Test Case Design using Keywords

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Abstract

The document details the various keyword test case design techniques and their pros and cons. The document will be of help to you if you are planning to use keyword driven approach for manual testing in your organization.

What is a Keyword?

Keyword is a short name for an event in an application with an associated parameter value. A keyword also can be considered as a test case with reusable navigation steps.

Keyword Example:

Most of the application requires the users to login to access the application. The business function "Login" can be implemented as a keyword where the user name and the password can be parameterized.

Window	Object	Action	Parameter
Login	User Name Field	Input Text in Text Box	"User Id "
Login	Password Field	Input Password in Password Field	"Password"
Login	OK Button	Click	N/A

Table 1: Sample Keyword Test Case

Types of Keywords:

Generic keywords:

Test Cases developed for events performed on an object present in any window can be considered as a generic keyword.

Product specific keywords: -

Test Cases developed for functions performed in a product can be considered as a

product specific keyword. This type of keywords can be divided broadly into two categories.

I. Workflow based: -

Reusable test cases are developed for a product workflow for example a keyword "Customer_Inquiry" can be used for searching for a customer in an Inquiry Application.

II. Window based: -

Reusable test cases are developed for each event performed in a window. For example an Inquiry window may have a large number of keywords. Selecting a search option can be a keyword and entering the search value in a text field can be another keyword.

Each of these types of keywords is explained in detail in the sections below.

Design of Keyword:-

Given below are the steps involved in developing a keyword driven approach for manual testing: -

a) Identification

b) Design

c) Review

d) Development of Test Cases.

e) Maintenance

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        ┌─────────────────┐
        │    Identify     │
        │    Keywords     │
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                 │
                 ▼
        ┌─────────────────┐
        │  Design Keywords │
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        ┌─────────────────┐
        │  Review Keywords │
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        ┌─────────────────┐
        │  Develop Test   │
        │  Cases using    │
        │    Keywords     │
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        │    Maintain     │
        │    Keywords     │
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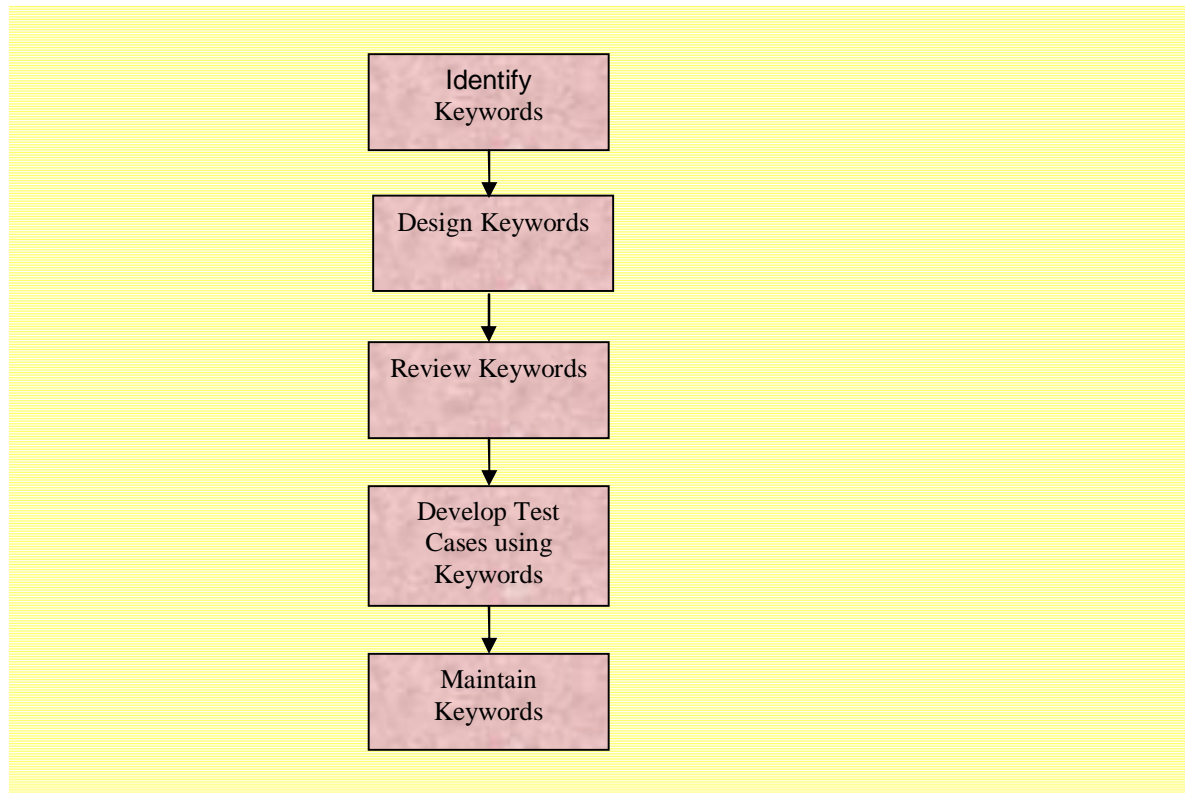
Figure 1: Flowchart on Keyword Design

Keyword Maintenance:

- ❖ Keywords should be maintained by single person.

- ❖ Keyword maintenance occurs whenever a :

    - ➢ Defect is detected in a keyword

    - ➢ Business workflow changes.

    - ➢ Keyword standards are modified.

Keyword Standards:

- ❖ Each keyword should have a Name, Description, Parameter and Expected Result.

- ❖ Number multiple parameters in a single keyword to retain order.

- ❖ Change font color of the parameter for better readability.

  Example: - Enter <<<1.User_ID>>> in the User ID field.

- ❖ Make parameter a single word and use underscores to separate words if needed.

- ❖ If a value is not needed in a field, then please enter "accept default value" in the test case.

- ❖ Do not insert nested calls to Keyword test cases.

- ❖ Mark the hard coded values inside a keyword using [].

  Example: Click on the [OK] button.

Advantages:

- ❖ Significantly reduces the effort for test case development and reviews.

- ❖ Test cases will be easier to automate.

- ❖ Modifying only the Keyword can modify change to the object in AUT in all the test cases.

- ❖ Navigational Steps will be easy to execute, as the navigational test steps will be consistent across test plans.

Disadvantages:

- ❖ Large numbers of keywords are difficult to maintain.

- ❖ Training new team members requires more time.

- ❖ Testing procedures may require modification to suit the approach.

Generic Keywords:

Test Cases developed for events performed on a GUI object present can be considered as a generic keyword. Example: - Clicking on a button.

Each generic keyword test case will only have one step. The approach can be used for test case design of functional test cases.

Step Number	Description	Expected Results
Step 1	Click the button <<<01_ButtonName>>> in the window<<<02_WindowName>>>	The window <<<03_NextWindowName>>> is displayed.

Table 2: Generic Keyword Sample

Advantages: -

- ❖ Maintenance is less, as the generic natures of keywords are not going to change over a period of time.

- ❖ Reusability is more as the same keywords can be shared across different products.

- ❖ Easy to identify and develop, as it is easy to identify the standard GUI objects and write Keywords for the commonly performed actions.

- ❖ Generic keywords are application independent and can be used across products.

- ❖ New team members resources can be trained easily, as the number of keywords will be less.

Disadvantages: -

- ❖ Sharing generic keywords across products will be a challenge.

- ❖ Number of calls to test or number of steps in a test case will be large.

- ❖ Number of parameters that one has to pass as parameter to a test step will be high.

   For example for clicking on a button one may have to pass the name of the button, the window in which the button is located and the new window that appears after the button is clicked.

- ❖ The keywords are developed based on assumptions and one may not be able to re-use the keyword always.

   For example the keyword button_click may not open a new window always.

Naming convention: -

The generic keywords can be named using the convention ObjectType_Action.

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Examples: -

- ❖ For the keyword to click on a button the object is button and the event or action is Click so the keyword can be named as Button_Click.

- ❖ For the keyword to enter text in a Textbox the object is text box and the event is Enter Data so the keyword can be named as TextBox_EnterData

List of generic keywords: -

Given below are some examples of the generic keywords that can be used.

SI No	Keyword	Parameters	Remarks
1	Button_Click	Name of Button Window Name Next Window Name	Can be used when clicking on a button opens up a new window.
2	Link_Click	Name of the Link Page Name New Page Name	Can be used when clicking on a Link opens up a new page.
3	Password_Enter	Password Name Password Entered Windows Name	Can be used to enter password in a password field.
4	List_Select	List Box Name List Value Window	Can be used to select an item in a list box.
5	Menu_Select	Menu Name Window Name	Can be used when clicking on a Menu Item opens up a new window.
6	Radio_Select	Radio Button Name Window	Can be used to select a Radio button in a window.
7	RadioGroup_Select	Radio Button Name Radio Group Name Window	Can be used to select a Radio button from a Group in a window.
8	Tab_Select	Tab Name Window	Can be used to select a tab item in a window.
9	Toolbar_Select	ToolBar Item ToolBar Name Window Name	Can be used to select a toolbar item from a toolbar in a window.
10	Checkbox_Set	Checkbox Name Status of the Checkbox Window Name	Can be used to On or off a check box item in a window.
11	TextBox_Enter	Text box name Value of the Text Box Window Name	Can be used to enter value in a text box in a window.

Table 3: Generic Keyword List

Product Specific Keywords

Keywords are developed for functions performed in a product or AUT can be considered as a product specific keyword.

I. Workflow Based Keywords:

Test Cases are developed for the workflows or business events in the product or AUT can be considered as workflow based keywords.

Example: Login is a common operation in most of the applications. The steps required to login to an application can be included in a keyword test case called "Login_AppName".

Step Number	Description	Expected Results
Step 1	Enter<<<01_UserName>>> in the User Name field. Enter<<<02_Password>>> in the Password field. Select [0K] button.	<<<04_Next_Window>>> window is displayed.

Table 4: Workflow Keyword Example

Advantages: -

❖ Call to tests will be minimal as a test designer can include more steps in the keyword test case.

❖ Number of parameters will be less, as the keyword will be specific to a workflow or window.

❖ Number of keywords will be less compared with generic and window based keyword approach.

❖ Well suited for regression testing or for business workflow test cases.

Disadvantages: -

❖ Test designer will not be aware of all the workflows at the initial stages of a project.

❖ Change in GUI or workflow will result in keyword maintenance.

❖ The keywords developed will be application or product dependent.

❖ This approach is not well suited for functional testing, as this cannot be used for GUI

Testing etc.

❖ The tester should have a fair understanding of the keywords available and training a new resource may consume more time.

❖ The keywords should be maintained at a product version level as the new version of the product may have workflow changes or functional changes.

Naming conventions: -

The keywords can be named as per the functionality or workflow. For example a keyword for searching patient can be named as Customer_Search.

II. Window Based Keywords:

The keywords are developed are develop for the events performed on each GUI object in a window or page. Test Cases can be developed using these keywords to test the window itself or in any other test case where the window is used.

Figure 2: Sample Login Form

Note: In the sample login application provided above a valid user name is "george" with password   "george123". The form is used only for demonstration purpose.

A test designer can design the keywords given below: -

❖ UserName_EnterData

❖ Password_EnterData

- ❖ Login_Click

- ❖ Cancel_Click

SI No	Keyword	Description	Expected Results
1	UserName_EnterData	Enter the <<<01_UserName>>> in the UserName Field of Login Window.	The <<<01_UserName>>> is displayed in the UserName field
2	Password_EnterData	Enter the <<<01_Password>>> in the Password Field of Login Window.	The asterisks are displayed in the Password field
3	Login_Click	Click on the [Login] button of the Login Window	The window <<<01-WindowName>>> is displayed.
4	Cancel_Click	Click on the [Cancel] button of the Login Window.	The Login window is closed.

Table 5: Window Based Keywords

Using the keywords a test case designer will be able to arrive at a large number of test cases with minimal effort. A few examples are given below: -

Test Case 1: -

The test case can be used to test whether the users can login without entering password.

Step Number	Description	Expected Results
Step 1	Call UserName_EnterData With Parameters "george"	
Step 2	Call Login_Click	

Table 6: Sample Test Case 1

Test Case 2: -

The test case can be used to test whether the users can login without entering username.

Step Number	Description	Expected Results
Step 1	Call Password_EnterData With Parameters "george"	
Step 2	Call Login_Click	

Table 7: Sample Test Case 2

Test Case 3: -

The test cases can be used to test whether the users can login after entering correct username and password.

Step Number	Description	Expected Results
Step 1	Call UserName_EnterData With Parameters "george"	
Step 2	Call Password_EnterData With Parameters "george123"	
Step 3	Call Login_Click	

Table 7: Sample Test Case 3

Advantages: -

- ❖ The test coverage will be improved as a tester can use the keywords to arrive at a large number test case.

- ❖ The test cases written using this approach are easy to modify when a change in workflow occurs, as each action on a window is a separate keyword.

- ❖ Number of parameters that will be passed to a test case will be less.

- ❖ Keywords can be arrived by referring to the screen design or prototype.

- ❖ Reusability of keywords developed will be high.

- ❖ Can be used for both functional and regression test case design,

Disadvantages:

- ❖ Keywords are application dependent.

- ❖ The number of keywords will be large.

- ❖ Test Cases will have a large number of steps.

- ❖ Effort required maintaining the keywords will be high.

- ❖ The keywords should be maintained at a product version level as the new version of the product may have workflow changes or functional changes.

- ❖ Training a new resource will take more time.

Naming Convention:

The product keywords can be named using the convention Object_Action. All the keywords can be stored in a folder with the name of the Window based on the product version. For example All the keywords for the Login window stated in the above example can be stored under the folder "Login".

For example:

For the keyword to click on a Login the object is Login and the event or action is Click so the keyword can be named as Login_Click.

Comparison of Different Approaches: -

The table given below compares the different approaches: -

SI No	Feature	Generic Keywords	Workflow based Keywords	Window Based Product Keywords
1	Maintenance Effort	Low	Medium	High
2	TC Design Savings	Low	Medium	High
3	Training Requirement	Low	High	Medium
4	Difficulty of Implementation	Easy	Difficult	Moderate

Table 8: Comparison of approaches

Table Driven Testing: -

Test Case developed using keywords can be enhanced to test an application with a wide range of test data. This approach requires both keywords and data tables. The keywords can be developed using any of the approached provided above.

If one has to test the login procedure for an AUT the following test conditions has to be developed.

a) Test that corrects username and password is accepted by the system.
b) Test that incorrect username is rejected by the system.
c) Test that incorrect password is rejected by the system.

Step Number	Description	Expected Results
Step 1	Invoke the Application "Application Name"	The Application is invoked
Step 2	Enter <<<UserName>>>	
Step 3	Enter <<<Password>>>	
Step 4	Click [Login] button.	Verify the <<<ExpectedResults>>>

Table 9: Sample table driven test case

SI No	UserName	Password	Expected Results
1	George	George123	User is able to login
2	george	Blank	Error message is

			displayed
3	Blank	Blank	Error message is displayed

Table 10: Data Table

Conclusion:

There are various ways to implement keyword methodology in test case design. The product team should decide upon which approach should be selected for their respective products. Popular testing tool vendors like HP and Rational have provided features for keyword driven testing. The document can be used as a guideline for selecting the approach.

About the Author:

George Ukkuru is working as an Associate Quality Manager in the CRM Quality Management team of SAP Labs Bangalore. He is having around 8.2 Years of experience in software testing. He is a Certified Test Engineer from QAI and also holds the CAPM Certification from PMI. He can be reached at ukkuru@gmail.com