

### About ISEP:

One of the top schools of technology in Portugal, ISEP has been pioneering education and research in Engineering since 1852.

Our goal is to contribute to the achievement of sustainable development, by creating and transmitting applied knowledge. As future engineers, we believe our students can produce creative solutions for present or upcoming challenges, becoming agents of global progress.

ISEP offers a wide range of programmes in different fields of Engineering. With more than 6000 students, we believe each one is unique and has the ability to excel. Our job is simply to channel their potential with the spirit of entrepreneurship, team work, out-of-box thinking and technical expertise, key competences for a successful international career.



1. Figure - ISEP building

The School is also a trademark of Porto. This modern European city, known for its beauty, booming cultural agenda and strong traditional roots, is the Portuguese academic capital. Porto is also known for the friendly and cosmopolitan environment, which helps explain the large attraction of international students.

Along with renowned institutions, such as MIT (Massachusetts Institute of Technology), ISEP is a member of the international consortium CDIO (Conceive - Design - Implement - Operate) and has more than a hundred partnerships within the European Space of Higher Education.

Our school has an Informatics Engineering Master program with a branch in Software Engineering. This branch includes a course dedicated to software engineering quality where the students can learn and practice more advanced test methods, including test methods required for more critical systems in areas as avionics and automotive.

The introduction of Testwell CTC++ to the students in the software engineering quality course allowed the students to practice with those more advanced methods, to help students check the quality of their tests and to show how programs can be instrumented.

## CTC++ Coverage Report - Files Summary

[Directory Summary](#) | [Files Summary](#) | [Functions Summary](#) | [Untested Code](#) | [Execution Profile](#)

Symbol file(s) : MON.sym (Wed Mar 11 16:13:49 2015)  
 Data file(s) : MON.dat (Wed Mar 11 16:13:50 2015)  
 Listing produced at : Wed Mar 11 16:14:35 2015  
 Coverage view : Reduced to MC/DC coverage

Input listing : <stdin>  
 HTML generated at : Wed Mar 11 16:14:35 2015  
 ctc2html v4.2b2 options:  
 Structural threshold : **100** %  
 Statement threshold : **0** %

| TER % - MC/DC   | TER % - statement   | File                     |
|---|---|--------------------------|
| <b>Directory: .</b>   |   |                          |
| 81 % (13/16)         | 91 % (10/11)         | calc.c                   |
| 83 % (5/6)           | 86 % (6/7)           | io.c                     |
| 100 % (6/6)          | 100 % (6/6)          | prime.c                  |
| <b>86 % (24/28) </b> | <b>92 % (22/24) </b> | <b>DIRECTORY OVERALL</b> |
| <hr/>   |   |                          |
| <b>86 % (24/28) </b> | <b>92 % (22/24) </b> | <b>OVERALL</b>           |

Directories : 1  
 Source files : 3  
 Functions : 4  
 Source lines : 59  
 Measurement points: 27  
 TER structural : **86 % (24/28) MC/DC**  
 TER statement : **92 % (22/24)**

[Directory Summary](#) | [Files Summary](#) | [Functions Summary](#) | [Untested Code](#) | [Execution Profile](#)

2. Figure - HTML output of Testwell CTC++

Particularly important is the use of MC/DC to avoid the problem of multiple conditions. All this was possible not only in C++, but also in Java and C#, which was a great advantage of the tool.

```

Source file: calc.c
Instrumentation mode: multicondition   Reduced to: MC/DC coverage
TER: 63 % (10/16) structural, 82 % (9/11) statement

Hits/True False Line Source
-----
1 /* File calc.c ----- */
2 #include "calc.h"
3 /* Tell if the argument is a prime (ret 1) or not (ret 0) */
Top
3 4 int is_prime(unsigned val)
5 {
6     unsigned divisor;
7
8     if (val == 1 || val == 2 || val == 3)
9         return 1;
10    if (val % 2 == 0)
11        return 0;
12    for (divisor = 3; divisor < val / 2; divisor += 2)
13    {
14        if (val % divisor == 0)
15            return 0;
16    }
17    return 1;
18 }
***TER 63 % (10/16) of FILE calc.c
82 % (9/11) statement
Directory Summary | Files Summary | Functions Summary | Untested Code | Execution Profile
To files: First | Previous | Next | Last | Top | Index | No Index

```

3. Figure - MCDC coverage



ISEP  
 Instituto Superior de Engenharia do Porto  
 Prof. Alberto Sampaio  
 Rua Dr. António Bernardino de Almeida, 431  
 4249-015 Porto  
 Portugal  
<https://www.isep.ipp.pt/ISEP>

Testwell CTC++ is a tool and a trademark of Verifysoft Technology GmbH  
 For further questions please visit [www.verifysoft.com](http://www.verifysoft.com) and contact us at +49 781 127 8118-0

C Photos: ISEP and Verifysoft Technology GmbH