RTest - Test Adapter example

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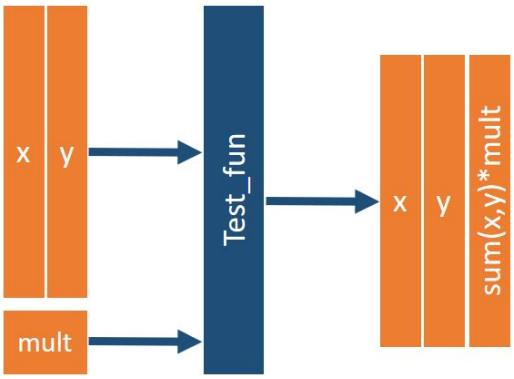
About

This test case shall explain to you how to construct a test case including a test-adapter.

Basic example

For the first test we would like to test a really simple example. We want to test a function that binds the sum of each row to a data frame as an additional column called `sum` and multiplies it with an additional parameter `mult`. The function shall be called `test_fun`.




```
## Define the functions to be tested
test_fun <- function(dat, mult) {   cbind(dat, "sum" = apply(dat, 1, sum)*mult) }

# assign global to work inside vignette
assign("test_fun", test_fun, envir = .GlobalEnv)
```

We want to create a test case that goes through and one that failes to show the RTest functionality.

Create the test case

First an empty test case in RTest contains a synopsis and input-data:

```
<?xml version="1.0" encoding="UTF-8"?>
<RTestCase

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:noNamespaceSchemaLocation="../xsd/RTest.xsd">
    <ID>RTest_TC-01</ID>
```

```
    <synopsis>
        <version>01</version>
        <author>Matthias Pfeifer</author>
        <short-description>RTest Template TC</short-description>
        <description>
    <![CDATA[
    Extended Description of the test case allowing also <some><special>/characters
    ]]>
        </description>
        <creation-date>2016-01-25</creation-date>
        <change-history>
            <change author="Matthias Pfeifer" date="2016-01-25">Initial Version</change>
        </change-history>
    </synopsis>
    <input-data>
        <data.frame name="test01">
            <col-defs>
                <coldef name="x" type="numeric" />
                <coldef name="y" type="numeric" />
            </col-defs>
            <row>
                <cell>1</cell>
                <cell>2</cell>
            </row>
            <row>
                <cell>1</cell>
                <cell>2</cell>
            </row>
        </data.frame>
    </input-data>
    <tests>
        ...
    </tests>
</RTestCase>
```

As you can see, the XML file that we'll create links to the RTest.xsd. This allows to pre-write certain parts of the document and define structures, like "What does a data.frame look like?". To visualize XML and XSD we highly recommend using Altova XML Spy. The input data output we created here can be generated using:

```
my_data <- data.frame(x=c(1,2),y=c(1,2))

RTest::xmlWriteData_data.frame("data.frame",my_data,"test01")
```

```
## Warning: no DISPLAY variable so Tk is not available
```

```
## <data.frame name="test01">
##   <col-defs>
##     <coldef name="x" type="numeric" />
##     <coldef name="y" type="numeric" />
##   </col-defs>
##   <row name="1">
##     <cell>1</cell>
##     <cell>1</cell>
##   </row>
##   <row name="2">
##     <cell>2</cell>
```

```
##     <cell>2</cell>
##   </row>
## </data.frame>
```

The next step is to define a test case. As RTest is made for testing packages each test case has to start with a package name node, e.g. `RTest`. Then you have to define a function to call, e.g. `funct_01`. These two nodes have to follow like this:

```
<tests>
 <RTest>
   <funct_01 test-desc="First test of funct_01">

   </...
```

Afterwards we have to define what we want to test in each function. Therefore we need to define input paramters

```
<params>
       <mult value = "1" type="numeric" />
</params>
```

in our case just the value of `mult` and the reference values.

```
<reference>
    <col-defs>
        <coldef name="x" type="numeric" />
        <coldef name="y" type="numeric" />
        <coldef name="sum" type="numeric" />
    </col-defs>
    <row>
        <cell>1</cell>
        <cell>2</cell>
        <cell>3</cell>
    </row>
    <row>
        <cell>1</cell>
        <cell>2</cell>
        <cell>3</cell>
    </row>
</reference>
```

Additionally we'll have to tell how the function shall be executed (silently, warning, ...). The test case for a working test looks like this:

```
<funct_01 test-desc="First test of funct_01">
    <params>
       <mult value = "1" type="numeric" />
    </params>
    <reference>
        <col-defs>
            <coldef name="x" type="numeric" />
            <coldef name="y" type="numeric" />
            <coldef name="sum" type="numeric" />
        </col-defs>
        <row>
            <cell>1</cell>
            <cell>2</cell>
            <cell>3</cell>
```

```
        </row>
        <row>
            <cell>1</cell>
            <cell>2</cell>
            <cell>3</cell>
        </row>
    </reference>
    <testspec>
        <execution execution-type="silent" />
        <return-value compare-type="equal" diff-type="absolute" tolerance="0.001" />
    </testspec>
</funct_01>
```

You see that mult is set to "1" and we basically add up the values rowwise.

For a non-working test we can use:

```
<funct_01 test-desc="see test_fun fail">
    <params>
       <mult value = "1" type="numeric" />
    </params>
    <reference>
        <col-defs>
            <coldef name="x" type="numeric" />
            <coldef name="y" type="numeric" />
            <coldef name="sum" type="numeric" />
        </col-defs>
        <row>
            <cell>1</cell>
            <cell>2</cell>
            <cell>5</cell>
        </row>
        <row>
            <cell>1</cell>
            <cell>2</cell>
            <cell>3</cell>
        </row>
    </reference>
    <testspec>
        <execution execution-type="silent" />
        <return-value compare-type="equal" diff-type="absolute" tolerance="0.001" />
    </testspec>
</funct_01>
```

this test shall fail as `<cell>5</cell>` is not the sum of 1 and 2. We are ready with the XML file. You can also get this file by using `paste0(find.package("RTest"),"/xml-templates")`

Create Test Adapter

The test adapter is an R-script that tells RTest how to interpret the XML file. The test adapter shall now use `params`, `reference` and `test-spec` to test the outcome of the function `test_fun`. Therefore we need to

1) Create a Test Adapter class - "TestPackageTestClass"
2) Create a Test Method - "test.RTest.funct_01" named after the XML structure

Part 1 is fairly simple. For Part2 you need to know some of the RTest functionalities. Please see the following code for an example:

```
## Loading required package: testthat
```

```
## Loading required package: magick
```

```
## Linking to ImageMagick 6.9.7.4
## Enabled features: fontconfig, freetype, fftw, lcms, pango, x11
## Disabled features: cairo, ghostscript, rsvg, webp
```

```
## Loading required package: XML
```

```
##
## Attaching package: 'RTest'
```

```
## The following object is masked _by_ '.GlobalEnv':
##
##     test_fun
```

```
# Create test adapter
setClass(
        Class          = "TestPackageTestCase",
        representation = representation(),
        prototype      = list(),
        contains       = "RTestCase",
        where = .GlobalEnv
)

TestPackageTestCase <- function(xmlpath){
    RTestCase(xml.fPath=xmlpath)
}

RTest::setTestMethod(
        "test.Pkg_1.funct_01",
        signature  = "TestPackageTestCase",
        definition = function(object, inputData, execCache, xmlDef, ...) {

            # Read parameters
            mult <- RTest::xmlReadData_variable(xmlDef[["params"]][["mult"]])


            # Calculate result
            result <- RTest::test_execution(
                    what        = test_fun,
                    args        = list(c(inputData[[1]], mult)),
                    xmlTestSpec = xmlDef[["testspec"]][["execution"]])

            # Read reference
            reference <- RTest::xmlReadData_data.frame(xmlDef[["reference"]])

            # Execute test
            if(!is.null(xmlDef[["testspec"]][["return-value"]]))
                RTest::test_returnValue_data.frame_cellbycell(
                        result,
                        reference,
                        xmlDef[["testspec"]][["return-value"]]
```

```
                )


            # Return result (will be cached)
            return(result)
        },
        where = .GlobalEnv
)
```

As you can see we use `xmlReadData_variable` to read the xml value of `mult`. Instead of `do.call` in RTest we use the wrapper function `test_execution` that not only runs code, but also checks, if it runs as expected. You can see that each of our test-methods gets the parameter `inputData` as an input. `inputData` is a list of all values inside the `input-data` section of the XML file. The first value inside our XML file was a data.frame, so we use `inputData[[1]]` to derive its values and hand it over to `test_fun`.

The reference can be compared using `test_returnValue_data.frame_cellbycell` which is the RTest wrapper for `expact_equal` for data.frames. All our compare functions start with the name `test_returnValue_` and you can find them by this.

In future we plan on enabling test-cases without test-adapters.

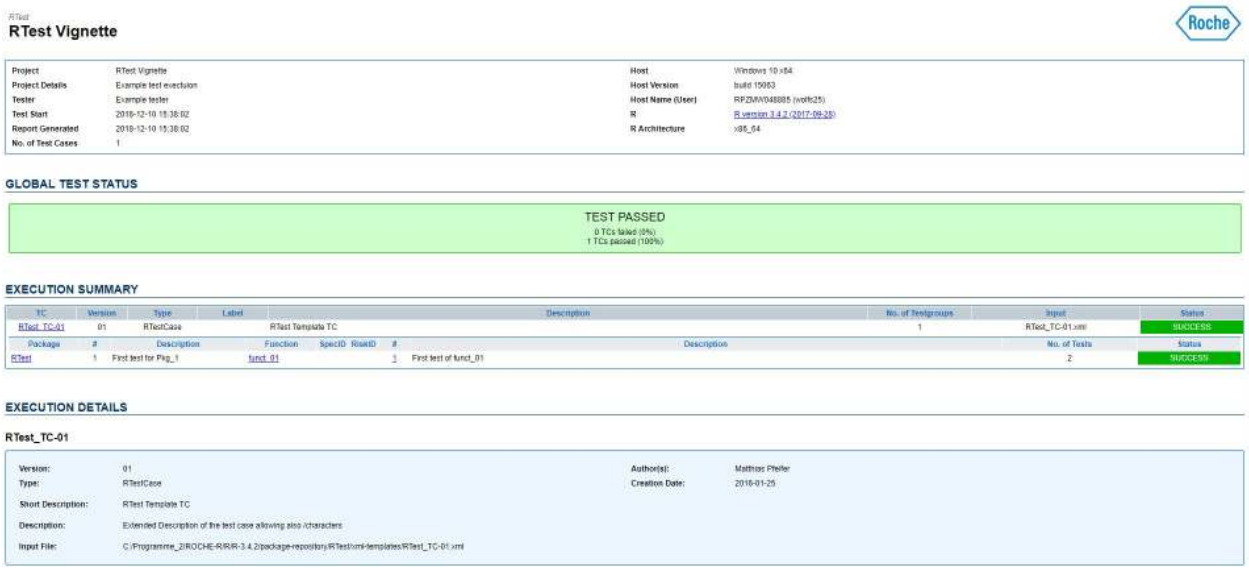
Execute test

We can now create a test collection from the folder where we stored the XML test files. In our case we use the basic example that we provide to you inside the package.

```
# Create test collection
testCollection <- new("RTestCollection",
        project.name    = "RTest Vignette",
        project.details = "Example test exectuion",
        tester          = "Example tester",
        test.start      = format(Sys.time(), "%Y-%m-%d %H:%M:%S"))

# Import TCs
TCDir <- paste0(find.package("RTest"),"/xml-templates")

testCollection <- importTCsFromDir(testCollection,
        xml.dPath = TCDir,f.pattern="RTest_TC-01.xml")
```

We will then run our test-collection and a lovely Report will be produced.

```
outf <- tempfile(fileext=".html")

# Execute test cases
testCollection <- exec(testCollection, out.fPath = outf, open=FALSE)
```



RTest

RTest Vignette

Roche

Project	RTest Vignette	Host	Windows 10 x64
Project Details	Example test execution	Host Version	build 15063
Tester	Example tester	Host Name (User)	RPZMW048885 (wolfc25)
Test Start	2018-12-10 15:38:02	R	R version 3.4.2 (2017-09-28)
Report Generated	2018-12-10 15:38:02	R Architecture	x86_64
No. of Test Cases	1		

GLOBAL TEST STATUS

TEST PASSED
0 TCs failed (0%)
1 TCs passed (100%)

EXECUTION SUMMARY

TC	Version	Type	Label	Description	No. of Testgroups	Input	Status
RTest_TC-01	01	RTestCase		RTest Template TC	1	RTest_TC-01.xml	SUCCESS

Package	#	Description	Function	SpecID	RiskID	#	Description	No. of Tests	Status
RTest	1	First test for Pkg_1	funct_01			1	First test of funct_01	2	SUCCESS

EXECUTION DETAILS

RTest_TC-01

Version:	01	Author(s):	Matthias Pfeifer
Type:	RTestCase	Creation Date:	2018-01-25
Short Description:	RTest Template TC		
Description:	Extended Description of the test case allowing also /characters		
Input File:	C:/Programme_2/ROCHE-R/R/R-3.4.2/package-repository/RTest/xml-templates/RTest_TC-01.xml		

DONE!

For any questions refer to the package maintainer.