

Qt and TDD

The Question:

*Why should I study QtTest
instead of watching
“The Expanse” on Netflix?*

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Short Bio

I am the Author of the book:
Qt 5 Quanto Basta

And I am a Qt enthusiastic user since early 2000.

Currently I work for Datalogic as Machine Vision Technical Support and I use Qt to play with images, logs and private projects.

TDD Not For Me!

- **I Am Against Acronyms (I.A.A)**
- The first time I heard TDD it was 2012
- How can I test something that doesn't exists?
- It's not for me!

TDD is very popular

- 16Milion hit on Google
- The topic is really discussed
- Popular

... inescapable!

A screenshot of a Google search results page. The search bar contains the query "tdd". Below the search bar are navigation links: "Tutti" (highlighted in blue), "Immagini", "Video", "Notizie", "Libri", and "Altro". A red rectangular box highlights the text "Circa 15.500.000 risultati (0,29 secondi)". Below this, a snippet of a search result is visible, starting with "Il test-driven development (abbreviato in TDD), in italiano sviluppo guidato dai test o sviluppo guidato".



My First Time /1

- In 2014 I study it again
- During summer, I prepare the campaign
- The original inception?
 - “Test Driven Development: By Example”
 - Kent Beck, 2002
- Fully Charged in September 2014 I start!

My First Time /2

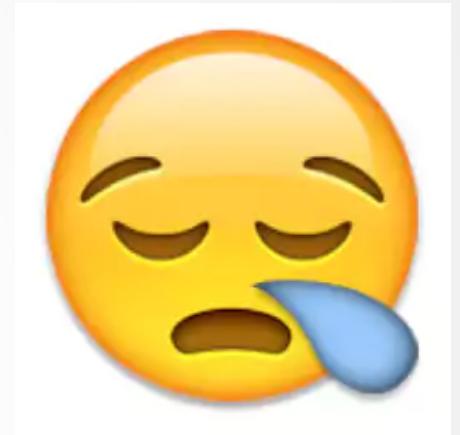
- I start from Qt Documentation
 - <http://doc.qt.io/qt-5/qtest-tutorial.html>
- And I try to implement the examples
 - Looks easy, what's the problem?

My First Time /3

- I try to do more and to create a library
 - A simple library to display information about images pixels
- I was in dream...
 - automatic building, testing, generating multiple targets (Linux, Mac, Windows, Raspberry ...)
- Creating my awesome library
- Unbelievable ... I was really up in the air!

My First Time /4

- October 2014 – I give up!
 - Just one month.
- Ok, I understand a few things:
 - the value of testing
 - create confidence
 - a bug fix lasting forever
- But it was clear again that ***TDD is not for me!***



Take away /1

- I learn a few lessons
- First: create projects:
 - Testing is 99% of time used for libraries
 - It needs a project where libraries and testing work together
 - It needs also to create a good structure to handle library, playground, testing.
- ***So before you start testing you need to understand how create projects with Qt.***

Take away /2

- The second lesson was the hardest:
 - Whatever you test your software, this doesn't means that it works.
 - It is like the joke about UNI-ISO 9000 Quality and Concrete Lifebelt.
- You can:
 - test every API in your code,
 - reach the 100% testing coverage,
 - but this don't means that you can turn a crappy code into a great or useful library.
- That was my case:
 - I create a library, that works, but not always, with nice testing, but with a very narrow scope, so... useless.

Take away /3

- Is TDD bringing Value to me?
- Where?
- Given a time budget, I think I should spend it for creating better libraries.
- Not for better testing.
- So again I fall down to: ***TDD is not for me!***

The Second time

The resistance is futile

... TDD is inescapable

The second time /1

- I stomp into “Bob Martin” or Uncle Bob
<https://blog.cleancoder.com/>
- After reading his blog and viewing a few presentation I get convinced that using TDD can in some cases deliver value also to me
 - *Well sometimes I think Uncle Bob was delivering value to his consultancy service...*

The second time /2

- The Citizenship Argument
 - <https://blog.cleancoder.com/uncle-bob/2018/01/18/TheCitizenshipArgument.html>
- It's not about being a good fellow,
- It's about time (do a project faster) and money (\$\$\$)
- This changes my mind!
 - I can sleep well even if I don't test 100% my code.
 - I can consider me a good citizen even if I create a library without test at all.

The second time /3

- But what push me to move was the article:

Giving Up On TDD

- <https://blog.cleancoder.com/uncle-bob/2016/03/19/GivingUpOnTDD.html>
- All my doubts are really common:
 - What test and what not
 - The green spot disease
 - And the learning curve.
 - I can't go from no test to 100% testing overnight

The second time /4

- Design testing is part of the design, and this why you should create test before coding.
- Think to testing during design time
 - Design for testability
- So it is the design that moves everything
- And I am the designer, so I have to decide what deserve a test and what no.

The second time /5

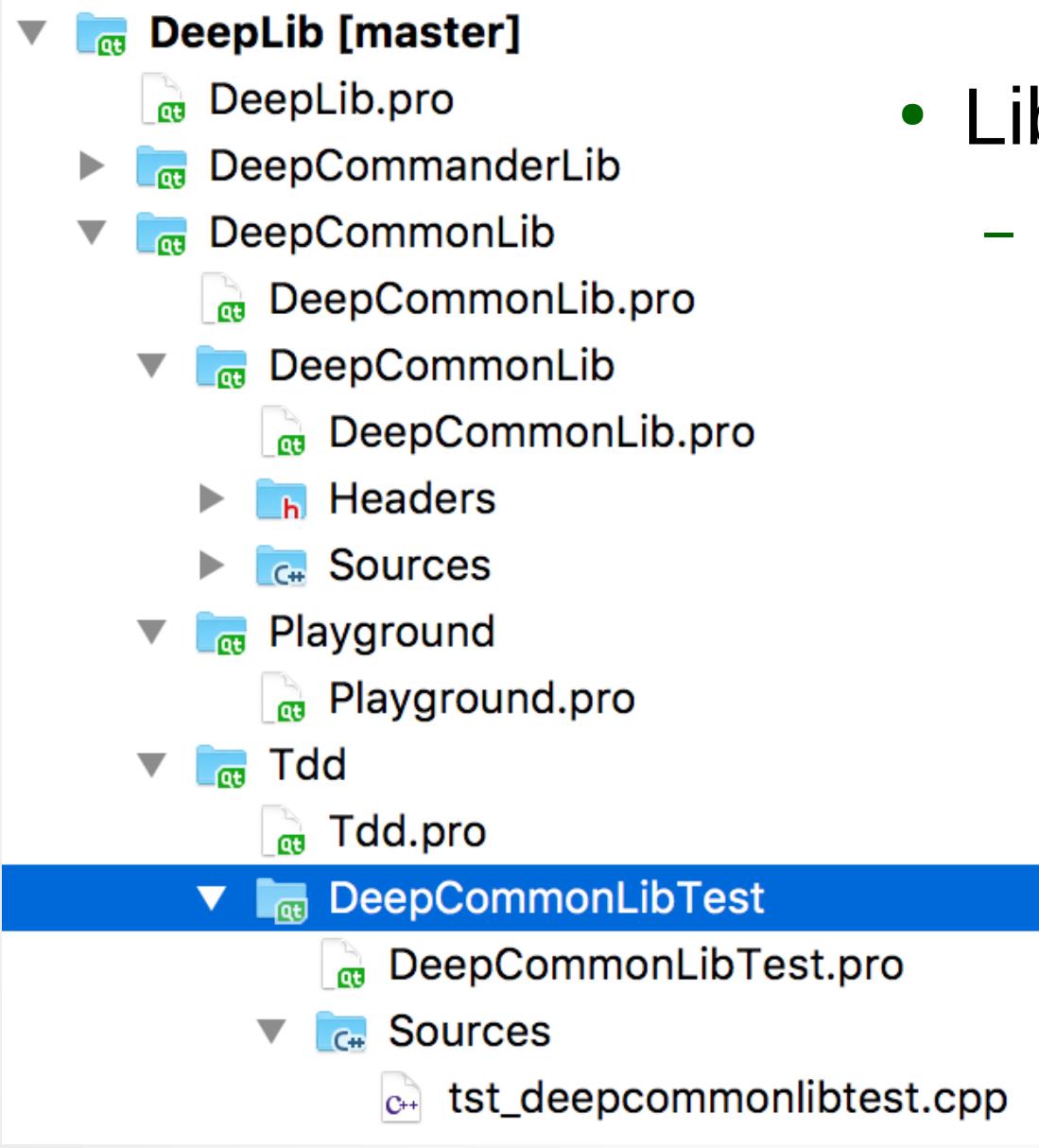
- January 2018, Fully Charged!
- I start from scratch because I forgot what I did in 2014
- And I jump on the chair when I discover it!



Creating Sub Projects /1

- “Sub Dirs Project” is the answer
- I have to thanks Davide Coppola for this!
 - <http://blog.davidecoppola.com>
- I change the way I create projects and use Sub Dirs Projects everywhere
- Now the test project is a stable piece of the puzzle.

Creating Sub Projects /2

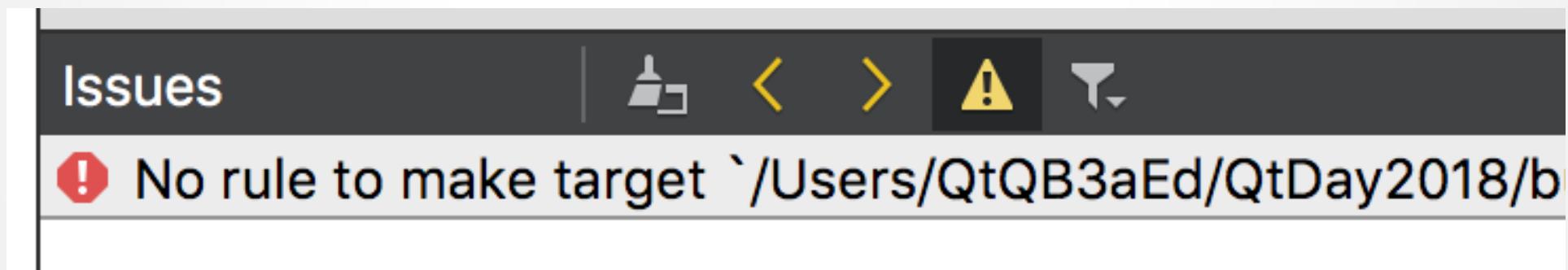


- Lib Project (framework)
 - Single lib sub-project
 - LibProject
 - Playground
 - TDD
 - 1 or more testing projects



Creating Sub Projects /3

- Watch-out!
 - No rule to make target
 - Problem with path length



Ready to go

- I need an opportunity
 - I'm not a real programmer
 - I use Qt as a toolbox
- I have a dataset to inspect
 - I create something to support me
- Usually this is a User Interface.
- Usually everything with Qt Library,
 - I don't need to create my own libraries
- And I still I don't see a value in testing the GUI
 - I suppose that The Qt Company already test their widgets!



Use Case 1

formatNsToDays

Gianbattista Gualeni – Florence May 24, 2018



FormatNsToDays /1

- The problem

- I work with a lot of data (images)
- I need to do it as fast as possible
- 10 micro secs turn into 10 seconds
- QElapsedTimer everywhere

```
QEapsedTimer ET;  
ET.start();
```

```
qDebug() << ET.nsecsElapsed();
```

FormatNsToDays /2

- The range problem
 - If I use the elapsed() method I see just ms

```
qDebug() << ET.elapsed();
```
 - If I use nsecsElapsed() I get an un-readable number
- The solution:

formatNsToDays()

FormatNsToDays /3

- qint64 as input
- QString as output
- Auto-range
 - ns
 - us
 - ms
 - sec
 - min
 - hours
 - days
- Fixed number of digits

```
QString etString;
if(et_ns < 1000) {
    etString = QString("%1 [ns]").arg(et_ns);
}
else if(et_ns < 1000*1000) {
    etString = QString("%1 [\u00b5s]").arg(et_ns/1000.0);
}
else if(et_ns < 1000*1000*1000) {
    etString = QString("%1 [ms]").arg(et_ms);
}
else if (et_ns < 60*1000*(quint64)1000*1000){ △ warning: use of old-
    etString = QString("%1 [s]").arg(et_ms/1000.0, 0, 'f', 2);
}
else if (et_ns < nsPerDay) {
    QTime time = QTime::fromMsecsSinceStartOfDay(et_ms); △ warning:
    etString = time.toString("HH:mm:ss");
}
else { // More than 1 day
    QTime time = QTime::fromMsecsSinceStartOfDay((et_ns/1000000) % (nsF
// QTime time = QTime::fromMsecsSinceStartOfDay(5*60*1000 + 5000);
    quint64 days = et_ns / nsPerDay;
    etString = QString("%1 %2")
        .arg(days, 3, 10, QChar('0'))
        .arg(time.toString("HH:mm:ss")));
}
```

FormatNsToDays /4

- Test help me during development
 - Not really the first time
- Testing with data
- Debugging
 - one dataset

formatNanoSecsToDaysTest	
<input checked="" type="checkbox"/>	123 ns
<input checked="" type="checkbox"/>	2 gg
<input checked="" type="checkbox"/>	2 h
<input checked="" type="checkbox"/>	2 m
<input checked="" type="checkbox"/>	59 s
<input checked="" type="checkbox"/>	800 ms
<input checked="" type="checkbox"/>	999 µs

Use Case 2

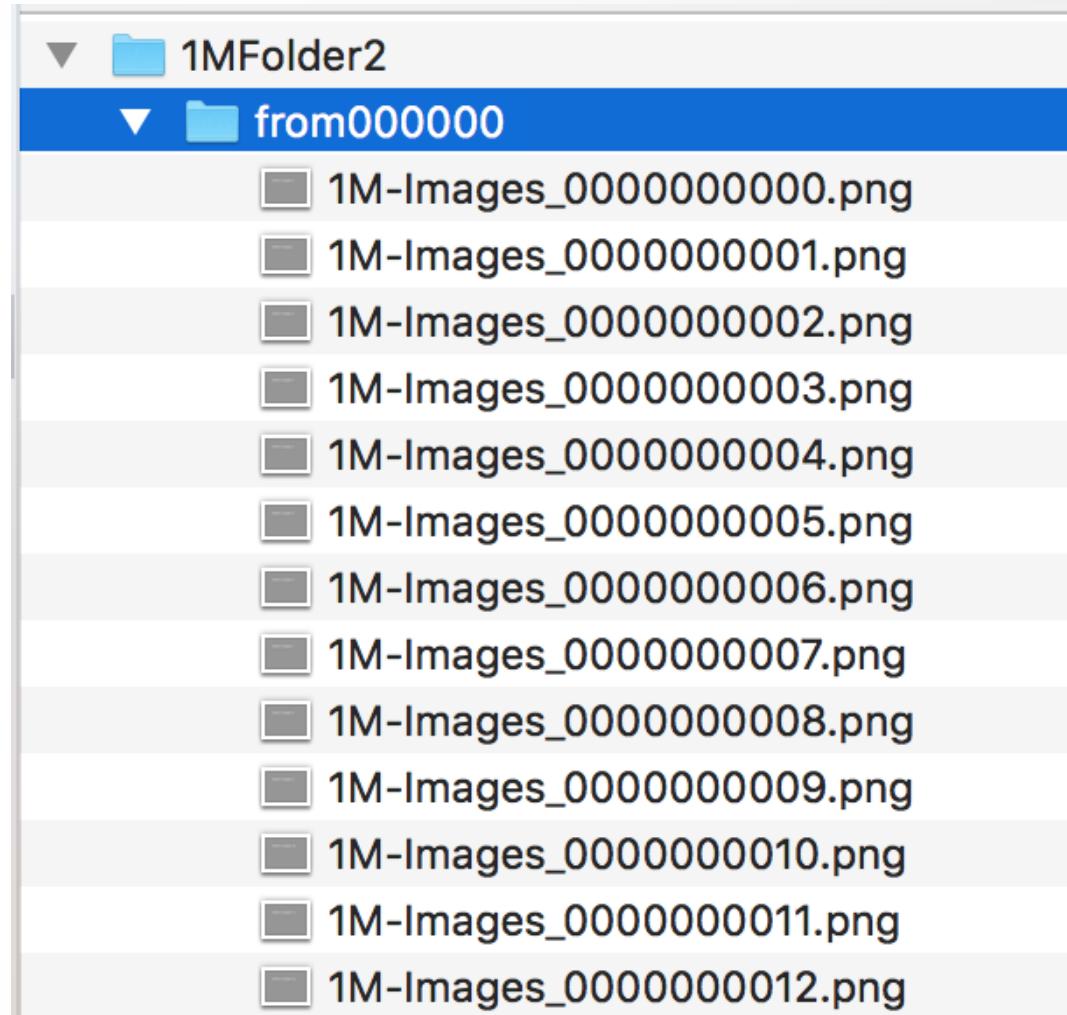
listFileInfosRecursively

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ListFileInfosRecursively /1

- The problem:
 - Up to 1 Million Images
 - One folder? Impossible
 - List all images into a QList
 - Ready to process all one by one



ListFileInfosRecursively /2

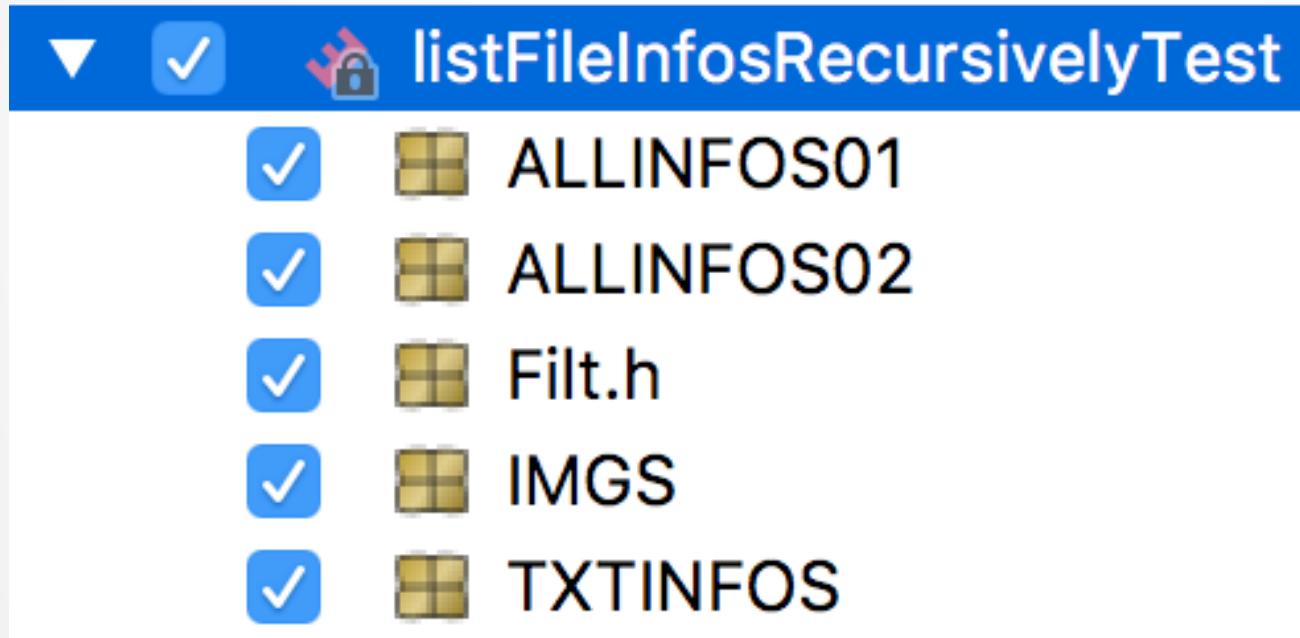
- Testing

```
// Init the file list
QString rootPath = QDir::currentPath() + "/listFilesInfosTest";
QStringList fileList;
fileList << rootPath + "/a/file00.txt";
fileList << rootPath + "/a/.qmake.stash";
fileList << rootPath + "/a/testFile.h";
fileList << rootPath + "/a/b/file01.txt";
fileList << rootPath + "/a/b/file02.txt";
fileList << rootPath + "/a/b/c/file03.txt";
fileList << rootPath + "/a/b/c/file04.JPG";
fileList << rootPath + "/a/b/c/file05.PNG";
fileList << rootPath + "/a/b/c/file06.BMP";
fileList << rootPath + "/a/b/c/file07.Jpg";
fileList << rootPath + "/a/b/c/file08.Png";
fileList << rootPath + "/a/b/c/file09.Bmp";
fileList << rootPath + "/a/b/c/file10.jpg";
```



ListFileInfosRecursively /3

- Testing for folder structure
- Testing for content filter



Other Use Cases /1

Qt Test	
▼	✓ DeepCommonLibTest
✓	colorToStylesheetTest
✓	convertToSnakeCaseTest
▶	✓ fastTokenizeTest
▶	✓ fileAutomaticRenameTest
▶	✓ fileCompareIfEqualTest
▶	✓ formatNanoSecsToDaysTest
▶	✓ formatToExaTest
✓	iniFilePathTest
✓	iniGroupNameFromClassTest
✓	iniGroupNameFromObjectNameTe
✓	libVersionTest
▶	✓ listFileInfoRecursivelyTest
▶	✓ listFilesRecursivelyTest
✓	mainWindowsFromWidget
▶	✓ moveFileOrFolderToRecycleBinTes
▶	✓ prefixToMultiplierTest
✓	solidColorIconTest

Testing?

No Limits!



Other Use Cases /2

How to Align test and library?

- Just test it!

```
void DeepCommonLibTest::libVersionTest()
{
    QCOMPARE(DeepCommonLib::version(), "DeepCommonLib 1.00.007");
}
```

- Well this is a little bit insane!

Finally /1

So what is the answer?

(to Life, Universe and Everything...)

Finally /2

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Finally /3

- TDD and Unit Test
- TDD and BDD
 - Mocha
- I see TDD applied for 3 reasons
 - Long term support
 - Development support
 - Multi platform.



```
describe('POST /todos', () => {  
  it('should create a new todo', (done) => {  
    // ...  
  }).  
});
```

Finally /4

- Long term can be dangerous
 - It is a wishful thinking
 - To be good fellow or a pious one
 - Hard to predict the value return
 - Easy to predict current burden
- Dangerous for your sleeping pattern

Finally /5

- Development support
 - This is where I see the real help
 - Try to image the unforeseen
 - Test the single case
 - Test the single value
 - Debug the single value
- Qt Test is great!

Finally /6

- Testing the portability

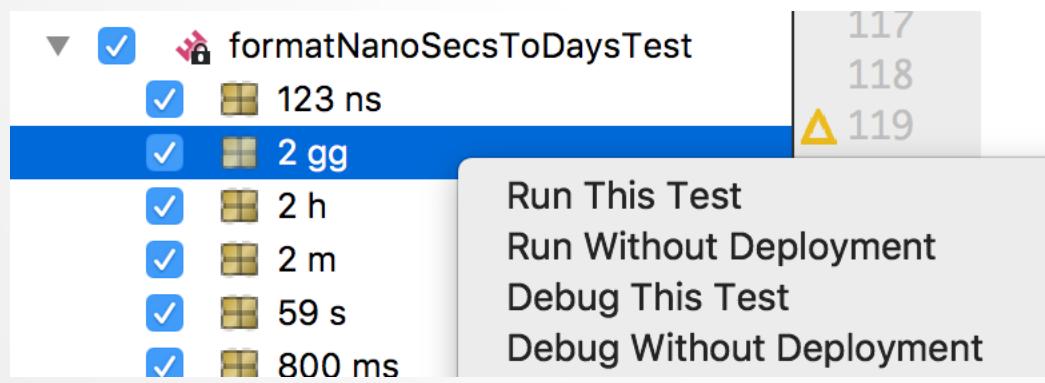
Test summary: 47 passes, 9 fails.

▼ ● FAIL	Executing test case DeepCommonLibTest
► ● PASS	Executing test function initTestCase
► ● PASS	Executing test function libVersionTest
► ● PASS	Executing test function convertToSnakeCaseTest
► ● PASS	Executing test function fastTokenizeTest
► ● FAIL	Executing test function iniFilePathTest
► ● PASS	Executing test function iniGroupNameFromClassTest
► ● PASS	Executing test function iniGroupNameFromObjectNameTest
► ● PASS	Executing test function solidColorIconTest
► ● PASS	Executing test function colorToStylesheetTest
► ● PASS	Executing test function mainWindowsFromWidget
► ● PASS	Executing test function formatToExaTest
► ● PASS	Executing test function formatNanoSecsToDaysTest
► ● FAIL	Executing test function moveFileOrFolderToRecycleBinTest
► ● FAIL	Executing test function listFilesRecursivelyTest
► ● FAIL	Executing test function listFileInfoRecursivelyTest
► ● PASS	Executing test function fileAutomaticRenameTest



Finally I7

- Is everything perfect?
- NO
 - Sometimes build are not aligned
- I'm dreaming about a shortcut to
 - Run this test
 - Run this test with this dataset



Finally /8

Elettrodomestici Bosch Da incasso e a libera installazion...

Netflix

27/01/2018

Ci dispiace vederti andar via
Conferma della disattivazione Ciao, come da tua
richiesta, abbiamo disattivato il tuo abbonamento con d...

NETFLIX

23/01/2018

Ahhiamo appena aggiunto un film che ti potrebbe piac...

NETFLIX

**Conferma della
disattivazione**

What's next?

Testing Gui

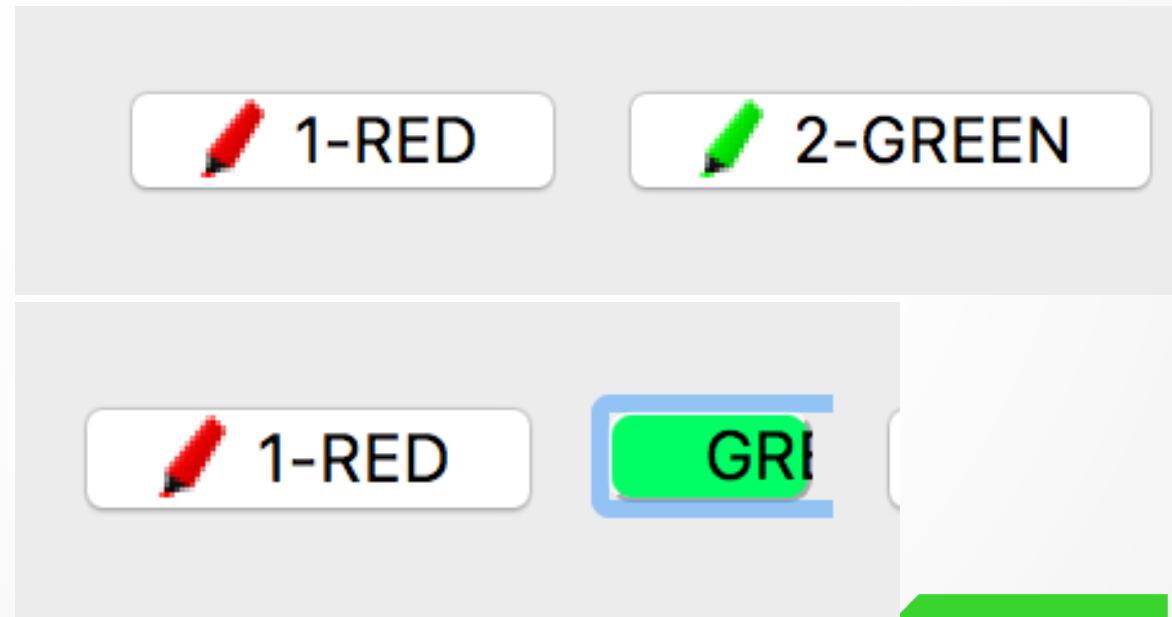
... I still haven't found what I'm looking for...

Testing GUI /1

- I skip this because I don't see how to use it
- Again the point is the value
- BUT

Testing GUI /2

- I skip this because I don't see how to use it
- Again the point is the value
- BUT



Testing GUI /3

As soon as I find the solution I'll come back to tell you!

Thanks !

ing. Gianbattista Gualeni

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