Intel VTune™ Amplifier — Platform Profiler

November 7, 2018
Intel® VTune Amplifier -

Platform Profiler
Identify system performance & configuration issues and headroom

Target User
- Infrastructure Architects
- Software Architects & QA

Performance metrics on system topology
- Display current configuration
- ~20 OS Metrics
- ~150 hardware Metrics

Identify system configuration issues
- Inefficient memory module placements
- Need for faster storage
- Need for larger/faster memory

Identify potential software issues
- Low CPU utilization
- NUMA-related issues (near vs. far memory accesses)
- Inefficient usage of memory/storage resources

Compare different system configurations
Common Uses

- Get more data from a timed run
  - Very low overhead ~2%
- Plan tuning strategy
  - Which app needs it most?
  - Which phase of the app?
  - Optimize cache? I/O? Threading?
- Monitor QA
  - Monitor long runs
- Optimize hardware configuration
  - Add more I/O? Add memory?

Platform Profiler Timed Run

- Duration of the run + everything that happened on the system during that run
- System Topology
- Interconnect and Bus Throughput
- Traffic Patterns
- CPU Utilization, Turbo, Cycle Efficiency
- NUMA and Latencies
- Efficiency comparisons

Timed run

- Only captures the duration of the run

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Progressive disclosure methodology

- Start with Overview and Topology
- Views covering different aspects of system
  Socket, Core, Memory, Disk, UPI, I/O
- Socket → Core → Internal Caches
- Socket → Memory Link → Memory Module
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Platform Profiler

Telemetry data collected (and displayed) at a granularity of 100ms

- Supports long collection durations
- Does not reveal confidential application info
- Average won’t hide erratic behavior

- Select and zoom to desired execution region (all graphs and averages adjust to selection)
## Platform Profiler

Web browser UI makes it easy to store, manage and share profiled data

<table>
<thead>
<tr>
<th>Name</th>
<th>Creation Date</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Folder</td>
<td>10/26/2018</td>
<td>This sample was collected using an application derived from the Intel Math Kernel Library Matrix Multiplication C Sample. The sample is not heavily CPU-bound and demonstrates efficient memory usage and throughput. However, the application is only running on a few cores and could benefit from parallelization. The sample was collected on an Ubuntu Linux system with 64GB of DRAM and 38 cores.</td>
</tr>
<tr>
<td>sample-hsx-20180326-1050-dgemm-te-10min</td>
<td>4/2/2018</td>
<td>This sample was collected while continuously copying 30+ randomly sized files for five minutes on socket 1 followed by five minutes on socket 0. It shows a marked increase in efficiency when using socket 0 and demonstrates that applications that use a lot of file operations can benefit from using the socket closest to storage. The sample was collected on an Ubuntu Linux system with two sockets and one NVMe disk.</td>
</tr>
<tr>
<td>sample-hsx-20180328-1042-filercopy-10min</td>
<td>4/2/2018</td>
<td>This sample monitors a memory traversal program that walks a 32GB allocation in varying steps. The same program is run five times using different core combinations and has a 10 second delay between each run. The sample was collected on an Ubuntu Linux system with 64GB of DRAM and 200GB swap space.</td>
</tr>
</tbody>
</table>

- **Name of the dataset includes hostname and date of creation**
- **Folders to manage datasets**
- **Comments to include any relevant information about the run**

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Platform Profiler
Collect and manage data from multiple targets easily

Data Collector

Platform Profiler Server
Web-based user interface

Data Collection “Targets”

Platform Profiler Server
Web-based UI
Chrome works best
**Workflow overview**

1. Install VTune and launch the Platform Profiler Server

2. Install data collector on “targets” (Linux or Windows)
   Ivy Bridge or Later

3. Collect data

4. Upload data

5. View and analyze results

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Backup
# The Long & Short of Performance Analysis

Get the big picture first with a Snapshot or Platform Profiler

<table>
<thead>
<tr>
<th><strong>Application Focus</strong></th>
<th><strong>System Focus</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>HPC App developer focus</td>
<td>Deployed system focus</td>
</tr>
<tr>
<td>1 app running during test</td>
<td>Full system load test</td>
</tr>
</tbody>
</table>

**VTune Amplifier’s Application Performance Snapshot**
- Metrics: OpenMP, Vectorization, MPI, Memory, I/O

**VTune Amplifier**
- Many profiles

**Intel Advisor**
- Vectorization

**VTune Amplifier’s Storage Performance Snapshot**
- Metrics: I/O, CPU, Memory, Network

**VTune Amplifier**
- Sampling
- Platform Profiler: System wide EBS

**ITAC**
- MPI Optimization

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<tr>
<th><strong>Snapshot</strong></th>
<th><strong>In-Depth</strong></th>
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</table>

Maximum collection times: 
- **L** = long (hours)
- **M** = medium (minutes)
- **S** = short (seconds-few minutes)
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