

Apex Embedded Systems STX104 Demo Application Quick Start

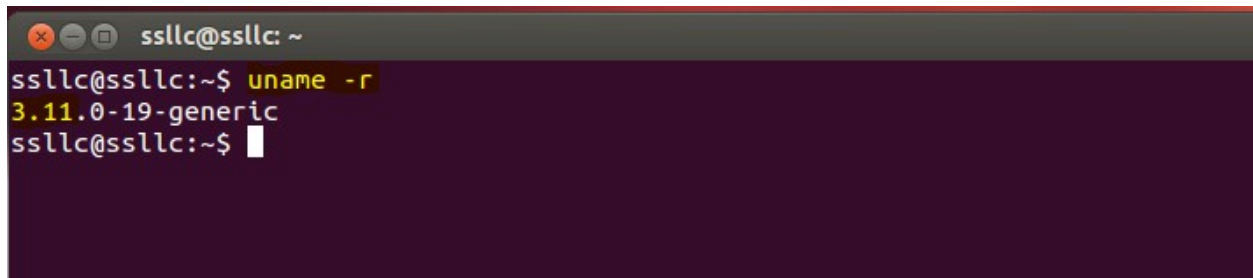
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Prerequisite

In order to utilize the C# STX104 Demo Application using Mono, you must be running kernel version 3.2 or later. You can verify your current kernel version by entering the following command

```
$ uname -r
```

A terminal window with a dark purple background. The title bar shows 'ssl@ssl: ~'. The prompt is 'ssl@ssl:~\$'. The command 'uname -r' has been entered and executed, resulting in the output '3.11.0-19-generic'. The prompt is now 'ssl@ssl:~\$' with a cursor.

Scope

This document applies to the aul_tree project being built as a shared resource.

The objective in doing so is to consume the library project from within the accompanying C# executable when run within Mono.

Overview

This application demonstrates using C# and Mono to build a graphical user interface to allow interaction and manipulation of an STX104 PC/104 card.

It is intended to be used to demonstrate utilization of the AUL library interface.

It is not intended to be used for production.

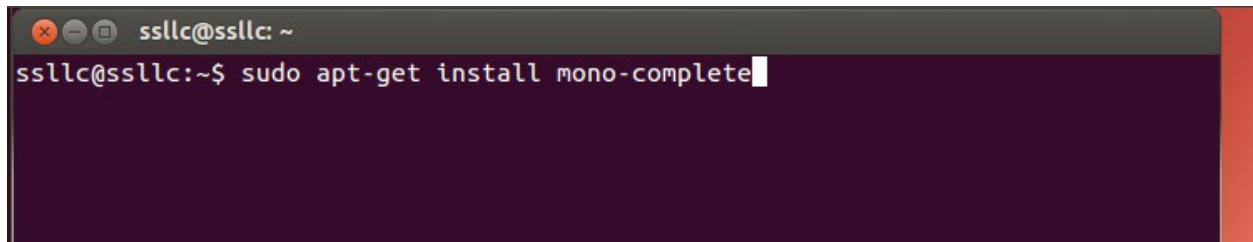
Setup / Installation

-To run the STX104 Demo Application for the first time a few setup steps are required. Please see Pre-requisite section before proceeding.

1. Mono Complete must be installed. This is required to run the demo application. This can be accomplished by running:

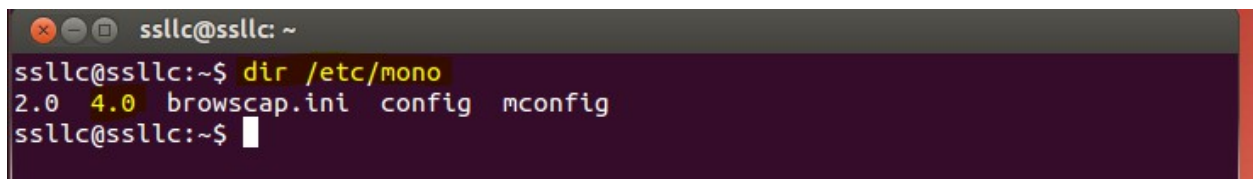
```
$ sudo apt-get install mono-complete
```

--Normal installation steps apply. Answer yes when asked if you want to continue. Enter root password to allow install when prompted.

A terminal window with a dark purple background. The title bar shows 'ssllc@ssllc: ~'. The command 'ssllc@ssllc:~\$ sudo apt-get install mono-complete' is entered at the prompt, with a white cursor at the end of the line.

1.b To verify correct Mono install you need to verify that Mono 4.0 is installed. To do so enter the following command and verify the mono directory contains a 4.0 directory as highlighted below.

```
$ dir /etc/mono
```

A terminal window with a dark purple background. The title bar shows 'ssllc@ssllc: ~'. The command 'ssllc@ssllc:~\$ dir /etc/mono' is entered. The output is '2.0 4.0 browscap.ini config mconfig', where '4.0' is highlighted in yellow. The prompt 'ssllc@ssllc:~\$' is shown again at the end of the line.

2. Install the correct library. Scripts have been provided to aid in this step and are located in the _Demo_Csharp directory.

There are two options for the library build. The simulator project that does not require hardware (Option A) and the full library (Option B)

2.(Option A) To use the simulator project use the build_aul_use_simulator script with the following command:

```
$ sh build_aul_use_simulator
```

-- Root password will be required to copy library to /usr/lib

```
ssllc@ssllc: ~/workspace/aul_tree/_Demo_Csharp
ssllc@ssllc:~$ cd workspace
ssllc@ssllc:~/workspace$ cd aul_tree
ssllc@ssllc:~/workspace/aul_tree$ cd _Demo_Csharp
ssllc@ssllc:~/workspace/aul_tree/_Demo_Csharp$ sh build_aul_use_simulator
```

2.(Option B)

To install the full library (for use with STX104 driver and hardware installed) use the build_aul_use_driver script with the following command:

sh build_aul_use_driver

-- Root password will be required to copy library to /usr/lib

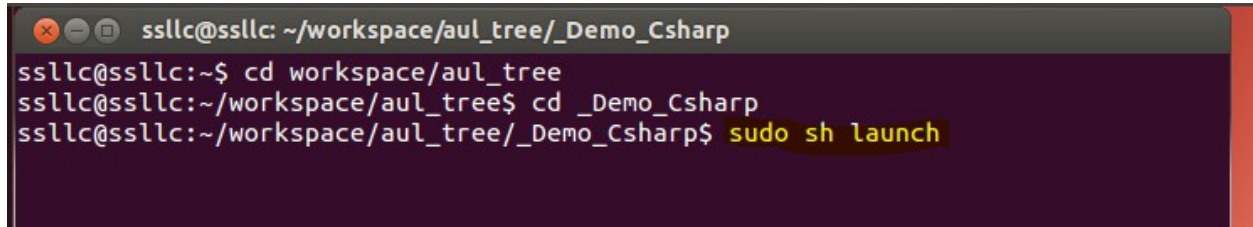
```
ssllc@ssllc: ~/workspace/aul_tree/_Demo_Csharp
ssllc@ssllc:~$ cd workspace
ssllc@ssllc:~/workspace$ cd aul_tree
ssllc@ssllc:~/workspace/aul_tree$ cd _Demo_Csharp
ssllc@ssllc:~/workspace/aul_tree/_Demo_Csharp$ sh build_aul_use_driver
```

Run The Demo

A launch script has been provided to aid in setting Mono and starting the application.

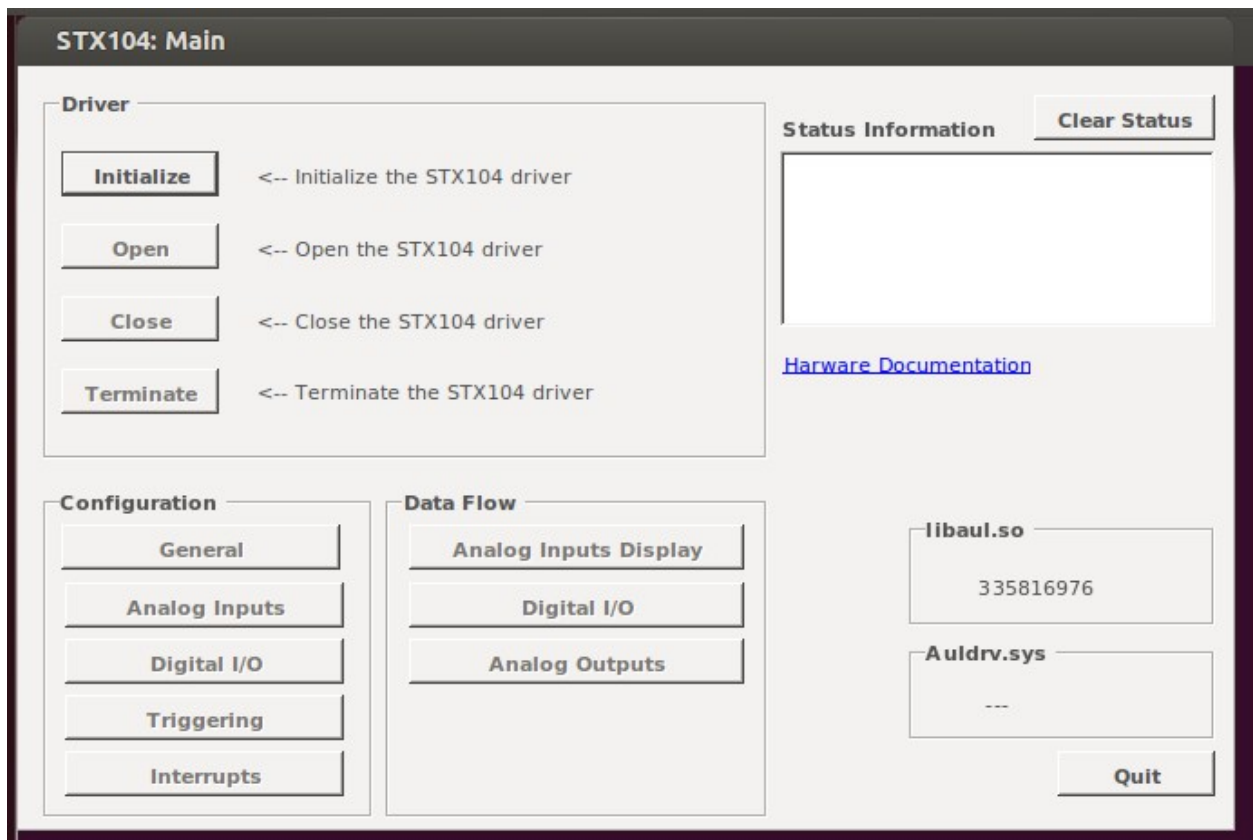
To run the application, navigate to the `_Demo_Csharp` directory and run the following command:

```
$ sudo sh launch
```



```
sslc@sslc: ~/workspace/aul_tree/_Demo_Csharp
sslc@sslc:~$ cd workspace/aul_tree
sslc@sslc:~/workspace/aul_tree$ cd _Demo_Csharp
sslc@sslc:~/workspace/aul_tree/_Demo_Csharp$ sudo sh launch
```

Doing so will start Mono and the STX104 Demo Application.

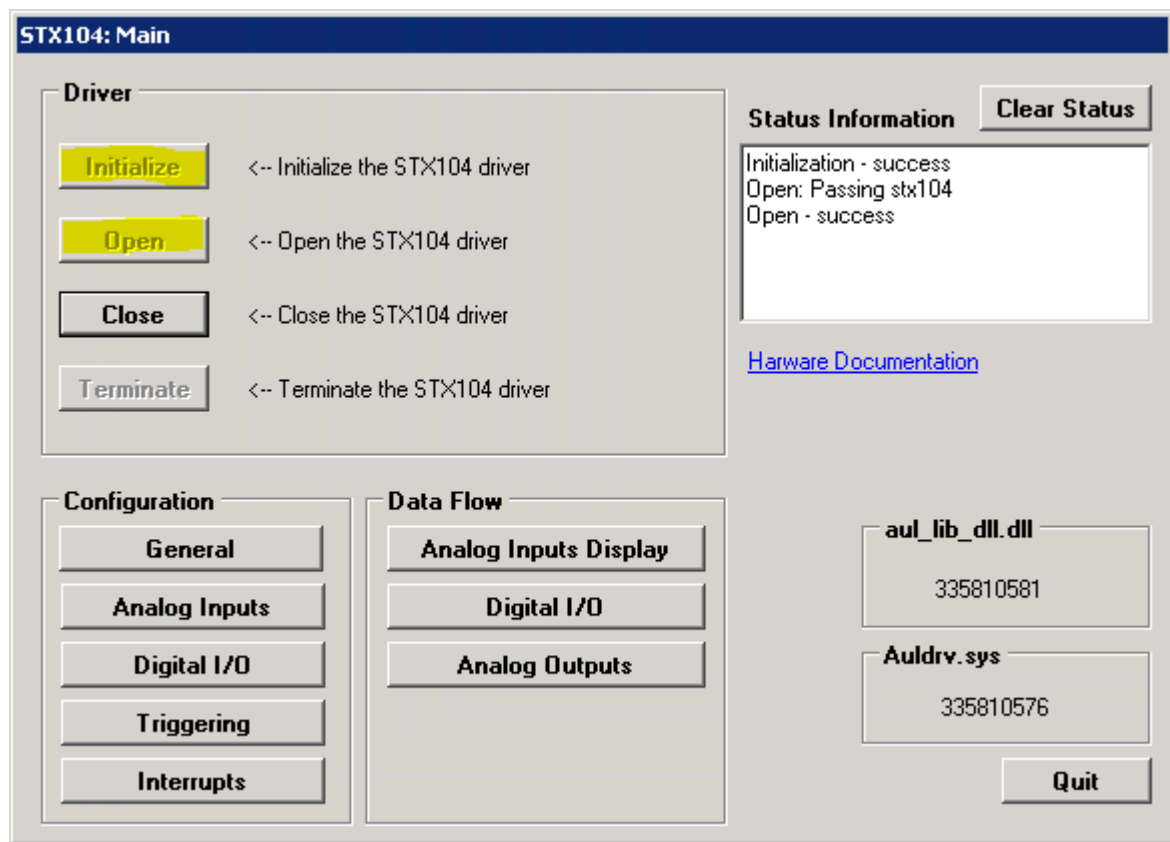


Demo Walk Through

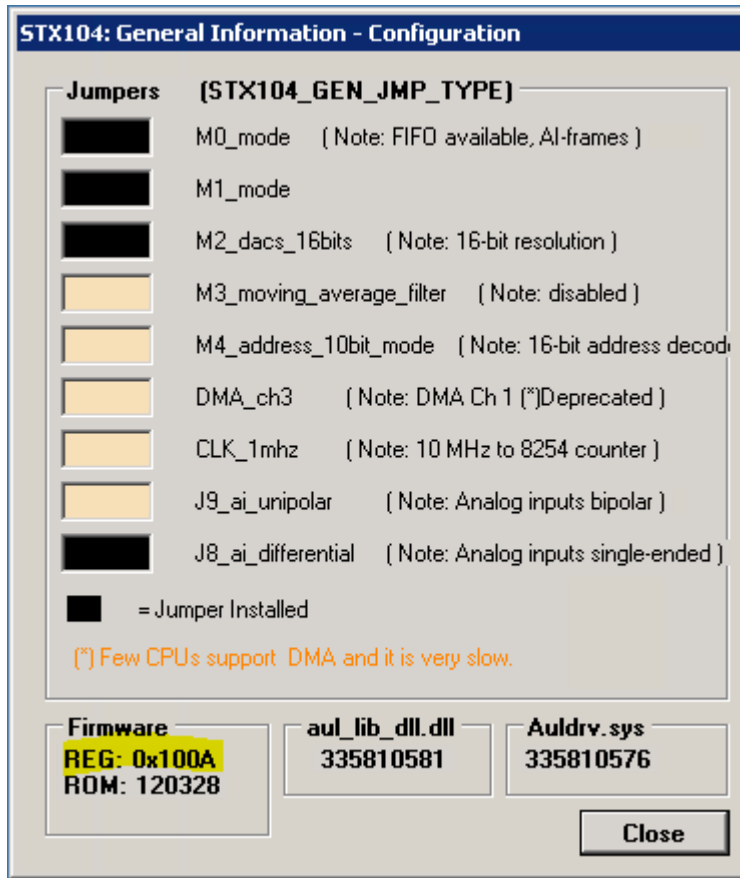
This document provides a simple walk through to configure and demonstrate triggering using DOUT0 within the STX104 Demo Application. Following these steps will allow you to configure the analog input, configure and enable a triggering example, trip the trigger we set up and read and display data from the board.

NOTE: This walk through only works with the full library and hardware installed.

1. Connect digital output 0 to digital input 0 on your STX104 hardware. Done so that we can change the state of DIN0 which is then used to drive triggering state.
2. Run STX104 demo application. Initialize and Open drive. Verification of success is displayed in the Status Information window. NOTICE the Configuration and Data Flow buttons as they will be discussed later.



3. Select the General button under Configuration above. The jumper configuration should match the below screenshot. Communication with the hardware can be verified by a valid Firmware Register Number (i.e. 0x100A Highlighted below). Number such as 0x0000 or 0xFFFF indicates no communications.



4. Select the Analog Inputs button under Configuration. Set the highlighted options to match the screen shot below and select the Apply button.

STX104: Analog Input - Configuration

Channel Range (Frames) First: <input type="text" value="0"/> Last: <input type="text" value="15"/> Type: <u>Single-ended</u>	Sample Rate Verification channel: <input type="text" value="0"/> capacitance: <input type="text" value="0"/> pF resistance: <input type="text" value="0"/> ohms
Timing frame_timer (seconds): <input type="text" value="1 sec"/> burst_timer_ns: <input type="text" value="5 us"/>	adc sampling behavior <input checked="" type="checkbox"/> use_triggering_subsystem ? <input checked="" type="checkbox"/> sync_aifc_to_trigger_start ? <input checked="" type="checkbox"/> sync_aift_to_trigger_start ? ADC Strobe or Samplig Source <input type="text" value="AISS_AI_FRAME_TIMER"/>
Gain <input type="text" value="ACFG_GAIN_10V"/> <input type="checkbox"/> moving_average_filter <input checked="" type="checkbox"/> high_speed_pre_queue_fifo	frame_max <input type="text" value="0"/> frames
ADC Encoding Scheme <input type="text" value="AI_ENCODING_STRAIGHT_BINARY"/> Polarity <div style="border: 1px solid gray; height: 100px; width: 100%;"></div>	

5. Select the Triggering button under Configuration. Set options as highlighted below and click Apply

STX104: Triggering - Configuration

☒ **Enabled**
Requires use_triggering_subsystem option under Analog Inputs Configuration to be selected.

delay (seconds)
0 ns

Start Mode
STM_IMMEDIATE

Start Sync Source
TSS_NONE

Stop Source
ETS_DINO_FE

Start Source
STS_DINO_RE

Apply Cancel OK

6. You are now ready to run the triggering / sampling test. Under Data Flow select the Analog Inputs Display and Digital I/O buttons. You should see the two forms below. Select DO button on the Digital I/O form. If wired correctly Din0 should turn on. These conditions will set Triggering to active and data will be sampled at the 1x per second set in the analog input configuration. Select the Pause Readout button to pause the display of analog input data. You will notice the data is being collected and added to the FIFO.

Select the Resume Readout button (Pause Readout in screen shot) to start display of analog input data. The FIFO count will remain constant until D0 is turned off ending the trigger condition. At this point, the remaining items in the FIFO will be processed.

STX104: Analog Inputs - Data Flow

Analog Input Behavior: bipolar single-ended

CHANNEL	RAW ADC	VOLTAGE
CH0:	0x4065	-4.969
CH1:	0x7FFE	-0.001
CH2:	0x406B	-4.967
CH3:	0xC244	5.177
CH4:	0x406F	-4.966
CH5:	0xC252	5.181
CH6:	0x406D	-4.967
CH7:	0xC24E	5.18
CH8:	0xC255	5.182
CH9:	0x406B	-4.967
CH10:	0xC244	5.177
CH11:	0x4069	-4.968
CH12:	0xC24D	5.18
CH13:	0x4068	-4.968
CH14:	0x7FFA	-0.002
CH15:	0x7FF8	-0.002

Triggering
State: Active

Trig Sync
Trig Start
Trig Stop

ADC Sample
Pause Readout

LED status ■

Frame Count: **70**
FIFO Count: **192**

Close

STX104: Digital I/O - Data Flow

Digital Inputs
DIN0 ■ DIN1 ■ DIN2 ■ DIN3 ■

Digital Outputs
D0 ■ D1 ■ D2 ■ D3 ■

Close