



School of Innovation,  
Design and Engineering

## Module I: Reading Assignments (INL2)

This document provides the instructions for the Module I reading assignments (INL2) in the DVA-434. The three assignments, when completed, correspond to 1 credit of the 7.5 credits in the course examination. Once you have completed all three reading assignments, please send your answers in a written report to [daniel.sundmark@mdh.se](mailto:daniel.sundmark@mdh.se).

### Assignment INL2.1: Faults, Errors and Failures

The objective of this assignment is to provide an overview of fault distributions in software engineering, and how one can analyze them in order to guide one's testing strategy.

#### Reading The Paper

In the assignment, you will read and answer a few questions based on an empirical software engineering study on fault distributions. The title of the study is "A Second Replicated Quantitative Analysis of Fault Distributions in Complex Software Systems", and it was published by Galinac Grbac, Tihana; Runeson, Per and Huljenić, Darko, in the IEEE Transactions on Software Engineering, vol.39, no.4, pp.462,476, April 2013.

In order to get started with the assignment, you first need to download the paper from the following link:

<http://www.promptedu.se/promptwp/wp-content/uploads/2014/11/Grbac13.pdf>

Please read the paper carefully.

#### Questions and Report

Once you have read the paper, please answer the following questions. Please note that multiple answers may be correct for the multiple choice questions.

1. What is meant by the "Pareto principle of fault distribution"
2. Which of the following claims are NOT supported by the results of the study?
  - a. If a module exhibits a lot of faults in lower levels of testing, it is also likely that it will exhibit lots of faults in higher levels of testing.
  - b. A small minority of software modules contains a large majority of the faults.
  - c. Larger software modules typically have a higher fault density.
  - d. If a module exhibits a lot of faults before release, it is likely to exhibit a lot of faults post-release as well.
3. Provided that the results of the study are true in the general case, which implications can be drawn from this?
  - a. It is only necessary to test the few modules that contain most of the faults.

- b. In system testing, it would be wise to pay special attention to the modules that exhibited lots of faults in lower levels of testing.
- c. It would be wise to pay special attention to larger modules in unit testing.
- d. If a testing strategy has been successful in terms of quality assurance in a previous project, it would be wise not to change it that much for the next similar project.
- e. It would be wise to pay special attention to the most complex modules in unit testing.

## Assignment INL2.2: Testing Fundamentals

The objective of this assignment is to provide a structured overview of the fundamentals of software testing.

### Reading The Paper

In the assignment, you will read and answer a few questions based on a seminal paper in the field of software testing. The title of the paper is “*Validation, verification, and testing of computer software*”. It was authored by Adrion, W. R., Branstad, M. A., and Cherniavsky, J. C., and published in the ACM Computing Surveys journal 14, 2, 159–192 in June 1982.

In order to get started with the assignment, you first need to download the paper from the following link:

<http://www.promptedu.se/promptwp/wp-content/uploads/2014/12/Adrion82.pdf>

Please read the paper carefully.

### Questions and Report

Once you have read the paper, please answer the following questions (in no more than 300 words in total):

1. According to the authors, why is testing theory one of the the most discouraging areas of testing research?
2. According to the authors, what are the essential components of a program test?
3. **Reflection:** Being published in 1982, this article is quite dated. In your view, what is the most obvious sign of the 30+ years age of the article? Or are all parts of it still valid and relevant?

## Assignment INL2.3: Alignment between Requirements and Testing

The objective of this assignment is to provide an overview of the interrelationship between requirements and testing, and to highlight some industrial challenges in this area.

### Reading The Paper

In the assignment, you will read and answer a few questions based on an empirical software engineering study on requirements alignment. The title of the study is “*Challenges and practices in aligning requirements with verification and validation*” It was authored by Elizabeth Bjarnason, Per Runeson, Markus Borg, Michael Unterkalmsteiner, Emelie Engström, Björn Regnell, Giedre Sabaliauskaite, Annabella Loconsole, Tony Gorschek and Robert Feldt, and published in the Springer Journal of Empirical Software Engineering, vol.19, no.6, pp.1809-1855, July 2013.

In order to get started with the assignment, you first need to download the paper from the following link:

<http://www.promptedu.se/promptwp/wp-content/uploads/2014/11/ReqAlgn.pdf>

Please read the paper carefully.

### **Questions and Report**

Once you have read the paper, please answer the following questions (in no more than 300 words in total):

1. According to the authors, what are the three main attributes of a high-quality requirement?
2. According to the authors, which are the practices that can be adopted to improve the quality of the requirements?
3. **Reflection:** In your view, which of the alignment challenges presented in the article is the most demanding to practically deal with? Why?