

# Decision Making Framework in e-Business Cloud Environment Using Software Metrics

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## **Abstract**

*Cloud computing technology is most important one in IT industry by enabling them to offer access to their system and application services on payment type. As a result, more than a few enterprises with Facebook, Microsoft, Google, and amazon have started offer to their clients. Quality software is most important one in market competition in this paper presents a hybrid framework based on the goal/question/metric paradigm to evaluate the quality and effectiveness of previous software goods in project, product and organizations in a cloud computing environment. In our approach it support decision making in the area of project, product and organization levels using Neural networks and three angular metrics i.e., project metrics, product metrics, and organization metrics*

## **IndexTerm**

*cloud computing, decision making, eBusiness, prediction, software metrics, RBF, Genetic algorithm*

## **I.Introduction**

Cloud Computing plays a significant role in e-business process via internet. Business transactions fully based on electronically. Huge enterprises needed to access the data processing and data accuracy due to large number of users. Software organization needs to develop quality software in global market competition. Software plays an important role in middleware for E-Business interoperability and the practice for enterprise application integration. With the rapid development of cloud-computing based E-Business, the size and complexity of software products are continuously increasing as a result of continuously increasing their functionalities, requirements, improvements, modifications, etc.

Software metrics define, collect, and analyze the data of a measurable process and these facilitate the understanding, evaluation, control, and improvement of the software product procedure for E-Business. In traditional E-Business systems, to provide measurement about the schedule, work effort, and product size among indicators, various software metric methods are proposed from different views.

In a cloud computing environment, traditional software metric approaches have inherent shortcomings, such as the lack of systematic software metrics, the lack of integral metrics indicators, and the lack of a standard data collection process. Moreover, traditional approaches depend on the key people of the project team and their experiences.

We need to maintain the user interface till the last stage of the processing. During the software process metrics become a Critical role to measure the development and maintenance of software using effective and efficient data's [1]

Several programs need to build quality software in developing stages it may consume large amount of time and resources [2].

Monitoring is most important one to improve the software process and product utilization it tries to focus on (G/Q/M) approach. This approach identified the focus of a problem for an organization [5]

## II. RELATED WORK

Several researches on software metrics to be conducted in past decades it leads to different approaches and ideas. It aims to improve the software process and development. GQM are one of the most famous measurement methods. It extends the approaches and framework [8], both functionality and complexity of a problem represented in orthogonal manner to provide the measurement size of a software system.

The implementation of software metrics using supporting tools and methods [9] several current metrics able to fit the metric-driven software process [10] GQM represented the Software life cycle deals all the type of software metrics from any stages like store, model [11] software metrics used to estimate and predict the future projects such as techniques, risk and cost. Classification of techniques used to predict the risk in different stages [12]

comparing the cost and project plans from earlier projects to make plan for future projects evaluating the software performance using intelligent techniques [13] patters are most important one to compare the similarity of a different patters with code metrics as predictors for code analysis in future projects [14] Based on the preventive software its shows the efficient of bug prediction [15]

Software metrics grouped in several categories they are statistical, machine learning[16], neural networks[17][18] and decision making methods[19]this models working based on relationship between input and output data.

Decision making approach widely used for project managers for planning and directing software activities NASA project data estimating the software effort using RBF [17] Neural network is one of the best method to estimate and predict the cost of a software [20]

## III. HYBIRD METRICS FRAMEWORK

In this section, a hybrid frame work based GQM used to evaluate the quality efficiency of the previous software's like products, projects and development for a cloud based ebusiness. Hybrid Frame consists of several layers they are Given Below

- 1) Management Console Layer. It mainly used for supervising and analyzing the data to be collected in cloud computing based framework.
- 2) Data Process Layer. It consists of several tasks to be validating the data to be collected from across the cloud resources.

- 3) Metrics modeling Layer. After receiving the formatted data from the data layer to be compute and exports to the metrics Database
- 4) Metrics Output Layer. It generates the relevant results based on the user request and presents as a report to the project Manager

#### **A. Management Console for Cloud**

It defines the rule for collecting different data from cloud Resources includes the access management of the data and authorization functionality to control the role of permission in Software QA. The Metrics process will reviewed and report will generated to the software developer.

Data access management provides the data access and control the information of the metrics and its related jobs. In hybrid framework it consists of two different data access they are automatic and manual data access. SQAG will need to configure the URL of software repositories and the parameter of URL.

This configuration information will be stored in metadata. Manual data access Framework will accepts the two different types of files, they are Excel and comma-separated value (CSV) files, basically the comma files are used to stored data.

The automatic metrics jobs configuration is based on triggered by the time. Manual metrics will triggered anytime based on user needs. Task Monitors will measure the metric jobs and monitor will triggered once the metric jobs is executed

#### **B. Data processing**

Cloud resource consists of several raw data across the software repositories or external files to pre-processing from data process layer .It includes several activities they are data collection and data validation .The analysis process includes data transferring and data formatting.

Several processing will perform using different data like testing and coding analysis, bug trackingwith help of different data sets.Raw data will consider as a both structured and non-structured. Every fixed period of times data collections will be triggered by timers.

Data validation is needed to check the data from the collection of process to meet the requirements. Some data's are wrong, invalid or error. Unqualified data will eliminate and ensure the effectiveness of data. The data's are structured into XML or Java Script.

Data transferring the formatted data to domain model, source data and domain data will found in localMeta data.

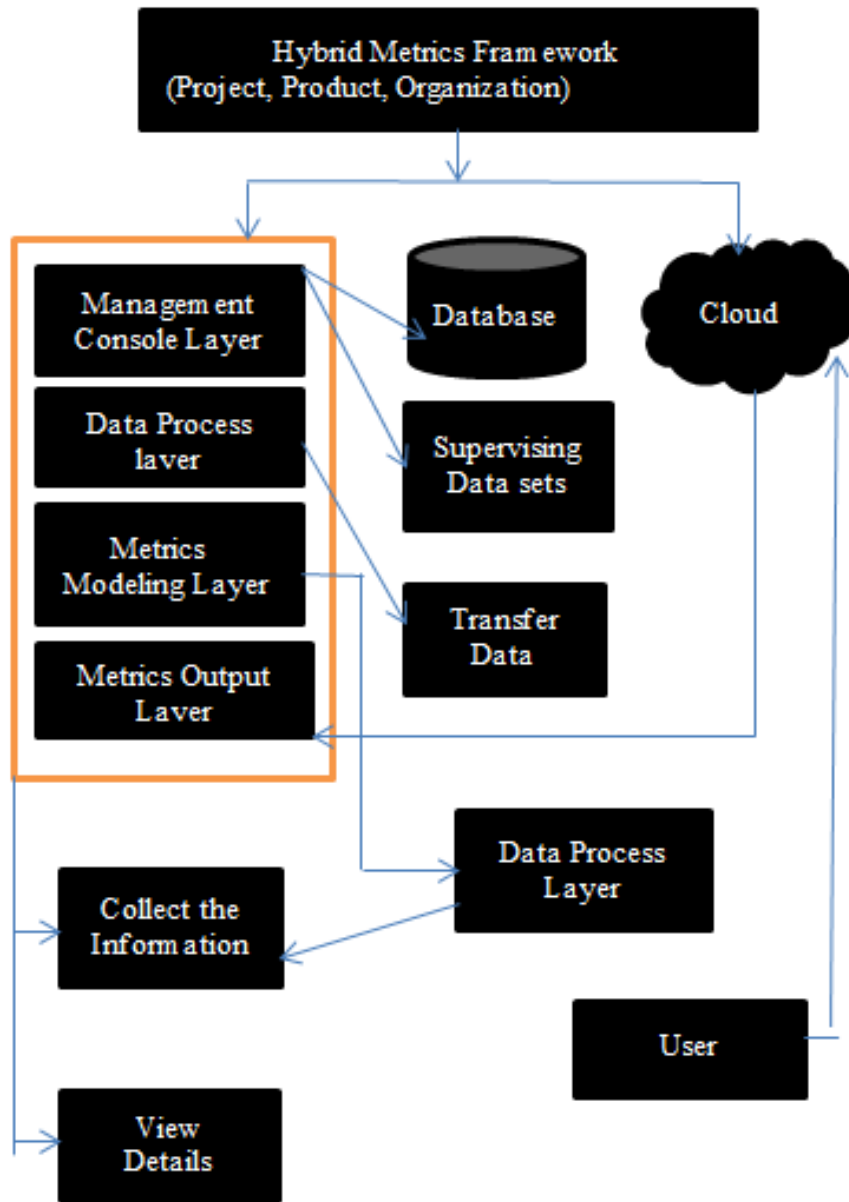


Figure 1:Hybrid Metrics Framework

### C. Domain Specific Cloud Metrics

Domain models consists of data process layer, metrics model layer and the processing of each layer data's are stored in metric database. There are two types of metrics model basic and derivative metrics model.

In basic model it generate the computing from domain model directly, in derivative model it generate through basic metrics model and Variety of resource available in cloud areaAfter metrics

process to be completed, all the data's are stored in metrics databases it used to review the historical data of software product and experience of the development.

The average productivity and code duplication is the process calculating the computational resources.Lines of code have been calculated based on metrics indicator, computed from basic metrics lines of code.

Duplication rate is indicating based on two domain models, project lines of code and command lines of code. Each code of lines will be measured by the software metrics to find the optimal values.

Average productivity

$$\frac{\text{all lines of code per month}}{\text{the number of people in the oraganization}} \times 6 \text{ months}$$

Code duplication rate

$$\frac{\text{Reused lines of code}}{\text{all lines of code}} \times 100\%$$

### C. Decision Making Metrics

Decision making is fully based on angular metrics and relevant metrics by their reporting tools. The role of decision maker to analysis and generate the ideas based on the reporting .There are different types of metric tools are available.

## IV. THREE ANGULAR METRICS

In hybrid framework it consists of three different angular metrics, they are project metrics, product metrics and organization metrics. Each metrics used to analysis and produce high quality software. The GQM leads to define the goal of organization whether goals has been reached or not. It helps to identified the solutions of different question

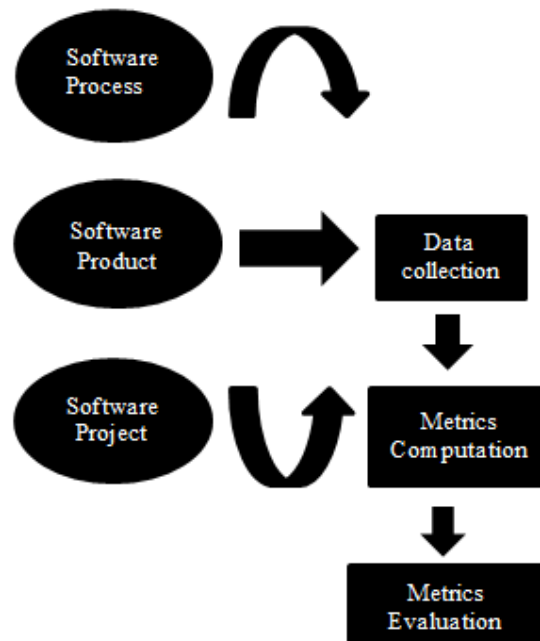


Figure 2: Software Metrics Process

#### A. Project metrics in hybrid Framework

Project metrics is used to control and manage the Situation of the project and status. This metrics will analysis the old projects and measure the drawbacks Andtime management of future projects. Based onThe Reportssoftware developer andorganization willmake adecisionto adjust the plan to produce high quality software.

#### B. Product Metrics in Hybrid Framework

It is used to predict the software product while itEvaluate the metrics process. Several metrics areApplicable like testing, coding, design.

#### C. Organization Metrics in Hybrid Framework

Organization Metrics process is based on theMeasurement of product and its development to improve the quality of software and regulating the process in proper manner to produce high quality software.

#### V. RBF Algorithm with Genetic algorithm

Radial basis Function (RBF) model is similarly related to the neural network with approximation of a non-linear function widely used to decision making. Many basis functions are available in linear and Gaussian function.

Three different layersare available in RBF. Such as input layer, hidden layer and the output layer, the hidden layer only transforms the intermediate function from input vector. Other two layers are based on the input functions. It helps to find out the optimal solutions to make a decision.

Hidden layer will hide the center process of information between input and output layer. While using the genetic engineering process chromosome, neurons will connected with neural network dramatically.

The centers and width of hidden layer neurons defined by two input patterns are coded and moved into the chromosome. It shows the basic function of neurons coded with parameter to provide the freedom of an optimal solution.

It helps to avoid the risk of getting stuck in weights between input and hidden layers. The outcome will be more efficient than optimal solutions.

## VI. CONCLUSION

Cloud computing has been successful Implemented in several sectors like Business, government and industry to defined the collaborative environment and service via internet eBusiness. In hybrid framework it extracts three different processes to evaluate the metrics for developing high quality software.

Project metrics, product metrics, organizationlevel metrics will combinearound all levels in cloud computing Environment. It helps to make a decision based on the metrics outcome. In future RBF model used to enable appropriate the cloud vendor dynamically using the decision making process.

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