

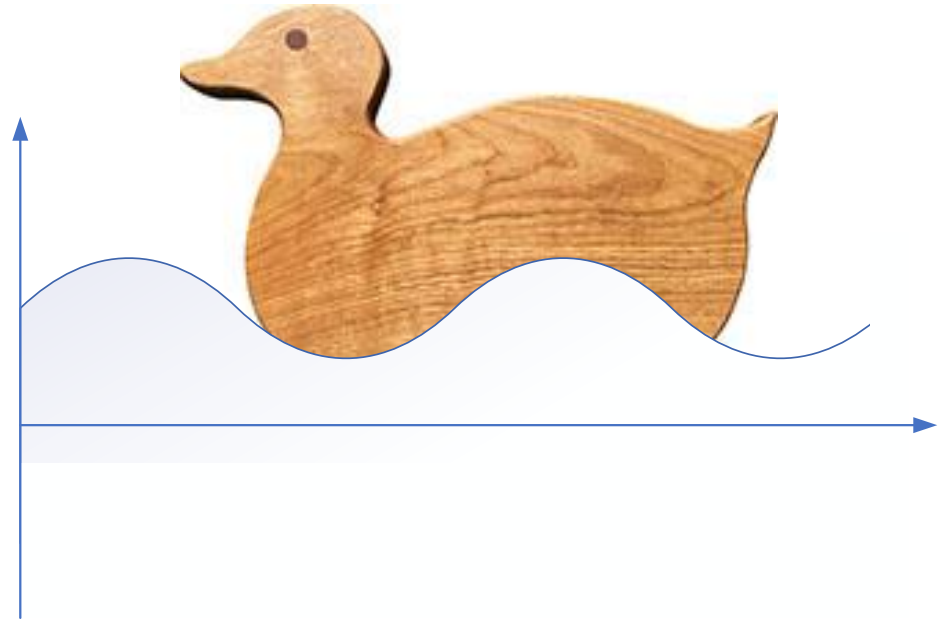
Overview of EPICS drivers for DAQ boards

Polina Pipp

polina.pipp@cosylab.com

Overview

- DAQ boards
- Requirements
- Framework
- Driver implementation
- Graphical interfaces
- Summary





❑ Gigasample digitizers

❑ ADQ7

- 1-2 14-bit channels
- Up to 10 GSPS

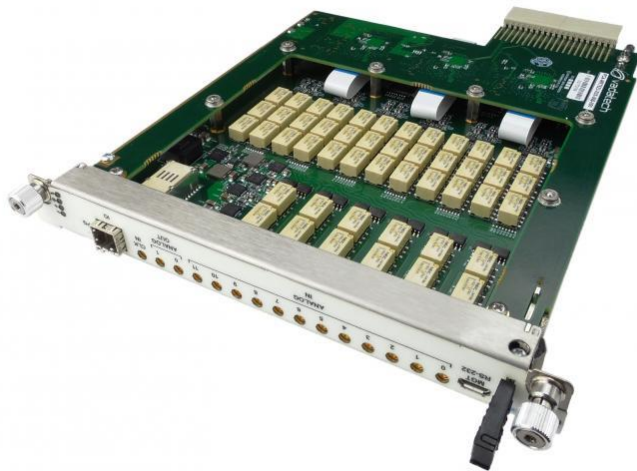
❑ ADQ14

- Up to 4 14-bit channels
- Up to 2 GSPS



- ❑ High-speed digitizer on all-in-one board

- ❑ ADC3110 FMC on IFC1410
 - 8 16-bit channels
 - 250 MSPS



- ❑ High-speed ADC/DAC module

- ❑ AMC523 with MZ523B on MRT523
 - 12 ADC 16-bit channels
 - 125 MSPS
 - 2 DAC 16-bit channels
 - 250 MSPS

Micro-Research Finland Oy



- ❑ Added support for MRF protocol in the firmware:
 - direct link to EVM through SFP on the front panel
 - supported functionality:
 - **synchronize time with MRF to provide timestamping**
 - trigger acquisition on event, generate pulse on event
 - standard trigger on the backplane is still supported if an EVR is present in the crate

There are many different DAQ boards but...

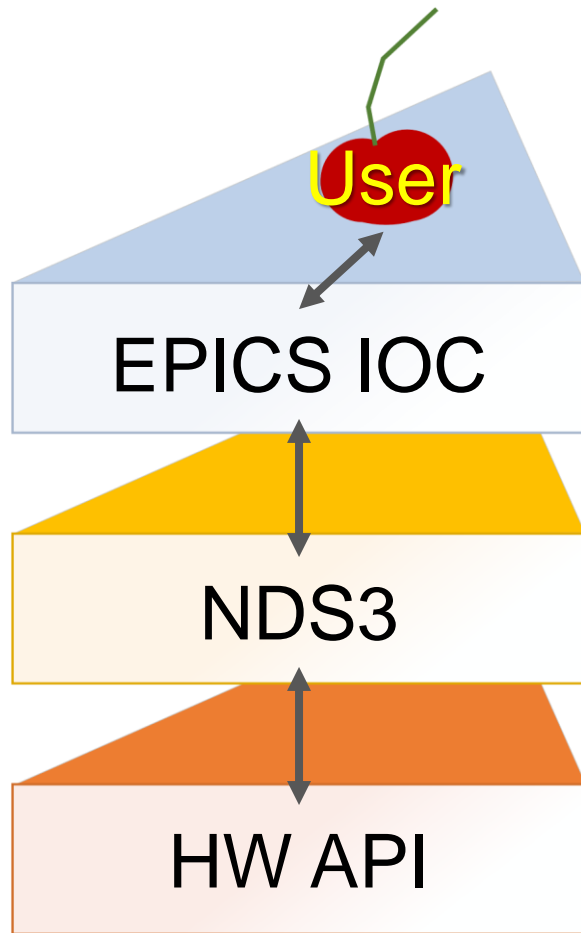
...they share a common use-case:

digitizing analogue signals.

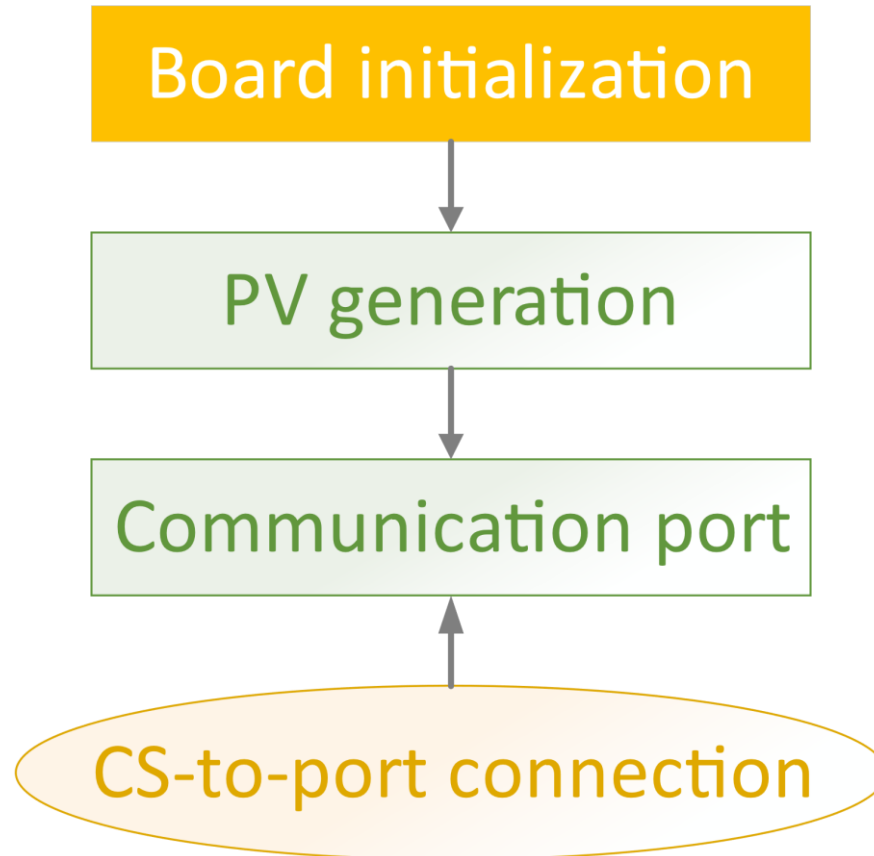
- ❑ Driver provides full support for main and board-specific functionalities:

Software support	<i>Driver supports a specific board model no matter what hardware interface it has.</i>
Automatic startup	<i>Communication with DAQ board established automatically.</i>
DAQ modes	<i>Any available DAQ mode can be chosen.</i>
DAQ parameters	<i>DAQ can be configured with various available parameters.</i>
Trigger modes	<i>DAQ can be triggered with any available source.</i>
Channel mask	<i>Number of active channels is configurable.</i>

- ❑ Support documentation has a standardized structure.



- Driver is based on community version of NDS3
- Three layered software application
- End user interacts with IOC application or GUI



Graphical interfaces



ADQ Digitizer Serial number: ADO-06215 | ADO-06215

Control: OFF | ON | RUN | Current status: ON

Temperatures: PCB 52°C, FPGA 56°C, ADC1 66°C, DCDC2A 54°C, ADC2 66°C

Device Information: ADQ14DC, product name: -4C-VG-PX1e, card option: 714, type: 32, 10

Data Acquisition Settings:

- DAO Mode: Multi-Record
- Trigger Mode: External trigger
- Pattern Mode: Normal
- Channel Mask: A
- Sample Skip: 0
- Number of records: 100
- Records to collect: 100
- Max samples: 1000
- Number of samples: 1000
- Pre-trigger samples: 0
- Hold-off samples: 0
- DBS Settings: Bypass 1, DC target 0, Trigger Settings: Delay 0, Edge Rising edge, Threshold 0.000 V
- Clock Settings: Source 0, Reference output 0

Bus Type: PX1e, gen: 2, width: 4, bus address: 655360

Sample Rate: 1000000000 Hz, with sample skip or decimation: 1000000000 Hz, 2 b/Samp

Channel Data Display: CH0

INFO: Acquisition finished.

Channel Input range: 0 mVpp, 5062 mVpp

Channel DC bias: 0

IOxOS IFC_1410 Scope Demo TRIGGER | Continuous Mode | Downloading 1.1 | Pre-trigger Ratio | Lab PowerTrigger | Refresh Screen

Channel 0: 6.55360e4, Level: 454, 254, 100, 0.000 V, 0.000 V

Channel 1: 6.55360e4, Level: 454, 254, 100, 0.000 V, 0.000 V

Channel 2: 6.55360e4, Level: 454, 254, 100, 0.000 V, 0.000 V

Channel 3: 6.55360e4, Level: 454, 254, 100, 0.000 V, 0.000 V

Channel 4: 6.55360e4, Level: 454, 254, 100, 0.000 V, 0.000 V

AMC523 Digitizer

Control: Stop

Hardware Parameters:

- Trigger Source: Force 1
- Sampling: 100MHz
- Center Frequency, Fc: 500
- Bandwidth: 0
- Clock Source: Internal
- Channel Mask: 1

Snapshot Parameters:

- Snapshot Mode: Continuous
- Trigger Source: Hardware
- Trigger Slope: High
- Read Rate: 500
- Dwell Time: 1
- Frequency: 10

Simulink Parameters:

- User Address: Trigger user
- Write: 0
- Read: 0

Statuses: System, Clock, Buffer, Initialization, PCIe, PCIe 0 Mb/s

Device Information: Firmware Ver 6, DAO system Ver 6, Num of channels 12, Max size of snapshot 1000, Low Latency Enable 0, 2000 buffer

Data Display: Channel-0

Channel-0 Data: Trigger Count 42

Primary Y Axis (V): 300.3964, 256, 194, 132, 70, 8, -54, -116, -178, -240, -302, -364, -426, -488, -550

Primary X Axis (S): 12.68, 13, 13.2, 13.4, 13.6, 13.8, 14, 14.2, 14.4, 14.6, 14.8, 15, 15.2, 15.4, 15.6, 15.8, 16, 16.2, 16.4, 16.6, 16.8

AMC523-Channel-0-data

Summary

- ❑ During the past year we have got a lot of experience with different DAQ boards, also of MTCA.4 form factor.
- ❑ And despite the wide variety of DAQ boards, they can be operated in a unified way...
- ❑ ...A way, that can be developed and maintained with community supported software.



THANK YOU!

Polina Pipp

COSYLAB

Web: www.cosylab.com

Your **TRUSTED** Control System Partner

