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MULTI-METHOD APPROACH AND FORMAL MATHEMATICAL MODEL FOR OWNER SHIP SERVICE MANAGEMENT ON CLOUD COMPUTING COST

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Abstract: The use of Cloud Computing Services appears to offer significant cost advantages. Particularly start-up companies benefit from these advantages, since frequently they do not operate an internal IT infrastructure. We found that particular cost types and factors are frequently underestimated by practitioners. In this paper we present a Total Cost of Ownership (TCO) approach for Cloud Computing Services. We applied a multi-method approach (systematic literature review, analysis of real Cloud Computing Services, expert interview, case study) for the development and evaluation of the formal mathematical model. We found that our model fits the practical requirements and supports decision making in Cloud Computing.

Keywords: Cloud computing, Risk factors, Time factor, TCO approach,

INTRODUCTION:

According to Gartner's hype cycle of emerging technologies 2010, Cloud Computing has moved beyond the peak of inflated expectations and will be widely adopted by companies in about two to five years [17]. Due to the anticipated advantages of Cloud Computing, as e. g. high flexibility and low costs many companies do not analyze their decisions carefully [2]. This approach rises risk factors like for instance hidden costs or a vendor-lock-in [17] which discrete the pursued benefits. Thus, companies should conduct an extant analysis of direct and indirect costs to mitigate certain risk factors and to be aware of important cost types and factors. In this paper we present a formal mathematical model for the calculation of the Total Cost

of Ownership (TCO) of Cloud Computing Services. The TCO is one of the most important cost-oriented approaches that is widely spread in both research and practice [22]. The main focus of our model lies in the identification and calculation of cost factors. More precisely, the model strongly supports start – up companies that do not operate an internal IT infrastructure. The calculation results serve as decision support by evaluating Cloud Computing Services and providers on a cost basis we conducted a systematic literature review with which we identified important cost types and factors. The TCO model is prototypically implemented on a website for further evaluation steps and is accessible for the general public. The software tool is able to analyze the cost structure of Cloud Computing Services and thus supports decision makers in validating Cloud Computing Services from a cost perspective. The presented multi-method approach extends the TCO theory and applies deductive and inductive methods to develop a theoretically and practically based model. The paper is structured as follows. In the following section we define the term Cloud Computing and TCO. In Section 2 we discuss related work and the Underlying research approach. Furthermore, Section 3 comprises the discussion of our model assumptions, the applied cost structure and the analysis of pricing schemes of real Cloud Computing Services. A conceptual and technical evaluation is presented and we finally draw conclusions by means of limitations, implications and future research.

EXISTING SYSTEM:

The focus of the analysis lies in the cost comparison of different Cloud Computing Services and service models. As a result, purchasing costs for servers are not considered in the model. A change of a service provider corresponds to the first adoption of a Cloud Computing Service*:* If a provider change is taking place, it should be considered as a deployment of a new Cloud Computing Service. The reason for this is that the steps for the initial deployment of a Cloud Computing Service are the same as that of a change here we does not consider cloud storage hidden cost .

PROPOSED SYSTEM:

The total cost of ownership approach is one of the most important cost-oriented approach. The main focus of our model lies in the identification and calculation of cost factors. The software tool is able to analyze the cost structure of Cloud Computing Services and thus supports decision makers in validating Cloud Computing Services from a cost perspective. TCO approach makes it possible to analyze the costs or individual cost components of an IT artifact by means of a predefined scheme. TCO is a software tool to calculate setting-up and maintenance costs for a cloud(costs of storage, data transfer)computing.

LITERATURE SURVEY:

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy n company strength. Once these things r satisfied, ten next steps are to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from

websites. Before building the system the above consideration r taken into account for developing the proposed system.

OBJECTIVES:

1. Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

2. It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

3. When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow

INPUT DESIGN:

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

OUTPUT DESIGN:

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2.Select methods for presenting information.

3.Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the Future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

IMPLEMENTATION:

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

Modules:

1.Cloud Computing.

2. Fixing Pricing Scheme.

3.Calculating Cost Factor.

4.User Module.

• Cloud computing

Cloud computing is a model for enabling convenient, on demand network access to a shared pool of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service-provider interaction. It divide into three type

1.Application as a service.

2.Infrastructure as a service.

3.Platform as a service.

Cloud computing exhibits the following key characteristics:

1. Agility improves with users' ability to re-provision technological infrastructure resources.

2. Cost is claimed to be reduced and in a public cloud delivery model capital expenditure is converted to operational expenditure. Pricing on a utility computing basis is fine-grained with usage-based options and fewer IT skills are required for implementation. The e-FISCAL project's state of the art repository contains several articles looking into cost aspects in more detail, most of them concluding that costs savings depend on the type of activities supported and the type of infrastructure available in-house. 3. Virtualization technology allows servers and

storage devices to be shared and utilization be increased. Applications can be easily migrated from one physical server to another.

4. Multi tenancy enables sharing of resources and costs across a large pool of users thus allowing for:

5. Centralization of infrastructure in locations with lower costs (such as real estate, electricity, etc.)

6. Utilization and efficiency improvements for systems that are often only 10–20% utilized.

7. Reliability is improved if multiple redundant sites are used, which makes well-designed cloud computing suitable for business continuity and disaster recovery.

8. Performance is monitored and consistent and loosely coupled architectures are constructed using web services as the system interface.

9. Security could improve due to centralization of data, increased security-focused resources, etc., but concerns can persist about loss of control over certain sensitive data, and the lack of security for stored kernels. Security is often as good as or better than other traditional systems, in part because providers are able to devote resources to solving security issues that many customers cannot afford. Private cloud installations are in part motivated by users' desire to retain control over the infrastructure and avoid losing control of information security.

10. Maintenance of cloud computing applications is easier, because they do not need to be installed on each user's computer and can be accessed from different places.

• Fixing pricing scheme.

TCO approach makes it possible to analyze the costs or individual cost components of an IT artifact by means of a predefined scheme. The cost structure and identification of cost types have been initially created on the basis of real Cloud Computing Services and the identified literature. Finally the results of the expert interview approved and extended our model. It is also possible to pay a fixed price in order to get discounts on usage dependent prices.

• Calculating cost factor.

This calculation scheme is applied for calculate the storage inbound, outbound, data transfer costs. The storage cost is calculation is depended on the user storage capacity and time. Most cloud storage providers offer hourly (usage-dependent) Component - based rates. The costs incurred depend on the particular pricing.

• User Module:

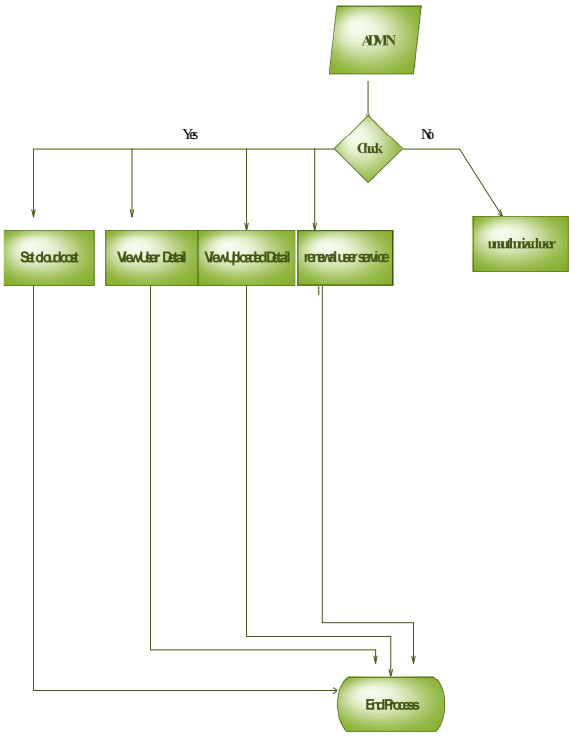
The user can store own data in cloud storage area. They can view cloud storage data at any time user should pay cost for the cloud storage reliable data storage.

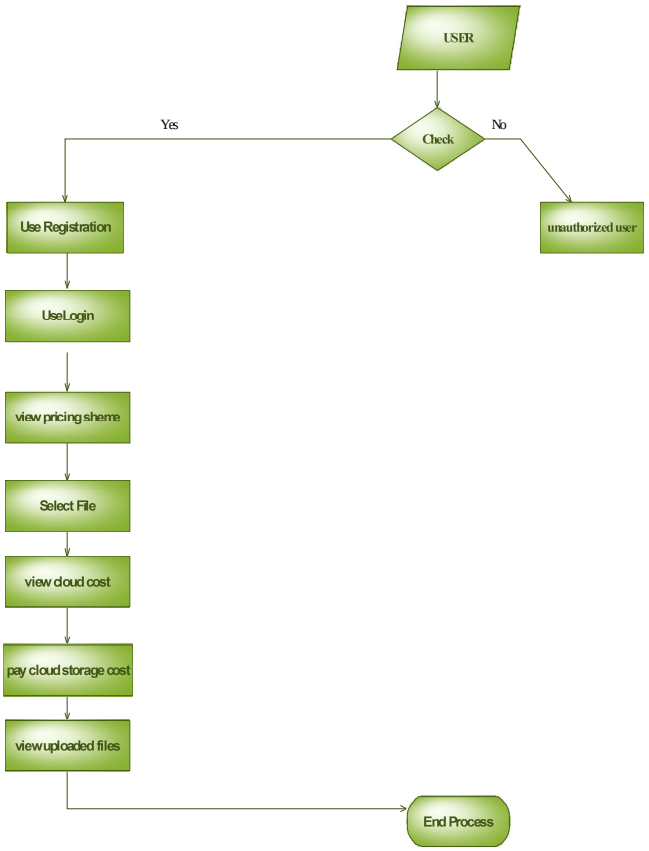
SYSTEM DESIGN:

The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of the

input data to the system, various processing carried out on these data, and the output data is generated by the system.

Admin:





User:

SYSTERM TESTING:

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the

Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various

types of test. Each test type addresses a specific testing requirement.

Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

CONCLUSION:

In this paper we argue that the analysis of relevant cost types and factors of Cloud Computing Services is an important pillar of decision-making in Cloud Computing management. IT artifact is presented in the form of a mathematical model and implemented on a website that is open for the general public. The TCO model has been evaluated by means of an expert interview, the result of the analysis of real Cloud Computing Services, a case study as well as scientific taxonomies and on topologies. During our research process we found that the evaluation and selection process of Cloud Computing Services is frequently conducted ad-hoc and lacks systematic methods to approach this topic. The presented method rises the awareness of indirect as well as hidden costs in Cloud Computing. If a company plans to implement a private Cloud these additional cost types are necessary for a complete evaluation. Since our approach focuses strongly on the evaluation of Cloud Computing Services that are frequently provided externally, we feel that these assumptions simplify the cost evaluation approach and its applicability. Furthermore, we do not consider quality or functional aspects of Cloud Computing Services within our method. Implications for the scientific community are aiming at several new fields that have not been discussed extensively in the scientific literature on Cloud Computing yet. For instance, we found that current work strongly focuses on risk and security aspects of Cloud Computing. Additionally, benefits management in Cloud Computing is another new research field that can for instance be explored by means of cost-benefit analyses in real world scenarios that reveal more insights on economic and managerial success factors in Cloud Computing. Additionally, further research can tackle some of the stated limitations. With regard to our TCO model we are planning to anonymously collect and store data that has been applied to the software tool. They can be statistically analyzed to better understand decision making in Cloud Computing. Moreover, it is possible to include an AHP process for the evaluation of quality of service compared to the results of the TCO model.

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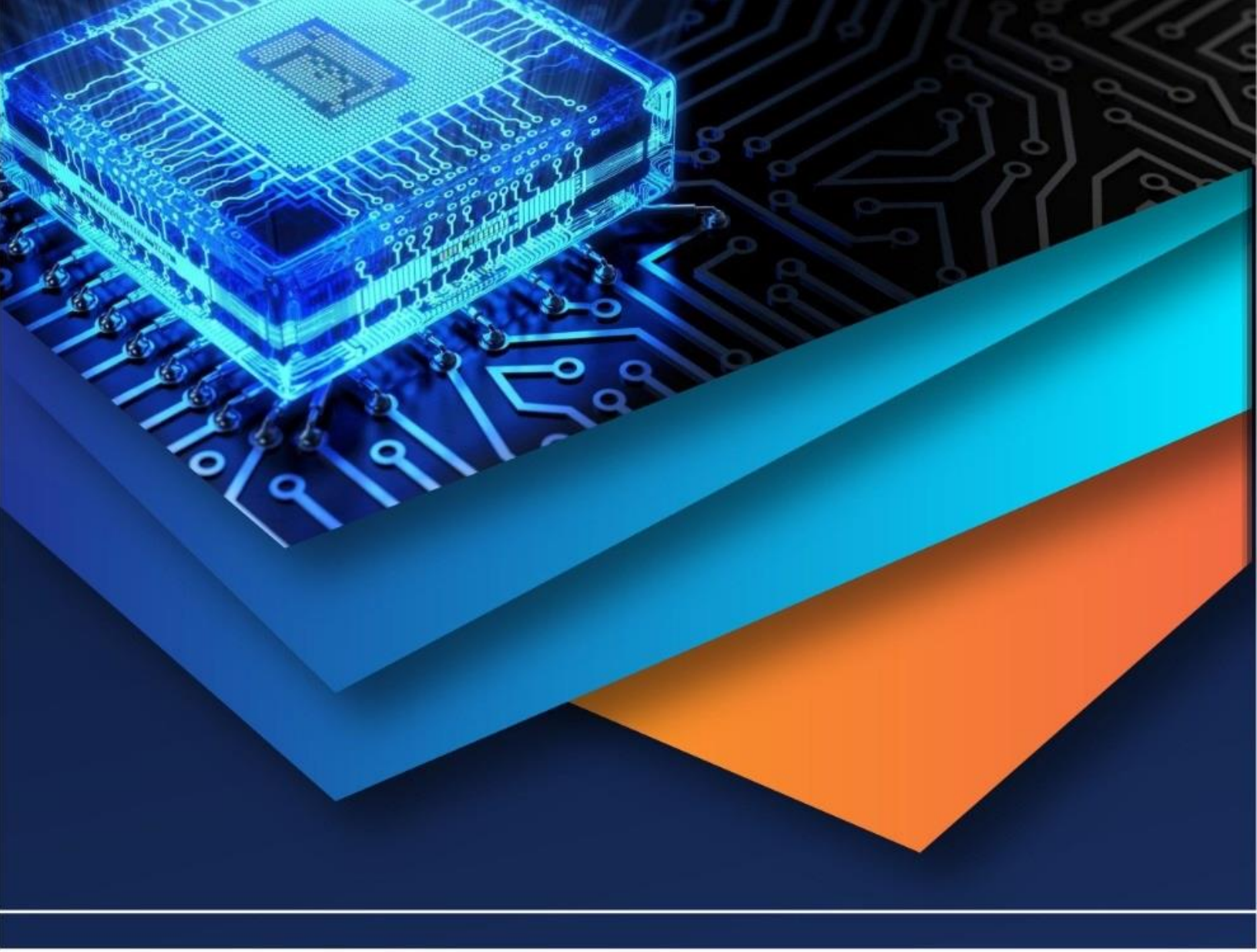

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