



Tuning Device Drivers with the Intel® VTune™ Performance Analyzer

VTune Performance Analyzer Overview

The VTune™ Performance Analyzer is a tool you can use to identify and improve performance bottlenecks in software. It's useful not just in applications, but also in kernel mode device drivers. The methodology used is to sample execution addresses as the software under analysis runs, and then analyze those address samples after the application ends. The VTune analyzer results in very low overhead while the performance data is being gathered, which means it won't slow you down.

VTune Analyzer Features for Device Drivers

The VTune analyzer uses instruction pointer sampling to identify bottlenecks in software. This applies to ring 0 device drivers in exactly the same way it does for applications. The interrupt-based sampling mechanism the VTune analyzer uses gathers samples in ring 0 drivers just as it does for applications so this is a natural result of “system-wide” sampling and analysis. The VTune analyzer can analyze not only execution bottlenecks for device drivers, but all of the performance-sensitive CPU events available in Event Based Sampling (EBS) such as cache misses, misaligned data access, etc. You can drill down all the way to source code and assembly language code for device drivers just as you can for applications. In addition, Counter Monitor (operating system counters) and static assembly analysis (assembly analysis without running the driver) also work with drivers.

How to Use the VTune Analyzer with Device Drivers

Using the VTune analyzer with device drivers is similar to using it with applications. Use a fully-optimized release build with symbols to generate the driver's code. Then use the VTune analyzer to run an application that uses the driver. The analyzer cannot directly invoke the driver, so you must run an application to get the driver running. After that, using the analyzer with a driver is the same as using it with an application.

Look at the system-wide process report and continuously double-click through the graphs until the source code or assembly language is displayed. This will reveal the source code for the driver's performance bottleneck. The few features the VTune™ analyzer does not support in ring 0 include Call Graph and the Pause and Resume APIs.

Summary

The VTune analyzer supports device driver tuning in ring 0 (kernel mode) in much the same manner as it does for applications. This is due to its “system-wide” capabilities that analyze all code in the system, not just a particular application. As with normal applications, generating a release build of the driver with symbols enables you to gather performance data in a low-intrusion manner and then drill down to the source code for the most important performance bottlenecks.



Intel Corporation
2200 Mission College Blvd.
Santa Clara, CA 95052-8119
USA

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