Variants of student solutions to assignments concerning functional testing (classification tree method)

Michael Ritzschke
Humboldt-Universität zu Berlin
Department of Computer Science
Software Engineering

11th Workshop “Software Engineering Education and Reverse Engineering”
Ohrid, Macedonia, 22 August – 27 August 2011
Contents

- Lesson Functional Testing
- Tool CTE (Classification Tree Editor)
- Assignment “select test cases with classification tree method”
- Student Solutions: Examples
- Summary
The lesson Functional Testing

Topic 20
Functional Testing

DAAD Project
“Joint Course on Software Engineering”

Humboldt University Berlin, University of Novi Sad, University of Plovdiv,
University of Skopje, University of Belgrade, University of Niš, University of Kragujevac,
University of Timisoara, University of Zagreb, University of Tirana, University of Sarajevo,
University of Banja Luka, University of Rijeka, Polytechnic University Tirana

Part of this lecture has been presented as part of the course on “Software Engineering” at Humboldt University Berlin by
Joachim Wegner and Roman Pitschnitz (Daimler Chrysler).
First part of these slides are taken from E. Lehmann, J. Wegner: “Test Case Design by Means of the CTE XL.”, EuroSTAR’90, Copenhagen,
4-8 December 2000.

Version: May 24, 2010

Translation by Zoran Putnik

20. Functional Testing

a) Introduction
b) Guidelines for taskclasses
c) Use-case based approach
d) Analysis of boundary values
e) Classification Tree Method
f) Classification Tree Editor CTE
g) Complex example for CT Method
h) Model-based test: State automata
The lesson:
What means “Functional Testing”

Functional Testing

Main Point:
- Derive test cases from the specification of the software (requirements specification)
- The program is unknown (black box testing)
The lesson: Some Examples to explain the CT-method

Comp. Vision System: Identification of Shapes with typical properties
1: relevant aspects
2: test cases

Classification tree: covers all classifications and classes

1: Size = large, Color = red, Shape = circle
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Classification Tree Editor

eXtended Logics

free Version of CTE XL

the tool is popular amongst developers and testers and is successfully used in various domains

for possibilities see the link

www.systematic-testing.com

CTE, CTE XL, CTE Professional

Tool support for the classification tree method:

CTE (ca. 1995) implemented in C
CTE XL (ca. 2002) in Java
CTE Professional (2010)

www.systematic-testing.com
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Reminder of assignments

- Berlin: 8 assignments
- Novi Sad: 7 assignments
- Tirana: 4 assignments

<table>
<thead>
<tr>
<th>Assignments</th>
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<tbody>
<tr>
<td>1. Review requirements specification “SemOrg”</td>
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<td>2. Function points</td>
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<td>3. Review structured analysis model</td>
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<td>4. Develop an OOA model</td>
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<td>5. Formal specifications</td>
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<td>6. Metrics</td>
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<td>7. Select test cases functionally by the CTE</td>
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<td>8. Select regression test cases by ATOS</td>
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<td>9. Review of a assign solution of another team</td>
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<td>10. Test coverage with SOTA</td>
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Use cases of “Seminar Organisation”

3 Product overview

For each use-case:
Variety of typical Application scenarios, i.e. Many test-cases (normal and special cases)

Basis:
- verbal description
- formal description (e.g. Activity diagram)
The tasks for the students (teams)

- think about the possible inputs for the use case “booking”, find out classifications and classes
- study the tutorial of CTE to understand the main possibilities of the tool
- create a classification tree with the help of CTE
- find out necessary test cases for **Minimality Criterion** (every class must be represented at least once)
- find 3 additional „interesting“ test cases
Schema description of “booking”

Use case: booking  from registration to booking.
Category: primary
 Preconditions: -
Post condition success: client is notified.
Post condition failure: notification to clients that presentation is overbooked, or does not exist, or a booking for the client is already made.
Actor: client manager, client, company
Triggering event: client registration is available.
Description:
1 Client data retrieval
2 Presentation verification
3 Booking undertaking
4 Registration notification and sending invoice
5 Sending invoice copy to the accounts department
Extension:
-
Alternatives:
1a Inclusion of a new client
2a When the presentation is overbooked, to point out the alternative one
2b Notification of "false presentation", if the presentation does not exist

For each use-case: typical application scenarios lead to test cases.
Relevant aspects of “booking”

- the kind of the Seminar: company-internal, public
- kind of client: company, private
- registration status of client or company: available, obsolete, new
- kind of presentation: don’t exist, occurs, fully booked
- payment morale
- ...

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Example 1
Example 2

- flat hierarchy with element composition
Example 2

Compositions can summarize several classifications. The classes of several classifications, which are located under a composition, are not mutually exclusive. Classifications and more compositions can be created under a composition.
Example 2

- 3 test cases to fulfill Minimality Criterion
Example 3

- flat hierarchy without composition
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Example 1

- classification and classes: decomposition of the input space
  - not activities (check presentation, recall client data ...)
  - not outputs (send informations ...)

(Figure showing a decision tree or flowchart with nodes and branches indicating processes related to event checks and data handling)
Example 2

- incomplete test cases: question mark means that no class has yet been marked
Example 3

- 5 test cases necessary for Minimality Criterion
Example 4: inconvenient solution

- several identical classification and classes
Example 5: extremely extensive tree
Example 5

- type of data of the input space: digit, date, String ...
- possible mistakes in the input stream: not a number
Summary

- students learn how it’s possible to find test cases early in software development process
- there are many possibilities for the design of the CT, so we get different solutions
- work with a professional Tool
- think about useful test cases and about the minimal and maximal number
- the method is easy to understand
- students have further tasks
Entirely new CTE XL Professional

CTE XL Professional - For Even More Systematic Test Case Design

Dear Michael Ritzschke,

You are registered as a potential professional user of the CTE XL.

Therefore, we would like to inform you that Berner & Mattner has developed an entirely new classification-tree editor to cope with the growing demands from testing experts: the CTE XL Professional. Many feature requests desired from current users have been integrated.

The Eclipse based implementation features new major functionalities such as

- Prioritization of test cases based on weightings for test-relevant aspects
- Deterministic test case generation
- Statistical test case generation
- Significantly improved integration with IBM Rational DOORS and HP Quality Center
Thank you for your attention!