

Application Performance Snapshot User Guide for Linux* OS

Contents

Chapter 1: Application Performance Snapshot User's Guide for Linux* OS

Introducing Application Performance Snapshot	3
Analyzing Applications	4
Controlling Amount of Collected Data	6
Detailed Analyses	8
Common Analyses	8
MPI Analyses	10
Analysis Charts	10
Filtering Capabilities	23
Region Control with MPI_Pcontrol	29
Creating Configuration File for Intel® Trace Collector	30
Outlier Detection	30
Metrics Reference	32
Known Issues and Limitations	34
Notices and Disclaimers	35

Application Performance Snapshot User's Guide for Linux* OS

1

Use Application Performance Snapshot for a quick view into your application's use of available hardware.

Getting Started

To quickly get started with the Application Performance Snapshot, see [Analyzing Applications](#).

Metrics Reference

For a complete reference of the metrics Application Performance Snapshot supports, see [Metrics Reference](#).

Detailed MPI Analysis

For a more detailed analysis of MPI functions, messages and communications, see [Detailed MPI Analysis](#).

See Also

Collected links

[Analyzing Applications](#)

[Metrics Reference](#)

[Detailed MPI Analysis](#)

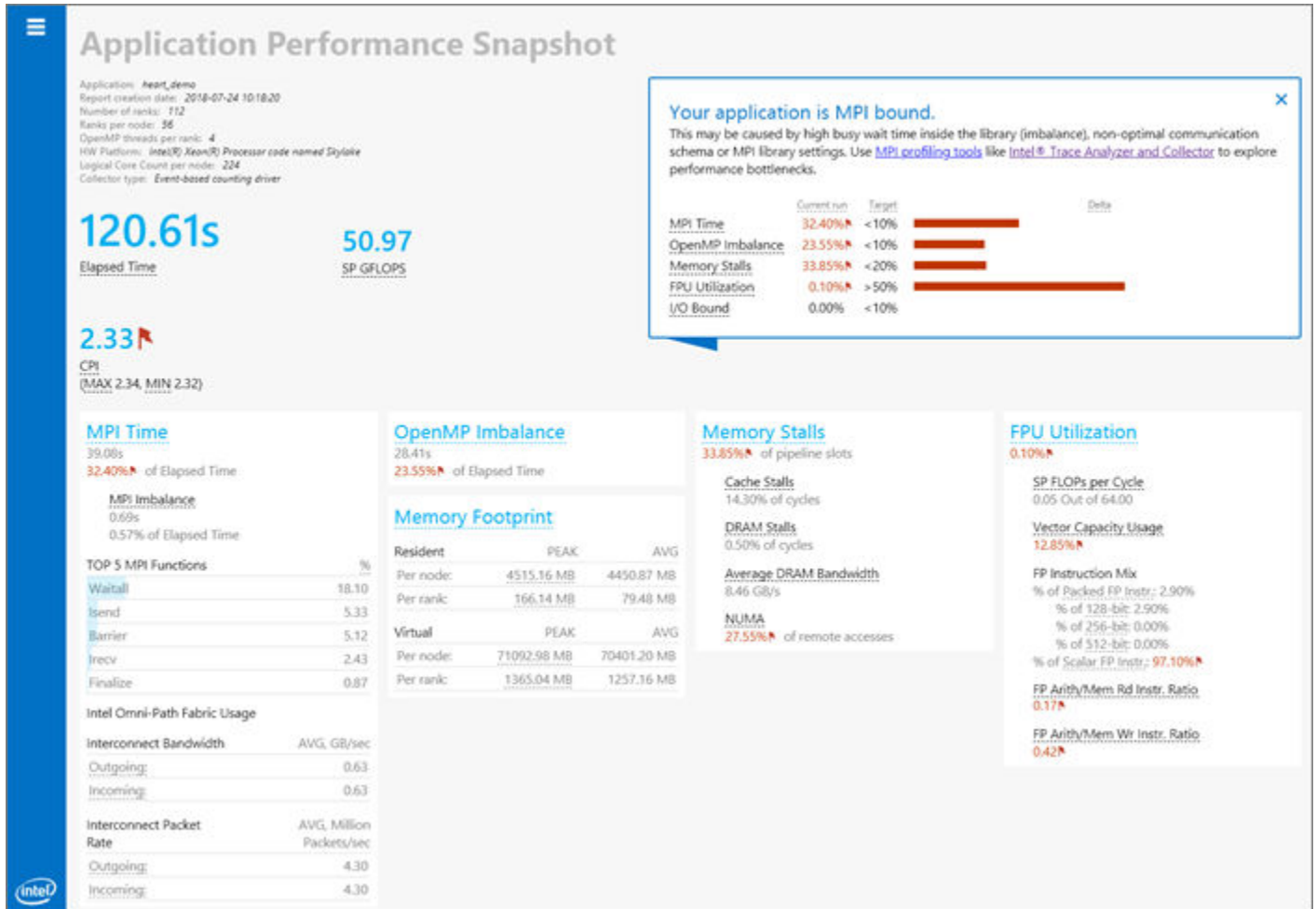
Introducing Application Performance Snapshot

Use Application Performance Snapshot for a quick view into different aspects of compute intensive applications' performance, such as MPI and OpenMP* usage, CPU utilization, memory access efficiency, vectorization, I/O, and memory footprint. Application Performance Snapshot displays key optimization areas and suggests specialized tools for tuning particular performance aspects, such as Intel VTune Profiler and Intel® Advisor. The tool is designed to be used on large MPI workloads and can help analyze different scalability issues.

Application Performance Snapshot comes bundled with all installations of VTune Profiler on Linux* OS.

Acquire VTune Profiler from one of these locations:

- [Standalone VTune Profiler download](#)
- [As part of the Intel® oneAPI Base Toolkit](#)
- [As part of the Intel® oneAPI System Bring-Up Toolkit](#)



What's New

To learn about updates and improvements to Application Performance Snapshot, see the [Intel VTune Profiler Release Notes](#).

Analyzing Applications

Prerequisites

(Optional) Use the following software to get an advanced metric set when running Application Performance Snapshot:

- Recommended compilers: Intel® C++ Compiler Classic, Intel® oneAPI DPC++/C++ Compiler or Intel® Fortran Compiler Classic and Intel® Fortran Compiler (other compilers can be used, but information about OpenMP* imbalance is only available from the Intel OpenMP library)

Before running the tool, you need to set up your environment. In the terminal, run the following command to set the environment variables:

```
source /opt/intel/oneapi/vtune/latest/apvars.sh
```

Tip

Launch `apsvars.sh` with the `--help` option for a list of available setup options.

Analyzing Shared Memory Applications

1. Run the following command:

```
$ aps <my app> [<app parameters>]
```

where `<my app>` is the path to your application and `<app parameters>` are your application parameters.

Application Performance Snapshot launches the application and runs the data collection.

2. After the analysis completes, a report appears in the command window. You can also open an HTML report with the same information in a supported browser. The path to the HTML report is included in the command window. For example:

```
firefox ./aps_report_01012017_1234.html &
```

3. Analyze the data shown in the report. Hover over a metric in the HTML report for more information.
4. Determine appropriate next steps based on result analysis. Common next steps may include application tuning or using another performance analysis tool for more detailed information, such as Intel® VTune™ Profiler or Intel® Advisor.

Analyzing MPI Applications

1. Run the following command to collect data about your MPI application:

```
$ <mpi launcher> <mpi parameters> aps <my app> [<app parameters>]
```

where:

- `<mpi launcher>` is an MPI job launcher, such as `mpirun`, `srun`, or `aprun`.
- `<mpi parameters>` are the MPI launcher parameters.

NOTE

`aps` must be the last `<mpi launcher>` parameter.

- `<my app>` is the path to your application.
- `<app parameters>` are your application parameters.

Application Performance Snapshot launches the application and runs the data collection. After the analysis completes, a `aps_result_<date>` directory is created.

2. Run the following command to complete the analysis:

```
$ aps --report aps_result_<date>
```

After the analysis completes, a report appears in the command window. You can also open an HTML report with the same information in a web browser.

3. Analyze the data shown in the report. Hover over a metric in the HTML report for more information.
4. Determine appropriate next steps based on result analysis.

Common next steps may include communication tuning with the `mpitune` utility or using another performance analysis tool for more detailed information, such as Intel® Trace Analyzer and Collector or Intel® VTune™ Profiler.

Application Performance Snapshot also provides advanced capabilities for MPI analysis. See [Detailed MPI Analysis](#) for details.

See Also

Collected links

[Detailed MPI Analysis](#)

Controlling Amount of Collected Data

Application Performance Snapshot (APS) provides several methods to control the amount of collected data. This enables you to reduce profiling overhead and focus on relevant application sections.

Collection Control API

By default, APS collects statistics for the whole application run. In some cases, it is important to enable or disable the collection for a specific application phase. For example, you may want to focus on the most time consuming section or disable collection for the initialization or finalization phases. APS provides APIs to control data collection from source code.

For MPI applications, use the `MPI_Pcontrol()` API. Call `MPI_Pcontrol(0)` to pause data collection, call `MPI_Pcontrol(1)` to resume it again. For more information, refer to [Region Control with MPI_Pcontrol](#).

For non-MPI applications, the Instrumentation and Tracing Technology API (ITT API) is also available. Before using ITT API, you need to configure your system. For instructions, refer to the [Configure your Build System](#) page of the VTune Profiler User Guide. After the system is configured, you can use ITT API. Call `__itt_pause()` and `__itt_resume()` to pause and resume data collection, respectively.

By default, profiling is enabled when the application is launched. To launch the application without profiling, use the `-start-paused` option. Profiling will begin automatically with the first call of `MPI_Pcontrol(1)` or `__itt_resume()`. This can be useful to skip the initialization phase.

MPI Imbalance Collection

By default, APS collects and reports on the MPI imbalance (idle time). The `APS_IMBALANCE_TYPE` environment variable allows for additional control over how the imbalance is calculated. The default level changes based on the setting of the `APS_STAT_LEVEL` environment variable. To change the level, update the `APS_IMBALANCE_TYPE` environment variable. For example:

```
export APS_IMBALANCE_TYPE=2
```

Value	Description
<code>APS_IMBALANCE_TYPE=0</code>	Default value if <code>APS_STAT_LEVEL=1</code> Turns off the imbalance calculation. Disabling the imbalance calculation reduces the overhead of APS, but does not provide information about MPI imbalance, which is an important statistic as part of application performance analysis. For the Intel® MPI Library, imbalance (Idle time) is reported at this level.
<code>APS_IMBALANCE_TYPE=1</code>	Default value. Only Intel® MPI can collect the imbalance requested by this setting. If you use any other MPI implementation, the behavior is similar to <code>APS_IMBALANCE_TYPE=0</code>.
<code>APS_IMBALANCE_TYPE=2</code>	Imbalance is calculated by calling <code>MPI_Barrier</code> before any collective operation and measuring the time of the call. This can provide data about

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