An Approach to Evaluate the Software Test Matrix Over Cloud Network

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Abstract
Software Matrix computation has always been a hot issue since the development of software has taken place. A software matrix defines how effective a software could be in the provided conditions. A software matrix may include the costing of the software, the performance measure, time to evaluate a particular result and the effectiveness of the result produced. Here in this paper, a software has been analyzed in terms of costing which includes the consumption of the RAM (Random Access Memory), allocation time of tasks provided to the system and time to compute the same. This paper also presents a future scenario of the work process. The written segment code has been tested on the MICROSOFT cloud computing network WINDOW'S AZURE.

Keywords
WINDOW'S AZURE, Software Computation Matrix, Cost Analysis, System Performance.

I. Introduction

In recent years software testing technologies have emerged as a dominant software engineering practice which helps in effective cost control, quality improvements, time and risk reduction etc. The growth of testing practices has required software testers to find new ways for estimating their projects. A key research area in this field has been 'measurement of and metrics for' the software testing. Measurement since plays a critical role in effective and efficient software development, making measurements of the software development and test process is very complex [11].
Before we start with any computational system and the cost to compute the data, it is necessary to understand where it is going to be computed. The platform over which the code segment is Window's Azure which is a cloud platform from Microsoft.
Section 1 describes the fundamentals of the cloud computing. Section 2 of this paper explains the software matrices which judge the performance of software in action and the section 3 defines the work scenario of our software implemented and tested.

II. Overview

A. Cloud Computing

Cloud computing is the next stage in evolution of internet acting as both business as well as economic model. The cloud in cloud computing provides the means through which everything can be delivered to the user as a service whenever and wherever user needs it. The range of everything can be from computation power to computer infrastructure, applications, business processes to personal collaboration. All lie in its range. Cloud act as a fluid that can be easily expanded and contracted. It is a platform which provides all the basic needs of day to day life of software usability and its services. Cloud Computing illustrates the services into three major categories as follows:

- IAAS (Infrastructure as a Service)
- PAAS (Platform as a Service)
- SAAS (Software as a Service)

1. IAAS

IAAS stands for Infrastructure as service. It is a service which is provided by the cloud computing network to avail users with the infra required by the user. As for the example if a user would require any operating system, it would be provided by the cloud computing platform. In the same manner the user will have to pay for each and every MB of space getting used. In such a manner pilgrims ends at both the sides.

2. PAAS

PAAS stands for Platform as a service and it is used to avail the users with the platform required. We can take the example of the .NET platform. The platform will be availed by the cloud server and again the user will have to pay for such work space.

3. SAAS

SAAS stands for software as a service and it covers all the software required by the user like Media Player, Job Schedulers etc. [1, 2, and 3]

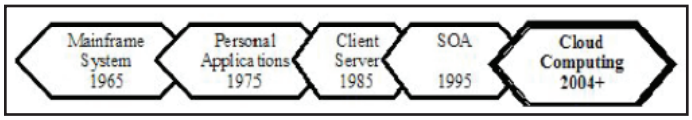

Fig. 1: Evolution of Cloud Computing

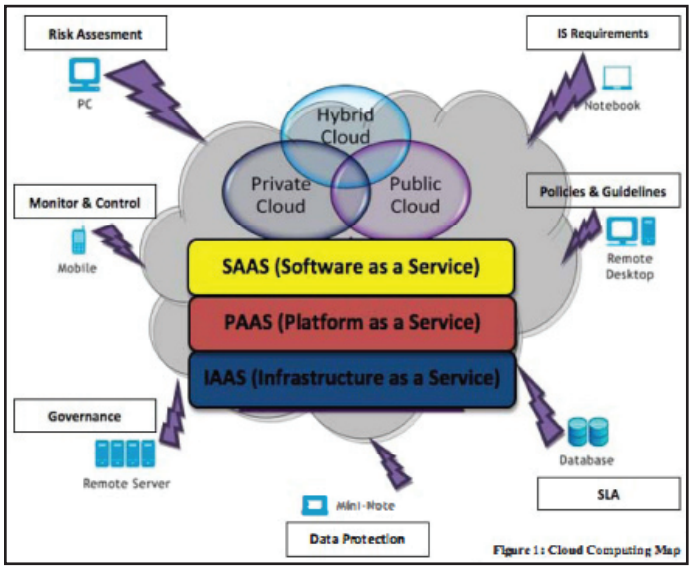

Fig. 2: Map of Cloud Computing

B. Characteristics of Cloud Computing

1. Virtualization refers to creating a virtual network at the time of the implementation. The benefit of such network is that it consumes less amount of energy in the execution and gets alive only for that time when it is required. The concept of virtualization is active for the last couple of years [3].
2. Location and Device independence is a feature that enables

the users to access the data from anywhere in the world regardless of the device which the user is using [3].

3. Maintenance is a maintenance free organization i.e. the server itself would be responsible for all kind of service maintenance of the resource. The users will not have to take burden of the data maintenance [4].
4. Scalability in the Cloud computing provides a scalable network in the same contrast. The scalability refers to extension in the cloud network in terms of services.
5. Ubiquitous network access is to the system regardless of user location or the location of device.
6. Rapid elasticity means to quick scale up or scale down of resources through elastic provisioning or the release of capabilities in near real time.
7. Resource pooling means the cloud server is efficient enough to perform the proper resource utilization so that maximum number of resources gets executed and less amount of costing is performed.
8. Broad network access allows access to network is available through multiple platforms that are used by user (i.e., cellular phones, laptops).
9. Pay per use help capabilities that are charged to be using a metered and advertising-based billing model to promote optimization of resource use or fee-for-service. One pays only for the time when the resource is used.

III. Software Evaluation Matrix

Software may be measured on the following parameters.

A. LOC

LOC stands for the lines of code. It is the measure which tells you that how much lines have been written to perform a specific section of the entire code. The question becomes how this parameter can be considered as software metric. The following example will illustrate the same.

Suppose a program has to be written to sum up two numbers. The program can be written in the following manners if tried with c++.

Way 1

```
Int a;
Int b;
Int c;
Cout<<"Enter a number";
Cin>>a;
Cout<<"Enter Second Number";
Cin>>b;
c=a+b;
Cout<<"The result is :"<<c;
```

Way 2:

```
Int a ,b ,c;
Cout<<"Enter two numbers ";
Cin>>a>>b;
c=a+b;
cout<<"The result is "<<c;
```

LOC IN WAY1: 9
LOC IN WAY2: 5

It means that both the ways are computing the same thing but lines of code written in the first segment takes more effort where as the second way puts a less effort but produces the same output.

B. FPA

FPA stands for function point analysis and it evaluates how complicated a function is. It is used to analyze the performance of the software in terms of time. Less complicated software would result into less time consumption.

C. COST

Costing of software can be computed in various aspects like amount of memory it is utilizing to perform, amount of time it is using to compute a result and other aspects also like energy consumed to compute a task.

D. Cohesion or Coupling

It depicts the dependencies of the code segments over each other.

E. Allocation Time

It gives you the measure over which you can analyze that how responsive the software is because computation time does not include the allocation time.

IV. Implementation

For evaluation of matrix there must be a set procedure to implement a process. The implementation process involves the following major steps

- Connectivity with the Cloud Network
- Setting up the software for performance evaluation
- Executing the needs over software
- Analysis of the results

A. Connectivity with the Cloud Network

As mentioned earlier, the operation has been performed over the cloud network (Window's Azure), hence with the successful registration over the cloud network, Microsoft provides you the id and password and the gateway to get connected to the cloud server. The gateway is configured over the code segment and server has been put on start mode through which the code segment gets connected with the cloud network.

B. Setting up the Software

The second step is to prepare the software for testing .For this purpose the software must be provided with some task with different parameter requirement so that the flexibility of the system can be tested. The performance has been checked with the following tasks and specifications.

Table 1: Task Management

NUMBER OF TASKS	RAM REQUIREMENT	PROCESSOR REQUIREMENT	TIME REQUIREMENT
50-100	1-2 GB	1.2-2.1 GHZ	10-60 ms / task

C. Execution of Processes

Executing the processes involves the allocation, execution. Allocation process finds the suitable thread to get the tasks executed and the process utilization estimation which briefs the system, how the work flow is going to be.

Result Analysis: The following results have been analyzed after the successful completion of thread execution.

Table 2: Result Analysis

LOC	DEPENDENCY	COSTING	ALLOCATION TIME	RESPONSE TIME
120 lines per segment (avg)	Per two block , there is one dependent block	1.87 GHZ processor is always busy	3 ms per task	5 ms is the response time including the allocation time

The above computation has been done over window's azure cloud. The future aspects of this work would be to compare the result of the same scenarios with other cloud computing networks.

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