Polytechnic University of Tirana

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

10th Workshop " Software Engineering Education and Reverse Engineering "

Ivanjica, Serbia

Marin Aranitasi, Edit Kapcari, Griselda Kuzumi, Reinaldo Dado

---

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

► **Assignment 1 – Marin ARANITASI**
" REVIEW OF A REQUIREMENTS SPECIFICATION AND A GLOSSARY "

► **Assignment 2 – Edit KAPCARI**
" THE TEST CASE SELECTION PROBLEM AND STRUCTURE-ORIENTED TESTING USING SOTA "

► **Assignment 3 – Griselda KUZUMI**
" TEST CASE DETERMINATION BY THE CTE XL TOOL SUPPORTING THE CLASSIFICATION TREE METHOD "

► **Assignment 4 – Reinaldo DADO**
" PROBLEM OF SOFTWARE QUALITY AND SOFTWARE QUALITY MEASURMENT "

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

► Objective and Motivation

► Experience with Tools

► Efforts and Difficulties

► Team Work Experience

► Impressions and Suggestions

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

► Assignment 1 – Marin ARANITASI
" REVIEW OF A REQUIREMENTS SPECIFICATION AND A GLOSSARY "

► Assignment 2 – Edit KAPCARI
" THE TEST CASE SELECTION PROBLEM AND STRUCTURE-ORIENTED TESTING USING SOTA "

► Assignment 3 – Griselda KUZUMI
" TEST CASE DETERMINATION BY THE CTE XL TOOL SUPPORTING THE CLASSIFICATION TREE METHOD "

► Assignment 4 – Reinaldo DADO
" PROBLEM OF SOFTWARE QUALITY AND SOFTWARE QUALITY MEASURMENT "

Objective and Motivation

► This first assignment was intended to introduce us to our main case study of the course, which was subject to several topics of the lecture.

► This assignment was solved before the lectures started.

Assignment main goals:

► Understanding the purpose of a technical review.

► Writing a review protocol

Reviews

► **The purpose of a technical review is to evaluate a software product by a team of qualified personnel to determine its suitability for its intended use and identify discrepancies from specifications and standards.**

1. The first part of a review process consists of an individual preparation of the team members by reading the document individually.

2. The second part consists of several meetings where the team members jointly go through the document and discuss its problems.

3. Finally, a review protocol collecting the findings of the meetings will be produced.

Effort and Difficulties

Difficult and doubtful steps of the assignment:

► The detailed review of both documents Requirements Specification V2.3 and Glossary

► The comparison with each other

► Producing a Review Protocol, for each document, with certain standards

► The comparison of this protocol with IEEE Standard for Software Reviews

Team Work Experience

► Organization of different meetings

► The establishing of each member role in the technical review

► Different opinions collection

► The respect of each member opinion and role

► The successful fulfill of all requests of the assignment

Impressions and Suggestions

Assignment 1 benefits:

►The familiarization in advance with the main case study of the course

►Experience with different review protocols

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

►**Assignment 1 – Marin ARANITASI**
" REVIEW OF A REQUIREMENTS SPECIFICATION AND A GLOSSARY "

►**Assignment 2 – Edit KAPCARI**
" THE TEST CASE SELECTION PROBLEM AND STRUCTURE-ORIENTED TESTING USING SOTA "

►**Assignment 3 – Griselda KUZUMI**
" TEST CASE DETERMINATION BY THE CTE XL TOOL SUPPORTING THE CLASSIFICATION TREE METHOD "

► **Assignment 4 – Reinaldo DADO**
" PROBLEM OF SOFTWARE QUALITY AND SOFTWARE QUALITY MEASURMENT "

Objective and Motivation

Main Purpose:

Test-case selection

Find all possible test cases → Detect all problems

Software testing phase:
- ► *50% time&cost of Software Development process*
- ► *Expensive and even impossible*

Solution:

Structure-Oriented Testing and Analysis

Using SOTA and Eclipse

SOTA (After reading the manual)
- ► Easy to use
- ► Fast and structured reports

Eclipse (Already familiar)

SOTA and Eclipse
- ► Testing program – created using Eclipse
- ► Testing project – created using SOTA
- ► The project and the program should be named the same
- ► Eclipse and SOTA should have the same directory

Effort and Difficulties

Efforts:
- ► Well specified assignment requests
- ► Objective and motivation
- ► Software under test and Assignment tasks
- ► How to deliver the assignment
- ► Very useful manuals for the tools

Difficulties (Theoretical):
- ► Find minimal test cases--coverage measures 100%
- ► Interpret coverage measure results

Team Work Experience

The tasks were fulfilled as a combination of:
- ► Individual work

(understanding of the assignment, independent ideas)

- ► Team work

  Based on: Discussing and sharing ideas

                Argumentation of controversial opinions

                Better understanding and fast solution

Impressions and Suggestions

Impressions:

- ►Introduced with recent software testing tools
- ►Good way to complete the understanding of an important phase of software development process
- ►Enables a student to focus on details and get involved to find solutions

Suggestions:

- ►Teams should be created randomly to avoid subjectivity and to get a pure team work

---

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

► **Assignment 1 – Marin ARANITASI**
" REVIEW OF A REQUIREMENTS SPECIFICATION AND A GLOSSARY "

► **Assignment 2 – Edit KAPCARI**
" THE TEST CASE SELECTION PROBLEM AND STRUCTURE-ORIENTED TESTING USING SOTA "

► **Assignment 3 – Griselda KUZUMI**
" TEST CASE DETERMINATION BY THE CTE XL TOOL SUPPORTING THE CLASSIFICATION TREE METHOD "

► **Assignment 4 – Reinaldo DADO**
" PROBLEM OF SOFTWARE QUALITY AND SOFTWARE QUALITY MEASURMENT "

Objective and Motivation

This assignment is focused on the testing activity of the software development process.

Assignment main goals:

► Understanding Functional Testing

► Usage of Classification Tree Method (CTM)

► Usage of CTE XL (**C**lassification **T**ree **E**ditor e**X**tended **L**ogics) tool

Using CTE XL Tool

Classification Tree Method is very well supported by CTE XL tool.

We used CTE XL tool to:

   ► draw the classification tree
   ► select the test cases

Working with CTE XL was made easier because of:

   ► simple classification tree
   ► moderate number of test cases

Effort and Difficulties

Difficult and doubtful steps of the assignment:

► Determining the input domain of the software under test

► Determining the aspects for testing

► Creating the classification tree

► Deriving reasonable test cases

Team Work Experience

My team and I have organized different meetings to fulfill the task of the assignment.

Team work was very important because of:

► the impossibility to partition the work between team members

► the necessity to discuss about doubtful points

► the necessity to take decisions together

Impressions and Suggestions

Assignment 3 benefits:

► Materialization of the theoretical concepts given in the lecture

► Experience with the supporting tool (CTE XL)

Suggestions:

► Clarification and extension of the software component functionalities specification

► Extension of the task in order to use more functionalities and features of CTE XL tool

---

Experience with assignments at intensive course "Software Engineering" at Tirana 2010

► **Assignment 1 – Marin ARANITASI**
" REVIEW OF A REQUIREMENTS SPECIFICATION AND A GLOSSARY "

► **Assignment 2 – Edit KAPCARI**
" THE TEST CASE SELECTION PROBLEM AND STRUCTURE-ORIENTED TESTING USING SOTA "

► **Assignment 3 – Griselda KUZUMI**
" TEST CASE DETERMINATION BY THE CTE XL TOOL SUPPORTING THE CLASSIFICATION TREE METHOD "

► **Assignment 4 – Reinaldo DADO**
" PROBLEM OF SOFTWARE QUALITY AND SOFTWARE QUALITY MEASURMENT "

Objective and Motivation

*"SE is the application of a systematic, disciplined, **<u>quantifiable</u>** approach to the development, operation and maintenance of software"*

(IEEE Standard Glossary of Software Engineering Terminology, 1990)

Main goal of the assignment 4:

► Measure the quality of a software system

- Understanding the software metrics
- Usage of respective tools to measure them
- Interpreting the results

Metric Tools

► SOTA (Structured Oriented Test and Analysis)

- Coverage Measure analysis: metrics *FEEC, C0, C1, C2, C3, MMCC, BI* etc
- Static code analysis: metrics ***<u>cyclomatic complexity (MVG), lines of code</u>**, essential complexity, number of branches, condition statements* etc

► CCCC (C and C++ Code Counter)

- Software Metrics supported: ***<u>lines of code, cyclomatic complexity</u>**, object oriented metrics*

Software under test: *Error.java, Scanner.java*

Effort and Difficulties

Difficult and doubtful steps of the assignment:

► Comparison between the values of MVG and LOC derived from SOTA and CCCC

- $v(G) = e - n + 2$; $v(G) = p + 1$; $v(G) = R$

► Justify the high value of MVG (>10) for the respective methods

► Giving alternatives to improve the value of MVG

Team Work Experience

► Organization of several short meetings

- Share opinions
- Discuss the best alternatives
- Derive a fast solution

► Enjoy working in group and experiences with Metric Tools

Impressions and Suggestions

Benefits:

► Gain knowledge about software metrics and their classification

► Practicing the techniques of software quality measurement

Suggestions:

► Extension of the task to study other software metrics (Essential Complexity, Object Oriented metrics, Halstead metrics etc)

► Manual about metrics calculations for CCCC tool

THANK YOU !