Intel APS

Application Performance Snapshot

Durham, April 4, 2024

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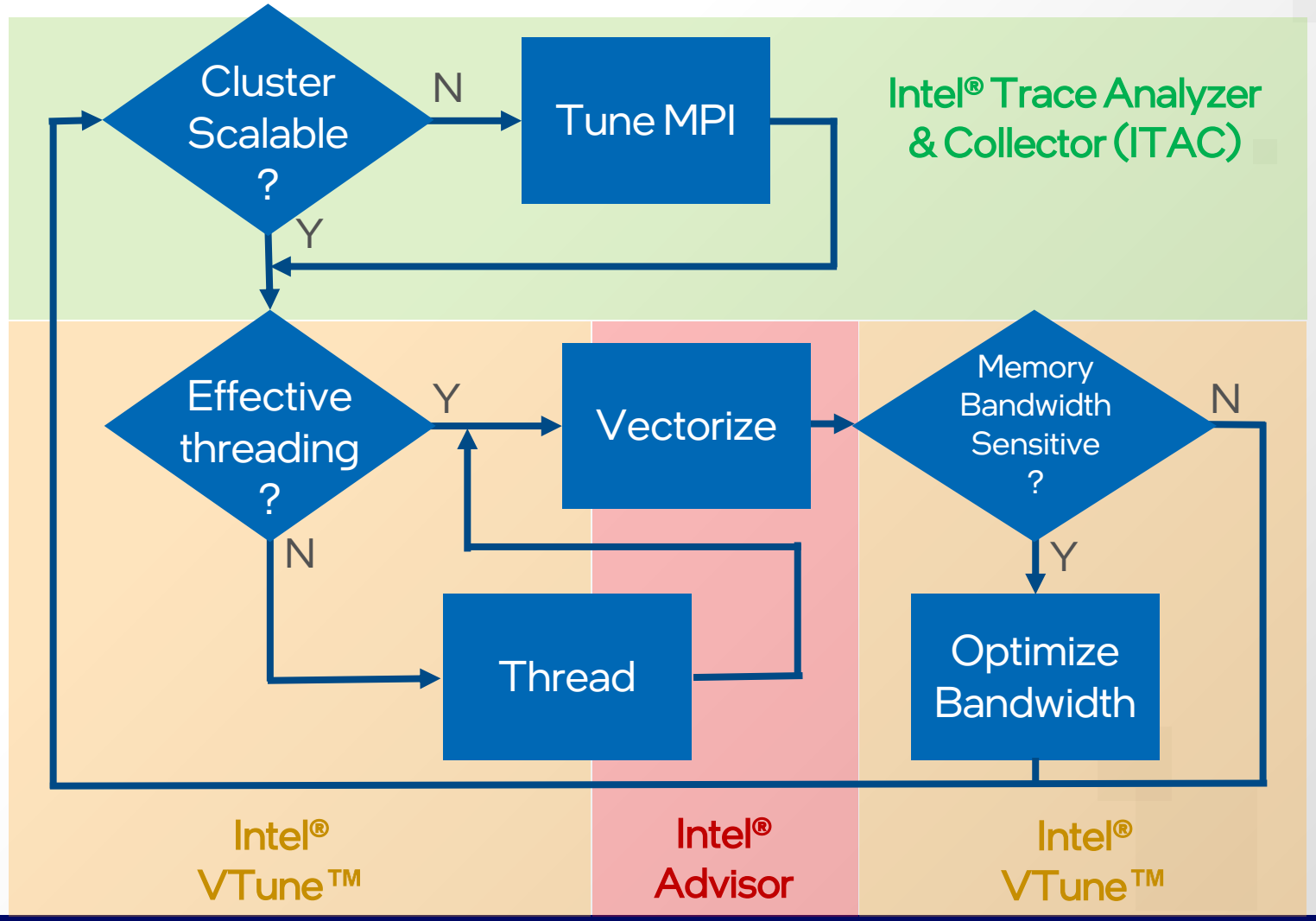
Agenda

- How shall I start performance analysis?
- MPI details
- Troubleshooting
- Additional resources

Which tool should I use?

Performance Analysis Tools for Diagnosis



Before dive to a particular tool..

- How to assess easily any potential in performance tuning?
- What to use on big scale not be overwhelmed with huge trace size, post processing time and collection overhead?
- Which tool should I use first?

- Answer: try Application Performance Snapshot (APS)

- Look for VTune module if available

APS Usage

Setup Environment

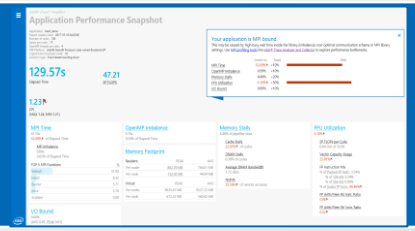
- $ source <path_to_vtune>/vtune_vars.sh # or load module

Run Application

- $ aps <application and args>
- MPI: $ mpirun <mpi options> aps <application and args>

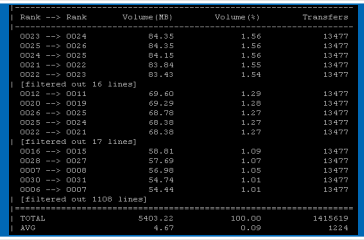
Generate Report on Result Folder

- $ aps –report <result folder>



Generate CL reports with detailed MPI statistics on Result Folder

- $ aps-report –<option> <result folder>



Application Performance Snapshot (APS)

Data in One Place: MPI+OpenMP+Memory Floating Point

Quick & Easy Performance Overview

- Does the app need performance tuning?

MPI & non-MPI Apps†

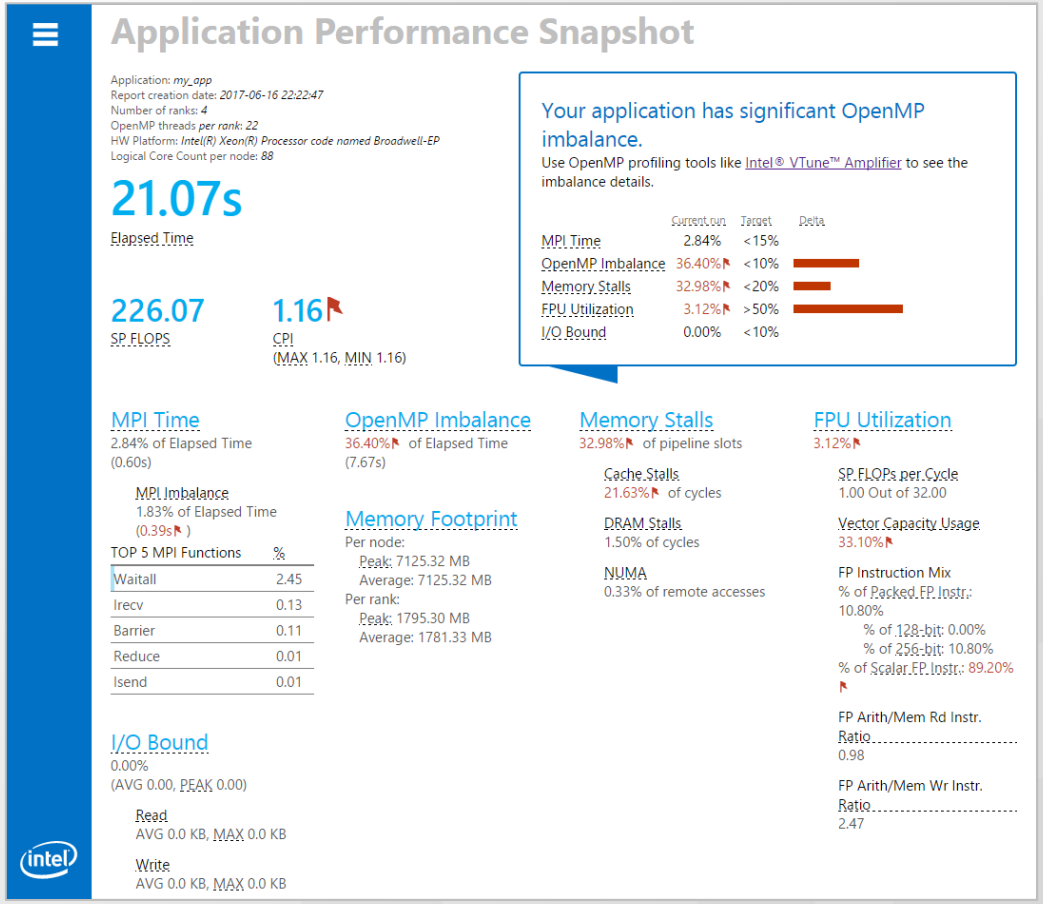
- Distributed MPI with or without threading
- Shared memory applications

Popular MPI Implementations Supported

- Intel® MPI Library
- MPICH & Cray MPI

Richer Metrics on Computation Efficiency

- CPU (processor stalls, memory access)
- FPU (vectorization metrics)



†MPI supported only on Linux*

APS Command Line Reports – Advanced MPI statistics (1/3)

- MPI Time per rank
  - aps-report –t <result>

MPI Time per Rank

Rank	LifeTime(sec)	MPI Time(sec)	MPI Time(%)	Imbalance(sec)	Imbalance(%)
0007	72.52	14.31	19.74	4.84	6.67
0004	72.53	11.57	15.96	3.26	4.50
0005	72.52	11.40	15.72	3.20	4.42
0006	72.51	11.11	15.32	3.17	4.37
0000	72.49	11.08	15.29	4.33	5.97
0001	72.52	10.95	15.10	3.01	4.15
0002	72.49	10.79	14.88	2.57	3.55
0003	72.50	10.64	14.68	2.50	3.45
TOTAL	580.07	91.86	15.84	26.88	4.63
AVG	72.51	11.48	15.84	3.36	4.63

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APS Command Line Reports – Advanced MPI statistics (2/3)

- Message Size Summary by all ranks
  - aps-report –m <result>

Message Sizes summary for all ranks

Message size(B)	Volume(MB)	Volume(%)	Transfers	Time(sec)	Time(%)
8	1.49	0.09	195206	27.79	37.93
176	0.41	0.02	2420	27.67	37.78
4	0.00	0.00	1150	15.55	21.22
100264	115.89	6.94	1212	0.27	0.37
98400	113.74	6.81	1212	0.19	0.26
66256	38.29	2.29	606	0.17	0.23
[filtered out 57 lines]					
TOTAL	1670.60	100.00	265160	73.25	100.00

APS Command Line Reports – Advanced MPI statistics (3/3)

- Data Transfers for Rank-to-Rank Communication
  - aps-report –x <result>

And many others – check
- aps-report -help

Rank --> Rank	Volume(MB)	Volume(%)	Transfers
0023 --> 0024	84.35	1.56	13477
0025 --> 0026	84.35	1.56	13477
0024 --> 0025	84.15	1.56	13477
0021 --> 0022	83.84	1.55	13477
0022 --> 0023	83.43	1.54	13477
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0012 --> 0011	69.60	1.29	13477
0020 --> 0019	69.29	1.28	13477
0026 --> 0025	68.78	1.27	13477
0025 --> 0024	68.38	1.27	13477
0022 --> 0021	68.38	1.27	13477
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0016 --> 0015	58.81	1.09	13477
0028 --> 0027	57.69	1.07	13477
0007 --> 0008	56.98	1.05	13477
0030 --> 0031	54.74	1.01	13477
0006 --> 0007	54.44	1.01	13477
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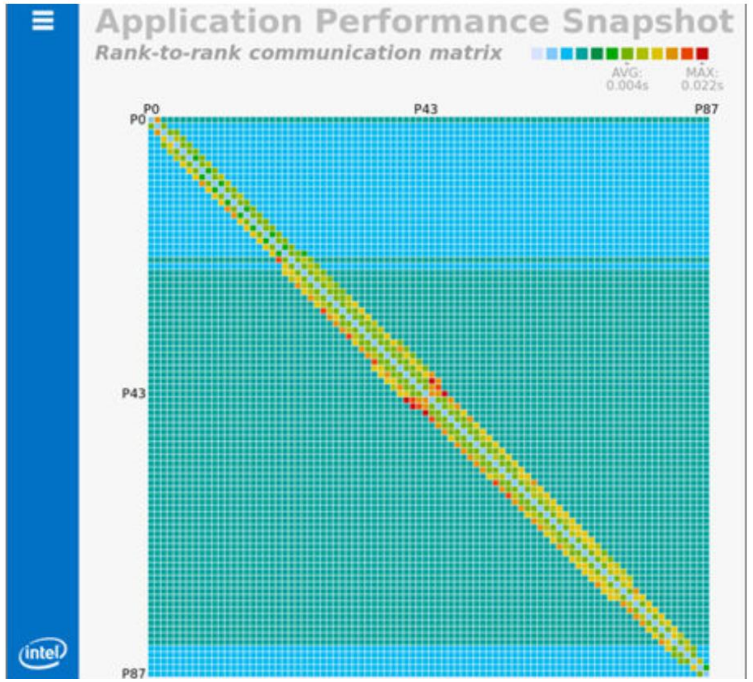
TOTAL	5403.22	100.00	1415619
AVG	4.67	0.09	1224

Communication Matrix

```
aps --report -x --format=html <result name>
```



Troubleshooting

- Hardware sampling might not work for APS due to missing drivers and settings (like running on AMD HW):

  Add the following option to APS: `--collection-mode=mpi` this will just show the MPI related information. Another collection mode is "omp" that can be added for OMP information when using the Intel compiler

- If you don't want to change your script you might use the following environment var:
  export I_MPI_GTOOL="aps <options> -r=<dir> :all"

Resources for APS

- Getting started: https://www.intel.com/content/www/us/en/docs/vtune-profiler/get-started-application-snapshot/2024-1/overview.html
- User Guide: https://www.intel.com/content/www/us/en/docs/vtune-profiler/user-guide-application-snapshot-linux/2024-0/overview.html
- Help Menu: `$ aps --help`
- MPI Analysis Help: `$ aps-report --help`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