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Comparative Study of Revenue Generation Model in Cloud Computing

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Abstract*: Cloud computing provide a new area of computation process in a very essay meaner. The industry with an increasing number of cloud service Providers brings new possibilities, allowing selling their software products using the Software-as-a-Service (SaaS) model. It also brings a new competitive market to fulfil the requirement of new as well as existing cloud user.

Due to different resource capacities and service workloads, users may observe different finishing times for their cloud computing tasks and experience different service qualities as a result.

In order to maximize revenue in such a competitive market it is critically important for each cloud service provider to select a best revenue model corresponds to their service qualities, This forms a competition market from different cloud service providers, in which it is important to understand the underlying rationale and characteristics.

In this paper we were analyse the different revenue models and the reasons for using particular revenue models. The revenue models were found to be mainly based on software renting, with a variety of pricing strategies. For cloud providers, The software renting model popular because (i) it minimize actual costs for using the software, (ii) it makes it possible to purchase the software without special budgeting or the approval of top management. Interestingly, none of the firms used the commonly cited pay-per-use model.

I. INTRODUCTION

From the perspective of cloud users, cloud providers rent their computing resources in a scalable and on demand manner , with flexible pay-as-you-go model. There is a number of companies that provider public cloud computing services, including Google, Amazon, Microsoft, and Rackspace. These cloud providers differentiate themselves with their usage prices for each type of cloud service, e.g., computing, storage, and data transfers, which reflects their capacities in a certain type of resource. For example, for a Virtual Machine (VM) with 4GB of RAM and 4 CPU cores, GoGrid charges $0:19 for an hour of use, while Rackspace charges $0:24 per hour for the use of a similar VM with 4GB of RAM and 160GB Disk. Since a user's cloud service demand may be satisfied by any of the cloud providers, a user will choose the provider that fulfill its own requirement , i.e., its utility obtained by choosing the cloud service minus its payment. The utility of a user is not only determined by the importance of the task but also closely related to the urgency of the task (i.e., how quickly it can be finished). The same task, such as encryption, is able to generate more utility for a cloud user if it can be completed within a shorter period of time in the cloud. Since the diversity among cloud providers will lead to different net rewards, multiple cloud service providers form a market to compete for cloud users.

This paper focuses on different cloud providers and their revenue models The reason for this choice is based on the rapidly growing number of cloud service providers and users in the market A study by Armbrust et al. [1] also highlights the fact that SaaS providers have received less attention than SaaS users. Based on the considerations, this article will describe various revenue models used by cloud providers, and more specifically, the reasons for the use of a particular revenue model or combination of models. The following question is of addressed: Why do software firms in the cloud business use particular revenue models? The study thus seeks to contribute to the knowledge available on cloud computing related revenue models.

II. RELATED WORK

Considerable performance differences across cloud providers have drawn much attention from the literature recently. Li et al. presented Cloud Computing, a systematic comparator of public cloud providers, considering differences in both their performance and cost. Hong et al. [2] and Tsakalozos et al. [3] applied dynamic programming and microeconomics, respectively, to achieve optimal resource allocation for cloud users in VM-based clouds, with full awareness of different prices charged by cloud providers.

A. Cloud Computing

Cloud computing refers to the provision of computing capacity, storage capacity, and applications as a service across the Internet. In line with Armbrust et al. [1], cloud computing is considered here to cover software applications delivered through the Internet, and the hardware and system software that is used within data centres to provide these services. The data centre hardware and software that form a "cloud" [1] can be divided into a public cloud, a private cloud, and a hybrid cloud. In a

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public cloud, a software vendor uses its own or a third party's cloud infrastructure (data centre) to offer SaaS for customers in a pay-as-you-go manner. A private cloud involves the customer's internal data centre, where the software is installed and used in a centralized manner within the organization, that is, the software is not made publicly available [1, 4]. In the case of a hybrid cloud, a firm using a private cloud may, for example, offload part of the workload to a public cloud and in that way acquire more computing capacity [4, 5, 6]. A common reason to use a private cloud instead of a public cloud is related to concerns about data security [1, 7]. If a firm's data is stored on a public cloud, it may not know precisely where the data is stored, and there may well be other data sources that are collectively stored along with the firm's data [7, 8]. Since cloud computing is a very new phenomenon, concerns may be also related to national governments possibly having access to the information if the data flows over national borders [7]. Armbrust et al. [1] list ten obstacles in cloud computing that might limit customers' willingness to use a public cloud infrastructure. These obstacles are related to worries about business continuity and service availability, data lock-in, data confidentiality and auditability, data transfer bottlenecks, performance unpredictability, scalability of the storage, bugs in the distribution system, scaling time, reputation fate-sharing, and limitations in licensing. However, although data security seems to be the major concern, Creeger [4] points out that 75–80 precent of intellectual property breaches take place *inside* the firm; hence this issue should not rationally impact on a decision to use public cloud services.

III.METHODOLOGY

In line with Sainio and Marjakoski [9], a revenue model is here seen as an operational description, indicating how a firm collects revenue from its customers. In other words, it relates to the various options that a firm may offer to customers who might wish to buy its software. In traditional software revenue models, software is sold as a packaged or perpetual license. In packaged licensing, a customer buys single license for single user or computer, whereas in perpetual licensing, the software is bought for a certain number of users or computers. Hence, the number of computers on which the software can run is limited. In addition to the initial license fee, customers commonly have to pay a maintenance fee, which includes technical support and version updates [10]. In this study, the term "traditional license" is used to describe these two options. SaaS involves a new way of delivering and selling software. In an SaaS model, the software is licensed for a fixed term by applying a usage or periodic subscription fee [11, 12, 13]. In the literature, cloud or providers have been commonly referred to as adhering to a pay-per-use method [1, 4, 17]. This refers to charging the customer on the basis of metered usage of server hours. This differs from software renting, in which the customer pays a negotiated subscription fee for a certain time period [1]. Altogether, the use of SaaS lowers customers' initial investment costs, since they pay only for services when they are needed (pay-per-use) or periodically (e.g. pay-per-month). From the considerations above, it would seem that there are some similarities between traditional revenue models and the revenue models available through SaaS. However, the main difference is that in the SaaS model, the software is available through a public or private cloud and is delivered to the users' devices through the Internet or Intranet. The research setting for this study consisted of five software company operating in the cloud computing business (see Table 1) as cloud providers. Three of the company were dealing with a national cloud software program in Finland, and two firms were contacted on the basis of the industry knowledge of the author. Thus, the most important selection criterion was good access to the required information, as recommended by Stake [14]. The personal-contact aspect increased mutual trust between the researcher and the persons interviewed in the case company, and consequently, facilitated the collection of accurate information. Multiple sources of information were used to gather data from each case company. The main form of data collection was a semi-structured interview, guided by a list of topics. Altogether, there were 21 semi-structured open-ended interviews with two to five informants from each case company. Having two or more

Company	Year of Establishment	Product/Service	Delivery Channel	Revenue Model(s)
Company A	1998	- Planning and optimization software for telecom operators	- Public and private cloud	- Renting - Traditional licensing
Company B	2000	- Gaming platform - Game content for the Platform	- Public cloud	- Renting
Company C	2006	- Risk management software for banks	- Private cloud	- Renting - Traditional licensing
Company D	2008	- Entitlement management Software	- Public and private cloud	- Renting - Traditional licensing
Company E	2006	- Interactive 3D sales Software	- Public and private cloud	- Renting

Table-I Overview Of The Case Firms

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interviews from each case company made it possible to ask more detailed questions of the second interviewee, following on from the first interview. Working in this way improved the validity of the data collected. All the interviews (lasting 45–90 minutes) were digitally recorded and transcribed verbatim by the author. A second listening was carried out to ensure correspondence between the recorded and the transcribed data. The complete case reports were then sent back to the interviewees for comment, and any inaccuracies they noticed were corrected. In addition, e-mail and telephone communication was used to collect further information and to clarify inconsistent issues if necessary. A further step at this point was to look at many types of secondary information sources (websites, annual reports, press releases, etc.). By comparing the interview data with other documents from the case company, the information collected was triangulated [16]. This increased the validity of the interview data, and made it possible to formulate further questions to clarify incoherent information [15].

IV. FINDINGS

This section will present the revenue Models for these companies and the reasons for the use of a particular model. Table 1 summarizes key information on the case companies.

Company A offers planning and optimization services/software for telecom operators. In its business, company uses software renting and traditional licensing. In the rental model, the amount of revenue is based on the number of users and the length of the agreement. Agreements are commonly made for at least three months. A longer agreement reduces the monthly fee for the software. However, pricing is fairly flexible and is negotiated with each customer separately. However some customers do not want to use the software through a public cloud, because of security concerns. For these customers, company has a traditional licensing model available, in which a customer buys a traditional license for a workstation or uses the software in its private cloud. A pay-per-use method was not considered by this firm, since software renting was seen as a safer pricing method (due to the fact that the amount of the actual usage was difficult to estimate.

Company B provides interactive gaming platforms and games-on-demand services. The company licenses game content from game developers and converts these games to its gaming platform. The network operators operate the platform and deliver games to players' set-top boxes or PCs through their broadband network subscribers. The revenue model is based on software renting with a variety of payment options for consumers. These options include a subscription for a particular game for 24 hours, a monthly subscription for all the games available in the service, and a subscription for different games packages for a certain time period. This model provides flexible payment options for consumers, and these increase the attractiveness of the service compared to the traditional way of buying games from a store. The CEO of the firm expressed this as follows: "This revenue model allows very interesting pricing strategies. Instead of buying the game from a store, this makes it possible to rent the game for a day…or the game can be a part of a games package that can be used, for example, for a month." Other revenue models were not suitable, as the games are offered as a service in the Firm B business model. For the network operators who delivered the games, a rent-based fee was simpler to use and charge than a pay-peruse model.

Company C offers risk management software for banks. Since the software is used to handle highly confidential data related to bank transactions, the service is provided in a private cloud. However, the company also has a demo version of the software that is available through a public cloud. The CEO of the firm explained this as follows: "The software is related to the banks' core know-how, they do not let the information go outside the bank…this is related to their own cash flow, it is the biggest secret that they have". Company C uses two revenue models. The first model is traditional licensing including a license fee and an annual maintenance fee. The second option is to rent the software. The initial rental agreement is made for a two-year period and then renewed for a year at a time, or else according to an agreement with the customer. The CEO commented on this as follows: "Previously we only had a traditional licensing model – an initial license fee plus an annual maintenance fee. However, we are now moving increasingly towards a license-renting model in which we charge a monthly rental fee. Then the bank doesn't have to make an investment decision, it just pays the monthly rental fee. Then it is more like a cost, not an investment." The traditional license or rental fee depends on the number of users, the functionalities of the software, and the size of the customer.

Company D develops software for entitlement management. The software is available to customers through a rental model, or else a customer can select a traditional software license. In the rental model, an operator who hosts the cloud service is charged according to a monthly fee that is dependent on the estimated number of users. In some cases, customers want to buy a license in the traditional way and use the software in their private cloud. The traditional license fee includes an initial license fee based on the number of features included, and an annual maintenance fee. The sales manager of the firm explained the software offering in the following manner: "We like to have both options available (rental and traditional license) for customers, because both are sought by the customers. We do not want to turn this into a restrictive issue." The traditional license was mainly for customers who had concerns about the security or reliability other public cloud.

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Company E sells interactive 3D sales software for furniture manufacturers and furniture retailers. Company E also models the customers' furniture elements for their 3D software, and encodes the rules for how different furniture elements can be attached to each other. The revenue model is based on an implementation fee and an annual rent fee. The implementation fee includes software implementation for the customer, activation, and visualization. The initial rental agreement is for three years and thereafter a customer can renew it for a fixed period. The amount of the rent fee depends on the functionalities and the number of furniture elements included in the software. The customer may start using the software with the inclusion of only a basic function, and then purchase more functionality as required. New furniture elements can also include in the software later on. The CEO of the firm explained this as follows: "We apply a yearly rent fee and then content production and activation fees. When the system is activated, we can bring in new content all the time. The customer may start with one collection of furniture, but they may have ten collections or have the collections recur." The rental model was seen as simpler to use than the pay-per-use method, which would require metering of the actual software usage. Most of the customers used the software through a public cloud, but in some cases in which a large customer had its own servers available, the software was used within a private cloud.

	Traditional licensing	Software renting	Pay-per-use
Workstation	A	-	-
Private cloud	A, C, D	A, C, E	-
Public cloud	-	A, B, D, E	-

TABLE-II Delivery and Revenue models of the case company's

V. DISCUSSION

The findings indicated that the cloud providers used software renting and traditional licensing as their primary revenue models. The major observations are summarized in Table 2 Interestingly, none of the firms interviewed used pay-per-use pricing, despite the fact that in the literature it is the most commonly cited revenue model for cloud computing [1, 4, 17]. The case firms saw pay-per-use pricing as a more complex than software renting. In addition, they thought that pay-per-use requires technical tools to measure the actual usage of the software. Furthermore, it requires maintenance of auditable records of the each customer usage. This decreased the case firms interest to use the pay-per- use model.

One notable reason for providing flexible software offering and revenue models was the customers' concerns regarding software offerings through a public cloud. Some of the customers did not trust Cloud offerings through a public cloud, preferring to use the software either in a private cloud or to buy a traditional license for a workstation. The customers thought that by using a public cloud they would lose control over their own data. This finding is in line with points made by Kaufman [7] and Armbrust et al. [1], relating to Cloud users' concerns that they will lose control of their data if it is stored in a public cloud. Indeed, a lack of trust in public clouds is one of the most important challenges in cloud computing [9]. As regards revenue models, the findings here show that it is good to have alternative options available for customers who are concerned about data security in the public cloud. Otherwise, the firm may simply lose these customers.

VI. CONCLUSION

Altogether, the findings here indicate that Cloud providers favour software renting as the primary revenue model. Software renting provided a predictable and less risky revenue stream. In addition, it was easier and simpler to use compared to pay-per-use method. From the customers' point of view, software renting made it possible to estimate the costs of software and to buy the software without special budgeting or long decision processes. Many features of traditional licensing were transformed into who had concerns about data security in a public cloud. The vendors could make a traditional software license available, and could make it possible to rent the software over a private cloud. In contributing to an understanding of the revenue model in cloud computing, this study also points to aspects requiring further study.

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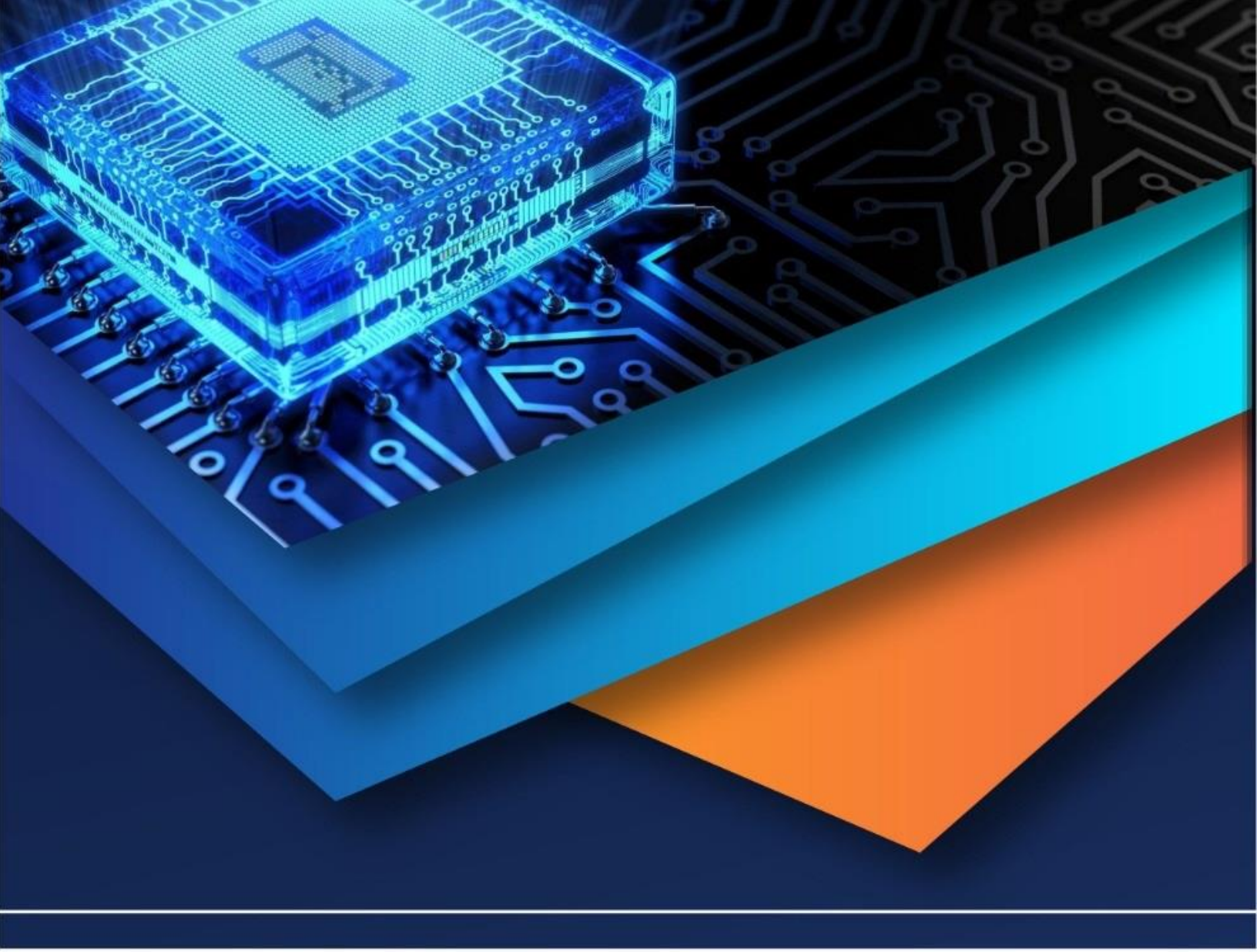

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