NIGHTWING

DejaVM

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Virtualized development environment for cyber resiliency

In today's networked environment, cyberthreats pose an increased security risk to mission-critical systems. Testing these systems to ensure their resiliency against modern cyberattacks is challenging. As threats accelerate in complexity and cadence, it is necessary to leverage advanced development and testing tools to increase the cyber resiliency of these systems.

Nightwing's DejaVM solution addresses these challenges by providing virtualized test environments to assess and reduce cyber risk.

DejaVM OVERVIEW

Need for virtual development environment

Modern cyber warfare affects all systems, making cyber resiliency as important for legacy systems as it is for systems currently under development. Advanced software testing can help mitigate this exposure and enhance cyber resiliency, but can be challenging to perform, especially in environments with constrained hardware quantities. Through emulation, DejaVM can augment development and testing on hardware, and provide precise insight into the inner workings of software platforms with its fully integrated debugging capabilities.

DejaVM enables complex systems to be virtualized, supporting large-scale automated cyber testing and allowing system owners to efficiently identify and resolve vulnerabilities.

The DejaVM solution

DejaVM is a whole-system emulation environment built from the ground up, focusing on software testing and analysis. DejaVM's virtual environment enhances software development, debugging, testing and security on Windows and Linux systems, as well as custom and embedded systems.

KEY CAPABILITIES

- Significant cost and time savings from scaling of software development and security testing.
- Whole-system emulation for Windows, Linux and custom systems.
- Support for x86, ARM, PPC and MIPS architectures.
- Fully integrated system-level debugger for user-mode and kernel-level code.
- Advanced introspection capabilities, including continuous rewind, snapshot, code coverage, execution tracing and robust analysis API.

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The DejaVM solution (continued)

By integrating its debugging capabilities into the platform, DejaVM provides infrastructure that can be leveraged on any virtualized system. This approach allows software developers to debug applications and functions of the operating system, directly and seamlessly, from a unified debugging environment. Any code within the system can be debugged, memory can be modified and bugs can be detected wherever they occur.

For over 10 years, DejaVM has been supporting high-volume scalable fuzz testing, an automated testing technique that discovers coding errors and security loopholes in software. Through rapid snapshotting, testing focuses only on the code that needs to be exercised, increasing test throughput. This process has enabled tens of billions of security test cases per year on a moderate-sized server infrastructure.

How it works

DejaVM's full system introspection enables analysis of an entire system, instead of a single process, allowing useful debugging regardless of the availability of source code or debug binaries. This capability also enables debugging of malicious code and defeat of typical anti-debugging techniques.

Fixing bugs in software can be time consuming and complicated. DejaVM's continuous rewind feature provides unparalleled flexibility without the need to set a recording point. This feature supports single-step rewind and snapshots that make returning to a known state after test case execution quick and easy. Exact replays and extensive instrumentation provide in-depth analysis and granular control, guaranteeing bugs are reproducible.

DejaVM also allows users to expand its operation beyond the original design by offering plugin support. Plugins allow users to create new debugger commands and perform arbitrary analysis on a guest environment. Plugins are built on a rich API, allowing full access to the inner workings of guests running in DejaVM, including process information, memory, CPU state and more.

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