**Solution-Soft**

## AUTOMATING TIME SHIFT TESTING WITH TIME MACHINE®

## TIME SHIFT TESTING

Testing software systems for correct behavior requires precision and proper setting.  As an example, when it comes to enterprise software systems, timing can be everything.  Is the item of interest month-end, quarter-end, or year-end?  Has the system correctly aged uncollected receivables?  Have the systems amortized the debt correctly; over the correct period?  These are examples of questions that must be answered during the testing discipline of the life cycle.  These are examples of what could become date and time sensitive test cases.

Staying ahead of your competition and excelling in your market requires another attribute, agility: the ability to adapt to changes quickly and effectively.  Being agile also means that your software systems would become increasingly volatile as you react to change.  Time Shift Testing is one way to mitigate this volatility.  Believe it or not, for organizations without agility, they would actually wait for a quarter-end to test changes to quarter-end logic.  Time Shift Testing obviates the need to wait for this actual time to elapse.  Instead, it makes the system being tested believe that it is the date or time needed to trigger the event we need to validate.  Time Shift Testing is sometimes called Virtual Clock Testing because it uses software virtual clocks to accomplish this goal. Software virtual clocks are fast and easy to use.  It is an alternative to changing the system clock on the server, which can be an extremely slow process with punishing unintended consequences.  In many organizations, changing the system clock requires opening a ticket and having multiple administrators involved. Changing the system clock in a secure network environment may also be prohibited. Active Directory and networks using Kerberos do not like to see member servers clocks deviate more than a small specified amount of time and Group Policy Objects can be enabled not only to synchronize time on all network connected devices but also to prevent users from changing the system clock.

Time Shift Testing uses strategically placed software virtual clocks to time travel the system being validated into the past or the future. What is strategic about the software virtual clocks is directly related to how the system queries the environment for the date and time and the underlying architecture of the environment itself. Time Shift Testing can result in enormous savings over the life of a project by eliminating the resource utilization and procedures associated with changing the system clock on one or many servers in the environment.

## TIME MACHINE® AND TIME MACHINE SYNC SERVER

Time Machine facilitates the creation of software virtual clocks. These virtual clocks enable Time Shift Testing without requiring a change to the system clock on the servers that make up the architecture of a deployed application. The Time Machine Sync Server allows for the broadcast of a virtual clock to specified targets that may be spread across different computing nodes in the enterprise. These groups of related targets are known as Sync Groups. Using the web services provided by the Time Machine Sync Server API during test execution brings seamless time travel to your automation scripts.

## TEST AUTOMATION

Selenium is the most commonly used open source automation framework. Selenium is capable of supporting a variety of programming languages such as Python, Java, C/C++, Ruby as well a variety of browsers such as IE, Safari, Firefox, Chrome. Hence, software developers and QA engineers have more freedom and ability to create sophisticated, data rich automation test scripts that may depend on complex environments. But Selenium is far from the only option supported by Time Machine. Testing tools from vendors such as IBM, MicroFocus and SmartBear can also be used. It could be any testing tool or language that supports web service calls for that matter.

The initial test scripts are typically generated by the test tool's IDE, an environment that allows the tester to record and play back user interactions with the application under test. The recorded scripts can be exported to a target language that can then be used for other types of tests like unit testing, stress testing, or performance testing.

## HOW TIME MACHINE AND AUTOMATION SCRIPTS WORK TOGETHER

Test scripts provide the backbone for the automated test. These scripts are created to simulate user actions.  By calling the web services in the Time Machine Sync Server API from the test script, one enhances the capabilities of testing the date and time centric logic across multiple nodes, environments and time zones.

A script may use the Time Machine Sync Server API to enable and disable the Sync Group.  This essentially turns on and off the virtual clock on all targets defined in the Sync Group. A new virtual clock can be specified at the same time as the Sync Group is being enabled. If the next test case in the test bed requires a different virtual time, the Sync Group can be enabled again with that subsequent virtual clock without ever being disabled. When virtual time is no longer required, the Sync Group is disabled and the system clock is back in effect.

## Benefits of Automation:

- *Save Costs:* Reduced operational costs.
- *Boost Productivity:* Increased productivity.
- *Improved Quality:* Increased quality of product.
- *Successful Deployments:* Can produce scalable test scripts on demand, browser independent. Supports multiple programming languages.
- *Application:* Can be used in any type of test (regression, integration, performance, unit testing.)

## Features & Benefits of Time Machine:

- *Save Costs:* Hardware and software maintenance costs*.*
- *Boost Productivity:* Boost engineering team productivity.
- *Successful Deployments:* Ensure large scale software projects finish on time and under budget.
- *Mitigate Failures*: Mitigate risks for mission- critical application failures.
- *Travel to Past, Future, running or frozen clocks:* Virtual clocks can be set to the past or future, running or frozen in time, and specified by absolute or relative values.
- *Variable Speed Clock*: Using the Variable Speed Clock function, applications can run up to 1000 times faster or slower than real time.
- *One System can perform multiple simultaneous tests:* Concurrent testing of multiple virtual clocks enable one test environment to become multiple test environments.

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