic units for the stakeholders such as managers, capital owners, creditors, government and economic units via financial reports [5]. From another view, accounting refers to accounting information system, designed for processing the information related to financial events, effective on business organizations and units and reports of their effects on decision-makers [1].

According to the main statement of accounting theory, accounting refers to identifying, measuring, and reporting economic information for conscious decision-making by information users. In that statement, accounting information is considered economic information [8].

With a comprehensive look, all companies from small institutes to the largest factories need accounting information. If a person wants to invest on a company, he wants to first check financial and accounting statements. Thus, for meeting this financial need, accounting software was designed.

Accounting software and its development trend:

Accounting software is an informatics computer-program, helping owners, investors, managers, and government to make better decisions about economic problems via providing necessary accounting information. With development of economic affairs and increasing their complexities, methods and goals of designing accounting software and their application models for responding to financial needs have developed since people and enterprises need confident accounting reports that are achieved through new technologies.

In recent years, with fast progresses in computer and IT technologies, ways of information spread, and business methods, accounting has revolved and organizations try to use such progresses and offer financial information in accessible form for all stakeholders. Then, there is a necessity for researches on recognizing new technologies and their applications that improve accounting quality along with advances in IT area. Researches have shown that successful companies are the ones with managers aware of using good accounting software since they are useful tools for calculating profit/loss and cost with high speed in minimum time. Also, they have set capital and labor turnover for maximum profit and minimum loss. Now the question is that "how can account software be used considering IT service advances?"

Different models of accounting software:

During using software services, accounting organizations have 3 choices: traditional model with accounting software and PC computers, cloud model, combined model.

Traditional model:

To understand the function of accounting software and PCs, consider a company which has provided a computer for each staff with different operating systems installed on them. In this model, companies need to buy accounting software and install them on the computer and put all information in their hard disks. This creates various problems. Companies have files for processing which the staff needs interaction. For example, consider a report that needs to be edited by 5 people. Sharing files is an issue that has attracted much attention. How this is possible when all these files are on hard disc of an employee? Then, the company should pay for buying the license of 5 software's and install all of them on each computer. This needs much cost. Software's should be installed 5 times and if computers break down, some extra time will be needed to solve software problems. Moreover, promoting operating systems of the computers and their extra costs need special attention.
From another view, if a user wants to edit a video or text file with software, he should buy it and install it on his computer. What if a trip happens for him? In that case, he can't take his computer and can't use installed software on any other computer.

All above items have time and place costs and functional limitations, making large and small companies resort to cloud models and cloud accounting which is the end of these nightmares. The user executes software once and all other people get access to it via online services.

**Cloud operational model:**
Cloud accounting or online accounting acts like accounting software installed on users' computers. Accounting software can be performed on servers offering online services and users can have access to it by their web browsers. It means that you have access to financial affairs of your company from everywhere only by connection to Internet. In cloud accounting in which users gain access to applied accounting software via Internet, offering software services in a cloud, they actually buy usage of software in a similar model from online service provider. They don’t pay for software, hardware, or network, but they pay for calculation ability and software services [5]. With these explanations, if accounting professionals conclude that cloud computing is the same old drink of outsourcing in a new bottle, they haven’t gone astray. Similar to outsourcing, cloud computing is like buying one or some work processes from a supplier with out-of-organization services. The key difference is in what is purchased which is a definite work process in outsourcing such as normal salary or wage; but, in cloud computing, it is information infrastructure and IT services that some or all work processes may depend on it. Infrastructures of IT impress all work areas in a company including accounting. So, it seems reasonable to examine the necessity of using cloud computing in accounting [19].

**Combined operational model:**
This model consists of some internal and external service providers and a good option for business institutes; because, in this pattern, non-critical information and external sources of the organization are processed in a general cloud while critical services and data are kept in the private cloud. Thus organizations can use private cloud for important information and general cloud for the resources needing high automatic scalability. These resources are temporarily hired in maximum loads and are released.

**The necessity of cloud computing in accounting:**
The most important factor creating changes in organizations is Internet [12]. With a basic change, Internet revolves the functions of the companies which are beyond e-business since e-business is a by-product of Internet.

While Internet is the main change-creating factor in organizations, the role of enterprise resource planning should not be ignored. What they do is putting all organizational information in a central resource to make it easily accessible for outsiders. Reaching higher levels of recourse planning for the enterprise needs coordination of internal planning resources and customer systems that leads to multiple enterprise recourse planning [20]. A powerful technology for developing such mechanisms is cloud computing. The question posed here is that" how IT is related to accounting models and why they need changes?" The answer is that investors and creditors are searching for continuous information resources to evaluate efficiency of the companies. Financial statements as such resources are available in quarterly form. Some expect to get the information beyond normal disclosures given out daily by websites. This doesn’t satisfy their thrust to detailed financial information of the companies. Thus, offered information is insufficient unless a new model is created for more financial information which is possible via cloud computing. Using it through general databases gives users growing and various data for making better decisions [21]. But, what effective accounting technologies can be used in cloud computing?

**Effective accounting technologies in cloud computing:**
Effective accounting technologies include:
- used in cloud computing include data base (for data analysis)
- expert systems (helping deviation analysis, loan, risk analysis)
- neural network (as prediction tools)
- information storages (for providing specific information for users)
- decision-supporting software (helping data analysis and decision support before making it)
- top connection (for improving information accessibility)
- digital signatures and confirmations (providing continuous auditing)
- artificial intelligence –based software (making report change possible with conditions),
- simultaneous data search and analysis and intelligent operators (for data analysis and decision support),
• XBRL reporting language (to transfer accounting information to the web, facilitating investors and analyzers’ access to information, correct data extraction and evaluation, comparing financial reports of the companies in each industrial group via creating harmony in data classification)[21].

Here, we compare traditional and cloud computing models and identify their advantages and disadvantages.

**Comparison of traditional and cloud computing models:**

There is a great body of literature on comparing traditional and cloud computing models. Some researchers believe that the companies use special software and operating systems via Internet and outsourcing all IT components to transfer from traditional model to new environments with intervention of service providers such as cloud computing.

![Fig. 6: Traditional operating models][11].

![Fig. 7: Cloud Operating Model][11].

As seen in figure 6,7 applied cloud programs designed for web are various and users share that process ability and space provided by the salesperson.

In accounting cloud computing, business is done on the web removing the need for buying, executing, and keeping IT in structures, servers, and software. On the contrary, traditional software's are distributed with normal settlements [2]. The difference is that traditional service providers offer their services to the customers based on contracts in long-term (one year or more) with fixed features. But cloud servers like water or electricity receive costs based on demand and supply rate. Thus, the cost depends on your usage. As a result, the most important advantage of cloud computing is cost saving.

In the figures 8,9 some information is offered about the costs of traditional and cloud computing.

In cloud computing, subscription fee of applied software's is about 1800$ but no cost is paid for software permission, its updating, other hardware/software, and keeping system. The mean cost for each user is 50$ per month and installation time is 1 hour. While, in traditional model, software permission costs 9500$, software updating costs 7.125$, hardware costs 5000$, other software's cost 2000$, and keeping system costs 3.600$. The mean cost for each user is 76$ per month and needed installation time is 1 day.
In the cloud model, subscription fee of applied software's is about 85%; 0% for IT; 2% for education; and 3% for council. While in traditional model, subscription fee of applied software's is about 23%; 4% for infrastructure software; 49% for IT; 5% for education; 5% for hardware; and 14% for council services. Based on the findings:
- Customers of cloud computing pay no cost for IT infrastructures and their management because the fee at start includes all those costs.
- In traditional model, IT costs for software's and hardware and their preservation includes 51% of total costs in 4 years. This paragraph shows cost difference of ownership of two models.

Examining results showed that total ownership cost of cloud computing is 40% less than traditional model [17]. Since total cost is an important factor for the people and companies, low cost of cloud computing is its most important advantage [3].

Advantages of cloud computing in accounting:
The advantages of this technology include:

Saving time:
Undoubtedly, if accounting affairs are done using online services and cloud computing, sending and receiving e-mails and files will be accelerated.

Following works without physical presence:
In some occasions, when people take a day off or are in missions, they can send and receive e-mails everywhere and every time by Internet.
Connection to other computers:
Many office letters impact other systems. For example, a leave request impacts payment system. An invoice influences a storehouse. A report affects accounting system. Thus, in case of integrity in the system using online services, these effects are easily exercised.

Accessibility:
Internet can be accessed everywhere. So, using cloud computing all of your employees are accessible and you can send orders or directories to the shopping agent in another country or request him about prices and machinery’s features.

Low-cost computers for users:
You don’t need a powerful and high cost computer for executing web-based programs since programs are executed in the cloud.

Efficiency improvement:
Since applied programs are executed in the cloud, users can see higher efficiency from their computer, reducing bulk programs occupying computer memory.

Increasing calculation power:
When you enter a cloud computing environment, you own the whole power of cloud and are not limited to the simple computer power and get privileged by both computer and server ability.

Infinite storage capacity:
For cloud computing, you can connect to the cloud on any system and even get documents on a heterogeneous system.

Improving adoption between documents’ formats:
You don’t need to worry about the documents you make on your machine to match with others. All documents are made by a web-based program and are accepted by the same program in another machine.

Easier group cooperation:
Sharing documents leads to cooperation on documents. Cooperation on a document or project is very important for users. This is possible by cloud computing.

Global access to documents:
With cloud computing, work collection of every person (i.e. documents at PC or another document in the office) exists in the cloud with him. When a document is needed, you just need to connect to cloud computing system and then it is all yours.

Access to the latest version:
When you edit a document somewhere, you have access to the latest changes somewhere else because document is stored in a cloud. Since total cost is important for the companies and people, low cost of cloud computing is the important feature of it [7,13].
Despite mentioned advantages, it has some disadvantages as well.

Disadvantages of cloud computing:
For some reasons some of which are as follows, you may not want to use cloud computing:

A need to connection to a fixed Internet:
For connection to cloud computing, you need Internet without which no access to the cloud is possible.

Deficiency of performance with low-speed Internet:
With low-speed Internet such as usual telephone system, cloud computing doesn’t work well.

Security:
Most users of cloud computing in accounting worry about service reliability and data security. All data are safed in the cloud but they may not be safe or the service might be disrupted. Thus, connectivity of cloud computing to internal controls and auditing is obvious [3].
Lack of thorough knowledge about control:
Lack of thorough knowledge about controls dominating Internet providers of cloud along with issues such as data ownership can expose users to higher risks. Thus, professional auditors should inform users about SAS auditing, No. 70 [19].

Movement towards cloud computing:
Predictions of InfoWorld states that in future decade, IT world will focus on cloud services. Statistics show that offering cloud services has started some years ago but tendency towards cloud computing is growing. Various reports in this regard confirm this continuity.

General statistics:
In a report, Gartner Group estimated that SaaS sale reached 9 $B in 2010 which shows 15.7% growth compared with 2009. The growth of 10.7$B in 2011 is a growth of 16.2% compared with 2010. Based on estimations, over 10% of total sold applied programs in the world are in SaaS form. Also, by 2014, SaaS will include over 16% of applied programs [2].
In a report by analysis center of Tec market View, market value of cloud computing which was 5.8 billion pounds in 2010 will reach 10.4 billion pounds in 2014.

Accounting statistics:
LaFollette predicts that in next 10 years there will be almost no software application based on traditional model. In a poll on 1000 auditing companies by CPA2Biz, AICPA marketing arm (American Institute of Certified Public Accountant) showed that 70% of respondents plan for increasing their usage of web-based applied programs in next 6-18 months. CPA2Biz has had a negotiation with some cloud sellers such as Bill.com, Copanion, Intacct, Paychex and XCM as a part of trust-making council program [2]. Ivans claims that cloud-based accounting software's are now accepted by accountants and companies. About 14% of companies and 23% of accountants were attracted to use cloud-based accounting software's for managing their accounts in Australia.

Fig. 10: The adoption of cloud computing by accountants and companies[7].

In this survey, 60-77% of the accountants who don’t use cloud systems will use them in next years. What meaning do these statistics have for accounting? Based on the data, accountants who are not moving toward cloud system expose their businesses to risk. A broad necessity for accountants is gaining innovation for using cloud-based solutions, accompanying their customers with them. In that way, they make their basic roles secure in managing financial accounts of the customers and can focus on offering strategic and more valuable services [7].

Conclusion:
We witness growing tendency to use transportable tools for accessing to Internet services rather than PCs. Since such tools can’t strongly process data, which tool can provide such processing capability? The answer is cloud system. Driving motor behind cloud systems are spread wireless networks, decrease of storage costs, and improving processor Internet processors. With cloud systems, customers can inject higher capacity into their systems, decrease costs, experience new services, and remove useless capacities. In short, the result of cloud computing is as follows:
Significant growth in all fields = speed decrease + cost decrease:

Although disadvantages and relative safety of cloud computing are conflicting issues, such service providers have strong motivations for keeping trust and will try to remove defaults, increase safety, and continue forward movements. Reports also confirm that cloud computing will have a significant movement in next ten years. If we put all these points together, we will see a big change in IT Technology. Thus, accounting experts prefer more certain and innovative models rather than governmenteally-controlled models to meet growing needs of this field via cloud computing.

Suggestions:

Based on informatics needs of accounting users and defaults of present traditional models, accounting is doomed to modernize itself. Thus, secure accounting and auditing systems should develop based on modern technologies to keep pace with fast changes of business world.

REFERENCES


