



# Intel® VTune™ Performance Analyzer

## How-To Guide

*Instructions apply to versions 9.0 update 9 and above, screen captures are taken in Windows\* environment, but apply to Linux\* as well.*

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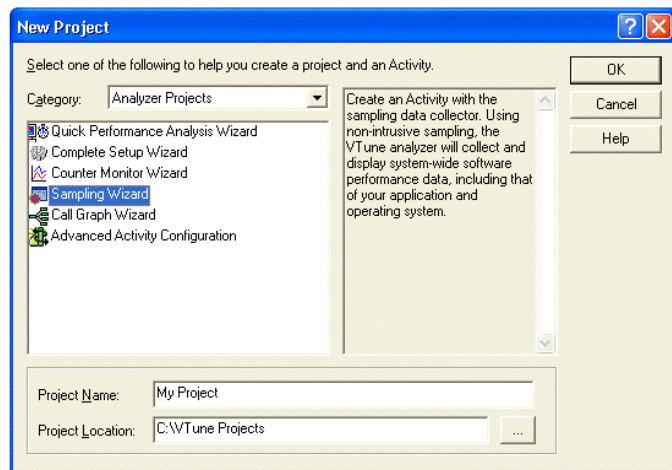
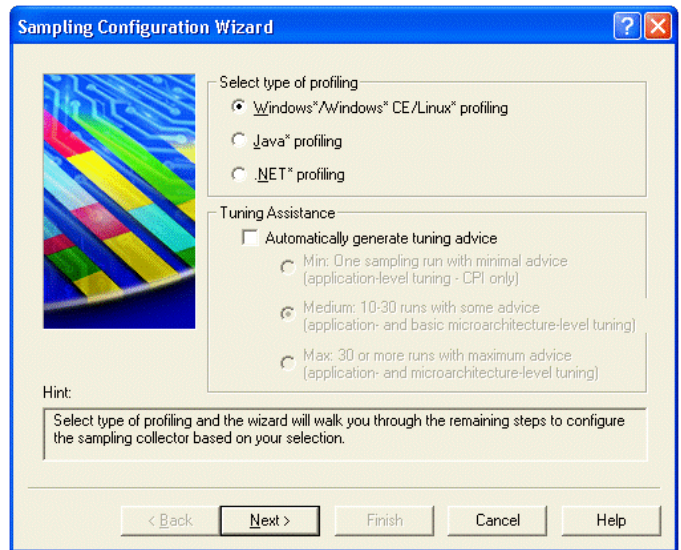
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## Getting the Most Out of Intel® VTune™ Performance Analyzer

- Make sure your application is compiled in Release Mode
- Ensure you have symbols for your application by compiling with
- Have a reproducible “workload” for your application and run it the same way every time you profile
  - Make sure you are running the parts of the application you want to optimize

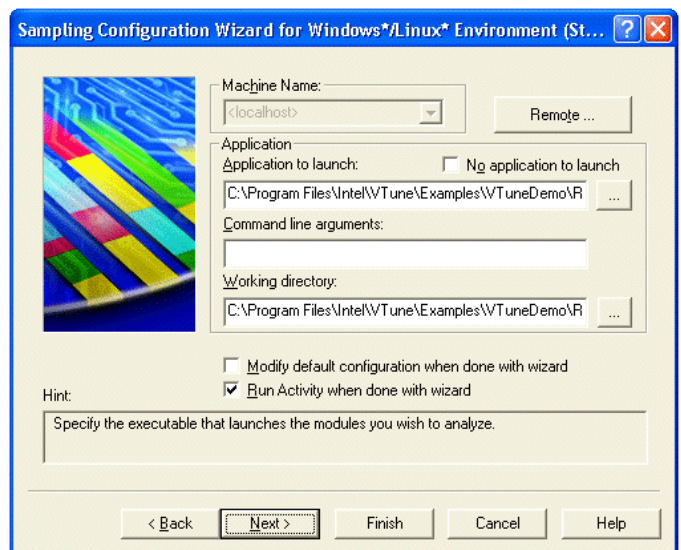
### How To Set Up a Basic Sampling Project

- File > New Project
- Choose Sampling Wizard
- Fill in name and location and click OK

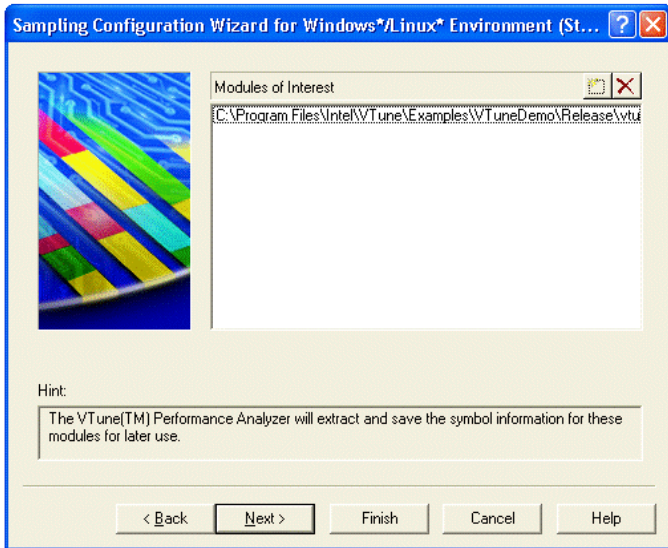


- Select the appropriate type of profiling
- Enable generation of tuning advice if desired
- Click Next

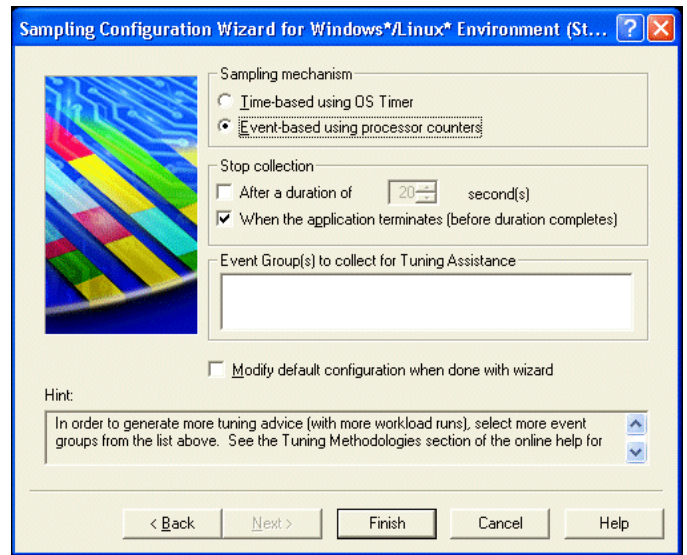
- Select the application to profile, fill in command-line arguments if needed, and select the working directory
- Leave the Run Activity when done with wizard box checked
- Click Next



- Select additional Modules of Interest if needed
  - Only needed if your application launches other processes you want to sample
- Click Next



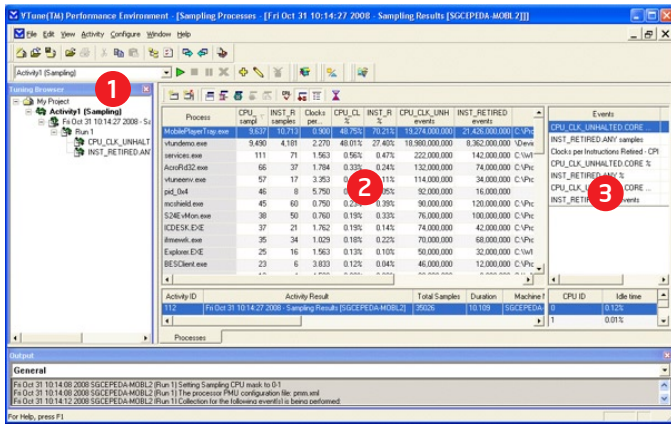
- Leave the *Sampling mechanism* radio button at default
  - Change Stop collection checkbox to sample application for fixed time period if needed
- Click Finish



- Intel VTune Performance Analyzer will launch your application
- Wait for the data collection to complete and load
- Optionally rename the Activity using the Tuning Browser
- View the data (see How To Interpret the Data)

## How To Interpret the Data

### Understand the interface



1. Tuning browser allows access to each sampling activity
2. Center pane has spreadsheet-like view of all data
3. Event pane shows list of events and their values for the highlighted process in the center pane

The Sampling Wizard profiles using two events (All active processes on the system will be sampled):

- CPU\_CLK\_UNHALTED: CPU cycles when a core is active
- INST\_RETIRED: Instructions executed

Process	CPU_CLK_UNHALTED samples	INST_RETIRED samples	Clocks per Instruction	CPU_CLK_UNHALTED %	INST_RETIRED %	CPU_CLK_UN events	INST_RETIRED events
MobilePlayerTray.exe	9,637	10,713	0.900	48.75%	70.21%	19,274,000,000	21,426,000,000
vturndemo.exe	9,490	4,181	2,270	48.01%	27.40%	18,980,000,000	8,362,000,000
services.exe	111	71	1,563	0.56%	0.47%	222,000,000	142,000,000
AcroRd32.exe	66	37	1,784	0.33%	0.24%	132,000,000	74,000,000
vturndemo.exe	57	17	3,393	0.11%	0.11%	114,000,000	34,000,000
pid_0x4	46	8	5,790	0.05%	0.05%	92,000,000	16,000,000
mschfield.exe	45	60	0,750	0.23%	0.39%	90,000,000	120,000,000
SZMSMon.exe	38	50	0,760	0.19%	0.32%	76,000,000	100,000,000
ICDESK.DXE	37	21	1,762	0.19%	0.14%	74,000,000	42,000,000
Itemsvk.exe	35	34	1,029	0.18%	0.22%	70,000,000	68,000,000
Explores.DXE	25	16	1,563	0.13%	0.10%	50,000,000	32,000,000
BESClient.exe	23	6	3,833	0.12%	0.04%	46,000,000	12,000,000

1. Samples columns show the number of samples taken for each event
2. CPI automatically calculated
3. % columns show the distribution of samples across data rows
4. Events columns show actual numbers of events, calculated by multiplying the number of samples times sampling frequency

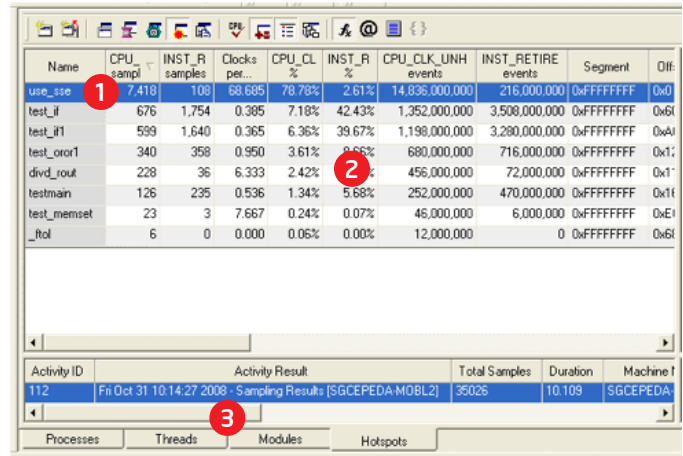
- In order to minimize impact to the system, samples are only taken periodically
- For an event like CPU\_CLK\_UNHALTED (an active CPU cycle), a sample might be taken only after every 2,000,000 events
  - The sampling frequency (ie 2,000,000) is known as the SAV value (Sample After Value)

- Different events may have different SAVs
- For a particular event, you can choose to concentrate on either samples or events to determine hotspots

Process	CPU_CLK_UNHALTED samples	INST_RETIRED samples	Clocks per Instruction	CPU_CLK_UNHALTED %	INST_RETIRED %	CPU_CLK_UN events	INST_RETIRED events
MobilePlayerTray.exe	9,637	10,713	0.900	48.75%	70.21%	19,274,000,000	21,426,000,000
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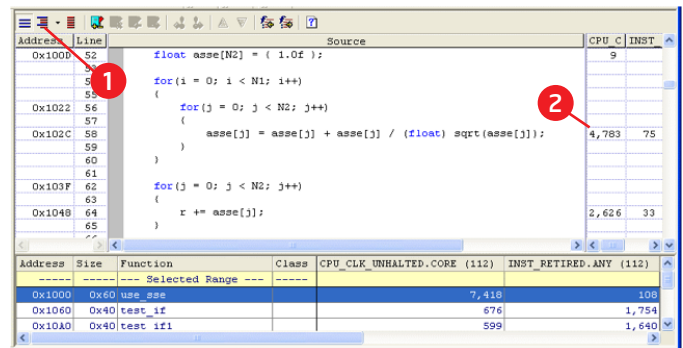
9,490 samples \* 2,000,000 SAV = 18,980,000,000 events occurred

### Navigating through the data



1. Double-click a row in the center pane to drill down to a new view of the data
2. Functions will be sorted in descending order; functions with the most samples of the CPU\_CLK\_UNHALTED event are called "hotspots"
3. Drill down to thread, then module, then hotspot view

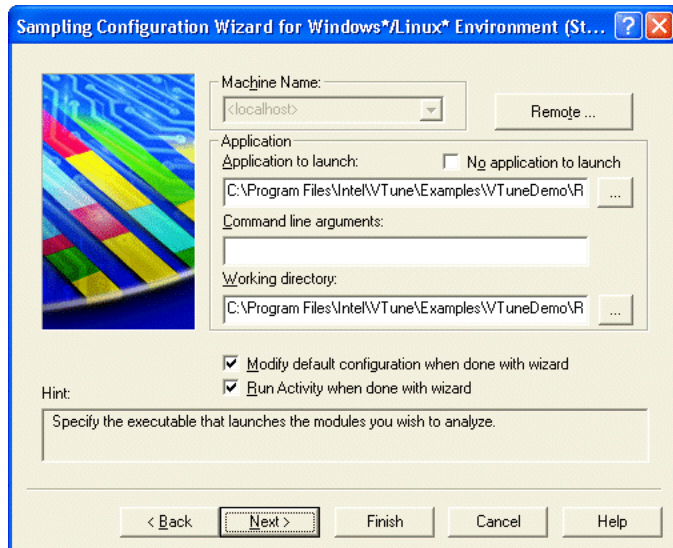
### Navigating through the data



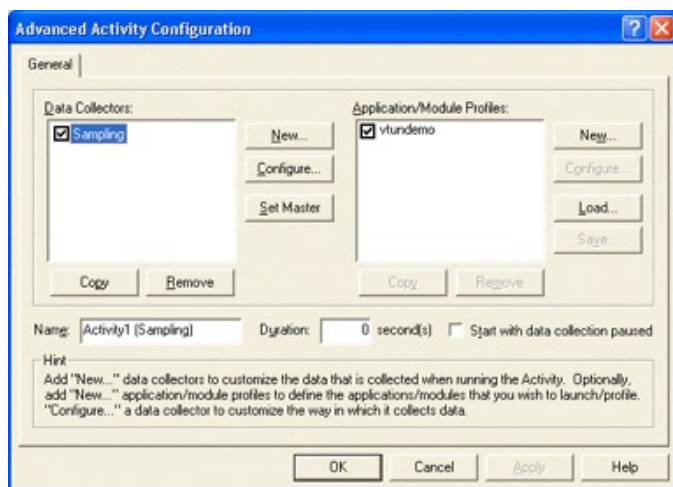
1. Switch between source, assembly, and combined views
2. View samples for each line of code

## How to Set up Event-Based Sampling

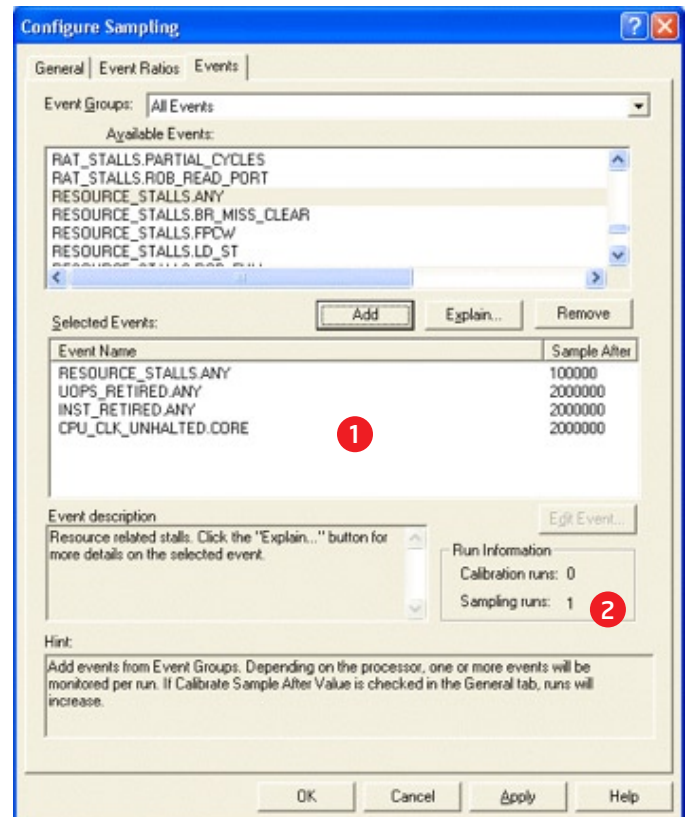
- Set up a project using the Sampling Wizard in the same way as a Basic project until step 3
- Check the Modify default configuration box



- Continue through the next screens and click Finish
- In the Advanced Activity Configuration dialog, choose Sampling from the Data Collectors list box and click the Configure button



- In the Configure Sampling dialog, go to the Events tab
- Select Events from the list, and click Add
- An appropriate SAV is determined based on the CPU frequency, but it can be changed if desired
- Intel VTune analyzer will run the application more than once depending on the number of events selected



- Two new events have been added, and SAV values automatically set
- Sometimes more than one run of the application will be needed

- After selecting your events, click OK on the Configure Sampling dialog
- Click OK on the Advanced Activity Configuration dialog
- Intel VTune will run your application one or more times while collecting data
- After the data loads, rename the activity if desired and analyze the results

