Getting Started with the LabVIEW™ Mobile Module

Version 2009

The LabVIEW Mobile Module extends the LabVIEW graphical development environment to Mobile devices so you can create applications that run on Windows Mobile and Pocket PC. You can create portable solutions for a wide spectrum of applications, such as field test systems, remote control and monitoring systems, and portable data acquisition systems.

This manual contains new features for version 2009, system requirements, installation instructions, and a tutorial that shows you how to create a LabVIEW project and build, run, deploy, and debug a Mobile application.

Contents

System Requirements

The Mobile Module has the following requirements:

- A computer with Windows Vista/XP or Windows 2000 with Service Pack 4.0 or later
- LabVIEW 2009 Base, Full, or Professional Development System
- 2.5 GB available disk space

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- A Mobile device running Windows Mobile 5.0, Windows Mobile 6.0, or Pocket PC 2003

Note For more information about additional software requirements and supported devices for Windows Mobile and Pocket PC, refer to *KnowledgeBase 3ANADAKN: LabVIEW Mobile Module Software Requirements and Supported Devices* at ni.com.

Refer to the *LabVIEW Release Notes*, available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and opening `LV_Release_Notes.pdf`, for standard LabVIEW development system requirements.

Installing the Mobile Module

Complete the following steps to install the Mobile Module.

1. Log in as an administrator or as a user with administrator privileges.
2. Install LabVIEW 2009, if not already installed. Refer to the *LabVIEW Release Notes* for standard LabVIEW installation instructions.
3. Install the Mobile Module from the LabVIEW Platform DVD. The Mobile Module includes Microsoft tools, such as Microsoft ActiveSync on Windows XP/2000 and ARM emulators for Windows Mobile. Some of these Microsoft tools might interfere with any existing installations of Visual Studio, Windows Embedded, or Windows CE toolkits.

   Note **(Windows XP/2000)** The Mobile Module installs ActiveSync 4.2 if you do not already have ActiveSync 4.2 or later installed. The Mobile Module works with ActiveSync 4.2 or later.

4. Activate the Mobile Module.

   You must activate the Mobile Module before you can build VIs into Mobile applications. The Mobile Module runs in evaluation mode if you do not activate it. In evaluation mode, you can create VIs, but any Mobile applications you build run only for five minutes. You have the option of activating the Mobile Module at the end of the installation. You also can use the NI License Manager, available by selecting **Start»All Programs»National Instruments»NI License Manager**, to activate National Instruments products. Refer to the *National Instruments License Manager Help*, available by selecting **Help»Contents** in the NI License Manager, for more information about activating NI products.
5. Restart the computer when the installer completes.
6. **(Windows Vista)** You must install Windows Mobile Device Center to use the Mobile Module. Refer to the Microsoft Web site at www.microsoft.com to download Windows Mobile Device Center.
7. Install the additional tools you need. Refer to the *Installing Additional Tools* section for more information about additional tools.

Uninstalling the Mobile Module

In addition to uninstalling the Mobile Module, you also must uninstall the following:

- **(Windows XP/2000)** Microsoft ActiveSync
- Microsoft Device Emulator version 1.0 – ENU
- Microsoft Visual C++ 2005 Redistributable

Installing Additional Tools

You must install additional tools on the target depending on the functionality you need.

Shared Variable Support

To use front panel data binding and Shared Variable nodes in Mobile applications, you must install the latest version of shared variable support on the target.

Complete the following steps to install or uninstall support for shared variables on a Mobile target.

1. Connect the device to the host computer using ActiveSync/FTP.
2. Navigate to and run `labview\PDA\Utilities\Variables\PocketPC\Setup.exe`.

Tip You also can right-click the target in the **Project Explorer** window and select **Install»Support for Shared Variables** from the shortcut menu.

(ARM Emulators) You also must install Virtual PC 2007 on the host computer. Download the appropriate installer from the Microsoft Download Center at `www.microsoft.com/downloads`.

PNG Image Support

You must install support for PNG images on the target if the VI contains PNG images on the user interface.

Complete the following steps to install or uninstall support for PNG images on a Mobile target.

1. Connect the device to the host computer using ActiveSync/FTP.
2. Navigate to and run `labview\PDA\Utilities\LVPNG\PocketPC\Setup.exe`.

Tip You also can right-click the target in the **Project Explorer** window and select **Install»Support for PNG Images** from the shortcut menu.

NI-VISA Support

You must install NI-VISA on the target to use VISA in Mobile applications. If you did not install NI-VISA when you installed the Mobile Module, select **Start»All Programs»National Instruments»VISA»Windows Mobile Driver Installation**.

Tip You also can right-click the target in the **Project Explorer** window and select **Install»Support for NI-VISA** from the shortcut menu.

WIDCOMM Bluetooth DLLs

You can use the WIDCOMM Bluetooth DLLs on a Mobile device to run applications that use Bluetooth communication if you do not have the Microsoft Bluetooth driver.

Note The Mobile Module supports the WIDCOMM BTW-CE 1.4 or later driver. Do not install the WIDCOMM Bluetooth DLLs if you are using the Microsoft Bluetooth driver or you receive an error when you use the Bluetooth VIs and functions. If your device uses the Broadcom Bluetooth driver, install the LabVIEW WIDCOMM Bluetooth driver by manually copying `LVBtw.dll` from the `labview\PDA\Utilities\Bluetooth` directory to the `Windows` directory. Do not run `Setup.exe` and do not copy `BtCoreIf.dll` or `BtSdkCE30.dll` if they already exist on the device.

Complete the following steps to install the WIDCOMM Bluetooth DLLs.

1. Connect to ActiveSync on the host computer.

2. On the host computer, run `labview\PDA\Utilities\Bluetooth\Setup.exe` to install the DLLs on the device.

Tip You also can right-click the target in the **Project Explorer** window and select **Install»Support for WIDCOMM Bluetooth** from the shortcut menu.

Refer to `README.txt`, located in the `labview\PDA\Utilities\Bluetooth` directory, for more information about manually installing the WIDCOMM Bluetooth DLLs.

LabVIEW SMS Client

You must install and run the LabVIEW SMS Client, which is located in `labview\PDA\Utilities\SMS\Setup.exe`, on the host computer to receive Short Message Service (SMS) messages or to use the Request Make Call VI. The LabVIEW SMS Client notifies the Mobile application if there is an incoming SMS message and stores the incoming message in `LVSMSClient.dat`, which is located in the `\Program Files\National Instruments\labview\SMS` directory on the target.

Complete the following steps to install or uninstall the LabVIEW SMS Client on a Mobile target.

1. Perform a soft reset on the device. Refer to your device documentation for information about performing soft resets.
2. Connect the device to the host computer using ActiveSync.
3. Run `Setup.exe` on the host computer to install or uninstall the required DLLs.

You also can right-click the target in the **Project Explorer** window and select **Install»Support for SMS Client** from the shortcut menu.

NI-DAQmx Base

You can download the latest version of NI-DAQmx Base for use with Mobile devices from the National Instruments Web site. After you complete the NI-DAQmx Base installation, you must copy the driver files to the device.

Complete the following steps to install NI-DAQmx Base on the Mobile device.

1. Select **Start»Programs»National Instruments»NI-DAQmx Base»Utilities**.
2. Launch the Driver Installation utility that corresponds to the Mobile device.
3. Check the device screen to see if any additional steps are requested, such as replacing an older driver.

Refer to the *NI-DAQmx Base Readme* and the *NI-DAQmx Base 3.x Getting Started Guide* for more information about NI-DAQmx Base.

Windows Mobile Emulators

Emulators are tools you can use during development to run and test Mobile VIs quickly without having to download the application to the target.

ARM Emulators

If you are using ARM-based emulators, you must install Virtual PC 2007.

(Windows Vista) If you want to use emulators on host computers that use Windows Vista, you must download the Microsoft Device Emulator 2.0.

Download Virtual PC 2007 and the Microsoft Device Emulator 2.0 from the Microsoft Download Center at `www.microsoft.com/downloads`.

x86 Emulators

On host computers with Windows XP/2000, the Mobile Module installs ARM targets, including emulators, for Windows Mobile and Pocket PC. If you need x86 emulator targets, install the following Microsoft eMbedded Visual Tools:

- Microsoft eMbedded Visual C++ 4.0
- Microsoft eMbedded Visual C++ SP 4 or later
- SDK for Windows Mobile 2003-based Pocket PCs

Refer to the National Instruments KnowledgeBase at `ni.com/info` and enter the info code `pdaevc` for the most recent information about downloading and installing the Microsoft eMbedded Visual Tools.

What's New

Refer to the *LabVIEW Upgrade Notes*, available by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals** and opening `LV_Upgrade_Notes.pdf`, for more information about new features and changes in the LabVIEW development system.

Refer to the **Mobile Module** book on the **Contents** tab of the *LabVIEW Help*, available by selecting **Help»Search the LabVIEW Help** in LabVIEW, for more information specific to the Mobile Module and Mobile applications.

Refer to the *LabVIEW Mobile Module Readme*, available by selecting **Start»All Programs»National Instruments»LabVIEW»Readme** and opening `readme_Mobile.html`, for known issues.

The LabVIEW 2009 Mobile Module includes the following enhancements and features.

VIs and Functions Support and Enhancements

The Mobile Module includes the following support and enhancements:

- Additional Fixed-Point Support—The following functions now support the fixed-point data type:
  - Divide
  - Reciprocal
  - Square Root
  - In Range and Coerce
  - Unflatten From XML
  - Flatten To XML
- Execution Highlighting Support—The Mobile Module now supports execution highlighting, which you can use to view an animation of the execution of the block diagram. Execution highlighting is supported only for instrumented debugging.
- VI Call Configuration Support—Use the **VI Call Configuration** dialog box to configure when to load a subVI. Right-click a subVI and select **Call Setup** from the shortcut menu to display this dialog box.

Front Panel Controls Support and Enhancements

The Mobile Module includes the following support and enhancements:

- Graph and Chart Control Enhancements—The graph and chart controls include the following enhancements:
  - Improved Appearance—Graphs and charts in Mobile applications now have a high-color, three-dimensional appearance. Graphs and charts also include improved placement and appearance of scale labels and the plot area.
  - Plot Legend Support—Graphs and charts now support the plot legend, which you can use to customize how the plot appears in the plot area of a graph or chart.

- Cursor Legend Improvements—Graphs and charts in Mobile VIs now use the same cursor legend as graphs and charts in VIs running on Windows.
- Scale Legend Improvements—Graphs and charts in Mobile VIs now use the same scale legend as graphs and charts in VIs running on Windows.
- Graph Palette Support—Graphs and charts now support the graph palette, which you can use to move cursors, zoom, and pan the display.

LabVIEW Class Support

You can now use LabVIEW classes in Mobile VIs in the same way you use LabVIEW classes in VIs running on Windows.

The Mobile Module now supports using the following node and functions with LabVIEW classes:

- Call Parent Method
- Preserve Run-Time Class
- To More Generic Class
- To More Specific Class

The Mobile Module does not support using LabVIEW classes in the following VIs and functions:

- Get LV Class Default Value
- Get LV Class Path
- Flatten To String
- Unflatten From String
- Flatten To XML
- Unflatten From XML
- Variant To Flattened String
- Flattened String To Variant
- File I/O VIs and functions

You cannot probe a LabVIEW class data type. You can debug and probe values on any static, dynamic, and accessor VIs of a LabVIEW class.

Tutorial

Use this tutorial to learn how to use the Mobile Project Wizard to create a LabVIEW project and build, run, and debug a Mobile application.

The VI in this tutorial simulates a sine wave with configurable offset and frequency values and displays the result in a graph.

Creating the LabVIEW Project

Use LabVIEW projects to group together LabVIEW files and non-LabVIEW files, create build specifications for building a Mobile VI into an application, and deploy the application to the target. You must use a project to build a Mobile VI into an application.

Using the Mobile Project Wizard, complete the following steps to create a LabVIEW project, add the target, and add an existing VI to the project.

1. Launch LabVIEW. In the **Getting Started** window, select **Mobile Project** from the **Targets** pull-down menu. Click the **Go** button to launch the Mobile Project Wizard.

2. Define the project information as shown in Figure 1.
   a. Select **New Mobile project, import VI** from the **Project type** pull-down menu to create the LabVIEW project using an existing VI.

      Tip The blank VI project type creates a project with a new Mobile template VI rather than importing an existing VI.

   b. Specify a project name and the location where you want to save the project and the VI in the **Project location** text box. Save the project to a location other than the default location so you do not overwrite the shipping example with your changes. The default project name is `Untitled project.lvproj`. For this tutorial, name the project `Mobile Tutorial.lvproj` in the **Project location** text box.
   c. Click the **Browse** button next to the **VI path** text box and navigate to `labview\examples\WindowsMobile\tutorial\Mobile Tutorial.vi` to select the VI to import. Click the **OK** button to add the VI to the project you are creating.

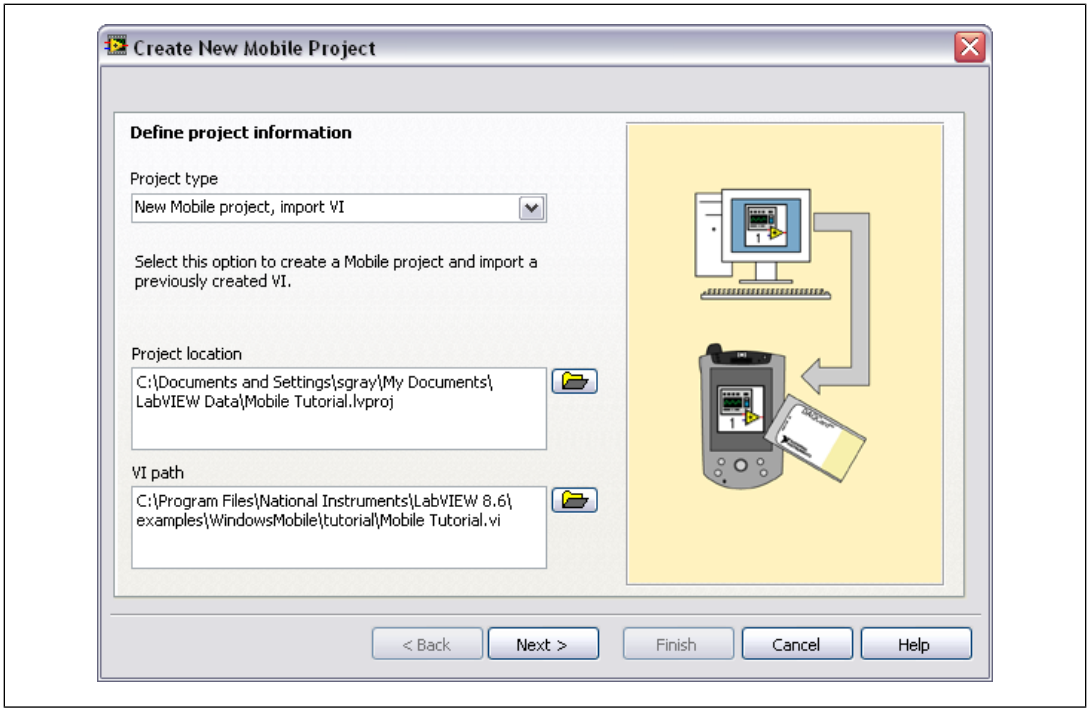

Figure 1. Defining the Project Information

3. Click the **Next** button.
4. Select **Windows Mobile 5.0 Pocket PC Emulator** from the **Device type** pull-down menu, as shown in Figure 2.

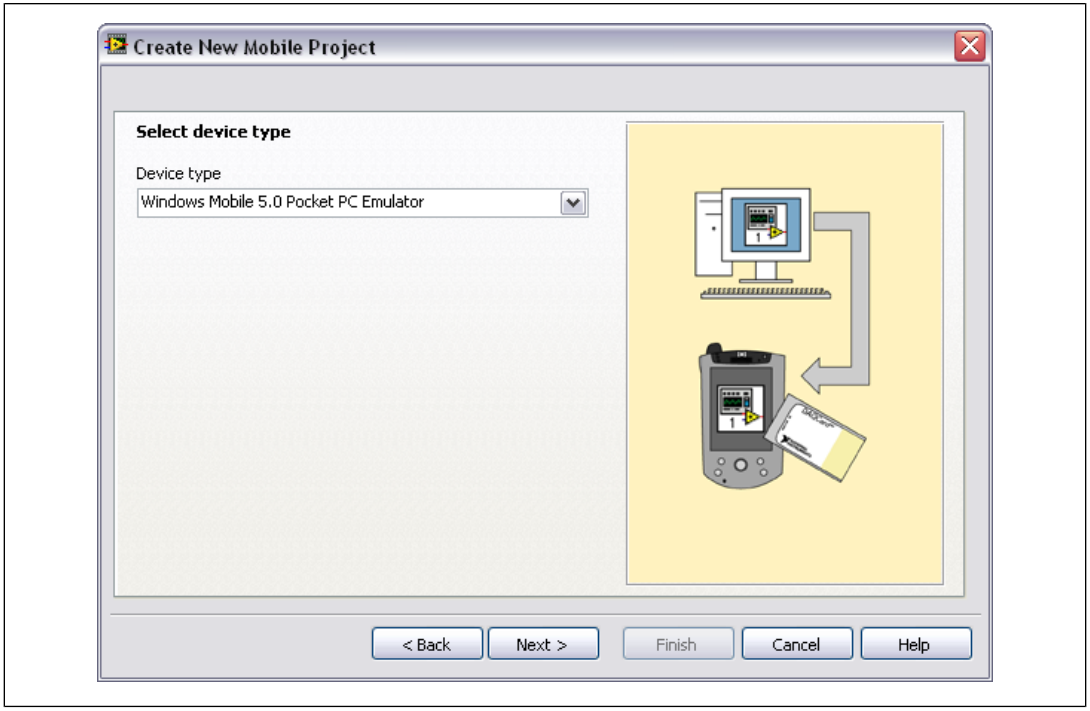

Figure 2. Selecting the Target

Note You might see additional targets for Windows Mobile or Pocket PC if you configure additional devices through the Microsoft Device Emulator Manager.

5. Click the **Next** button.
6. Click the **Finish** button. Because the **Create a build specification** checkbox contains a checkmark, as shown in Figure 3, the **Mobile Build Specification Properties** dialog box opens. Refer to the *Creating the Build Specification* section for more information about creating a build specification.

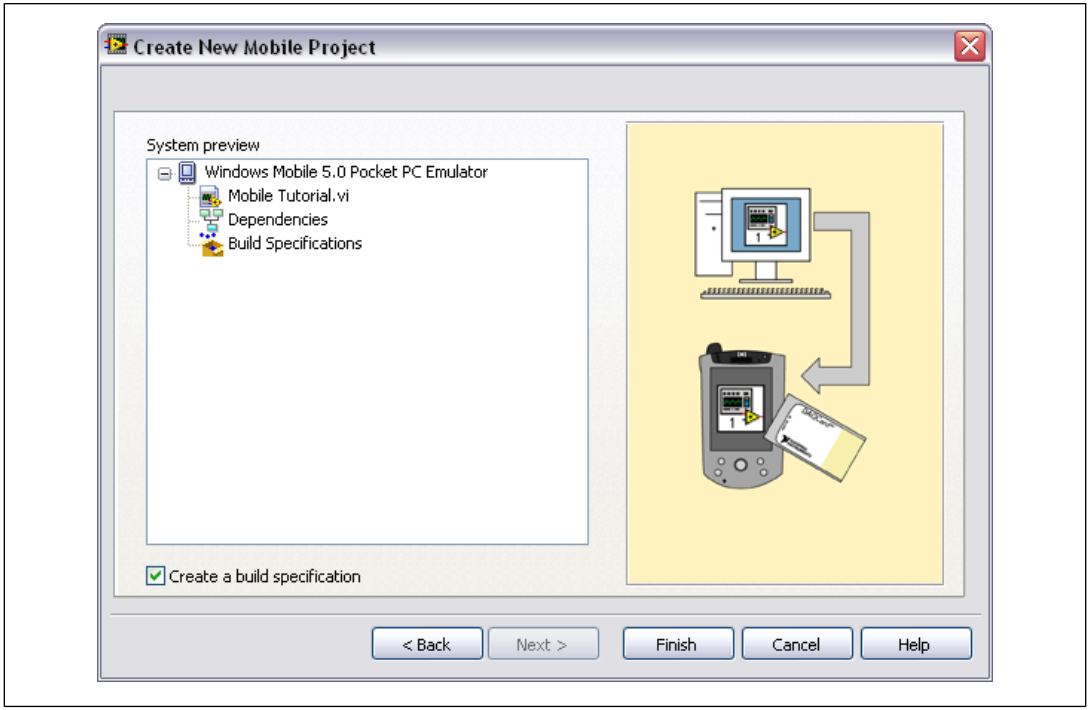

Figure 3. Previewing the Project

Creating the Build Specification

Build specifications contain the build settings and code generation options to use when you build a Mobile VI into an application. You can create the build specification when you create a project or wait until you are ready to build the application. You must create a build specification before you can build a Mobile VI into an application.

You can have multiple build specifications for the same target. For example, you might want one build specification that generates debugging information and another build specification that does not generate this extra information.

Note This tutorial creates the build specification through the Mobile Project Wizard. You also can create a build specification at any time by right-clicking **Build Specifications** under the target in the **Project Explorer** window and selecting **New»Mobile Application (EXE)** from the shortcut menu.

Complete the following steps to create a Mobile build specification.

1. Define the settings for the Mobile application, as shown in Figure 4.
   a. Enter `Mobile Tutorial` in the **Build specification name** text box. This is the name that appears under **Build Specifications** in the **Project Explorer** window.
   b. (Optional) By default, the name of the application is the same as the top-level VI. If you do not want to use the top-level VI name for the application name, remove the checkmark from the **Same as top-level VI** checkbox and enter a name in the **Target filename** text box.
   c. Browse to and select the destination directory for the application on the host computer, which is where LabVIEW saves the `.exe`, in the **Destination directory** text box.

d. Enter the destination directory for the application on the target in the **Remote path for target application** text box.

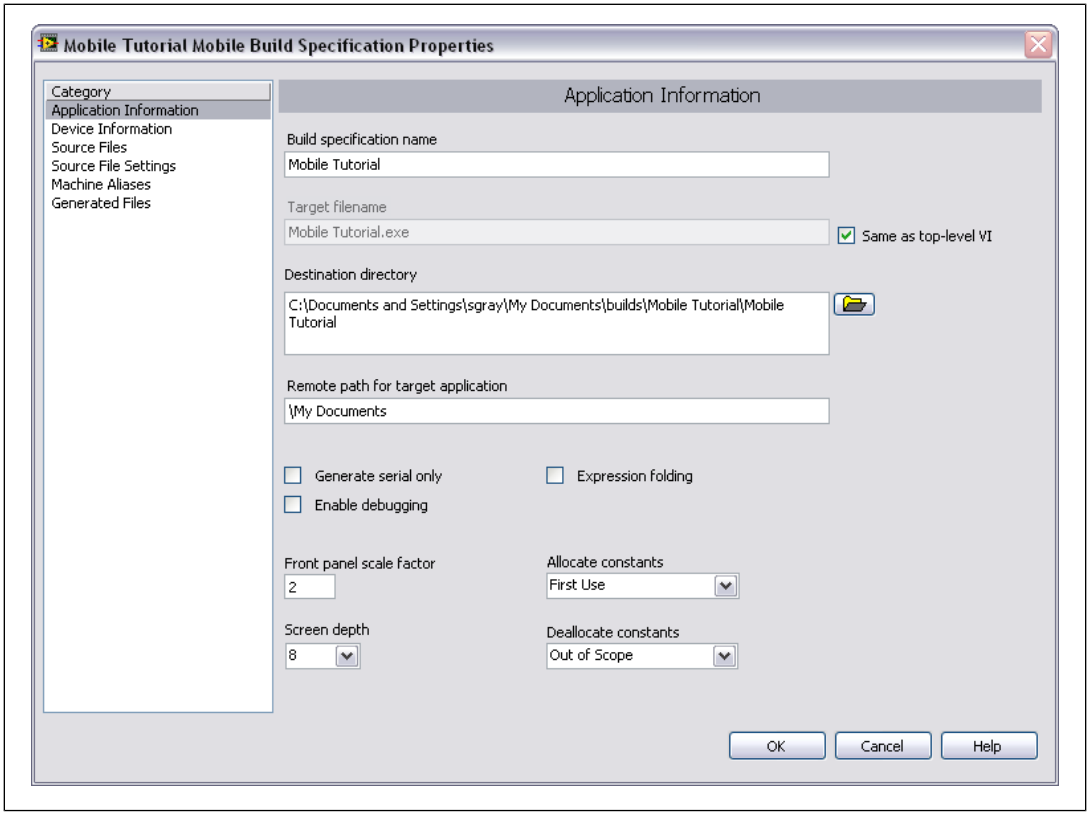

Figure 4. Defining the Application Information

2. (Optional) Click the **Help** button to open the *LabVIEW Help* and read a description of each build setting.
3. Select the **Device Information** category to view which target and processor this build specification applies to.
4. Select the **Source Files** category to select the source files to include when you build the VI into an application. When you use the Mobile Project Wizard to create a build specification, LabVIEW automatically uses the VI you import as the top-level VI. When you create build specifications outside of the wizard, you must manually select the top-level VI and click the blue arrow button to move the VI to the **Top-level VI** text box, as shown in Figure 5. Mobile applications can have only one top-level VI.

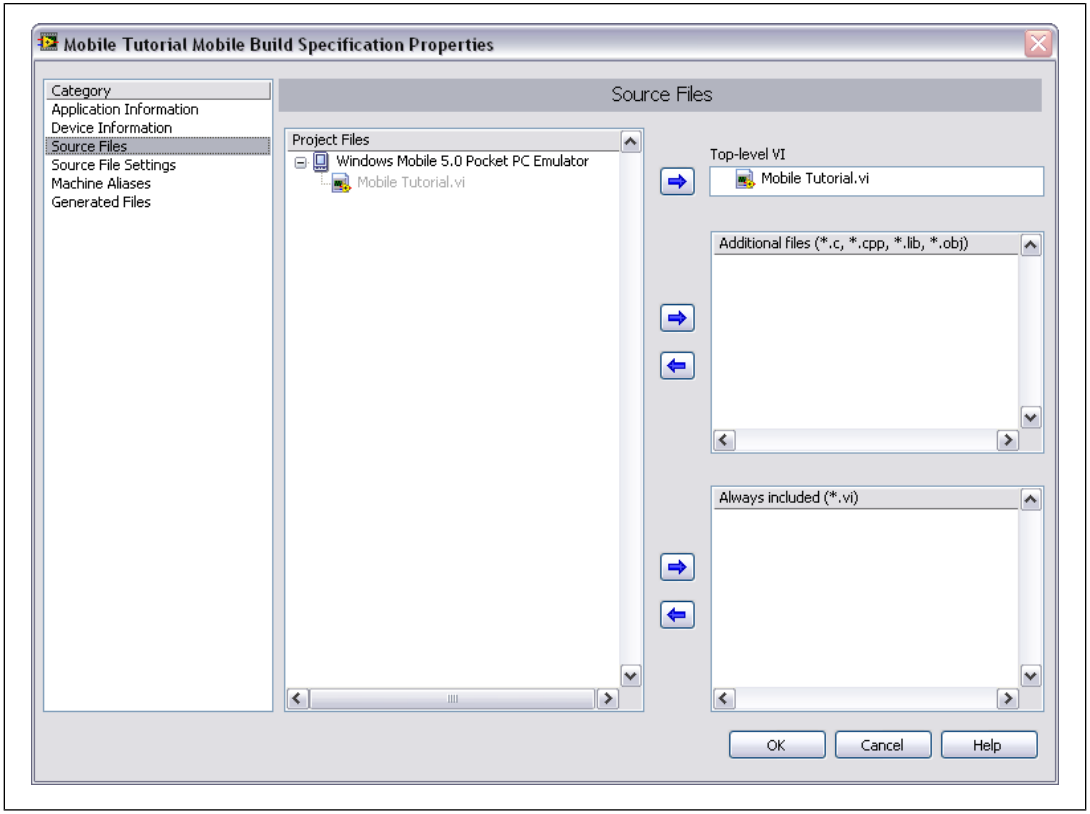

Figure 5. Selecting the Source Files

5. Select the **Generated Files** category to view the filenames and paths to the files the Mobile Module generates when you build the VI into an application.
6. Click the **OK** button. The build specification you just created appears in the **Project Explorer** window under the Mobile target, as shown in Figure 6.

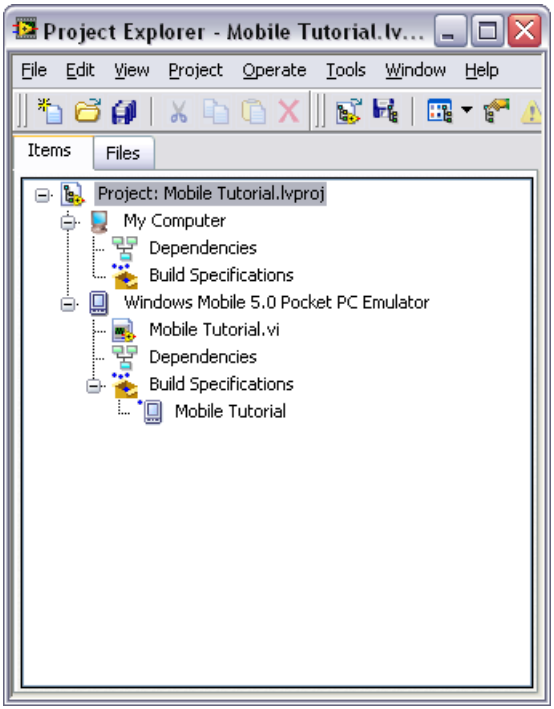

Figure 6. Project Explorer Window

7. Select **File»Save Project** in the **Project Explorer** window to save the project. LabVIEW saves any build specifications with the project.

Building the VI into an Application and Deploying

After you develop the VI on the host computer, you build the VI into an executable application that you can run on a target. Pick one of the options in the *Using the Shortcut Menu* section or the *Using the Run Button* section of this manual to build, deploy, and run the application.

Click the **Run** button in the application on the target to start simulating the sine wave.

Note ARM emulators for Windows Mobile require a few minutes to load the OS before you see the application running on the emulator target.

Using the Shortcut Menu

Right-click the build specification in the **Project Explorer** window and select one of the following options from the shortcut menu:

- **Deploy**—Builds the VI into an application, if necessary, and deploys the application to the target. This option does not run the application automatically.
- **Run**—Builds the VI into an application, if necessary; deploys the application to the target; and runs the application automatically.

- **Build**—Builds the VI into an application. This option does not deploy or run the application automatically.

Using the Run Button

When you run a VI under the Mobile target in the **Project Explorer** window, the **Run** button behaves differently from when you run a VI under My Computer in the **Project Explorer** window:

- **If you want to build, deploy, and run**—Click the **Run** button in a VI to build the VI into an application, deploy the application to the target, and run the application on the target. LabVIEW prompts you to create a build specification if you do not have an existing build specification for the VI. If you have multiple build specifications, LabVIEW prompts you to select a build specification in the **Select a Build Specification** dialog box. Alternatively, you can specify a default build specification by right-clicking a build specification in the **Project Explorer** window and selecting **Set as Default** from the shortcut menu. LabVIEW indicates the default build specification with a green square around the build specification glyph in the **Project Explorer** window.
- **If you want to build without deploying or running**—Press the <Ctrl> key while you click the **Run** button in a VI to build the VI into an application without deploying or running the application. LabVIEW prompts you to create a build specification if you do not have an existing build specification for the Mobile VI. If you have multiple build specifications, LabVIEW prompts you to select a build specification in the **Select a Build Specification** dialog box. Alternatively, you can specify a default build specification by right-clicking a build specification in the **Project Explorer** window and selecting **Set as Default** from the shortcut menu. LabVIEW indicates the default build specification with a green square around the build specification glyph in the **Project Explorer** window.

Closing the Application

Tap the **Exit** button in the application on the Mobile target to close the application.

Debugging the Application

You must create a build specification that enables debugging before you can debug a Mobile application. Enabling debugging generates extra debugging information and can significantly increase the size of the application.

When LabVIEW on the host computer connects to the Mobile target, the application runs on the target. The front panel is fully functional on the target. However, the front panel controls have no effect on the application, and the indicators in the VI on the host computer do not reflect the execution of the application on the target.

The block diagram acts as a conduit between the application running on the target and the VI running on the host computer, where you can probe signals, set breakpoints, and step through code as you do in any other VI.

Tip You can modify an existing build specification by double-clicking the build specification in the **Project Explorer** window or right-clicking the build specification and selecting **Properties** from the shortcut menu. This tutorial creates a second build specification for debugging.

Creating a Debugging Build Specification

Complete the following steps to create a debugging build specification.

1. Right-click **Build Specifications** under the Mobile target and select **New»Mobile Application (EXE)** from the shortcut menu to open the **Mobile Build Specification Properties** dialog box.
2. Enter `(Debug) Mobile Tutorial` in the **Build specification name** text box.

3. Remove the checkmark from the **Same as top-level VI** checkbox so you can change the application name.
4. Enter `(Debug) Mobile Tutorial.exe` in the **Target filename** text box.
5. Place a checkmark in the **Enable debugging** checkbox to generate debugging information when you build the VI into an application, as shown in Figure 7.

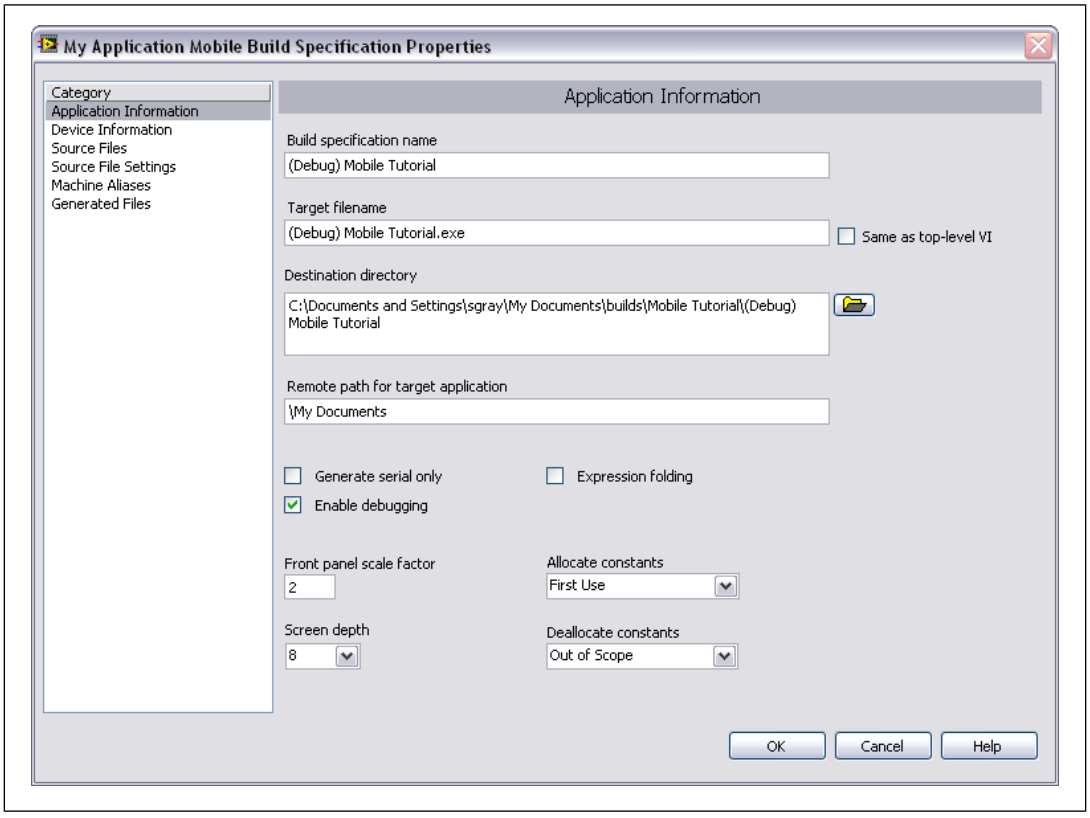

Figure 7. Creating the Debugging Build Specification

6. Select **Source Files** from the **Category** list and select **Mobile Tutorial.vi** in the **Project Files** list. Click the blue right arrow button to move the VI from the **Project Files** list to the **Top-level VI** text box.

7. Click the **OK** button. The build specification you just created appears in the **Project Explorer** window, as shown in Figure 8.

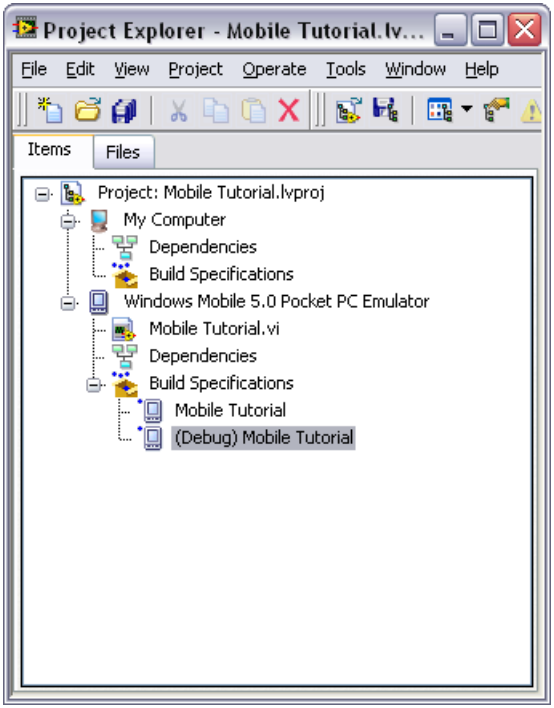

Figure 8. Two Build Specifications in the Project Explorer Window

Adding a Probe to the VI

Probes display information about the data that passes through a wire. As you interact with the application on the target, you can see the data passing through the wire in the corresponding VI on the host computer.

Complete the following steps to add a probe to the Mobile Tutorial VI.

1. Select **Window»Show Block Diagram** in the VI to open the block diagram if it is not visible.

   Tip Double-click the VI in the **Project Explorer** window to open the VI if the VI is not already open.

2. Right-click the wire connecting the **Frequency** control to the For Loop and select **Probe** from the shortcut menu.

A floating **Probe** window appears when you create a probe. LabVIEW numbers the **Probe** windows automatically and displays the same number in a glyph on the wire you probe, as shown in Figure 9.

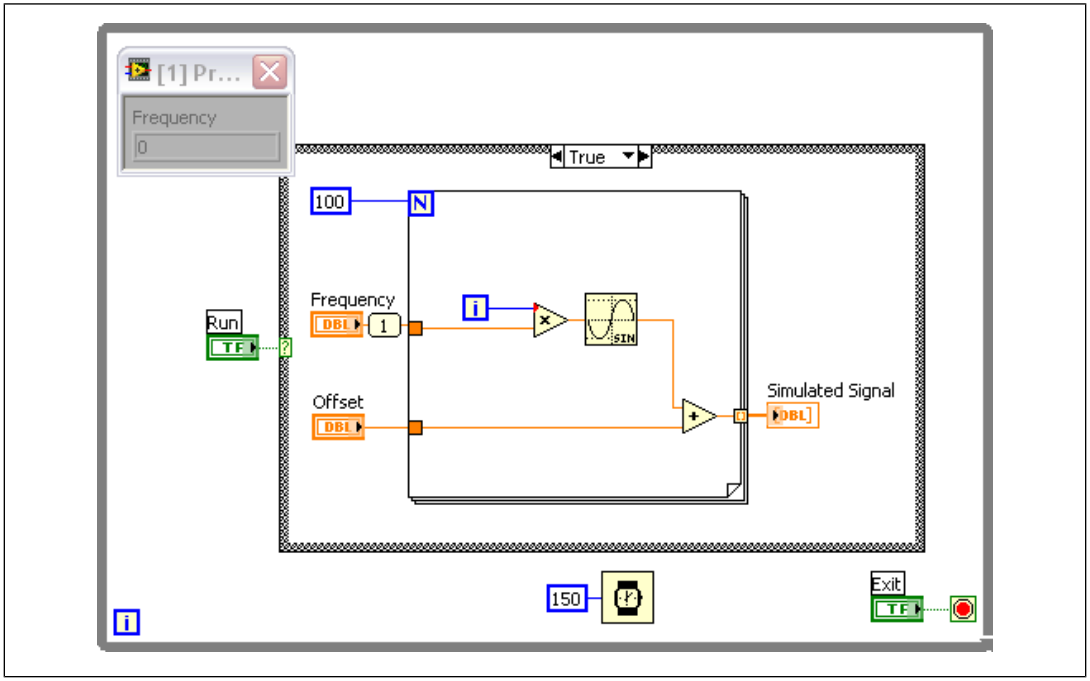

Figure 9. Adding a Probe to the Block Diagram

Deploying and Debugging a Mobile Application

You must use the debugging build specification to deploy the application, which contains debugging information, to the target before the probe in the VI on the host computer can update the values passing through the wire.

Complete the following steps to deploy and debug the Mobile application.

1. Right-click the debugging build specification you want to build and deploy and select **Debug** from the shortcut menu. Save any VIs if prompted.

   LabVIEW builds the VI into an application, deploys the application to the target, and runs the application on the target as shown in Figure 10. A new instance of the emulator opens each time you build and deploy an application.

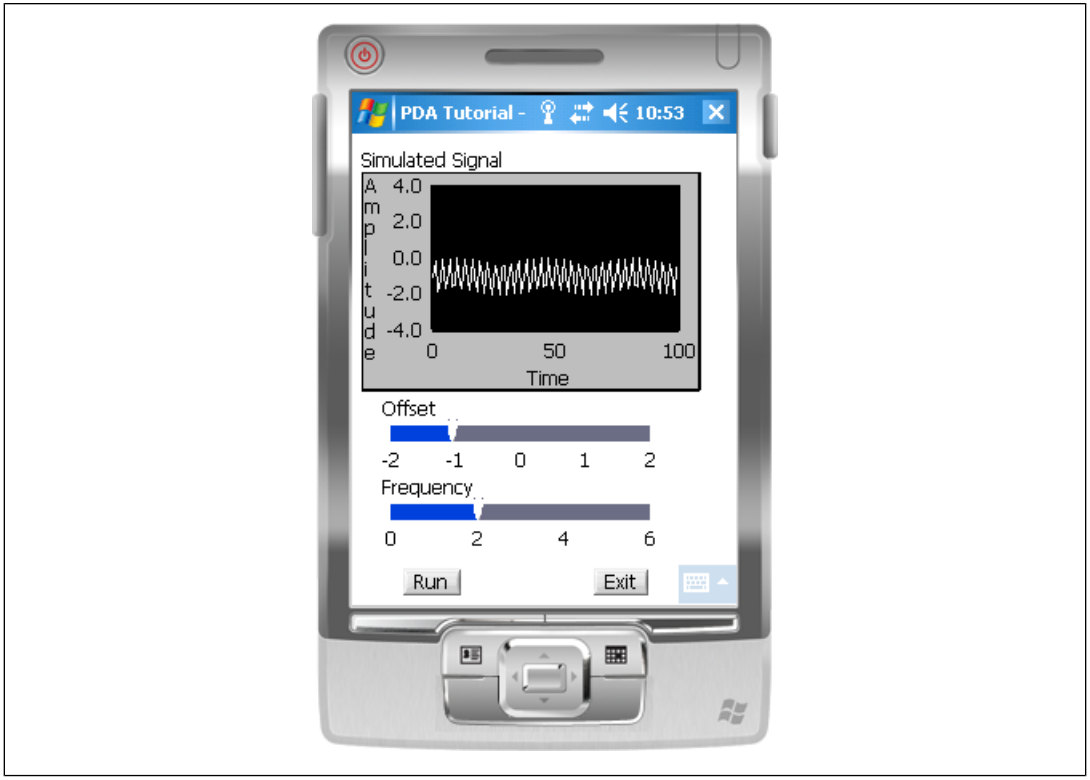

Figure 10. Running the Application on the Emulator

2. Click the **Run** button in the application on the target.
3. Move the **Frequency** slider in the application running on the target and click the **Run** button again. The value in the **Probe** window on the block diagram updates as you move the slider in the application on the target.

Note Any changes you make on the front panel of the Mobile VI on the host computer have no effect on the application running on the target.

4. Click the **Exit** button in the application on the target to stop the application and end the debugging session.

Related Documentation

LabVIEW includes extensive online and print documentation for new and experienced LabVIEW users. The following documents contain information that you might find helpful as you use the Mobile Module:

- *LabVIEW Help*—Refer to the *LabVIEW Help*, available by selecting **Help»Search the LabVIEW Help** in LabVIEW, for information about LabVIEW programming concepts, step-by-step instructions for using LabVIEW, and reference information about LabVIEW VIs, functions, palettes, menus, and tools. Refer to the **Mobile Module** book on the **Contents** tab of the *LabVIEW Help* for information specific to the Mobile Module and Mobile applications. The *LabVIEW Help* uses `(Mobile)` in the index to indicate Mobile-specific topics.

- *LabVIEW Mobile Module Readme*—Refer to the *LabVIEW Mobile Module Readme*, available by selecting **Start»All Programs»National Instruments»LabVIEW»Readme** and opening `readme_Mobile.html`, for last-minute information and known issues.
- Mobile Module Examples—Use the Mobile Module examples to learn how to use certain VIs and functions as well as a starting point for developing your own Mobile VIs and applications. You can modify an example to fit an application, or you can copy and paste from one or more examples into a VI that you create. Browse or search the example VIs with the NI Example Finder by selecting **Help»Find Examples**.
- *NI-DAQmx Base 3.x Getting Started Guide*
- *NI-DAQmx Base Readme*
- Documentation for your device.
- LabVIEW PDFs—In addition to this document, the *Getting Started with LabVIEW* manual, *LabVIEW Quick Reference Card*, *LabVIEW Release Notes*, and *LabVIEW Upgrade Notes* are available as PDFs by selecting **Start»All Programs»National Instruments»LabVIEW»LabVIEW Manuals**.

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