Vector Software

WHITEPAPER

Test like Google with VectorCAST

Introduction

In the book, How Google Tests Software – Help me test like Google the authors describe the evolution of the Google™ software testing process from the early days until now. Bugs that resulted from incomplete testing had become one of the biggest barriers to Google's continued success. When they analyzed their test environment, they discovered three main problems:

1. Complete testing required developers to write 2 to 3 lines of "Test Code" for every line of code under test.

2. The "Test code" required as much maintenance as the application code, and often had more bugs, than the application code.

3. Most developers performed incomplete testing.

Google found that the solution was to create a well-defined team approach with continuous integration and testing, where "hyper incremental" builds and testing are the norm and the primary responsibility for quality rests with the developers.

Can other companies adopt the Google testing process?

Is it feasible for other companies to build a homegrown testing infrastructure similar to Google's? Due to resource issues and cost, probably not, but you can build something similar using off-the-shelf automated tools like those from Vector Software.

The following section describes some of the key testing processes used at Google, and how VectorCAST™ can be used to provide similar functionality for any software organization.

Google Software Testing	Corresponding VectorCAST Automation
Software Engineers (SWE) Responsible for coding and test case development. Utilize the "code a little, test a little" method, using an Agile Test Driven Development approach.	VectorCAST/C++ Provides built-in support for "Test Driven Development" and lets you build test cases as soon as the header files are created.
Software Engineer in Test (SET) Assist the SWE with the unit testing. The SET's are responsible for building test harnesses and frameworks including stubs, mocks, and fakes for every version of the application. The SWE's use the harnesses to create the tests necessary to fully test the new and modified code.	VectorCAST/C++ Replaces the manual effort involved with framework, mocks, stubs, and fakes. Additionally, the tool automatically updates the test artifacts as the code changes. Google describes the ability to maintain test frameworks for every interface as "the perfect world" and "fairytale land". With VectorCAST/C++ this is reality.
Unit Test Dashboard Google has created a dashboard to enable them to run every test for every project every day.	VectorCAST/Manage Provides this exact functionality. In addition to the basic functionality of test control and reporting, it also allows the same tests to be run with different configurations of the source code, or with different compilers.
Code Coverage Analysis Google analyzes Code Coverage for all levels of testing.	VectorCAST/Cover Captures Statement, Branch, and MC/DC code coverage for any unit, integration, or system level test. It also allows the combining of coverage across all testing into a single metric.
Dependency Analysis Google has built a dependency analysis of each project so each developer knows exactly what code and test cases are affected by any source change. This provides immediate feedback on how each source change affects the entire system.	VectorCAST/Manage Has built-in support for *Change-Based Testing*, which performs dependency analysis for each source change and computes the sub-set of tests that are directly or indirectly affected by that change. A single click will run only those affected tests, reducing incremental test time from days to minutes.

Summary

The era of “build and break”, or other ad-hoc software testing methods is over, because the risks are simply too great to continue in this manner. In the span of just over a decade, Google’s test process and corporate culture surrounding software testing have become a center of excellence for the organization, and a standard that many companies aspire to achieve. While it is wise to understand the lessons of the Google model, the company does not have a monopoly on best practices for software test. In fact, environments like VectorCAST provide an off-the-shelf solution that is easily scalable and can be implemented incrementally, offering high levels of software quality for organizations of any size or application, in any industry. Moreover, VectorCAST provides all of the tools necessary to create a “change based” continuous integration environment — which is essential in today’s software development market, where the only constant is change.

References:

Whittaker, James , Jason Arbon, Jeff Carollo. How Google Tests Software. Westford, MA: Addison-Wesley, 2012.

About Vector Software
Vector Software, Inc., is the leading independent provider of automated software testing tools for developers of safety and business critical embedded applications. Companies worldwide in automotive, aerospace, medical devices, industrial controls, rail, and other industries, rely on Vector Software’s VectorCAST™. By automating and managing the complex tasks associated with unit, integration, and system level testing, VectorCAST helps organizations accelerate the development and ensure the reliability of their embedded software applications.

Vector Software, Inc.
1351 South County
Trail, Suite 310
East Greenwich, RI 02818 USA
T: 401 398 7185
F: 401 398 7186
E: info@vectorcast.com

Vector Software
Golden Cross House
8 Duncannon St
London WC2 N4FJ, UK
T: +44 203 178 6149
F: +44 20 7022 1651
E: info@vectorcast.com

Vector Software
St. Töniser Str 2a
47906 Kempen Germany
T: +49 2152 8088808
F: +49 2152 8088888
E: info@vectorcast.com

Vector Software
Rm 403, Building 6, No.88
Daerwen Rd, Zhangjiang
Hi-tech Park Pudong New Area
Shanghai 201203 China
T: 21- 3126 8126
F: 21-5132 8526
E: info@apac.vectorcast.com