

Tuning Device Drivers with the Intel® VTune™ Performance Analyzer 6.0

VTune™ Performance Analyzer Overview

The VTune™ Performance Analyzer is a tool that is used to identify and improve performance bottlenecks in software. It supports not just applications, but kernel mode device drivers also. The methodology that is used is to sample execution addresses as the software under analysis runs, and then to analyze those address samples after the application ends. This technology results in very low overhead while the performance data is being gathered.

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 ring0 drivers just as it does 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.

Drilling down all the way to source code and assembly language code is supported for device drivers just as it is for applications. In addition, chronologies (O.S. 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 not much different than 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 driver cannot be invoked directly from the analyzer, so an app must be run to get the driver running.

After that, using the analyzer with a driver is not any different than 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. In this way the source code for the driver's performance bottleneck will be displayed.

There are a few features of the VTune™ Analyzer that are not supported in ring 0. These include call graph and the sampling APIs (Configure/Start/Stop and Pause/Resume).

Summary

The VTune™ Analyzer supports device driver tuning in ring 0 (kernel mode) or ring 3 in much the same manner as it does for applications. This is due to the "system-wide" capabilities of the analyzer 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 enabled allows the developer to gather performance data in a low intrusive manner and then drill down to the source code for the most important performance bottlenecks.