

# Regression Testing is Always ON

## with Spirent TestCenter™ Virtual

### Executive Summary

Regression testing is not a new concept. However, with the advent of NFV, regression testing is undergoing a rapid transformation allowing Cloud and DataCenter operators to embrace virtualization technologies as part of their testing and development cycles.

Virtualization of the regression testing platform can help decrease the number of bugs and increases code coverage in testing, thus reducing the time-to-market for hardware or VNF products. Virtualizing regression beds today will enable users to test future offerings such as VNF easier.

Spirent recognizes the need to virtualize regression test beds. Spirent TestCenter Virtual solution alleviates the burden of creating new test cases by being 100% compatible with existing test cases. In addition to accelerating feature development, users can validate products on a variety of different platforms including VMware ESXi, OpenStack, AWS, Azure, etc. Each cloud platform has several different flavors on which users might need to test. Spirent TestCenter Virtual supports all major hypervisors and public clouds to facilitate this process.

### Why Virtualize Regression Testing?

Virtualized regression means the Device Under Test (DUT) and test tools are either VMs or containers that run on commodity servers with little to no requirement for specialized hardware testing. This is true for the Virtual Device Under Test (vDUT). The test execution happens in a virtual environment where a virtual topology is created by connecting the networking elements based on pre-defined topology configurations.

Any regression testing has two distinct stages in the workflow. The test cases are implemented individually and then aggregated into a suite during the "Test Case Execution" phase. The execution phase is where most of the benefits of virtualized regression are realized by increasing execution velocity, flexibility, portability and scalability.



As the number of virtual environments to be tested increases, the more configuration work must be done to fully leverage the benefits. The steps include:

- Setup a cloud platform using ESXi, OpenStack, AWS, Azure, etc.
- Create a virtual topology inside this cloud
- Connect the components using a virtual network connector
- Configure the test tool, DUT using configuration
- Execute the test case and clean up the virtual topology

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However, prior to execution, most users would require the automation of their test cases. Some of the artifacts involved in virtualized testing include:

- Spirent TestCenter configuration files
- Python, Perl, Tcl, scripts to control Virtual test ports via the TC APIs
- Topology definition, perhaps in YAML or TOGAF
- DUT configuration files

The test case authoring is probably the most time-consuming stage. However, it is an incremental process where every new test methodology that is automated adds value. Spirent understands this and has made test APIs uniform and consistent across both Spirent hardware and software platforms.

### Pros and Cons of Automated, Virtualized Regression Testbeds

While virtualization brings several advantages, there are some drawbacks to be aware of during implementation:

- **Performance bottleneck analysis:** Unlike with hardware, the underlying virtual infrastructure is not guaranteed to be consistent or the highest performing. Hence the root cause of performance problems cannot easily be identified between the vDUT and its infrastructure. This is not a regression test problem but in general a NFV problem.
- **Shared infrastructure:** Multiple test cases can run simultaneously on a single server, which increases the efficiency of your test bed. However, this may have unintended consequences. One test case that utilizes more resources could potentially starve another test case running on the same server. This can be avoided by intentionally scheduling high-performance test cases separately.

The advantages of automated, virtualized regression testing however do outweigh the above mentioned challenges. More and more leading Service Providers and Network Equipment Manufacturers recognize that a proven virtual test solution enables them to:

1. Avoid high costs of test escapes
2. Perform vDUT/VNF testing in different environments
3. Automate and scale test beds for future needs

### Heterogeneity of VNF Testing

The need to run large numbers of regression tests is increasing tremendously, especially when creating a Virtual Device under Test (vDUT) or Virtual Network Function (VNF). vDUT is a software product as opposed to a hardware network element, which means that the vDUT might have a much higher feature velocity due to agile development processes compared to its hardware counterparts. There is also an increasing trend towards combining several network elements into one software product. For example, Brocade (Vyatta) vRouter can act as Router, Firewall, Switch, and or VPN gateway. Users need any or all of these network features and expect

similar functionalities in the VNF as well. The result is that every vDUT inherits more regression testing requirements than ever before, and a scalable virtualized testing solution is required to support this.

### Parallel Scalability

This effectively is a multiplier on the regression test case. Users need to scale to a different level to start testing all the different features on all these new platforms. Luckily, virtualization provides the ability to scale. Spirent offers the most scalable regression testing kit with its Spirent TestCenter Virtual product line, where a few servers can run thousands of scripts per hour.

### Test Case Authoring

As the need increases to automate regression tests, the most time-consuming part is authoring the test cases. Spirent has an excellent suite of products to reduce the time needed to create test cases, by providing APIs and SDKs in the modern programming languages suitable for automation (Python, HLTAPIs, etc.). The APIs have the correct level of abstraction that is ideally suited for the automation engineer. An even faster way to automate test cases, is to create a test case using Spirent iTest, which is a test authoring interactive development environment (IDE) for accelerated test case creation and execution. Spirent Velocity simplifies the conceptualization, visualization, instantiation and deployment of virtualized test environments. It automates the instantiation and network configuration of the virtual test bed in preparation for regression test execution. Spirent iTest combined with Spirent Velocity accelerates test case creation and execution and can be a vital part of a continuous test / DevOps tool chain.

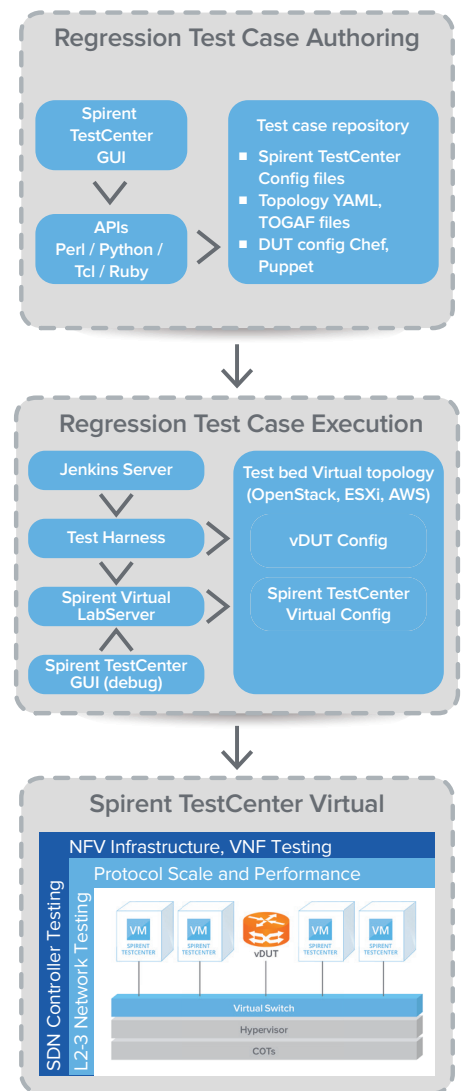
### Ease of Debugging

When regression test cases fail, this stalls the pipeline and has to be debugged quickly. As the scale of regression increases, a small change in code base could potentially cause a huge percentage of test cases to fail suddenly. When that happens, Spirent Virtual LabServer provides the tools to debug and find the root cause quickly.

### Continuous Integration (CI) and Development

In the age of continuous integration, is regression testing relevant? Where does regression fit in the continuous integration pipeline? Continuous integration is not a new concept. It brings together agile development processes, continuous testing and continuous delivery processes, creating a pipeline for software commits.

If the functionality of vDUT is fairly well defined, the regression is a large set of test cases that are automated in some scripting language. The entire set of test cases is usually run before a release, typically during the code-freeze timeframe. In the CI pipeline, regression testing now appears as the last pre-release/staging area testing gate. A good automated regression repository will enable users to transition faster to a CI model.



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## About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks.

We help bring clarity to increasingly complex technological and business challenges.

Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

For more information, visit: [www.spirent.com](http://www.spirent.com)

## Conclusion

Jumpstart regression testing with Spirent TestCenter Virtual, the only industry-proven solution to achieve:

- **High-velocity test case authoring**—due to collaboration, intuitive APIs help automatically create test scripts from a test case IDE.
- **High-scale regression test beds**—due to parallelization of test cases. After a test case is completed, Spirent TestCenter Virtual license is released to the user pool which helps reduce test execution time.
- **Infrastructure flexibility**—through repurposing servers during non-regression times. Test cases are 100% compatible between Spirent hardware and virtual platforms.
- **Effective debug ability**—execution through scripts that can be viewed from GUI and access to high-level to finer-grain APIs.
- **Automate once and for all**—whether developing scripts in iTest, Tcl, Perl, or Python for a complex regression environment, or focusing on script re-use and portability across platforms and teams. Fully automate virtual test lab management using Spirent Velocity.

To learn more about Spirent TestCenter Virtual solution, please visit: [www.spirent.com/Products/TestCenter/DataCenter/Virtual](http://www.spirent.com/Products/TestCenter/DataCenter/Virtual)

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