

ADVANCE DATA DRIVEN TECHNIQUES (ADDT)

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1. Introduction

Test automation can be thought of as "writing software to test other software". Using one of the commercially available automated testing tools, test scripts are written that drive the application under test -- execute keyboard, mouse actions and background processing -- and verify application responses and behavior just as a human would. Automated testing can reduce or eliminate the drudgery and repetition associated with some manual tests, decrease the time required to test and make your tests more consistent and repeatable. Automation testing also increases the quality of the product and produces early fault tracking during the testing phase.

Convergys Test Automation Team has developed an Advance Data Driven Testing (ADDT) approach by using the Test Automation Engine, which drives WinRunner based on the input provided by the tables. This technique is used to test our highly complex PC based Billing Application for the Client and also for Background testing. The approach has been successfully implemented in System Test Organization in Convergys for the regression and new features testing. In the last two years, it has been proven that Automation Testing can improve the reliability and the quality of our software products and reduce the man-hours needed. Automation testing also helps us to detect faults in earlier stages of software release cycles, which reduces the bug fixing cost dramatically. This technique is generic and can be used for any PC based Client/Server application or web application by modifying the Test Automation Engine.

2. Test Automation

2.1. Automation Methodology

2.1.1. Strategy

2.1.1.1. Understand the Limitations

Test tool vendors would like software companies to think that they can automate testing of their entire product in eight weeks or less. This is possible, but only if the product is less complicated and you have a very experienced testing team working on the project. More likely, it will take months before automation begins to really pay off.

The good news is that once automation begins to pay off, it builds momentum. The organization sees the benefits of automation and may be willing to commit more resources to it. Often, having time saving tools in place means there is time to create more time saving tools. Test automation becomes a self-supporting cycle.

The bad news is that the first few months are rough. It is difficult to justify committing talented individuals with strong product knowledge to a long-term project, when there are short-term crises.

2.1.1.2. Plan Before Coding

There are two steps to planning your automation: strategy and tactics.

- When planning your automation strategy, you want to clearly state your goals and the way in which you intend to measure your results against those goals.
- When determining your tactical plans, you want to focus on how you will implement your strategy. In general, you'll want a tactical plan for each major piece of automation. The tactical plan can be quite short. It should include both functional and technical specification information.

The tactical plans give you an opportunity to begin planning your tests before writing them. Much like most program bugs come from ill-defined requirements and functional specifications, most test bugs and maintenance issues come from lack of planning.

2.1.1.3. Reuse Code

Part of the planning process mentioned above should include designing tests to be reusable. Users get the most value out of reusable test scripts, so you'll want to identify them early and implement them first.

2.2. Automated Tool

WinRunner is used as an Automated Testing Tool to drive Convergys Auto Tester (CAT) by using the Automation Engine for ADDT (Advanced Data Driven Testing).

2.2.1. Record and Playback

Record and playback is a great way to learn a new test tool and to create “quick and dirty” scripts you never intend to reuse. The trouble is that scripts generated through record and playback generally have hard coded data that makes it difficult to maintain the scripts. Furthermore, users can really leverage the power of their automated testing tool if they begin to use data-driven testing techniques. Data-driven testing requires actual programming; you can't do it through record and playback alone.

2.2.2. Data Driven Testing

One of the claims made by some tool vendors is that you can create automated tests simply by recording the tests as they are executed manually. There is a flaw in this argument. If you simply use automation to record and playback individual test cases, you will probably achieve less test coverage with automation than without. The real value in automated testing only comes when you begin to use data driven automated tests, especially using the ADDT for more data control and flexibility.

2.2.2.1. What Does Data Driven Mean?

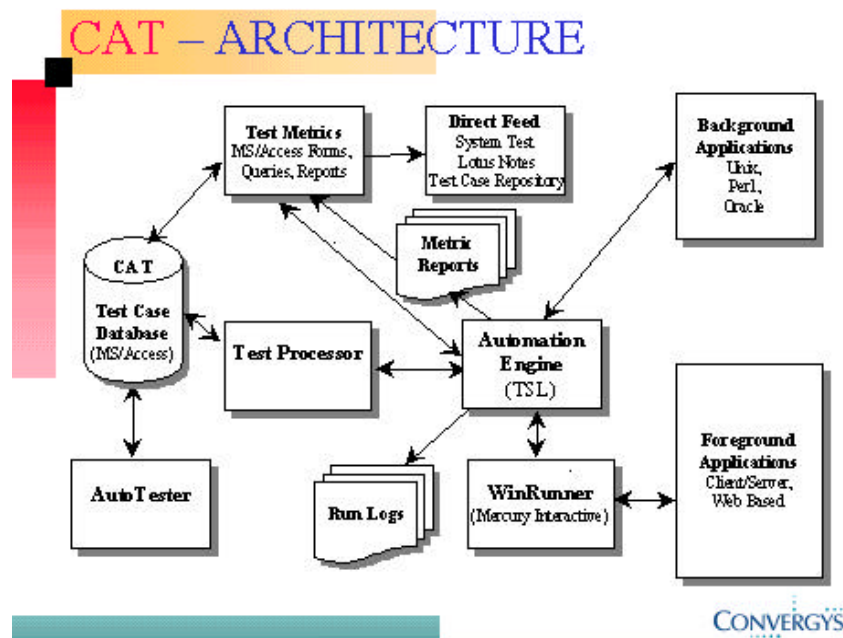
Data driven testing means that the automated tests read the test data from an external source, such as a file/table, rather than having the values hard coded into the scripts. To make your tests data driven, you write them to take parameters. These parameters define the way in which the test functions, allowing the user to test a variety of scenarios with the same automated test scripts by just changing the data.

2.3. Convergy's Auto Tester (CAT)

- Powerful Test Automation Tool Set for Client/Server and Web testing using ADDT
- Complete automation from test execution to report generation

2.3.1. CAT – Architecture

CAT architecture has been developed on A component basis and consists of A customized tool set and third party tools.



2.4. Convergys Auto Tester (CAT) Components

2.4.1. Engine

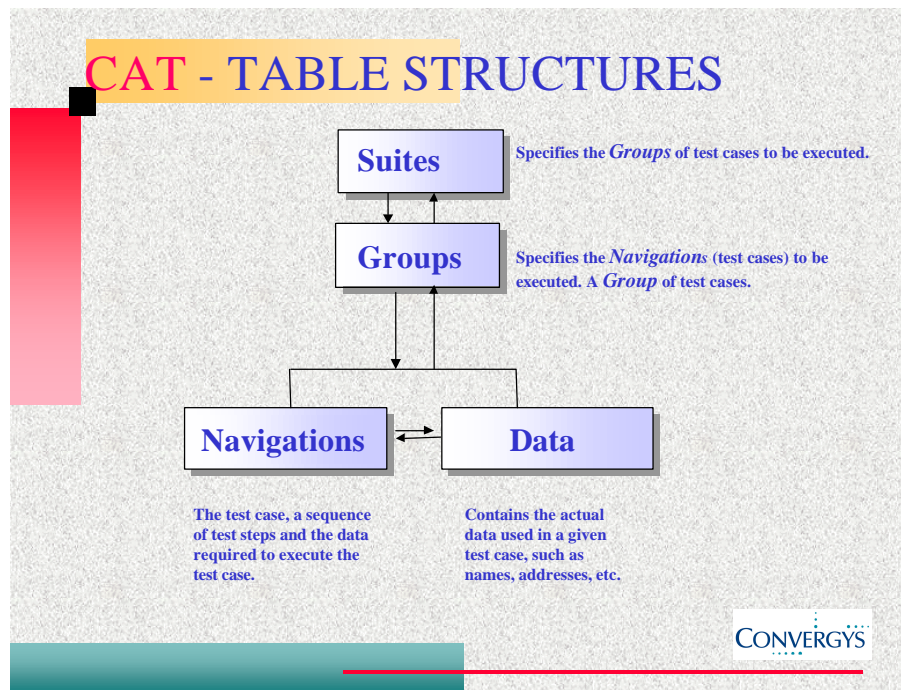
- Engine is a Translator.
- Engine consists of software modules, written in Mercury Test Scripting Language (TSL), and Visual Basic programs, which provide a front-end interface for users.
- WinRunner, customized tool set, and error handling code are embedded into the Engine for Foreground and Background processing, additional tool functionality, and error handling.
- It is a buffer between the application under test and automated tool (WinRunner).



2.4.2. Access Database

- MS/Access database is used as a test case repository for automation scripts. The database is transparent to users, but they can access this database by using the Test Explorer. Users can update, modify and delete their scripts.
- The database consists of four tables, Suite, Group, Navigation, and Data, which are used for ADDT (Advance Data Driven Testing).

2.4.3. Table Structures



2.4.3.1. CAT – Suite Tables

A **Suite** specifies the Groups of tests to be executed in a particular order. It is the highest organizational level for automated tests.

Convergys AutoTester - [TRAVEL : Suite]

File Edit View Tools Test Phases Window About Test Editor

Flight 2A Demo / Suite / NEW ORDER / VER / TRAVEL

Description: Suite of Travel Groups

Modified 11/15/00 11:05:03 AM By Marie Beringer

	Remark	Group Table	Num	Description
1		TRAVEL	1	Suite of Travel Groups
2				
3				
4				
5				
6				

2.4.3.2. CAT – Group Tables

A **Group** is a logical grouping of specific test cases (or Navigations) to be executed sequentially. Many Groups can make up one Suite.

Convergys AutoTester - [TRAVEL : Group]

File Edit View Tools Window About Test Editor

Flight 2A Demo / Group / NEW ORDER / VER / TRAVEL

Description:

Modified 11/21/00 1:47:19 PM By Shakil Ahmad

	Remark	Navigation	Data Table	Num	Description
1		TRAVEL_001	TRAVEL_001	1	Group of Travel Navigations
2					
3					
4					
5					
6					

2.4.3.3. CAT – Navigation Tables

A **Navigation** is a sequence of steps or actions required to execute a test case. Navigation is considered a test case. Multiple Navigations make up a Group.

Flight 2A Demo / Navigation / NEW ORDER / VER / TRAVEL_002

Description:

Modified 11/10/00 5:06:51 PM By Marie Beringer

	Remark	Action	Window	ID	Data	Description
1		ENTRY	Flight Reservation	OPEN ORDER	TRAVEL_002	Open Order
2		ENTRY	Flights Table	cust_name	TRAVEL_002	Enter customer name
3		PUSH	Open Order	OK		Press OK
4		ENTRY	Search Results	select_cust	TRAVEL_002	Select reservation in listbox
5		PUSH	Search Results	OK		Press OK
6		VAL	Flight Reservation	verify_info	TRAVEL_002	Verify Airline Arrival and Departure
7		ENTRY	Flight Reservation	tickets	TRAVEL_002	Change number of tickets
8		ENTRY	Flight Reservation	business	TRAVEL_002	Select Business
9		VAL	Flight Reservation	price	TRAVEL_002	Verify Price for single Business ticket
10		VAL	Flight Reservation	total	TRAVEL_002	Verify Total for Business tickets
11		ENTRY	Flight Reservation	first	TRAVEL_002	Select First Class
12		VAL	Flight Reservation	price_1	TRAVEL_002	Verify Price for single First Class ticket
13		VAL	Flight Reservation	total_1	TRAVEL_002	Verify Total for First Class tickets
14		ENTRY	Flight Reservation	economy	TRAVEL_002	Select Economy
15		VAL	Flight Reservation	price_2	TRAVEL_002	Verify Price for single Economy ticket
16		VAL	Flight Reservation	total_2	TRAVEL_002	Verify Total for Economy tickets
17		PUSH	Flight Reservation	Update		Press Update

2.4.3.4. CAT – Data Tables

A **Data** table contains the specific data (names, date, address etc.). The variables can be use to specify the data or actual data can be hard coded.

TRAVEL : Data

Flight 2A Demo / Data / NEW ORDER / TRAVEL

Description:

Modified 11/29/00 2:03:39 PM By Shakil Ahmad

	Description	ID	Date of Flight:	Fly From:	Fly To:	Customer Name:	Tickets:	Price:
1	ss	trvl_info	\$FLT_DATE	\$DEPART	\$ARRIVE			
2	flight number	flt_no						
3	customer info	cust_info				\$CUST_NAME		

2.5. *ADDT Approach to Data*

The Data table only allows the user to separate data from the actual automated scripts(s). In order to get more control of your data and maximize your Automation performance. The user needs additional functionality in the tool set, to make the data more flexible and reusable. To achieve these goals we have built-in functionality in our tool set.

2.5.1. SQL Editor

More flexibility can be obtained by allowing users to create SQL scripts and save the scripts. Parameters can also be passed to the SQL scripts.

2.5.2. Variable Tables

It will allow users to assign variable(s) to their data, for control and reusability.

2.5.3. SQL/PERL Scripts

Execute SQL/PERL script(s) and re-assign to variable(s) for additional flexibility.

3. AutoTester Features

- Added security via login
- Provide traceability
- Explorer functionality
- Ability to execute background scripts (Shell, Perl, Unix, etc.) or background processes
- Execution of logical statements i.e. if, else, case, etc.
- Screen capture functionality
- Scheduler functionality for off-peak run
- Capability to select environment
- Capability to map business rules
- Capability to create manual test cases
- One stop execution
- Provide Test Execution Metrics for upper management
- User friendly

4. Benefits of CAT (Convergys Auto Tester)

- A simple, repeatable, and measurable test process.
- All the benefits of automated testing with minimal technical support.
- Business analysts and end users can develop the test plans, as CAT tables are easy to create and simple to maintain.
- Tests can be built before the application is built.
- Tester does not need to know the programming aspects of the tool in detail.
- Reduce the Test Automation learning curve dramatically for the testers.
- Testers will only be involved in dealing with the tables and executing their Automated scripts by using the One Stop Test Execution window.
- High level of reuse is achieved because of the simple logical structure of the CAT tables.
- High quality automated test documentation is generated at each stage.

5. Bibliography

5.1. Recommended Books/Articles

Automated Software Testing, by Elfriede Dustin, Jeff Rashka and John Paul

Success with Test Automation, by Bert Pettichord

A White Paper, by Keith Zambelich

Lessons in Test Automation, by Elfriede Dustin

Classic Testing Mistakes, by Brian Marick

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Education:

- M.Sc. in Physics from University of Karachi, Pakistan
- B.Sc. in Electronic Engineering from London, England

Experience:

- 16 years of experience in the development and implementation of Test Automation
- Worked on automation projects with telecommunication companies, such as, Siemens and Motorola in the US and Plessey telecommunication in the UK
- Currently working with Convergys as a technical team lead for Test Automation projects, and responsible for all Test Automation development and implementation activities
- Responsible for test automation technical training in various Convergys locations in the US and the UK