Quality Factor Analysis for Reuse of Software Components

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Abstract – Now a days Reuse is broadly used to develop new system. Software reuse term used to reutilize and reapplying structure, design and code to develop new application. Our ongoing work motivated primarily to reuse software components from an existing system. For reusing any component is highly dependent on the quality of component, so quality analysis is more important. The proposed model discusses various factor of reusability to maintain quality efficiently for improve reusability. It is very easy to reuse code or module but when we want to reuse design, model/diagram, domain knowledge, human mind etc both technical and non-technical problems are present. The basic idea is that, reusable component have quality factors like analysis, time, reusable component etc. We want to analyze quality which increase reuse and decrease cost and time of software development.

Keywords- Reusable Software Components, Reusability, Analysis, Time, Complexity, Usefulness, Reusable Component, Reuse Libraries.

I. INTRODUCTION

Main approach of this paper by using reusable software component we reduce the costs and time of software development. It can be useful to any life cycle software development.

The basic motivation of this approach is to find out reusable software component by reviewing data and save time and efforts. This algorithm is capable to identify up to 40% remarkable reusable components from the set of components.

Reusable properties of software are as under.

![Diagram of Reusable Properties of Software](image)

II. ALGORITHM FOR REUSE SOFTWARE COMPONENT

In this section we will discuss an algorithm for reusability for software components. We can apply same algorithm for all the properties of reusable software as discussed in the above Fig. - 1.

Step-01 Start
Step-02 Decide objective for reuse
Step-03 Gathering requirement for reuse
Step-04 Examine existing component with different test
Step-05 Select components which satisfy the desired need
Step-06 Put opted component in general / reusable library
Step-07 Count reuse occurrence for every component.
Step-08 Revise component library with attribute time and cost.
Step-09 Check whether revise component fits or not for definite criteria.
Step-10 Decision taking by re-user that component selected or rejected for reuse.
Step-11 Stop.

III. ANALYSE QUALITY FOR REUSABILITY

Quality needs more attention, because if we may use hundreds of reuse component but if any one component is weak then overall quality may break down whole software. That’s why we need to focus on effective quality for reusability.

There are varieties of reusable artifact types, functions and techniques are utilized for design, management and continuous maintenance.

The hierarchy starts with top level to achieve overall goal of the organization. Middle level selects the factors concerned in measuring the quality of the software components. And Bottom level defines the various methods to meet the overall goal.

The quality measuring process depends on various factors for reusability. Formation of the problem is discussed in figure-2.
Above factors will decide how many components would fulfill quality with saving time and code. The sequences to identify quality factors are as under.

1. In First phase re-user will collect various factors from existing reusable components, study it deeply with system study, design, model, GUI, database structure etc.
2. In Second phase re-user will find how we can save our time by using existing code or model for new software applying some matrix.
3. In Third phase re-user will determine the Efficiency of factors and how re-user can take maximum benefit of those components. We also generate report for potential quality analysis.
4. In the Fourth phase re-user will study available reports, put maximum focus on quality and then decide whether this component is selected for reuse or not.

IV. Available Major Components to be Reused

Database: Existing system may have one or more table design which we can re-use with validation and constraint like Customer, Item, Sales, and Purchase etc. [With quality factors]

Design: New component’s design may remain same like top, middle and bottom frame penal, menu style and logo style, buttons and links etc [With quality factors]

Coding: New component may apply same coding as existing software has like module for database connectivity, validation, basic functionality like convert figure into words etc [With quality factors]

Performance: In our paper targeted aim is to maintain quality and re-use the component without any error. To increase performance of the new software component we must check extensibility, reliability, testability, security, maintainability etc. [With quality factors]

V. Measure Quality Factors

It is very difficult to determine which components should be used by re-user. Following are the list of quality requirement factors.

- Ability
- Extensibility
- Maintainability
- Interoperability
- Performance
- Protection
- Security
- Testability
- Usability

Let us take an example how to measure quality for reusable component.

1. X is a Total No of components selected by all existing systems. \( X \xrightarrow{lim} \infty \)
2. No of Factors = 4
   \[ 4X \text{ is a Total No of combinations of components} \]
   \[ \& \text{Factors} = 4X \]
3. Y is Total No of such combinations rejected while measure quality factors
   \[ 4X - Y \leq 0.4X \]
   \[ 4X - 0.4X \leq Y \]
   \[ Y \geq 4X - 0.4X \]
   \[ Y \geq 3.6X \]

After analyse above formula we should say that when we are using above formula we are always getting \( \leq 40\% \) remarkable components out of selected existence components Let us discuss same things using following figure-3

VI. Conclusion

It is fact that quality requirements are often less negotiable than any other requirements. The fundamental inspiration of this approach is to reduce the time and cost spent by the re-user to recognize and meet the requirements of the component for quality of reusability. The fundamental factors used for identify and meet the requirements of component to reuse is like Time, Code/Design, Complexity and Usefulness that can be broken down into more experimental stuff. This paper gives an insight vision of reusability factors for component based system and practical evaluation of these factors on various existing components. In the next phase, it should be going to apply the proposed analysis on major systems to analyse the merit and demerit. It is our aspiration that, next time we may add few more reusable factors and find improved quality which will provide more complete measures.
VII. REFERENCES


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No of Components reused by re-user

Provides Evidence for used Quality Factors

<table>
<thead>
<tr>
<th>Time</th>
<th>Code/Design</th>
<th>Complexity</th>
<th>Usefulness</th>
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Pass to Factors for Existence of Quality

Selected Component for re-use

Existing System-1

Existing System-2

Fig. – 3 No of Components reused by re-user