

# PROFILING WITH INTEL VTUNE

**Useful Tips** 

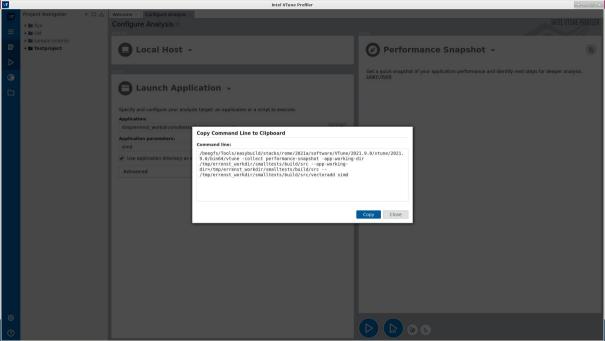
August 9, 2023 | Dr. Martin Errenst



## **COMMANDLINE INTERFACE**



- Useful for defining profiles in a script
- vtune -help is your friend!
  - E.g. vtune -help collect
- vtune -collect hotspot -knob <option>=<value> <application> to configure collection
  - vtune -help collect hotspots to find list of available options
  - Similar for other analysis types



# NON-DETERMINISTIC EFFECTS



- Consider and minimize "non-deterministic" effects
  - Store results in /tmp , if you only have a remote filesystem
  - Consider other influences (e.g. network, hdd vs. ssd)
  - Remember statistical nature of VTunes (sampling) results
    - ⇒ Don't take resulting numbers too literally
  - Separate active processes competing for the same resources

#### LARGE TEST CASE



- Profile results grow large for long running test cases
  - Minimize examples when iterating on problem
  - Collect only required data (do you need call stacks?)
  - Limit data collection to relevant code sections

# INSTRUMENTATION AND TRACING TECHNOLOGY (ITT) API



To steer data collection

- Consider using the Intel ITT API
- Steer the data collection in your code
- Provides much more than just resume and pause
- Can group and mark separate code sections

```
#include <ittnotify.h>
int main(int argc, char* argv[]){
   // Boring initialization
    itt resume();
    // relevant code section
   __itt_pause();
   // Boring cleanup
    return 0:
```



- github.com/jrfonseca/gprof2dot
  - Script to extract call graph
  - Works with various profiler formats
  - Export vtune result with
    vtune -report gprof-cc -result-dir <path> -format text
    -report-output output.txt
  - Then create dotfile and graph

# THIRD-PARTY TOOLING



perf traces

- VTune can import Linux Perf Traces
- Collected with perf record
- To analyze existing measurements or when data collection with VTune is not possible



## THIRD-PARTY TOOLING



**FlameGraph** 

- github.com/brendangregg/FlameGraph
  - Create flame graph from various profiler results
  - But: VTune ships its own flame graph visualization in recent versions!



- Intel VTune Profiler User Guide
- Intel VTune Profiler Performance Analysis Cookbook
- Tutorial: Analyze Common Performance Bottlenecks
- Tutorial: Analyzing an OpenMP\* and MPI Application
- Intel 64 and IA-32 Architectures Optimization Reference Manual
- Intel 64 and IA-32 Architectures Software Developer Manuals