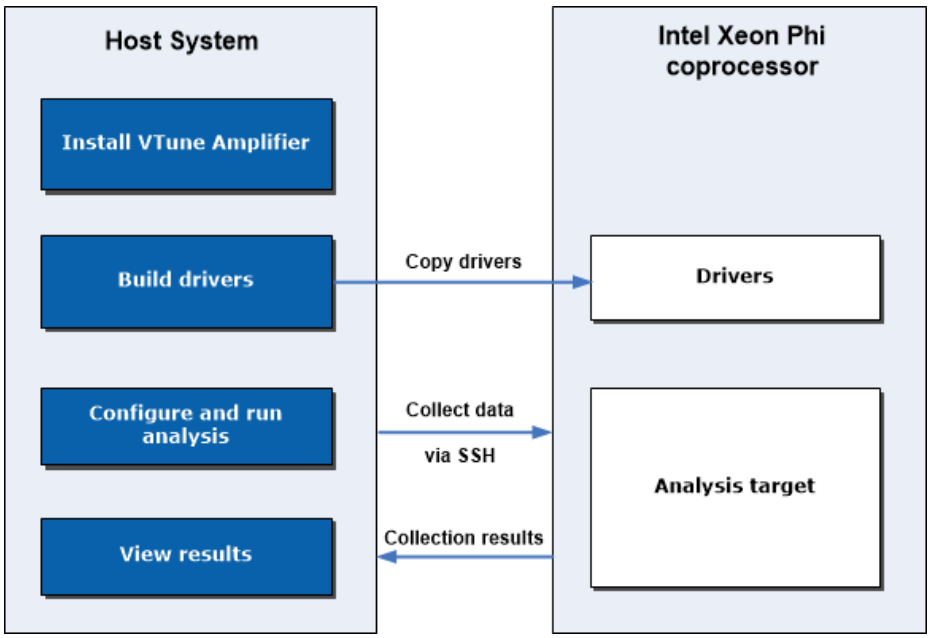
Intel® Xeon Phi™ Coprocessor (Code Name: Knights Corner) Analysis Workflow

NOTE

This type of analysis is supported by the Intel® VTune™ Amplifier XE only.

The following figure shows basic steps required to analyze an application running on Intel® Xeon Phi™ coprocessors based on Intel Many Integrated Core Architecture (Intel® MIC Architecture) or perform a system-wide analysis. You may choose to run one of the predefined analysis types, Advanced Hotspots, Bandwidth, General Exploration, or create a custom analysis type.

Prerequisites: Build the target on the host with full optimizations, which is recommended for performance analysis.



1.	**Install the sampling driver**	Install the sampling server and driver on an Intel Xeon Phi coprocessor card to be sampled.
3.	**Specify and configure your analysis target from the host system**	• For native application analysis, copy the binary to the Intel Xeon Phi coprocessor. For offload applications, no copying is required. To communicate with the Intel Xeon Phi coprocessor cards, you may use any of the following mechanisms: ◦ Mount an NFS share. See the *NFS Mounting a Host Export* topic in the Intel Manycore Platform Software Stack (MPSS) help for details. ◦ Use existing SSH tools. • In the **Project Properties: Target**, specify target options: ◦ a type of the target system, which can be **Intel Xeon Phi coprocessor (native)** or **Intel Xeon Phi coprocessor (host launch)**, and a coprocessor card ◦ an analysis target, which can be the system (**Profile System** type) or an application running on an Intel Xeon Phi coprocessor card (**Launch Application** type) • For proper symbol resolution, **specify search paths** for Intel Xeon Phi coprocessor modules in the **Project Properties: Binary/Symbol Search** and **Source Search** tabs. Symbol resolution for Intel Xeon Phi coprocessor modules is

		done on the host during collection post-processing. You can also specify search paths after collection, but, if you do that, the result should be re-resolved to get the symbol information from the binaries after the symbol paths have been established.
4.	**Configure and run an analysis type**	From the performance analysis tree in the **Analysis Type** window, choose and configure an analysis type. Click **Start** to run the analysis.
5.	**Open and interpret analysis results**	Intel® VTune™ Amplifier generates a data collection result and, by default, opens it in the default viewpoint. Switch between available viewpoints to identify code regions that took most of the CPU time and experienced potentially significant architectural bottlenecks.

Parent topic: Getting Started

See Also

Optimization and Performance Tuning for Intel® Xeon Phi™ Coprocessors, Part 2: Understanding and Using Hardware Events
Advanced Hotspots Analysis
Bandwidth Analysis
General Exploration Analysis
Creating a New Analysis Type
Tab: Project Properties - Binary/Symbol Search
Tab: Project Properties - Source Search
About Interpreting Hardware Event-based Sampling Data

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Choosing a Target on the Intel® Xeon Phi™ Coprocessor

NOTE

This type of the target is supported by the Intel® VTune™ Amplifier XE only.

To specify and configure a target for the hardware event-based sampling analysis on the Intel Xeon Phi coprocessor, use the **Project Properties** dialog box.

Prerequisites:

- Build the target on the host with full optimizations, which is recommended for performance analysis.
- For native Intel Xeon Phi application analysis, set up an SSH connection to the Intel Xeon Phi coprocessor card.
- For native Intel Xeon Phi application analysis, copy the application to the coprocessor card, for example:

  ```
  scp matrix.mic mic0:/tmp
  ```

  You may add this command to a build script to automate a copy action after the binary recompilation. Or you can mount the host directory so that the binary is visible on the Intel Xeon Phi coprocessor. See the *NFS Mounting a Host Export* topic in the **Intel Manycore Platform Software Stack (Intel MPSS)** help for details.

  ### NOTE

  Make sure you have copied any data files needed by your application to the card in a known location.

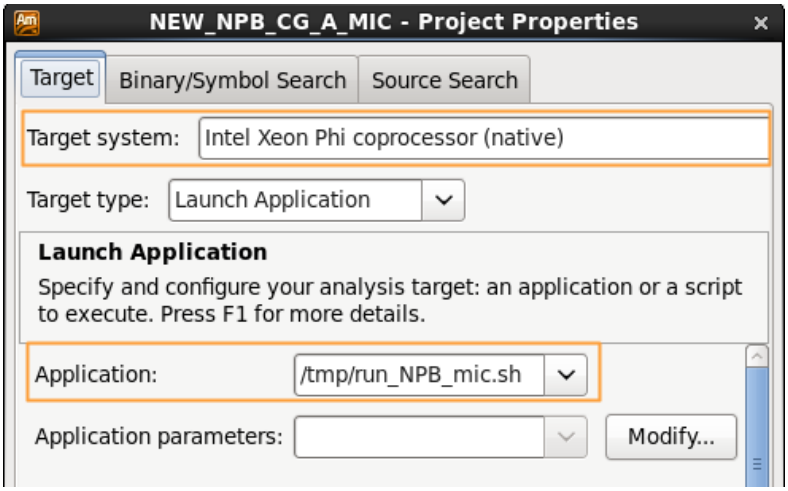
To choose a target for the Intel Xeon Phi coprocessor analysis:

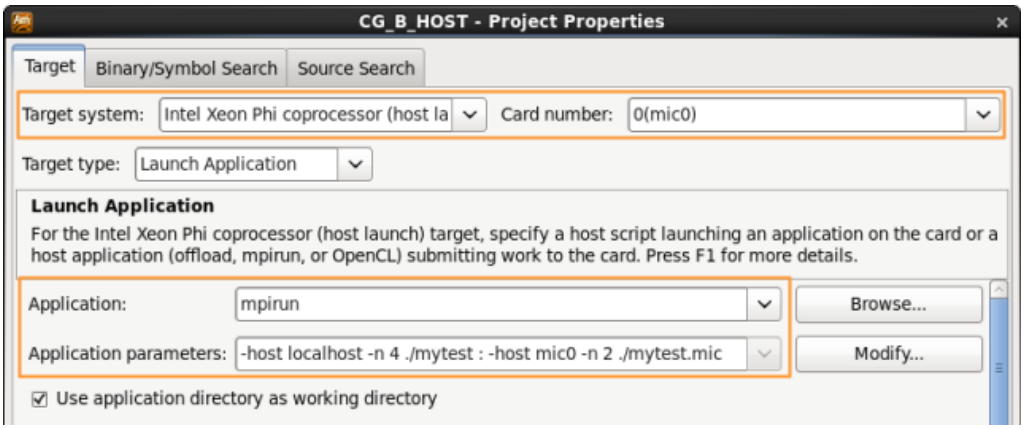
1. Click the menu button and select **New > Project...** to set up a new VTune Amplifier project for collection configuration. The **Create a Project** dialog box opens.
2. Specify a project name and location and click the **Create Project** button. The **Project Properties** dialog box opens with the **Target** tab active by default.
3. Select a type of the target system for your analysis from the **Target system** drop-down list:
   - **Intel Xeon Phi coprocessor (native)** for a native application running on the Intel Xeon Phi coprocessor
   - **Intel Xeon Phi coprocessor (host launch)** for any target activated from the host system and running on the Intel Xeon Phi coprocessor, for example: offload applications, OpenCL™ programs, MPI ranks, scripts, and so on.
4. From the **Card** menu, select the required Intel Xeon Phi coprocessor card. You may specify one card only. By default, card 0 is used.
5. From the **Target type** drop-down menu select one of the following target types supported for the Intel Xeon Phi coprocessor analysis:
   - **Profile System** target type for the system-wide analysis;
   - **Launch Application** to associate a collection with a particular application.
6. For the **Launch Application** target type, specify: a full path to your application or a launching script, for example:
   - For the **Intel Xeon Phi coprocessor (native)** target, specify an absolute path on the card for a native application or a script. For example, this configuration uses the `run_NPB_mic.sh` script located on the card to launch a native Intel Xeon Phi coprocessor application:
   - For the **Intel Xeon Phi coprocessor (host launch)** target, specify a host script launching an application on the card or a host application (offload, mpirun, or OpenCL) submitting work to the card. For example, this configuration starts 4 MPI ranks on the host system and 2 ranks on the Intel Xeon Phi coprocessor:

NOTE

Possible next steps:

- In the **Target** tab, **configure target options**, if required.
- In the **Binary/Symbol Search** and **Source Search** tabs, **specify search directories** for symbol resolution *on the host*.
- **Choose and configure an analysis type for the Intel Xeon Phi coprocessor**.





Parent topic: Choosing Targets

See Also

Intel Xeon Phi Coprocessor Analysis Workflow

Tab: Project Properties - Target

target-system amplxe-cl option to configure an Intel Xeon Phi coprocessor analysis target from command line

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Intel® Xeon Phi™ Coprocessor Analysis Configuration

For Intel® Xeon Phi™ coprocessors (code name: Knights Corner), configure the Intel® VTune™ Amplifier either to run the predefined Advanced Hotspots, General Exploration, or Bandwidth analysis types, or create a custom analysis type with an arbitrary set of hardware events.

To choose and configure an analysis for the Intel Xeon Phi coprocessor:

Prerequisites: An analysis target is configured, and **Intel Xeon Phi corprocessor (native)** or **Intel Xeon Phi corprocessor (host launch)** target type is selected in the **Project Properties: Target** tab.

1. Click the **New Analysis** button on the VTune Amplifier toolbar.
   The **New Amplifier Result** tab opens with the **Analysis Type** window active. The **Analysis Type** window displays only analysis types applicable to the Intel Xeon Phi coprocessor.
2. In the **Analysis Type** window, select the required analysis type from the left pane.
   The corresponding configuration pane opens on the right.
3. Configure the selected analysis type, if required.
4. Click the **Start** button on the right to start the analysis.
   VTune Amplifier collects samples for a list of events predefined in the analysis configuration. You may change this list by **creating a new custom configuration**: **New Knights Corner Hardware Event-based Sampling Analysis**.

   The number of hardware events that can be collected simultaneously is limited by CPU capabilities. It is no more than two events on an Intel Xeon Phi coprocessor card. To overcome this limitation, the VTune Amplifier splits the event list into several event groups. Each group consists of events that can be collected simultaneously. VTune Amplifier uses one of the following techniques:

   - Runs an application only once and multiplexes the event groups in a round-robin fashion during the run (default mode).
   - Runs an application several times collecting one event group during each run to achieve more precise results. To enable this mode in the GUI, set the **Allow multiple runs** option in the **Advanced** section of **Project Properties** dialog box.

   NOTE

   In this version of the product, the **Allow multiple runs** option is not available for the system-wide collection. So, you should manually distribute events by multiple runs if you do not want to use the event multiplexing mode.

Parent topic: Configuring Analysis Options

See Also

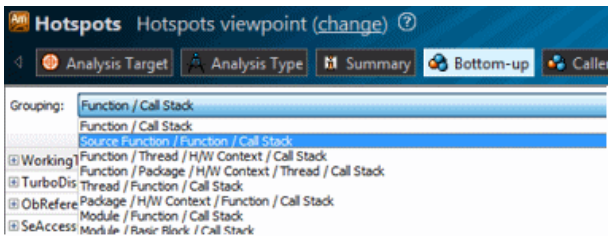
Intel Xeon Phi Coprocessor Analysis Workflow
Configuring Analysis Options
Event List configuration
Accurate Event Data Collection
target-system amplxe-cl option to configure a native or offload analysis target from command line
collect amplxe-cl option to configure Intel Xeon Phi coprocessor analysis from command line
collect-with runsa amplxe-cl option to configure a custom analysis on Intel Xeon Phi coprocessor

Viewing Data Collected on an Intel® Xeon Phi™ Coprocessor

Viewing the result of an Intel® Xeon™ Phi coprocessor analysis is similar to viewing results collected on the host system. These are some tips useful for viewing the data collected on the Intel Xeon Phi coprocessor.

Viewing Inline Functions

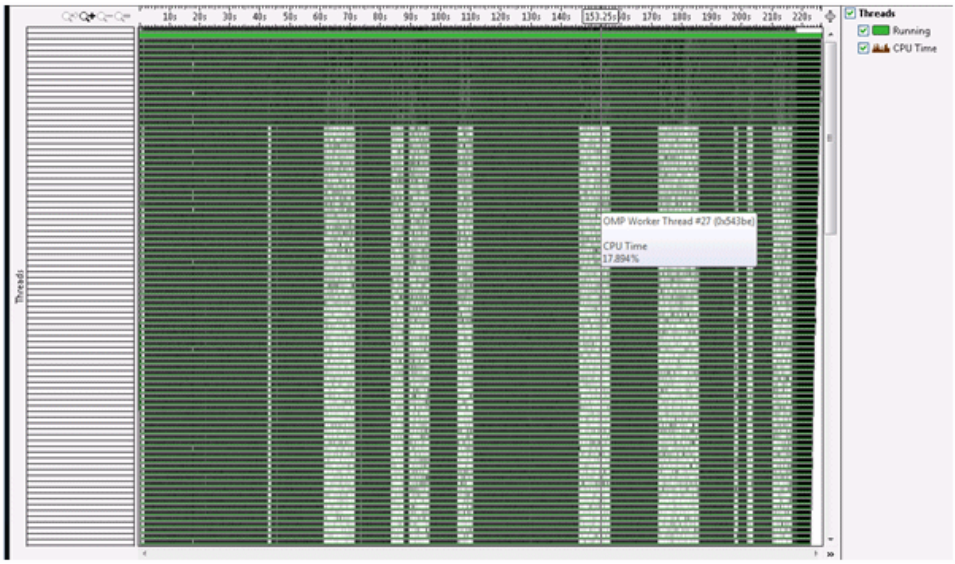
Intel® VTune™ Amplifier enables you to view performance data of inline functions for compiler-optimized applications with symbols. To enable this feature, use the Intel Compiler switch `-debug intel-debug-info`. By default, the VTune Amplifier displays inline functions (virtual frames) as regular functions. To view all instances of the inline function in one row, select the **Source Function/Function/Call Stack** level in the **Grouping** menu. Note that virtual frames may be structured as call stacks, but this is just a display of the inline functions nested within their calling functions. Call stack view is not supported for applications targeted for Intel Xeon Phi coprocessor.



To disable displaying inline functions, select **off** from the **Inline Mode** drop-down menu on the filter toolbar.

Viewing Threads on the Timeline

To view performance data provided in the Timeline pane, right-click, select the **Change Band Height** context menu option and select the **Tiny** display mode. It helps view large numbers of threads that are typical for high-end parallel applications targeted for Intel Xeon Phi coprocessors. This mode sets a minimal row height (about 6 pixels) and shows limited graphs of event data. If there are data, the active ranges are colored: the more data associated with a pixel, the more intense color is used for drawing. Otherwise, the band is shown in a regular background color.



Parent topic: Viewing Analysis Results