

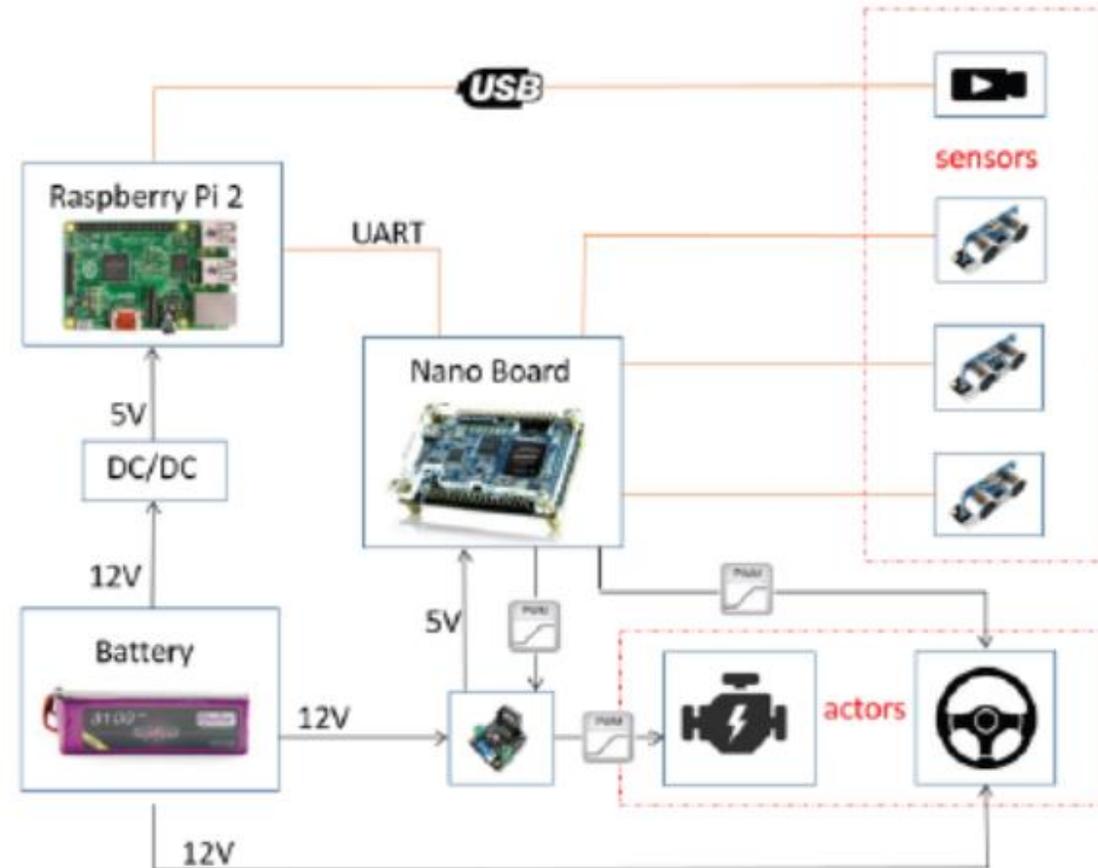
How to program Nano Board with Quartus

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Structure of the LEGO Car

- The basic use of the DE0-Nano board is providing an interface for the Raspberry Pi to control the car.

Name	Type
Raspberry Pi 2	ECU
DE0-NANO	ECU
Ultrasound	sensor
USB-Camera	sensor
engine	actor
steering	actor
battery	power
H-Bridge	converter
USB-HUB	converter



Download software

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www.altera.com/downloads/download-center.html

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The Quartus Prime software Standard edition version 15.1 supports the following device families: Arria II, Arria 10, Arria V, Arria V GZ, Cyclone IV, Cyclone V, MAX II, MAX V, MAX 10 FPGA, Stratix IV, and Stratix V.

Starting with version 15.1, Quartus II Subscription Edition is now Quartus Prime Standard Edition.

Quartus Prime software Lite edition*
FREE, no license file required
Includes MegaCore IP Library
IP available for purchase

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* The Quartus Prime software Lite edition version 15.1 supports the following device families: Arria II, Cyclone IV, Cyclone V, MAX II, MAX V, and MAX 10 FPGA.

Starting with version 15.1, Quartus II Web Edition is now Quartus Prime Lite Edition.

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Board System Design
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Quartus Prime Lite Edition

Release date: November, 2015
Latest Release: v15.1

Select release: 15.1

Operating System: Windows Linux

Download Method: Akamai DLM3 Download Manager Direct Download

✓ The Quartus Prime software version 15.1 supports the following device families: Arria II, Cyclone IV, Cyclone V, MAX II, MAX V, and MAX 10 FPGA. [More](#)

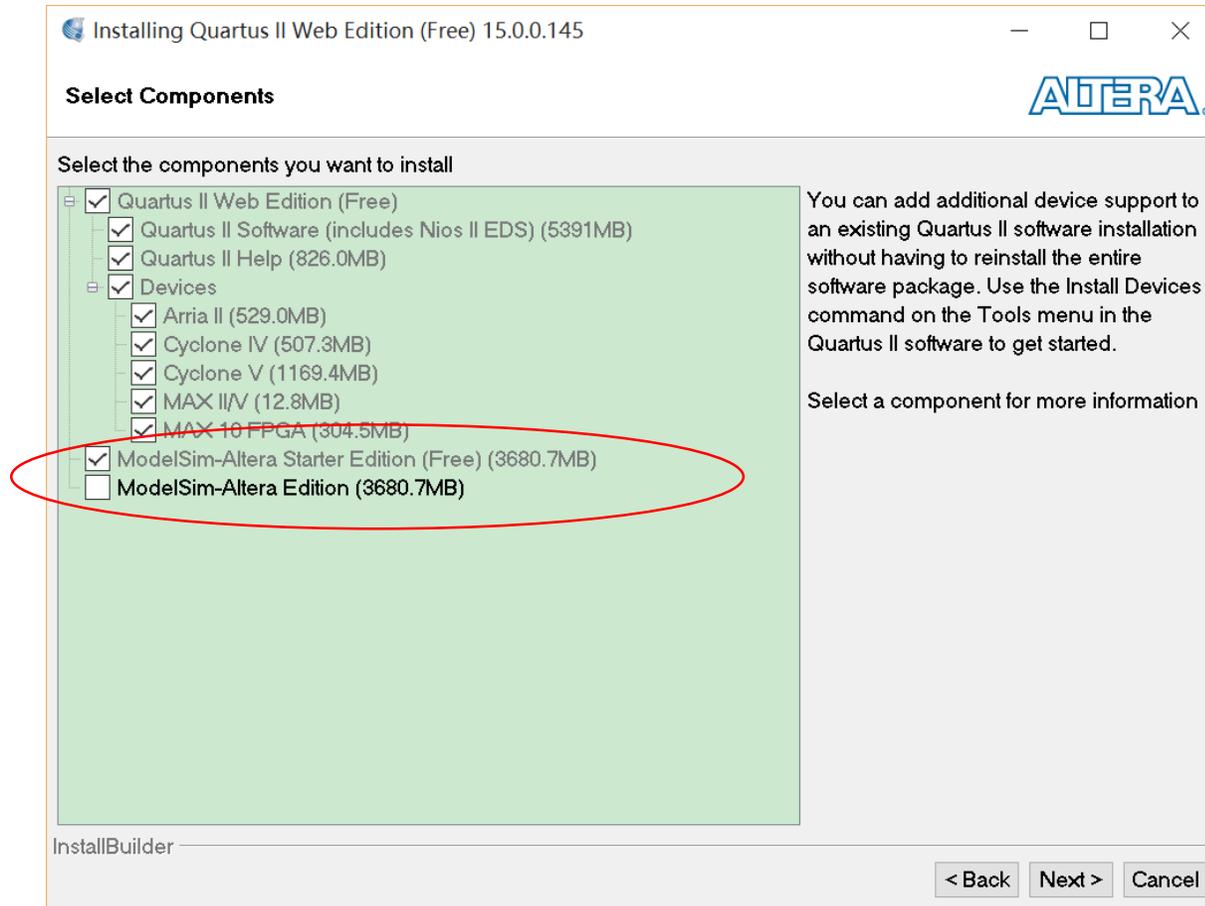
Combined Files **Individual Files** DVD Files Additional Software Updates

Download and install instructions: [More](#)
[Read Altera Software v15.1 Installation FAQ](#)
[Quick Start Guide](#)

Quartus Prime Lite Edition
 Quartus Prime Lite Edition Software (Device support included) [i](#) 
Size: 5.2 GB MD5: DA5CA30B29BF84D5C4E4BD37215F25D3 [Updates Available](#)

[Download Selected Files](#)

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During installation the ModelSim application is not required.

Connect board with PC

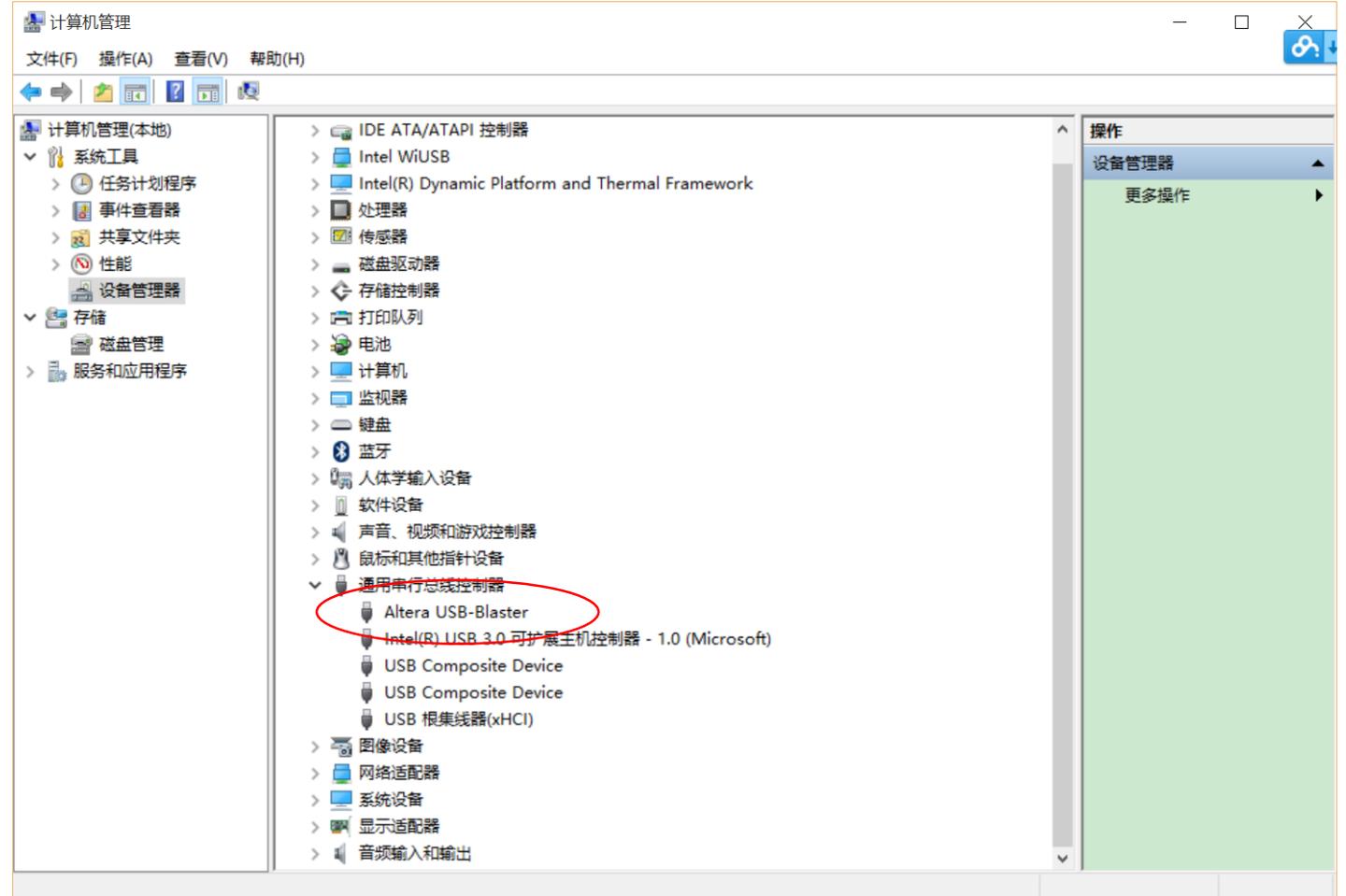
- Connect the Nano board USB-output with your computer.
- Check the driver is correctly installed.

1. For Linux users, refer in this link:

https://www.altera.com/content/dam/altera-www/global/en_US/pdfs/literature/ug/ug_usb_blstr.pdf

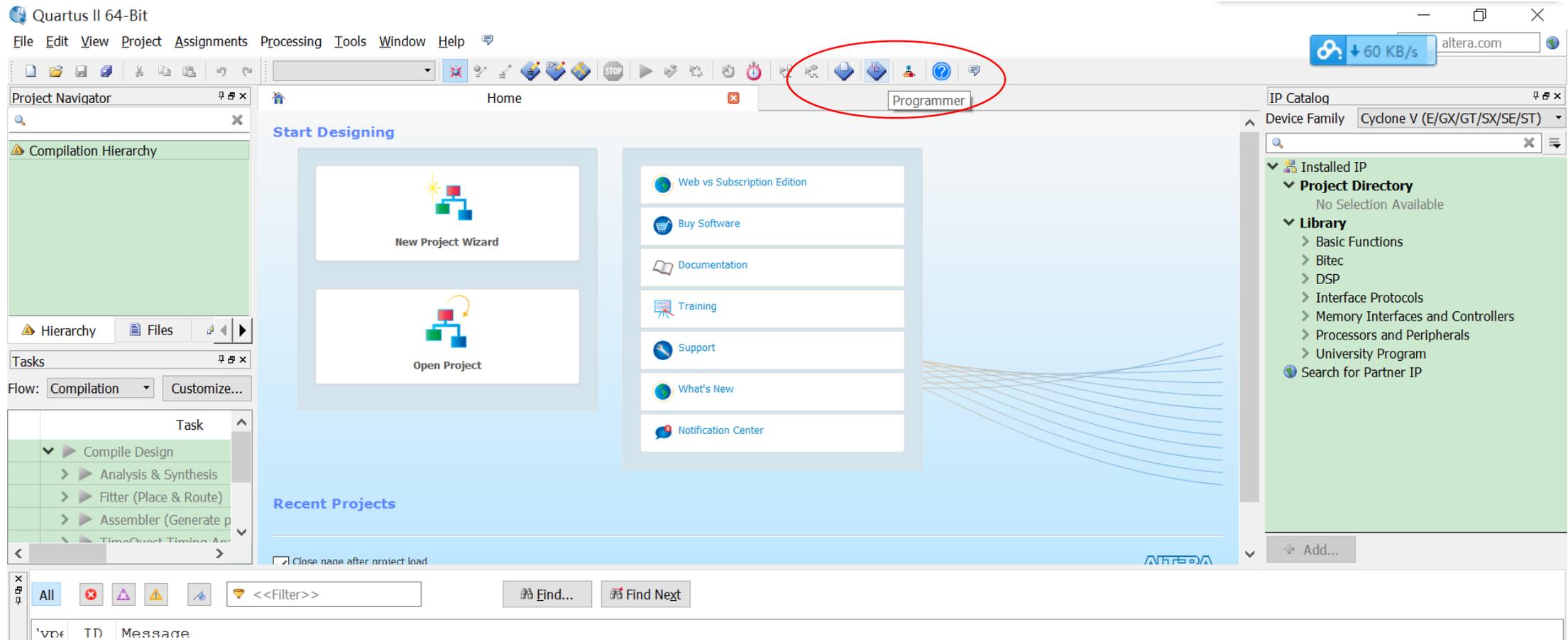
Use `sudo udevadm control --reload-rules` and `sudo udevadm trigger` to make the configuration take effect.

2. For Windows users, please choose the default driver directory in the Quartus installation path and update the driver.



Flash board with images

Click the “Programmer” icon to start software programming interface.



Flash board with images

Use the .sof file that you downloaded from our website.

The screenshot displays the Altera Programmer software interface. At the top, the title bar reads "Programmer - [Chain1.cdf]*". The menu bar includes "File", "Edit", "View", "Processing", "Tools", "Window", and "Help". Below the menu bar, there is a "Hardware Setup..." button, a dropdown menu showing "USB-Blaster [USB-0]", a "Mode:" dropdown set to "JTAG", and a "Progress:" field. A checkbox labeled "Enable real-time ISP to allow background programming when available" is present.

The main area features a table with the following columns: File, Device, Checksum, Usercode, Program/Configure, Verify, Blank-Check, Examine, Security Bit, Erase, and ISP CLAMP. A single row is visible with the following data: File: E:/PhD/FPGA-La..., Device: EP4CE22F17, Checksum: 007490D3, Usercode: 007490D3, Program/Configure: [checked], and all other columns are empty.

On the left side, there is a vertical toolbar with buttons for "Start", "Stop", "Auto Detect", "Delete", "Add File...", "Change File", "Save File", "Add Device", "Up", and "Down".

In the center, a "Select Programming File" dialog box is open. The "Look in:" field shows the path "E:\PhD\FPGA-LabC..._images_version2". The file list contains a folder named "software" and a file named "NIOSCar.sof". The "File name:" field is filled with "NIOSCar.sof", and the "Files of type:" dropdown is set to "Programming Files (*.sof *.pof *.jam *.jbc *.ekp *.jic)".

Flash board with images

The screenshot displays the Altera Programmer software interface. At the top, a status bar shows "Mode: JTAG" and "Progress: 100% (Successful)". Below this, the "Hardware Setup" section shows "USB-Blaster [USB-0]" and "Mode: JTAG". A table lists the programming details for the device EP4CE22F17.

File	Device	Checksum	Usercode	Program/Configure	Verify	Blank-Check	Examine	Security Bit	Erase	ISP CLAMP
E:/PhD/FPGA-La...	EP4CE22F17	007490D3	007490D3	<input checked="" type="checkbox"/>	<input type="checkbox"/>					

A "Select Programming File" dialog box is open, showing the file "NIOSCar.sof" selected in the "software" folder. The file name field contains "NIOSCar.sof" and the file type is set to "Programming Files (*.sof *.pof *.jam *.jbc *.ekp *.jic)".

On the right side of the image, there is a red text box with the following content:

After flashing the board, please remember to close this interface! Otherwise it will occupy the JTAG function and make the following program run failed (with error "Downloading ELF process failed").

Program the board

The screenshot displays the Quartus II 64-Bit software interface. The 'Tools' menu is open, and 'Nios II Software Build Tools for Eclipse' is selected. The interface includes a Project Navigator on the left, an IP Catalog on the right, and a Messages window at the bottom. The Messages window shows the following log:

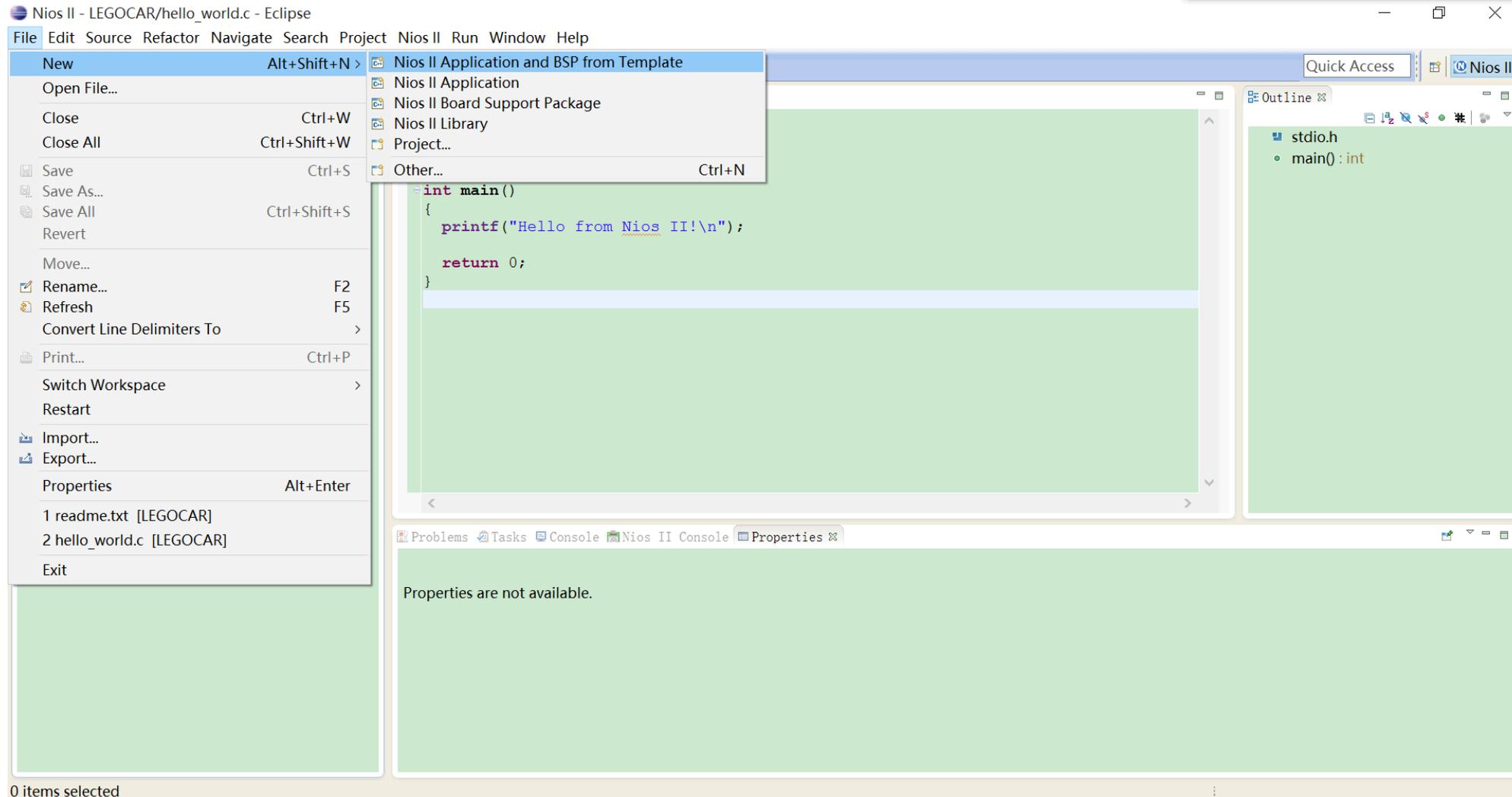
```
Messages
System (10) Processing
209060 Started Programmer operation
209016 Configuring device in
209017 Device 1 contains JT
209007 Configuration success
209011 Successfully perform
209061 Ended Programmer operation at Mon Apr 18 13:24:13 2016
```

The IP Catalog shows the following structure:

- IP Catalog
- Device Family: Cyclone V (E/GX/GT/SX/SE/ST)
- Installed IP
 - Project Directory
 - No Selection Available
 - Library
 - Basic Functions
 - Bitec
 - DSP
 - Interface Protocols
 - Memory Interfaces and Controllers
 - Processors and Peripherals
 - University Program
 - Search for Partner IP

The Messages window also shows the status: 'System (10) Processing' and 'Opens Nios II Software Build Tools for Eclipse'.

Program the board



Program the board

Use the .sopc file that you downloaded from our website.

Nios II Application and BSP from Template

Nios II Software Examples
Please specify a .sopcinfo file

Target hardware information

SOPC Information File name: ...

CPU name:

Application project

Project name:

Use default location

Project location: ...

Project template

Templates	Template description
Hello Freestandi	Hello World prints 'Hello from Nios II' to STDOUT.
Hello MicroC/O	
Hello World	
Hello World Sm	This example runs with or without

Nios II Application and BSP from Template

Nios II Software Examples
Create a new application and board support package based on a software example template

Target hardware information

SOPC Information File name: E:\PhD\FPGA-LabCourse\Dow ...

CPU name: nios2_qsys_0

Application project

Project name: **helloWorld**

Use default location

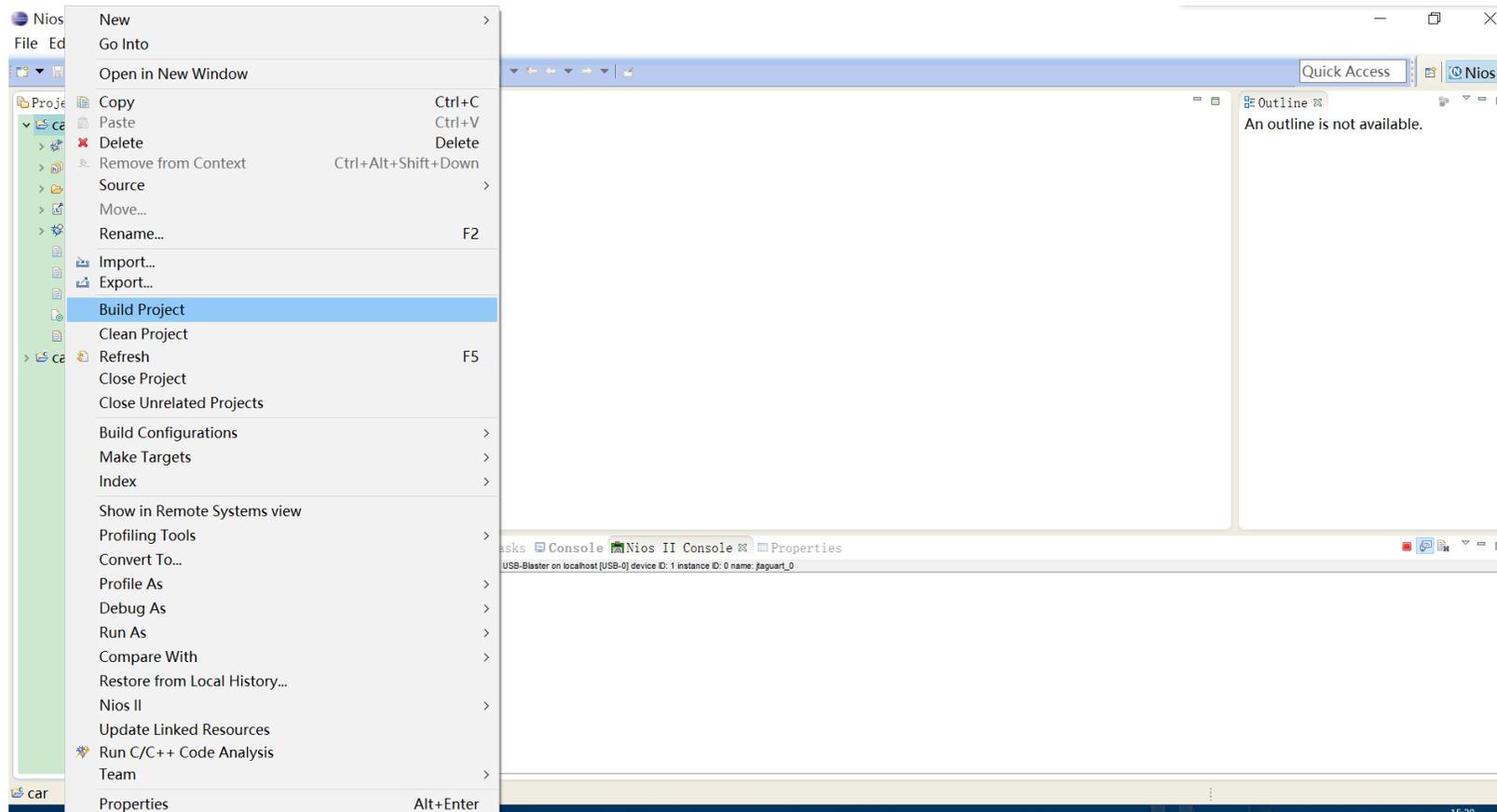
Project location: E:\PhD\FPGA-LabCourse\Download\DE0 ...

Project template

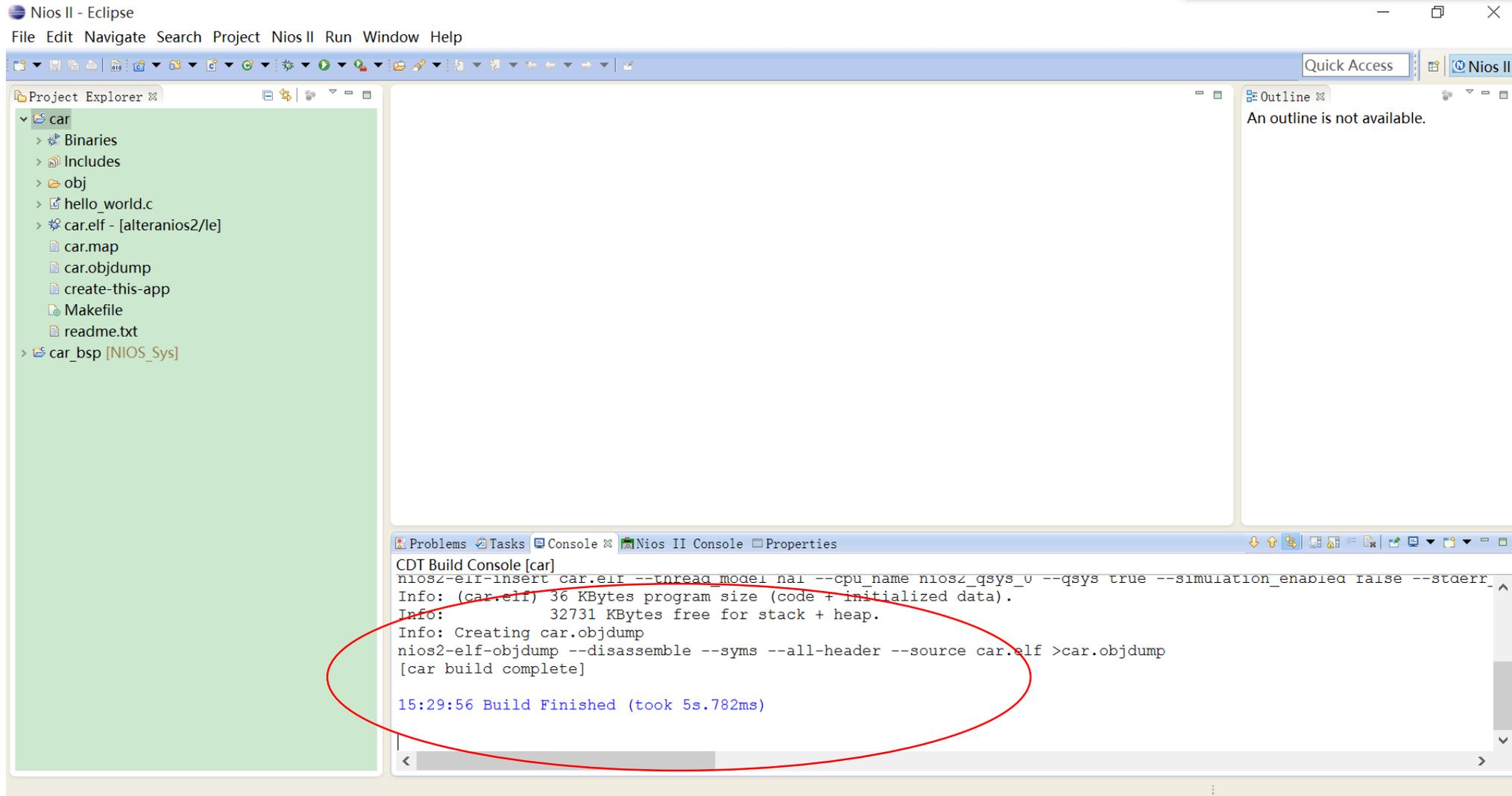
Templates	Template description
Hello Freestandi	Hello World prints 'Hello from Nios II' to STDOUT.
Hello MicroC/O	
Hello World	
Hello World Sm	This example runs with or without

Program the board

- Before running the program, you need to build the project.



Program the board



Program the board

Remember to select the two check boxes under “System ID checks” and press Apply.

The screenshot shows the Eclipse IDE with the Run Configurations dialog open. The dialog is titled "Run Configurations" and has a subtitle "Create, manage, and run configurations". A message at the top states: "The expected Stdout device name does not match the selected target byte stream device name." The "Name" field is set to "New_configuration". The "Connections" table lists a connection to "nios2_0" on a "USB-Blaster on localhost [USB-0]". The "Byte Stream Devices" table lists "jtaguart_0". The "System ID checks" section has two checked checkboxes: "Ignore mismatched system ID" and "Ignore mismatched system timestamp", which are circled in red. The "Download" section has "Download ELF to selected target system" and "Start processor" checked. The "Apply" button is highlighted.

Cable	Device	Device ID	Instance ID	Name	Architecture
USB-Blaster on localhost [USB-0]	EP3C25 [EP4CE22@1]	1	0	nios2_0	Nios2.3

Cable	Device	Device ID	Instance ID	Name	Version
USB-Blaster on localhost [USB-0]	EP3C25 [EP4CE22@1]	1	0	jtaguart_0	1

System ID checks

- Ignore mismatched system ID
- Ignore mismatched system timestamp

Download

- Download ELF to selected target system
- Start processor
- Reset the selected target system

15:29:56 Build Finished (took 5s.782ms)

Program the board

If successful, the results will be shown on the Nios II console tab.

