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A Study on Defect Identification in Sofware Engineering

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ABSTRACT

Software Engineering is an engineering branch related to the evolution of software product using well-defined scientific principles, techniques, and procedures. The result of software engineering is an effective and reliable software product. There is a testing phase in software engineering.A bug could be in either a program's source code or its design. We can easily find the bugs in the softwareprogram. Bug finding tool is needed to find out the defects in the software program.To test the software product,bug tool is most helpful.Bug tools is used to identify the flaws in the software.In this article ,let us discuss about the various software bug tools and how the tester is using this tool to test the software.

Keywords:Bug, Software, Factors, Developers

1.INTRODUCTION

Software engineering is the study of disciple to develop the software.To make the complete software,first we need to identify that the product which has been developed by the developer without any bugs.To identify the bugs,bug tool plays a vital role in the software development process.It is possible to rectify the few errors by the tester within the small duration but it is impossible to find out enormous amount of errors within the short duration of time.Since,bug tool is very useful to clear the flaws in the software.

1.1Tester Vs Debugger

Testing is performed by Testers and Debugging is performed by developers (debuggers).

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1.1.1 Testers

Testers performs testing and make sure that system is working as expected.Testers performs various types of testing (Unit, Integration, User acceptance, Stress, Load, performance etc.) as per requirements.Testers could plan, design and execute the testing.Testers identifies the defects in the system under test.Testers reports the defect to developers to get it fixed. Testing is a process of identifying the failure of implemented code.

1.1.2 Debuggers

Debuggers (developers) performs debugging to fix the defect in system.Debuggers debugs the defect based on its type and remove the same from system.Debuggers could not force the process the debugging.Debuggers identifies the root cause of the defects.Developer fix the issue in debugging.Debugging is a process to provide the resolution to code failure.

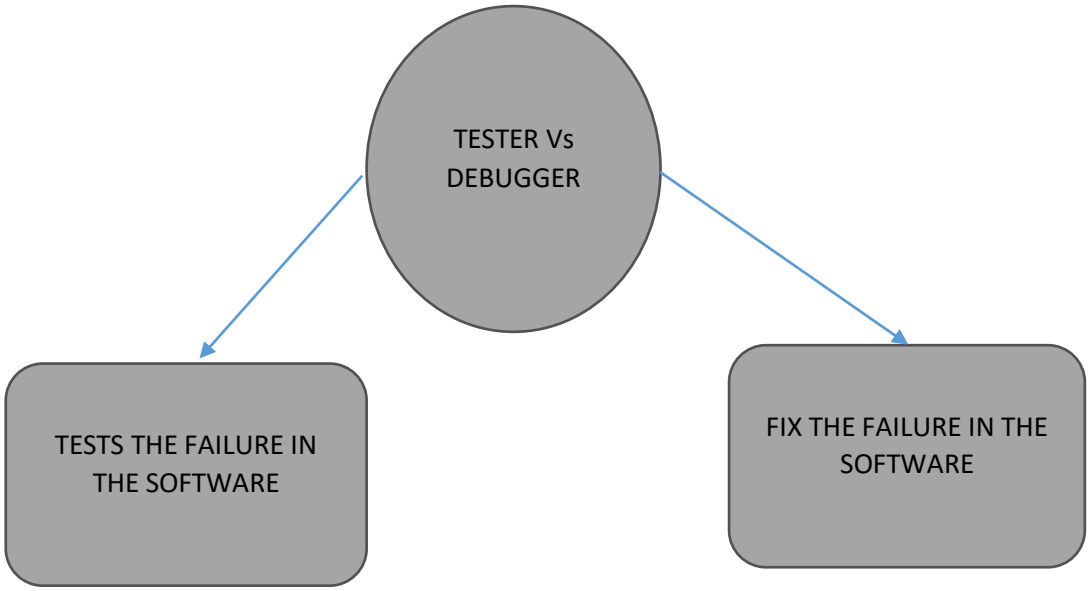


Figure 1:Difference for tester and debugger

1.2 SOFTWARE QUALITY FACTORS

There are several software qualities such as correctness,completeness and efficient of the software product.

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1.2.1 McCALL'S FACTOR MODEL

This model classifies all software requirements into 11 software quality factors. The 11 factors are grouped into three categories – product operation, product revision, and product transition factors.

- **Product operation factors** − Correctness, Reliability, Efficiency, Integrity, Usability.
- **Product revision factors** − Maintainability, Flexibility, Testability.
- **Product transition factors** − Portability, Reusability, Interoperability.

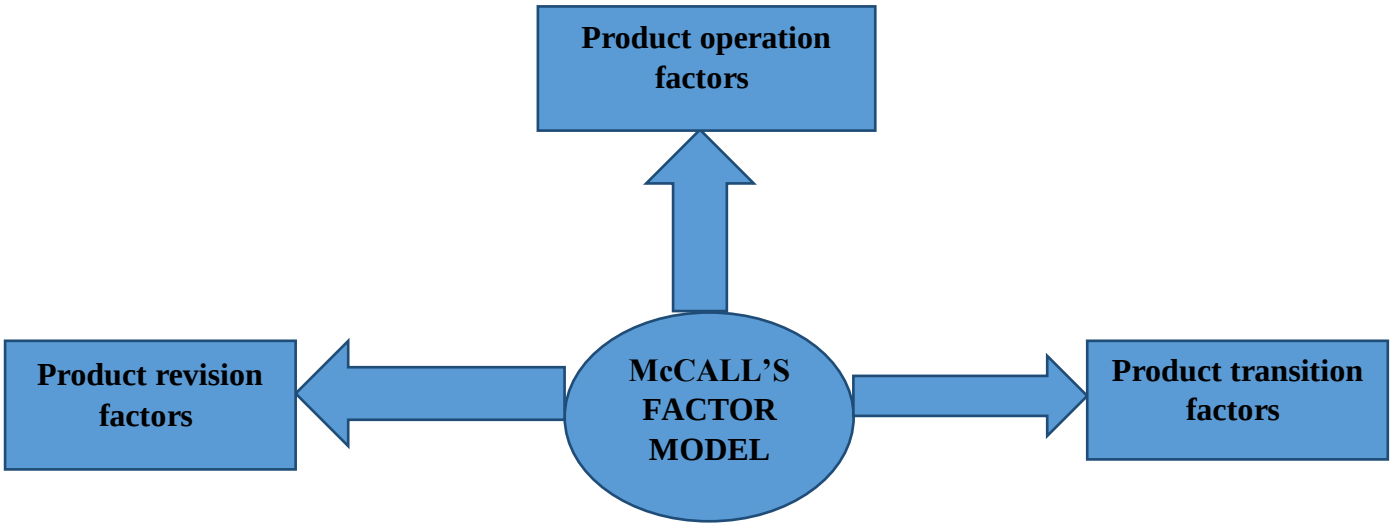


Figure 2:McCall's Factor Model

1.2.1.1 Product Operation Software Quality Factors

According to McCall's model, product operation category includes five software quality factors, which deal with the requirements that directly affect the daily operation of the software. They are as follows –

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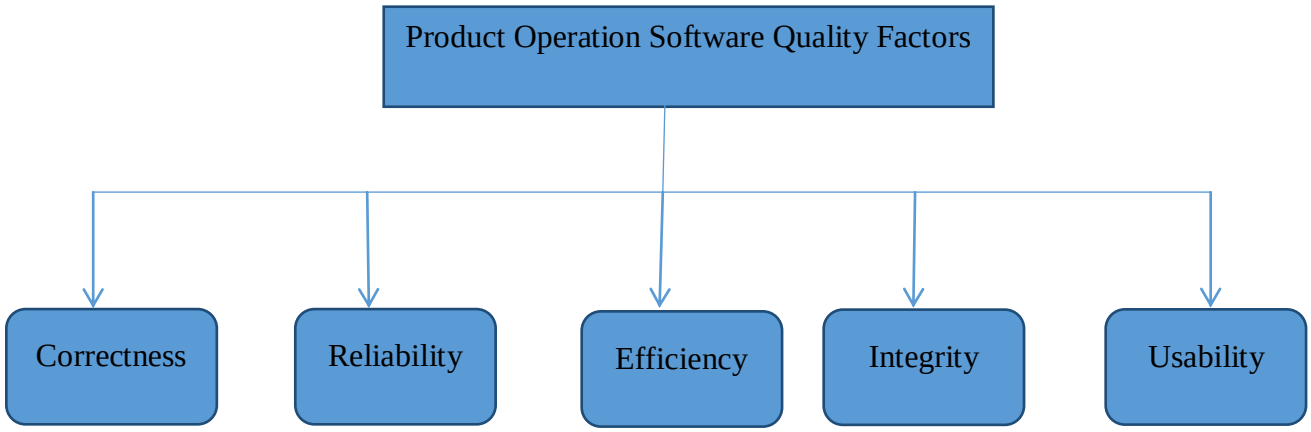


Figure 2.1:Product Operation Software Quality Factors

Correctness

These requirements deal with the correctness of the output of the software system. They include

- Output mission
- The required accuracy of output that can be negatively affected by inaccurate data or inaccurate calculations.
- The completeness of the output information, which can be affected by incomplete data.
- The up-to-dateness of the information defined as the time between the event and the response by the software system.
- The availability of the information.
- The standards for coding and documenting the software system.

Reliability

Reliability requirements deal with service failure. They determine the maximum allowed failure rate of the software system, and can refer to the entire system or to one or more of its separate functions.

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Efficiency

It deals with the hardware resources needed to perform the different functions of the software system. It includes processing capabilities (given in MHz), its storage capacity (given in MB or GB) and the data communication capability (given in MBPS or GBPS).

It also deals with the time between recharging of the system's portable units, such as, information system units located in portable computers, or meteorological units placed outdoors.

Integrity

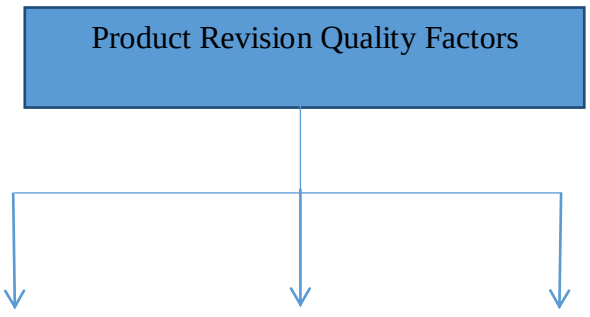
This factor deals with the software system security, that is, to prevent access to unauthorized persons, also to distinguish between the group of people to be given read as well as write permit.

Usability

Usability requirements deal with the staff resources needed to train a new employee and to operate the software system.

1.2.1.2 Product Revision Quality Factors

According to McCall's model, three software quality factors are included in the product revision category. These factors are as follows –



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Figure 2.2:Product Revision Quality Factors

Maintainability

This factor considers the efforts that will be needed by users and maintenance personnel to identify the reasons for software failures, to correct the failures, and to verify the success of the corrections.

Flexibility

This factor deals with the capabilities and efforts required to support adaptive maintenance activities of the software. These include adapting the current software to additional circumstances and customers without changing the software. This factor's requirements also support perfective maintenance activities, such as changes and additions to the software in order to improve its service and to adapt it to changes in the firm's technical or commercial environment.

Testability

Testability requirements deal with the testing of the software system as well as with its operation. It includes predefined intermediate results, log files, and also the automatic diagnostics performed by the software system prior to starting the system, to find out whether all components of the system are in working order and to obtain a report about the detected faults. Another type of these requirements deals with automatic diagnostic checks applied by the maintenance technicians to detect the causes of software failures.

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1.2.1.3 Product Transition Software Quality Factor

According to McCall's model, three software quality factors are included in the product transition category that deals with the adaptation of software to other environments and its interaction with other software systems. These factors are as follows –

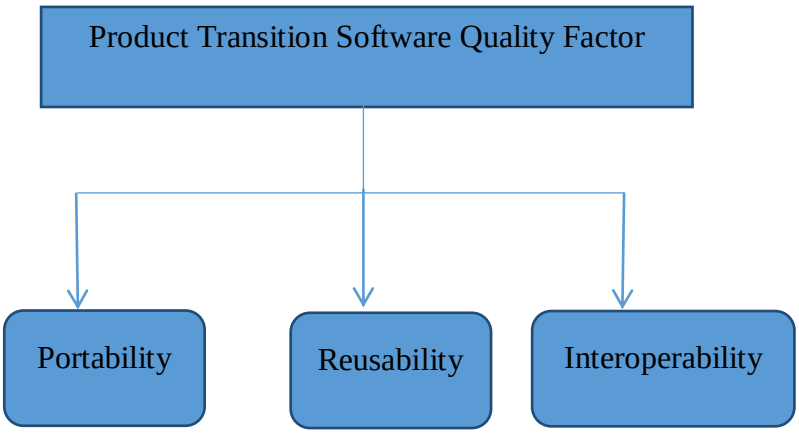


Figure 2.3:Product Transition Software Quality Factors

Portability

Portability requirements tend to the adaptation of a software system to other environments consisting of different hardware, different operating systems, and so forth. The software should be possible to continue using the same basic software in diverse situations.

Reusability

This factor deals with the use of software modules originally designed for one project in a new software project currently being developed. They may also enable future projects to make use of a given module or a group of modules of the currently developed software. The reuse of software is expected to save development resources, shorten the development period, and provide higher quality modules.

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Interoperability

Interoperability requirements focus on creating interfaces with other software systems or with other equipment firmware. For example, the firmware of the production machinery and testing equipment interfaces with the production control software.

2. DEFECT IDENTIFYING TOOLS:

2.1 BackLog

Backlog is a popular bug and project tracking tool in one platform. It's easy for anyone to report bugs and keep track of a full history of issue updates and status changes. Development teams use Backlog to work with other teams for enhanced team collaboration and high-quality project delivery.

- Easy bug tracking tool
- Search and advanced search features
- Full history of issue updates and status changes
- Project and issues with subtasks
- Git and SVN built-in
- Gantt Charts and Burndown charts
- Wikis and Watchlists
- Native mobile apps
- Kanban-style boards for visual workflow

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2.2ReQtest

ReQtest is a cloud-based bug tracking tool with the easiest way to handle bug. It helps to capture, track & manage bugs and issues. The tool allows you to preview bug reports without any clicks. ReQtest allows seamless integration with JIRA to handle bugs in JIRA or ReQtest or both.

- Preview bug reports without any clicks
- Charts for visual presentation of bug reports
- Built-in filters to quickly find specific bug reports
- Drag & drop any column to get a grouped view of your bug reports
- Single-page-view of bug reports without any long scrolls
- Visualize large amounts of data in bar or pie chart in a single click
- Create powerful reports by export the charts to Word, Powerpoint, etc.

2.3BugZilla

BugZilla is a popular bug tracking tool. These tool is an open source software and provides some great features like

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- E-mail notification for change in code
- Reports and Charts
- Patch Viewers
- List of bugs can be generated in different formats
- Schedule daily, monthly and weekly reports
- Detect duplicate bug automatically
- Setting bug priorities by involving customers
- Predict the time a bug may get fixed

2.4RedMine



It is an open source bug tracking tool that integrates with SCM (Source Code Management System) too. It supports multiple platforms and multiple data-bases while for reporting purpose, Gantt charts and calendar are used. Redmine is a project management web application developed using Ruby on Rail framework. Some of the RedMine features include

- Gantt chart and calendar
- News, document and files management
- SCM integration
- Issue creation via e-mail
- Multiple database support
- Flexible issue tracking system
- Flexible role based access control
- Multilanguage support

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2.5Trac

Trac is a web based open source issue tracking system that developed in Python. It is the superior version of wiki and used as the issue tracking tool for software development projects. You can use it to browse through the code, view history, view changes, etc. when you integrate Trac with SCM. It supports multiple platforms like Linux, Unix, Mac OS X, Windows, etc. A time-line shows all current and past project event in order while the roadmap highlights the upcoming milestones.

2.6 HP ALM/ Quality Center

HP ALM is a complete test management solution with a robust integrated bug tracking System within it. HP ALM's bug tracking mechanism is easy and efficient. It supports Agile projects too. It is an expensive tool and may not be very friendly with all the web browsers.

2.7Bugnet

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It is an open source issue tracking system that is written using Asp.Net platform and requires MySQL as a database. It has got everything that is required for creating projects, issues and managing them efficiently. It is free but the pro-version is licensed and commercial.

Main features

- Email notification
- Issue management
- Support multiple projects and databases
- Excellent Security
- Online support community
- Project and milestone management
- Easy navigation and administration
- Online support community

2.8DevTrack

DevTrack is not specially designed as a regular bug tracker tool. It has a wide range of function but can be considered for defect tracking system.

Main features

- Automatically route issues to appropriate users
- Email notifications
- Help team members to track and resolve issues
- Create and assign sub issues
- Import and authenticate users from Active directory

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Like the above defect tools,there are some other defect identifying tools such as Salesforce , FogBugz,The Bug Genie,Lighthouse,Zoho bug tracker,BugHost,Collabtive,TeamFoundation Server,IBM Rational ClearQuest,Unfuddle , eTraxis, Axosoft, JIRA,Mantisetc.which performs different features and these tools are most helpful to the tester

CONCLUSION

This article explains about the few software defect tools.Software defect tools is very useful for software implementation.Furthermore software defect tools will be designed and developed by the developer in the upcoming days and this makes the tester to rectify the defect in the short duration and to deliver the software to the end user.

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