

COMPACT
INFO

Automatic
TEST CASE GENERATION
with decision tables

1 Introduction

From the testing point of view decision tables are a valuable source of test cases. In projects in which business requirements are included in decision tables, test cases can be derived from this model in a structured and methodic fashion and, with an aid of the decision table tool LF-ET (<https://www.lohr-fink.de/en/solutions/lf-et/>), largely automatically generated further.

Thanks to automated test case creation, testers quickly have the appropriate test cases at hand, especially after changes in the requirements, and can perform the required tests promptly, which is essential for agile approaches.

2 Test design with decision tables in LF-ET

An online store selects shipping service providers depending on the order value, product category and region from which an order is made by a customer.

The rules are recorded in a decision table:

Criteria for selecting the shipping service provider												
	R01	R02	R03	R04	R05	R06	R07	R08	R09	R10	R11	R12
C01 order value	small	usual	large	very large	-	-	-	-	-	-	-	-
C02 category in basket	REPTILES	REPTILES	REPTILES	REPTILES	FISH	DOGS	DOGS	DOGS	DOGS	DOGS	CATS	BIRDS
C03 destination	-	-	-	-	-	DE-NORTH	DE-EAST	DE-SOUTH	DE-WEST	else	-	-
A01 service provider	Hermes	DHL	DHL	UPS	GLS	DHL	Hermes	UPS	DHL	GLS	DPD	DPD

From the point of view of a test analyst conditions often correspond to entries whereas actions represent the expected behavior of the systems.

In order to be able to generate test cases, the test analyst must enrich condition and action values with the relevant test instructions. Test instructions can also be handled by the generator both as pre- or postconditions so that in each test case the right preparation steps are determined in advance and follow-up procedure is incorporated at the end.

Behind the condition values of the first conditions, which concern the order value, value ranges are in EURO. LF-ET basically offers three possibilities how the test analyst can enforce specific values:

- Test instructions with a constant list of suitable products.
- A set can also be defined in the test instruction from which a random element is selected by the generator.
- In order to be able to generate test cases for different test environments, the test analyst can define filter statements which are applied by the generator to test data which is provided in separate files. Considerable flexibility is thus achieved because if there is a change in the data, only the test cases have to be regenerated.

With no support from LF-ET the effort for creating the test cases is determined by the number of rules. In the case of the procedure described herein, the effort depends on the number of condition and action values.

3 Generate low-level test cases from decision tables with LF-ET

Low-level test cases are generated shortly before test execution. You can thus ensure that generated test cases exactly match the last adjustment of the rules. This task can also be automated so that the process can be integrated in a CI/CD-pipeline.

This means there is no need to maintain test cases after the rules in the decision table are changed.

LF-ET offers various formats suitable for the project context:

■ **Gherkin**

Gherkin is a description language with a few rules for structured formulation of scenarios within the framework of behavior-driven software development.

For each decision table LF-ET generates a feature file that contains all scenarios that can be derived from the decision table:

```
30
31 # language: en
32
33 >> Feature: Criteria for selecting the shipping service provider
34
35     @recommended
36 >> Scenario: 0001 ShippingServiceProvider
37     ShippingServiceProvider
38     R01 : C01 order value = small ; C02 category in basket = REPTILES
39     Given I am logged in as user 'w.sternberg' with password 'w.ste'
40     When I add to cart
41         | productGroup | productID | itemID | count | price | total |
42         | REPTILES     | MP-BVR-01 | BVC-14 | 1     | 19.90 | 19.90 |
43     And I place the order
44     Then the order value should be '19.90' Euro
45     * the shipping service provider should be 'Hermes'
46
47     @recommended
48 >> Scenario: 0002 ShippingServiceProvider
49     ShippingServiceProvider
50     R02 : C01 order value = usual ; C02 category in basket = REPTILES
51     Given I am logged in as user 'j2ee' with password 'j2ee'
52     When I add to cart
53         | productGroup | productID | itemID | count | price | total |
54         | REPTILES     | RP-LI-02  | EST-13 | 1     | 18.50 | 18.50 |
55         | REPTILES     | RP-LF-010 | RLF-014 | 5     | 3.50  | 17.50 |
56     And I place the order
57     Then the order value should be '36.00' Euro
58     * the shipping service provider should be 'DHL'
59
```

■ Robot Framework

Robot Framework (<https://robotframework.org>) is a generic open source test framework for test automation with a focus on acceptance testing. The main idea of the framework is keyword-driven testing. Clear architecture makes it possible to integrate libraries which can be used for testing various test objects.

LF-ET generates a Robot file for each decision table; the said file contains all test cases that can be derived from the decision table:

```
41
42 ▶ *** Test Cases ***
43
44 ▶ 0001 ShippingServiceProvider
45     [Documentation]    ShippingServiceProvider
46     ...               | R01 | C01 order value = small | C02 category in basket = REPTILES
47     [Tags]            recommended
48     Perform Sign On   j2ee     j2ee
49     @{items} =       Split String    REPTILES_RP-LI-02_EST-13    \#
50     Put Item List To Cart    @{items}
51     Check Out With Default Values
52     Cart Value Should Be Equal    18,50    False
53     Courier Should Be    Hermes
54     Perform Sign Off
55
56 ▶ 0002 ShippingServiceProvider
57     [Documentation]    ShippingServiceProvider
58     ...               | R02 | C01 order value = usual | C02 category in basket = REPTILES
59     [Tags]            recommended
60     Perform Sign On   dietlind.boehm    dietl
61     @{items} =       Split String    REPTILES_RP-LI-02_EST-13#REPTILES_RP-SN-01_EST-11    \#
62     Put Item List To Cart    @{items}
63     Check Out With Default Values
64     Cart Value Should Be Equal    37,00    False
65     Courier Should Be    DHL
66     Perform Sign Off
67
```

In order for the keywords to be executed, the test analyst can control through settings in decision tables which directives should be created in the ***** Settings ***** section.

Keywords that have been configured as pre- or postconditions are summarized in test case-specific setup or teardown keywords.

■ TestLink

TestLink (<https://testlink.org>) is a web-based open source test management system in which requirements can also be managed in addition to test cases.

Test cases are generated by LF-ET into an XML format which can be imported directly by TestLink.

■ aqua

aqua (<https://aqua-cloud.io>) is a test management system from the andagon company based in Cologne. In aqua, requirements, deviation reports and project plans can be managed in addition to test cases.

LF-ET exports test cases to an Excel file which is optimized for import into aqua.

■ Excel

This format can be used by many test case management systems as import format. In certain cases minor configuration work is required in order to align the columns of worksheets with fields in the test case management system.

	A	B	C	D	E	F	G
1	Name	Description		Name (test step)	Instructions (test step)		Expected results (test step)
2	1	ShippingService Provider[1]	ShippingServiceProvider R01 C01=small C02=REPTILES	1	Login to the JPetStore	Login to JPetStore with the following information: User name: hmathes Password: hmath	Check that "Hello Helfred!" is displayed on the start page.
3	1			2	Add goods to the shopping cart	Add the following products to your shopping cart: From the reptiles section: 1x Supplementary feed, Nekton Iguana, 30g, EUR 3,50	
4	1			3	Complete order	Click on "Continue to checkout". Confirm the payment information and billing address by clicking on "Continue". Confirm the shipping address by clicking on "Confirm".	Check that the order has been successfully completed and the total amount has a value of 3,50 Euro.
5	1			4	Checking the delivery service		Check whether the delivery service Hermes is entered in the "Delivery service:" line of the order.
6	2	ShippingService Provider[2]	ShippingServiceProvider R02 C01=usual C02=REPTILES	1	Login to the JPetStore	Login to JPetStore with the following information: User name: w.sternberg Password: w.ste	Check that "Hello Wastl!" is displayed on the start page.
7	2			2	Add goods to the shopping cart	Add the following products to your shopping cart: From the reptiles section: 1x Aluminium Gaze Terrarium, Outdoor Terrarium Reptibreeze, EUR 64,90	
8	2			3	Complete order	Click on "Continue to checkout". Confirm the payment information and billing address by clicking on "Continue". Confirm the shipping address by clicking on "Confirm".	Check that the order has been successfully completed and the total amount has a value of 64,90 Euro.
9	2			4	Checking the delivery service		Check whether the delivery service DHL is entered in the "Delivery service:" line of the order.

This format can also be used for automated tests. Numerous test execution tools offer functions which can be used to process Excel files row by row.

Contact us

We have been supporting numerous authorities and companies from various industries at all stages of software development as an IT-consultancy and service provider for many years.

Test case generation from decision tables makes it possible to significantly reduce the manual effort of the tester and testing supports modern software development models, such as e.g. behavior-driven software development or model-based system development.

We would be happy to integrate decision tables as documentation of the requirements in your projects and provide the basis for automated generation of the source code and test cases.

Feel free to contact us with any further questions or queries:

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