

Unit-9

Software Quality Assurance

Software quality:

Quality software means that software which does exactly what the user wants it to do. Software quality can be defined in terms of the following quality factors:-

Correctness: The extent to which a program satisfies specification and user objectives.

Reliability: The extent to which a program can be expected to perform its intended function with required precision.

Efficiency: The amount of resources required by the software.

Integrity: The extent to which access to software or data by unauthorized person can be controlled.

Usability: The effort required to learn, operate, and prepare input and interpreter.

Maintainability: The effort requires locating and fixed an error in an operational program.

Testability: The efforts require to test a program to ensure its performance and intended function.

Flexibility: The effort require to modify an existing system

Software Quality Assurance

Software Quality Assurance (SQA) is simply a way to assure quality in the software. It is the set of activities which ensure processes, procedures as well as standards are suitable for the project and implemented correctly.

Software Quality Assurance is a process which works parallel to development of software. It focuses on improving the process of development of software so that problems can be prevented before they become a major issue. Software Quality Assurance is a kind of Umbrella activity that is applied throughout the software process.

Generally the quality of the software is verified by the third party organization like international standard organizations.

Software Quality Assurance (SQA) encompasses:

- SQA process
- specific quality assurance and quality control tasks (including technical reviews and a multitiered testing strategy)
- effective software engineering practice (methods and tools)
- control of all software work products and the changes made to them
- a procedure to ensure compliance with software development standards (when applicable)
- measurement and reporting mechanisms

Elements of Software Quality Assurance:

Standards: The IEEE, ISO, and other standards organizations have produced a broad array of software engineering standards and related documents. The job of SQA is to ensure that standards that have been adopted are followed and all work products conform to them.

Reviews and audits: Technical reviews are a quality control activity performed by software engineers for software engineers. Their intent is to uncover errors. Audits are a type of review performed by SQA personnel (people employed in an organization) with the intent of ensuring that quality guidelines are being followed for software engineering work.

Testing: Software testing is a quality control function that has one primary goal—to find errors. The job of SQA is to ensure that testing is properly planned and efficiently conducted for primary goal of software.

Error/defect collection and analysis: SQA collects and analyzes error and defect data to better understand how errors are introduced and what software engineering activities are best suited to eliminating them.

Change management: SQA ensures that adequate change management practices have been instituted.

Education: Every software organization wants to improve its software engineering practices. A key contributor to improvement is education of software engineers, their managers, and other

stakeholders. The SQA organization takes the lead in software process improvement which is key proponent and sponsor of educational programs.

Security management: SQA ensures that appropriate process and technology are used to achieve software security.

Safety: SQA may be responsible for assessing the impact of software failure and for initiating those steps required to reduce risk.

Risk management: The SQA organization ensures that risk management activities are properly conducted and that risk-related contingency plans have been established.

Software quality assurance focuses on:

- software's portability
- software's usability
- software's reusability
- software's correctness
- software's maintainability
- software's error control

Major Software Quality Assurance Activities:

SQA Management Plan:

Make a plan for how you will carry out the SQA through out the project. Think about which set of software engineering activities are the best for project. check level of SQA team skills.

Set The Check Points:

SQA team should set checkpoints. Evaluate the performance of the project on the basis of collected data on different check points.

Multi testing Strategy:

Do not depend on a single testing approach. When you have a lot of testing approaches available use them.

Measure Change Impact:

The changes for making the correction of an error sometimes re introduces more errors keep the measure of impact of change on project. Reset the new change to change check the compatibility of this fix with whole project.

Manage Good Relations:

In the working environment managing good relations with other teams involved in the project development is mandatory. Bad relation of SQA team with programmers team will impact directly and badly on project. Don't play politics.

Benefits of Software Quality Assurance (SQA):

- SQA produces high quality software.
- High quality application saves time and cost.
- SQA is beneficial for better reliability.
- SQA is beneficial in the condition of no maintenance for a long time.
- High quality commercial software increase market share of company.
- Improving the process of creating software.
- Improves the quality of the software.
- It cuts maintenance costs.

Software Reviews

Software Review is systematic inspection of software by one or more individuals who work together to find and resolve errors and defects in the software during the early stages of Software Development Life Cycle (SDLC). Software review is an essential part of Software Development Life Cycle (SDLC) that helps software engineers in validating the quality, functionality and other vital features and components of the software. It is a whole process that includes testing the software product and it makes sure that it meets the requirements stated by the client.

Usually performed manually, software review is used to verify various documents like requirements, system designs, codes, test plans and test cases.

Objectives of Software Review:

- To improve the productivity of the development team.
- To make the testing process time and cost effective.
- To make the final software with fewer defects.
- To eliminate the inadequacies.

Types of Software Reviews:

There are mainly 3 types of software reviews:

Software Peer Review:

Peer review is the process of assessing the technical content and quality of the product and it is usually conducted by the author of the work product along with some other developers.

Peer review is performed in order to examine or resolve the defects in the software, whose quality is also checked by other members of the team.

Peer Review has following types:

(i) Code Review:

Computer source code is examined in a systematic way.

(ii) Pair Programming:

It is a code review where two developers develop code together at the same platform.

(iii) Walkthrough:

Members of the development team is guided by author and other interested parties and the participants ask questions and make comments about defects.

(iv) Technical Review:

A team of highly qualified individuals examines the software product for its client's use and identifies technical defects from specifications and standards.

(v) Inspection:

In inspection the reviewers follow a well-defined process to find defects.

Software Management Review:

Software Management Review evaluates the work status. In this section decisions regarding downstream activities are taken.

Software Audit Review:

Software Audit Review is a type of external review in which one or more critics, who are not a part of the development team, organize an independent inspection of the software product and its processes to assess their compliance with stated specifications and standards. This is done by managerial level people.

Advantages of Software Review:

- Defects can be identified earlier stage of development (especially in formal review).
- Earlier inspection also reduces the maintenance cost of software.
- It can be used to train technical authors.
- It can be used to remove process inadequacies that encourage defects.