Importance of Software Testing in Software Development Life Cycle

Mohd. Ehmer Khan[1], Farmeena Khan[2]

**[1] Department of Information Technology,
Al Musanna College of Technology, Sultanate of Oman**

**[2] Department of Computer Science,
EIILM University, Jorethang, Sikkim, India**

Abstract

Software development life cycle is a structure imposed on the development of a software product. Software development life cycle is closely linked to what has come to known as structured analysis and design. Testing is an important part of software development. Testing should be started as early as possible to make it a part of a process of deciding requirement .The major role of testing involves checking, that there should be no discrepancy in the software development process anywhere throughout. In my paper I have explained various phases and importance of testing in software development life-cycle.

Keywords: *Software Development Life Cycle, Software Development Process, Software Testing*

1. Introduction

Software testing plays a vital role in the software development life-cycle to recognize the difficulties in the process very well. [1]

But before explaining the importance of testing in SDLC, I would like to explain different phases of software development process.

Phase 1 Requirement/Problem Definition: An investigation about requirement is conducted to state the problem to be solved. Main work in this phase is to determine the condition to meet for a new product or altered product. [2]

Phase 2 Specification: It describes the requested behavior of a required system. It also describes that technical requirement for software. It helps avoiding redundancy and inconsistency. Examples of functional specification are single UNIX specification and multi boot specification. [3]

Phase 3 Architecture: It defines the set of structures needed to understand the software system and elements of software. [4]

Phase 4 Software Construction: Development of user documentation for the system through the combination of coding, verification, testing (integration and unit) and debugging. The main fundamentals of software construction are: - [5]

1) Constructing for verification.
2) Minimizing complexity.
3) Anticipating change.

Phase 5 Software Design: Designing phase usually involves problem solving and planning up solution for software. The output of this phase will consist of the specification, which describes both WHAT (system will do) and HOW (it will work). [6]

Some of the main design concepts are:

1) Abstraction
2) Modularity
3) Data structure
4) Information hiding, and
5) Structural partitioning

Phase 6 Software Testing and Evaluation: It includes software testing, verification and validation of the system just built. Software testing can be implemented at any time in the development process .One of the most important purpose of testing is to detect software failures so that defects may be discovered and corrected. [7]

Phase 7 Debugging: Debugging is a necessary process in almost every new software or hardware development process. It is a process of finding and reducing the defects in a computer program or electronic hardware. Debugger is a debugging tool helps in identifying coding errors at various software development phases. [8]

Phase 8 Software Deployment and Maintenance: Deployment should be interpreted as a general process that

IJCSI International Journal of Computer Science Issues, Vol. 11, Issue 2, No 2, March 2014
ISSN (Print): 1694-0814 | ISSN (Online): 1694-0784
www.IJCSI.org

121

has to be customized according to specific characteristics and it starts after the code is properly tested and approved for release. [9]

Software maintenance includes error connections, enhancement of capabilities and optimization. [10]

Four main maintenance activities are:-

1) Adaptive Maintenance

2) Preventive Maintenance

3) Perfective Maintenance

4) Corrective Maintenance

2. Importance of Testing in Software Development Process

The major role of software testing involves that there should be no discrepancy in the software development process. According to one survey software errors costs U.S economy 0.6 percent of the gross domestic product and about 80% of the software development costs of a project are spent on identifying and fixing errors. [11]

Each software development life cycle has passed through a set of common phases one or more times. So starting activities early means we can catch small problems before they become big problems later on. Starting testing activities early also provides the chance to review requirements for important quality attributes, to ask questions and to resolve issues. There are three different testing phases in SDLC are: [12]

   i.   Test Analysis: tester tries to understand about the project.

   ii. Test Design: tester design the test cases based on user requirement.

   iii. Test Execution: tester execute the test cases and raise defects, if any.

Various types of testing involves throughout SDLC are: [1] [12]

   1. **Acceptance Testing:** Formal testing with respect to user needs, requirements, and business processes conducted to determine the acceptability of the system.

   2. **Ad-Hoc Testing:** It is performed without planning or documentation and its main work is to find errors that are not uncovered by other types of testing.

   3. **Alpha and Beta Testing:** Alpha testing is the testing done by test teams at development site after the acceptance testing. Beta testing carried out by real users in real environment.

   4. **Black Box Testing:** Black box testing is the testing technique whereby the internal workings of the item being tested are not known by the tester.

   5. **White Box Testing:** White box testing is the testing of a software solution's internal coding and infrastructure.

   6. **Automated Testing:** Using automation tools to write and execute test cases is known as automation testing.

   7. **Grey Box Testing:** Grey box testing is a software testing technique that uses a combination of black box testing and white box testing**.**

   8. **Integration Testing**: In integration testing the individual tested units are grouped as one and the interface between them is tested.

   9. **Regression Testing:** Regression testing means rerunning test cases from existing test suites to build confidence that software changes have no unintended side-effects.

   10. **Stress Testing:** Stress testing is a software testing activity that determines the robustness of software by testing beyond the limits of normal operation.

   11. **UAT (User Acceptance testing):** It is performed by the end users of the software**.** This testing happens in the final phase of testing.

   12. **Security Testing:** Security testing tests the ability of the software to prevent unauthorized access to the resources and data.
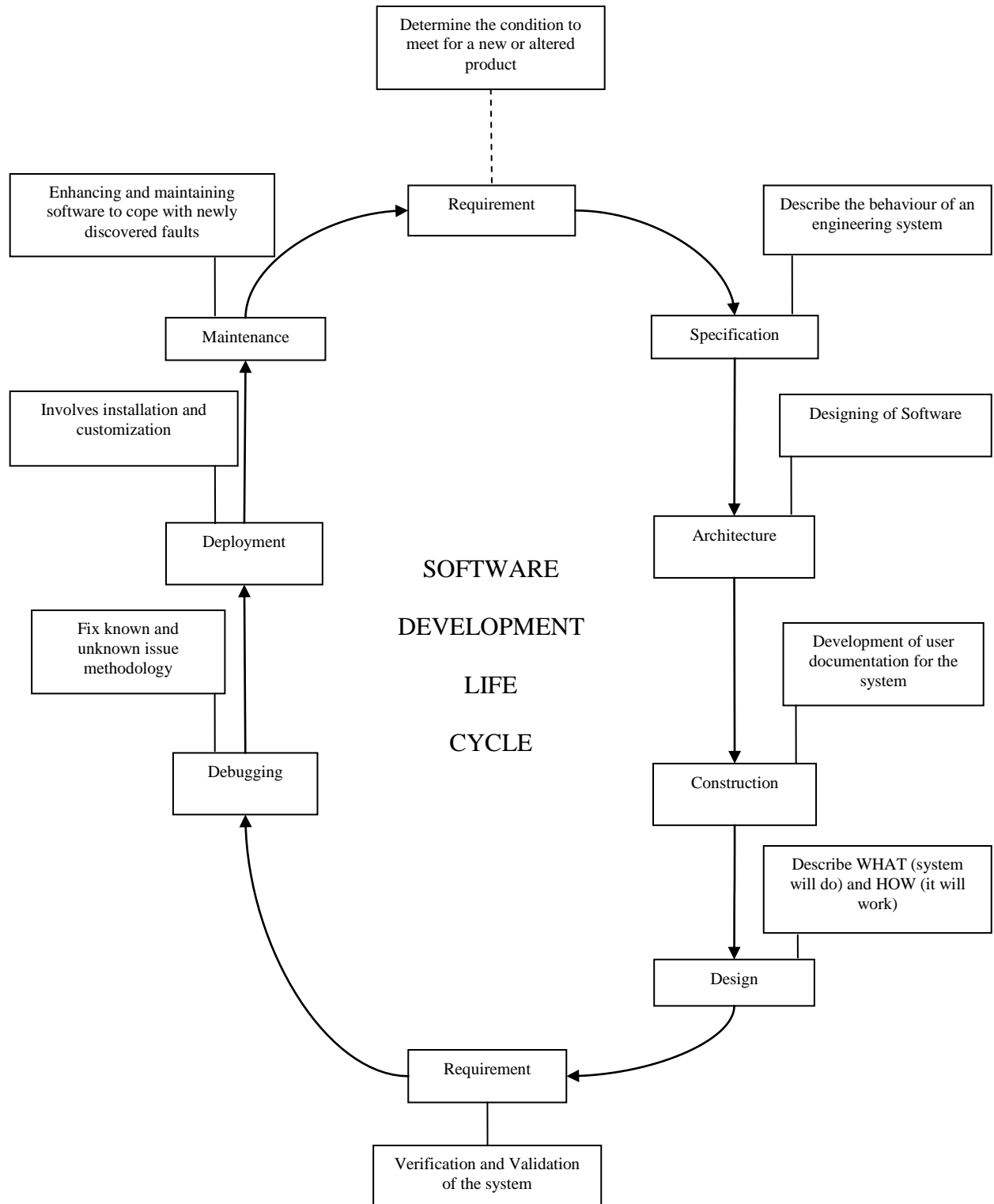
Fig. 1 Represent different phases of software development life cycle

IJCSI International Journal of Computer Science Issues, Vol. 11, Issue 2, No 2, March 2014
ISSN (Print): 1694-0814 | ISSN (Online): 1694-0784
www.IJCSI.org

123

13. Performance Testing: The goal of application performance testing is to appraise any user experience in realistic scenarios on our target application. In software engineering, performance testing is in general testing performed to determine how a system performs in terms of responsiveness and stability under every condition.

Hence, software testing is one of the major parts of the SDLC and it should be carried out effectively for the quality of the product. [1]

3. Conclusion

Software development life-cycle is a structure imposed on the development of a software product. There are different activities involved in SDLC such as requirement, specification, architecture, software-construction, design, software testing, debugging, deployment and maintenance. Software testing plays a vital role in each and every phase of SDLC. [12]

An effective and efficient testing will provide timely visibility into the quality and readiness of the system and its input artifacts that is necessary to enable effective decision making throughout the SDLC. In my paper, I have explained various phases of SDLC and importance of testing in each and every phase.

References:

[1] Introduction to software testing available at http://www.onestopsoftwaretesting.com/introduction-and-importance-of-software-testing-in-sdlc/

[2] Requirement analysis available at http://en.wikipedia.org/wiki/Requirements_analysis

[3] Functional specification available at http://en.wikipedia.org/wiki/Functional_specification

[4] Software architecture available at http://en.wikipedia.org/wiki/Software_architecture

[5] Software construction available at http://en.wikipedia.org/wiki/Software_construction

[6] Software design available at http://en.wikipedia.org/wiki/Software_design

[7] Software testing available at http://en.wikipedia.org/wiki/Software_testing

[8] Debugging available at http://en.wikipedia.org/wiki/Debugging

[9] Software deployment available at http://en.wikipedia.org/wiki/Software_deployment

[10] Software maintenance available at http://en.wikipedia.org/wiki/Software_maintenance

[11] Software development process available at http://en.wikipedia.org/wiki/Software_development_process

[12] Involve testing throughout the SDLC available at http://www.silverpath.com

Mohd. Ehmer Khan

I completed my B.Sc in 1997 and M.C.A. in 2001 from Aligarh Muslim University, Aligarh, India. I have worked as a lecturer at Aligarh College Engineering & Management, Aligarh, India from 1999 to 2003. From 2003 to 2005 worked as a lecturer at Institute of Foreign Trade & Management, Moradabad, India. From 2006 to present working as a lecturer in the Department of Information Technology, Al Musanna College of Technology, Ministry of Manpower, Sultanate of Oman. I am recipient of PG Merit Scholarship in MCA. My research area is software engineering with special interest in driving and monitoring program executions to find bugs, using various software testing techniques.

Farmeena Khan

I completed my BCA in 2003 from Dr. B. R. Ambedkar University, Agra, India and MBA in 2011 from Janardan Rai Nagar Rajasthan Vidyapeeth University, Rajasthan, India, and completed my M.Sc (Computer Science) in 2013 from EIILM University, Jorethang, Sikkim, India.