MAKING THE BEST
WHITEPAPER | AMD Radeon™ Software

MAKING A GRAPHICS DRIVER YOU CAN COUNT ON

Abstract

The core of AMD’s Radeon™ Software mission is to deliver an impeccable, repeatable user experience. This was backed by a 2018 independent audit by QA Consultants commissioned by AMD determining that “AMD has the most stable graphics driver in the industry.” At AMD, quality isn’t a last-minute bug-squashing scramble. It’s a methodology baked into the development cycle and integrated with every Radeon™ Software release.

This white paper details 4 ways AMD supports this methodology of a commitment to stability:

- A Stability Philosophy
- Multi-Wave Checks and Balances
- Independent 3rd Party Audits
- Planning for Tomorrow

Background

Today’s computer graphics are enabling the gaming and professional visualization industries to push the envelope of engagement and creativity. But as graphic accelerators become more capable, the paired software stack becomes more complex. The surface area for potential instability and unexpected behavior balloons. Left unchecked, performance can come at the cost of quality. A deep-seeded commitment to software stability is vital in delivering a dependable user experience.

A Stability Philosophy

Software planning dedicated to stability must scale with broader performance and feature planning effort. Otherwise user experience will suffer. AMD defines user experience as the cumulative benefit of features, performance, and stability. This can be visualized as the area of an “FPS” triangle.

Figure 1.
An FPS (Features, Performance, Stability Triangle)
If too great of an emphasis is directed to performance optimizations or feature development, then we end up with a Biased User Experience. Performance and feature code changes made in isolation are prone to causing quality regressions, and thus come at the cost of stability. The below illustrates a Feature-Biased and Performance-Biased User Experience.

Such Biased User Experience scenarios are lucrative for dramatic marketing campaigns where features and performance can be touted more readily. The trade-off, however, is unpredictability in everyday use cases.

AMD is committed to an unbiased, scalable user experience. Stability is front and center from software conception to retirement.

## Multi-Wave Checks and Balances

Engineering resources focused on quality and stability are allotted at every phase of development. Core team assessments are made at each phase to ensure driver quality is meeting or beating expectations. Otherwise, accommodations are immediately made to keep stability on track. AMD employs a six-wave stability workflow.
Pre-Test Planning Wave
Prior to the internal commitment of engaging in development effort, a thorough test plan is developed and approved by engineering staff. Dedicated headcount is reserved to focus on stability through all subsequent stages of development.

Developer Testing Wave
Before any software changes are considered for check-in into a central branch, a Developer Test Plan (DTP) is executed to verify key component functionality and validate overall sanity of the software stack.

Integration Testing Wave
Although high-level component functionality may be in the clear from the prior testing wave, regressions may be inadvertently exposed in other driver components. For instance, a new DirectX® driver change may, for whatever reason, impact OpenGL® performance. It is vital that these bugs are caught early enough when they can be solved in an architecturally-sound manner. If integration testing is deemed successful, the change can be promoted to the target branch.

Component Testing Wave
At this point, reasonable confidence has been attained that the target software change works reasonably well and doesn’t immediately interfere with the rest of the driver. During the Component Testing Wave, AMD's stability engineers deep-dive into the software component that was updated as part of the principal development effort.

Functional Testing Wave
The Functional Testing Wave represents the bulk of the resource cost in AMD's Multi-Wave testing strategy. During this phase, all components are tested exhaustively against real-world environments and 24/7 stress.

Regression Testing Wave
At this point, the driver has been locked for any new changes or additions. Our stability team once again runs through their exhaustive list of tests to uncover any potential relapses from the prior wave.

Independent Audits
To accompany AMD's internal Multi-Wave stability strategy, AMD has commissioned several independent audits of driver quality internally. A third party is regularly assigned to take AMD’s software stack through its paces and evaluate AMD against other vendors.

Robust Support for Tomorrow’s Use Cases
Creating a stable driver is just as much about planning for what’s next as it is about fine-tuning the current release.

- Pre-Release OEM Testing
  AMD works closely with Dell, HP, Lenovo, and other Original Equipment Manufacturers (OEMs) to help ensure the Radeon™ Software driver stack will hit the ground running with new OEM platforms and configurations.

- Pre-Release ISV Testing
  AMD works closely with video game and content creation ISV developers to deliver a great experience to gamers and professionals that use new cutting-edge applications.

Conclusion
Driver stability isn’t an accident. It is the direct result of AMD's stability-focused software development methodology. With a commitment to employing a stability philosophy, multi-wave testing, independent audits, and keen planning, users can continue to count on AMD to provide a consistent and predictable experience.

1. https://qaconsultants.com/stabilityaudit/
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