Agenda

Problem Definition

Overview of the Intel® VTune™ Amplifier XE 2013

Frame Analysis
  • APIs
  • Results Interpretation

Demonstration
Problem Definition

Repetitive high level SW functionality that slows down at seemingly random times

Examples:
• Game - Video frames
• Database – Transaction response times
• Computation – Convergence

How to diagnose the cause?
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Intel® VTune™ Amplifier XE 2013
Second Generation VTune™ Analyzer

Fast, Accurate Performance Profiles
• Hotspot (Statistical call tree)
• Hardware-Event Based Sampling¹

Thread Profiling
• Visualize thread interactions on timeline
• Balance workloads

Easy set-up
• Pre-defined performance profiles
• Use a normal production build

Compatible
• Microsoft, GCC, Intel compilers
• C/C++, Fortran, Assembly, .NET, Java*
• Latest Intel® processors
  and compatible processors¹

Find Answers Fast
• Filter extraneous data
• View results on the source / assembly
• Event multiplexing

Windows or Linux
• Visual Studio Integration (Windows)
• Standalone user i/f and command line
• 32 and 64-bit

¹ IA32 and Intel® 64 architectures. Many features work with compatible processors. Event based sampling requires a genuine Intel® Processor.
Sampling Technology

Gather SW performance data by generating occasional HW interrupts

• Save observed execution context in ring buffer
  – Spilled to disk when full
  – No profile build or other instrumentation required
  – Fully optimized build with symbols enabled

• Would like to focus on those samples that occurred when functionality was slow
Hotspots analysis

![Hotspots analysis using Intel VTune Amplifier XE 2013]

- **Function hotspot**
- **Function CPU time**
- **Thread timeline**
- **Call stack**
Hotspots analysis – Source View

The image shows a software interface for Intel VTune Amplifier XE 2013, specifically highlighting a section of code analysis. The code snippet is focused on lines 578 to 582, which appears to be a conditional statement in C or C++:

```
else if (tmax.z < tmax.y) {
    cur = g->cells[voxindex];
    while (cur != NULL) {
        if (ry->mbox[cur->obj->id] != ry->serial) {
            ry->mbox[cur->obj->id] = ry->serial;
        }
    }
```

The analysis is indicating that the conditional statement is being executed 5.9% of the time. The CPU usage is depicted in a timeline chart, showing resource allocation across different threads.
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Finding Random Slowdowns in Repeating Functionalities
(Frame Analysis)

Frame: a functionality that executes repeatedly
- DirectX video frames, or
- User-Defined frames via APIs

API marks start and finish points in time of each frames occurrence
Intel® VTune™ Amplifier XE
Find Slow Frames With One Click

(1) Regroup Data

Function - Call Stack
Module - Function - Call Stack
Source File - Function - Call Stack
Thread - Function - Call Stack
Function - Thread - Call Stack
OpenMP Region - Function - Call Stack
Task Type - Function - Call Stack
Frame Domain - Frame - Function - Call Stack
Frame Domain - Frame Type - Function - Call Stack

Result:

Intel VTune Amplifier XE 2011

**Hotspots** - **Hotspots**

- **Grouping:** Frame Domain / Frame Type / Function / Call Stack
- **Scanline Frames:**
  - 97.1% |
  - 47.1% |
  - 31.2% |
  - 16.8% |
- **Bad Frames:**
  - 2.9% |
  - 0.5% |
- **No frame domain - Outside any frame:**
  - 0% |

**Threads:**

- WinMainCRTStart-up (0x2)
- Thread (0x1870)
- Thread video (0x1674)

**Frame Rate:**

- 14,846,832,54
- 14,846,832,51
- 14,846,832,52
- 14,846,832,53
- 14,846,832,54

**CPU Usage:**

- 3.46775s
- 3.46775s
- 3.46775s
- 3.46775s
- 3.46775s

**Frame:**

- Start: 3.450s
- Duration: 67.346ms
- Frame: 36
- Frame Domain: Scanline Frames
- Frame Type: Slow
- Frame Rate: 14,846,832,54

**Ruler Area:**

- Frame
- Threads

**Status:**

- Running

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