An interoperable framework for cloud development & estimation using Cloud Client

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Abstract
With the development of parallel computing, distributed computing as well as the grid computing, a new computing model appeared which is called as the Cloud Computing. The cloud computing has various characteristics such as service oriented, loose coupling, strong fault tolerance, business model & ease of use but

despite that cloud computing has some cons such as interoperability and it makes the software development task more complex. This paper focuses on providing framework for integrating the cloud provider with the software developer to develop software as per cloud platform and also Cloud point metric has also been proposed for the estimation .

I. Introduction

Cloud computing is not a total new concept; it is originated from the earlier large-scale distributed computing technology. However, it will be a subversion technology and cloud computing will be the third revolution in the IT industry, which represent the development trend of the IT industry from hardware to software, software to services, distributed service to centralized service. Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the datacenters that provide those services. The services themselves have long been referred to as Software as a Service (SaaS). The datacenter hardware and software is what we will call a Cloud. When a Cloud is made available in a pay as-you-go manner to the general public, which called a Public Cloud; the service being sold is Utility Computing. The term Private Cloud is used to refer to internal data centers of a business or other organization not made available to the general public. The main advantage of Cloud computing is the flexibility which makes it distinguishable from grid or utility computing and SAAS (Software As a Service).[1]

This ability to launch new instance of application with minimum lab our & expense allows application providers to:

- Scale up & down rapidly.
- Recover from a failure
- Bring up development or test instance
- Efficiently load test an application

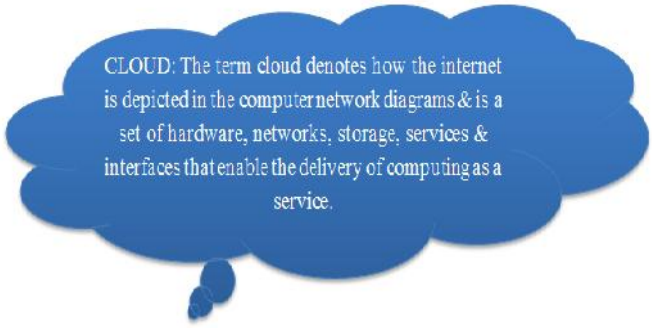

Figure 1: Cloud

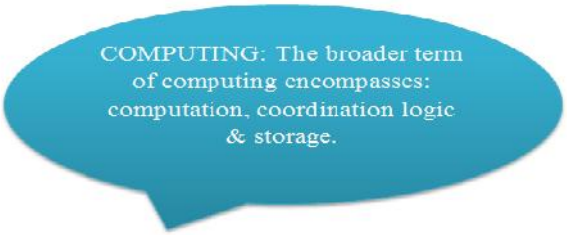

Figure 2: Computing

This paper analyzes impact of cloud computing platform on software engineering process to develop quality software (SW). Economies of all developed countries depend on quality SW and SW cost is more than hardware (HW) cost. Moreover because of the involvement of many parties, SW development is inherently a complex process and most of the SW

Software As A Service (SAAS)
Platform As A Service (PAAS) (Cloud computing Implementation)
Infrastructure As a Service (IAAS) (Virtualization, Storage)
Hardware As a Service (HAAS)

project fails because of lack of communication and

Fig 3: Cloud Computing Services

coordination between all the parties involved. This this paper extends the existing SDLC model termed as Internet Speed Development and keeping in mind to provide interoperability among cloud provider & software developer the model is modified and termed as Extreme Cloud Development model.

II. Cloud computing services

Cloud computing unlike traditional computing provides the computing facility the client by means of various services that are handled by different cloud vendors or cloud providers. One cloud provider may have multiple clients as well. Various services provided by cloud computing are shown in Fig 3. [2]

Software as a Service (SaaS)

Software is presented to the end user as a service on demand usually in a browser. It saves the users from the troubles of software deployment & maintenance. The software is often shared by multiple tenants, automatically updated from the clouds, and no additional license needs to be purchased. [3] It is a model of software deployment wherein a provider delivers its service to the user on demand basis. Example: - Google Apps.

Platform as a Service (PaaS)

It delivers a computing platform & solution stack as a service. It hides all the complexity of managing the underlying hardware, provides all the facilities required to support the complete lifecycle of building & deploying the web application and services entirely from the internet.[4] Platform as a Service (PaaS) is a way to rent hardware, operating systems, storage and network capacity over the Internet. The service delivery model allows the customer to rent virtualized servers and associated services for running existing applications or developing and testing new ones.

Infrastructure as a Service (IAAS)

It is also referred to as the resource cloud. Consumers control and manage the system in terms of the operating systems, applications storage and network connectivity but don't themselves control the cloud infrastructure. IaaS delivers a platform virtualization or network equipment; clients instead buy those resources as a fully outsourced service. Amazon S3, SQL Azure are the examples of IaaS.

Hardware as a Service

Hardware as a Service, also known as (HaaS), provides your business with the ability to provide a complete end-to-end managed service solution, which can include anything necessary to bring a client's network into today's technology. This can include servers, desktops, notebooks, infrastructure components, licensing, and much more, all in a monthly, recurring revenue based solution, with no up-front costs. Hardware as a Service (HaaS), in a managed services context, is a procurement process similar to licensing. Generally speaking, a managed service provider (MSP) remotely monitors and administers hardware on a client's site on a subscription basis.

III. Software Engineering

Today, software takes on a dual role. It is a product and, at the same time, the vehicle for delivering a product. Software delivers the most important

product of our time—information. Software transforms personal data (e.g., an individual's financial transactions) so that the data can be more useful in a local context; it manages business information to enhance competitiveness; it provides a gateway to worldwide information networks (e.g., Internet) and provides the means for acquiring information in all of its forms. Software Engineering: (1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. (2) The study of approaches as in (1). The software development is carried out by means of Software Development Life Cycle which consists of various stages such as requirements gathering, planning, designing, coding, testing & integration. [5]The whole development process from conceptualization till the operation is called as the SDLC process in software engineering. There are various SDLC models such as Waterfall, Incremental, Spiral, RAD, XP model & Internet Speed Development model. Here in this paper Internet Speed Development is described in detail.

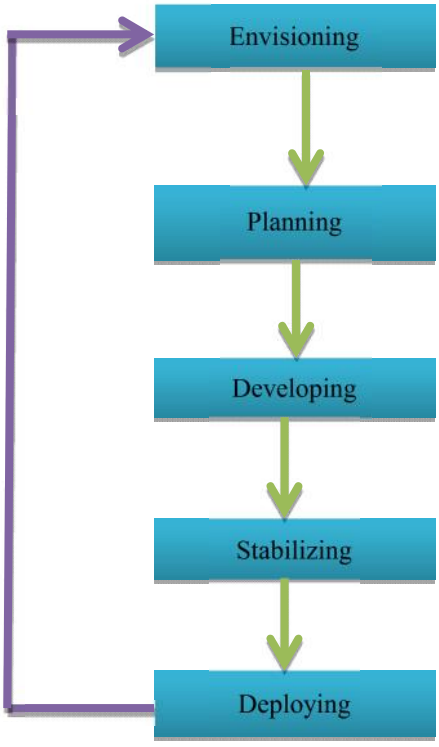

Figure 4 Internet Speed Development Model

Envisioning

This phase is concerned with specifying the requirements of the software to be developed as well as we define the goals and constraints regarding the same. After collecting the information we create vision or scope that at what extent it can be used and hence we develop the software for the same.

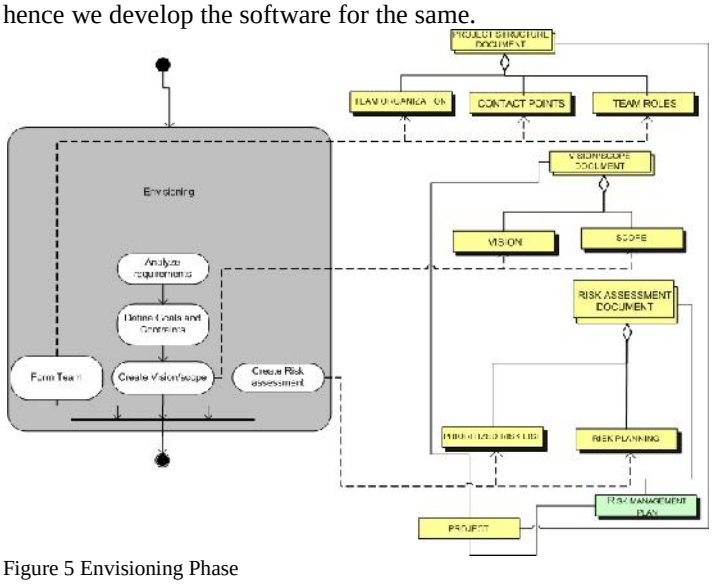

Figure 5 Envisioning Phase

Planning

In this phase we define the requirements and create planning whereby we estimate risks, estimate costs, create work plans as well as schedule is created. Besides this we also trace the requirements to the features and define the functional specification. At last we create the use case model where the role of different actors is involved.

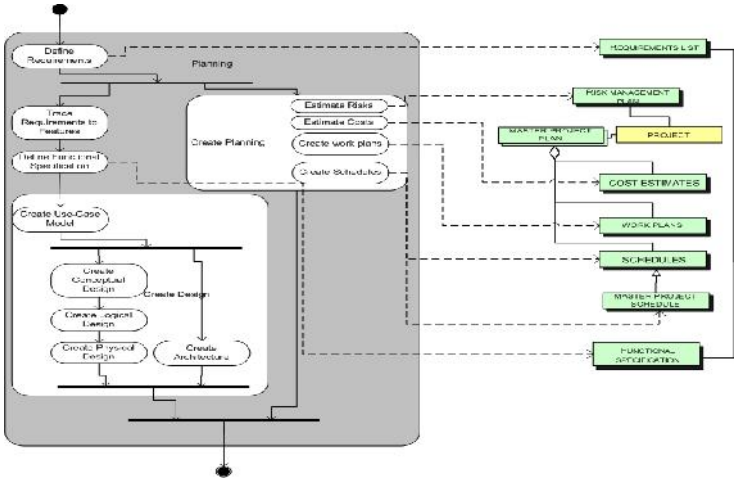

Figure 6 Planning Phase

Developing

After the planning phase in this phase the design procedure is followed and some features are developed, thereby daily build is created, finalize the scope as well as we also develop the instruction.

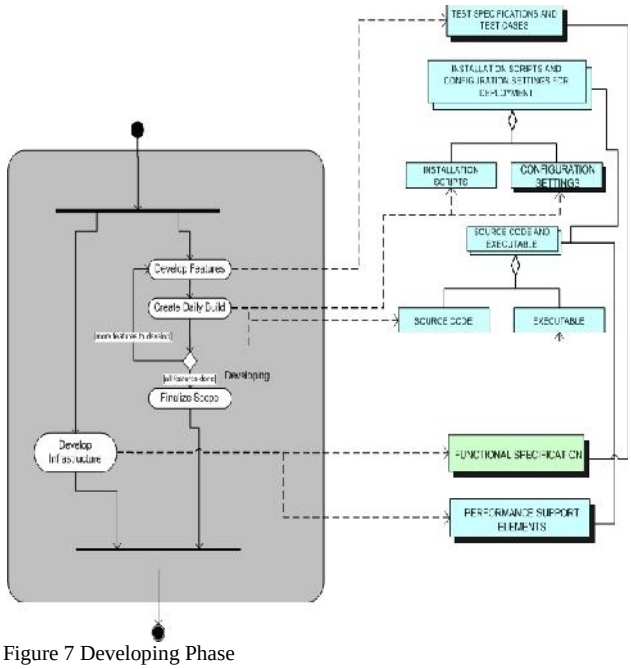

Figure 7 Developing Phase

Stabilizing

Software being developed by the developer needs to be tested for the bugs or any faults and that thing is done in the stabilizing phase. The software is tested by the tester and necessary precautions are taken to resolve those bugs occurring using various test cases and the tools and finally after resolving bugs review is done to again conform, whether any bug is there or not.

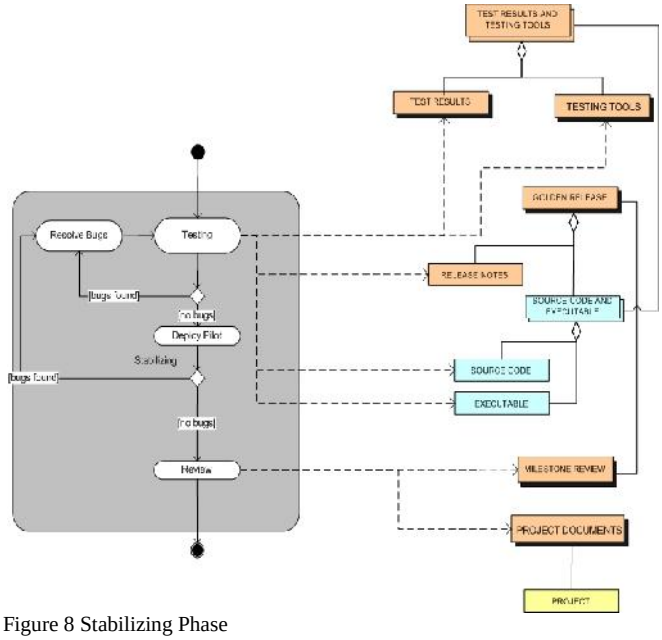

Figure 8 Stabilizing Phase

Deploying

This is the final stage where the tested software is finally implemented using various tools and techniques.

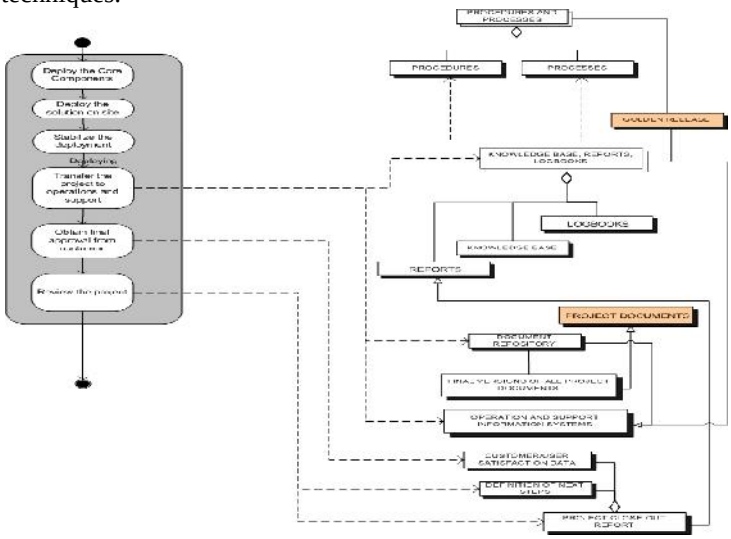

Figure 9 Deploying Phase

IV. Proposed Model

Some kind of Innovation is needed in the software engineering to leverage all the benefits of cloud computing & mitigate its challenges strategically to push forward its advances. Here in this paper I have proposed an extended version of Internet Speed Development model for cloud computing platform

and name it as Extreme Cloud Development model. We know that cloud computing allows sharing of resources hence in this software aspect is also included. The software that needs to be developed to be implemented on the cloud computing platform requires the fulfilling the needs of the cloud provider i.e.: what kind of s/w is to be developed & the software Developer develops the software in the general phenomenon for general use. To develop the software to be implemented on cloud computing platform the software Developer must be guided at every level including from initial phase of planning till the last phase. In this model like the original one all the phases i.e.: Envisioning, Planning, Developing, Stabilizing & Deploying are the same but with the addition of role of cloud provider along with the Software Developer at every level & backtrack facility from deploying phase to the envisioning phase. Interface Design, Software architecture, software architecture to Hardware architecture mapping, data types Design, cost estimation and schedule estimation of the project all should be done in collaboration with the cloud provider. The Software Developer and the cloud provider are separated based on their roles or responsibilities and in described in the table1.

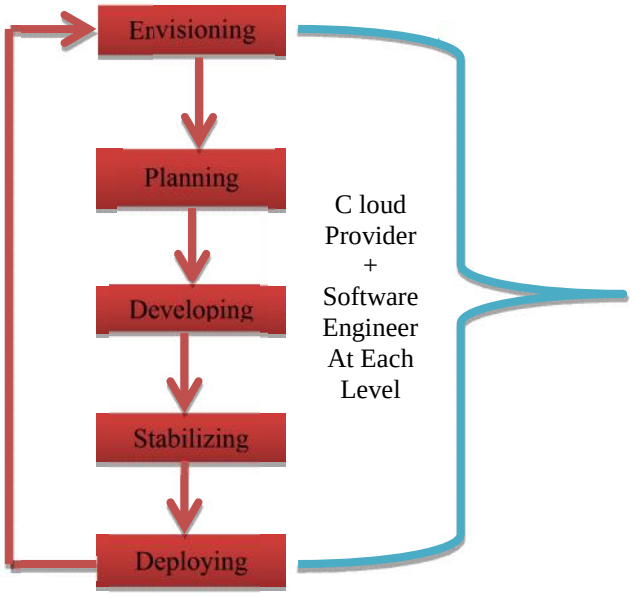

Figure 10 Extreme Cloud Development Model

Table 1
Roles separating Software Developer & Cloud Provider

Activities	Roles or responsibilities	
	Software Developer	Cloud Provider
Envisioning	Elicitation	Resource Accounting
		Virtual Machine
Planning	S/w Modules, Data Types Interface Design, Resource Estimation.	S/w H/w Architecture, Component Reuse
Developing	Coding, Web Service Integrity	Details of implementation
Stabilizing	Unit & Integration Testing	Integration Test
Deploying	Obtaining approval from Customer	Operation & Management

In order to estimate the cost of the proposed model here we also need to develop the metric for the same or integrating the software to fit with the existing metrics or modifying that particular metrics. All I have done in this paper to estimate the cost of the product in terms of human resource required I have developed a metric called as Cloud Point. Cloud point is mostly used model for cost estimation of various SW development projects. Feature Points are calculated using the following parameters including the additional parameter of Cloud Computing whose value is chosen hypothetically.

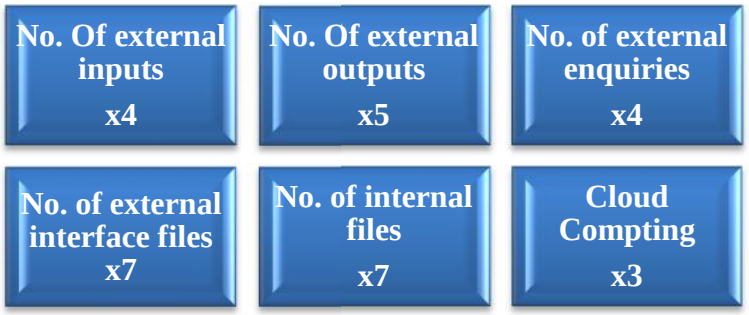

Figure 11 Parameters for Cloud Point Estimation

Formulae:
UFeC= 4*NEI+5*NEO+4NEQ+7NEIF+7NILF+3NCC

Note: Above formulae is used for cost estimation of proposed model.
The UFeC in function point calculation is used to calculate the feature point.

V. Conclusion

Cloud computing is a modern technology over the traditional way of developing and deploying of software. This technology inspite of benefits will surely make software engineering more difficult as the software developer needs to be interacted with the third party called as the “cloud provider”. The amount of work required for developing software will reduce but there will be added communication and coordination requirement with the cloud provider which makes software development project more complex & costlier hence much more experienced developers are required. The main focus of this paper

is that the prevalent SW process models should incorporate this new dimension of interaction with the cloud provider and separate roles of SW engineers and cloud providers at every stage. Also a metric called as Cloud point is used including the Cloud Computing parameter in order to estimate the cost of the software product in terms of man power or human resource.

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