TANGO activities in BINP

A.Senchenko, G.Fatkin, E.Kotov,
S.Serednyakov, V.Sitnov

Starting point

- 2015
- Linear Induction Accelerator(LIA-20)
  - New hardware
  - New Control System

Type	Channel Number
Fast (< 10 us)	594
Slow (> 10 us)	1485
Timing	1485
Interlock	1485
Technological control	1000
Total	6000

CS requirements

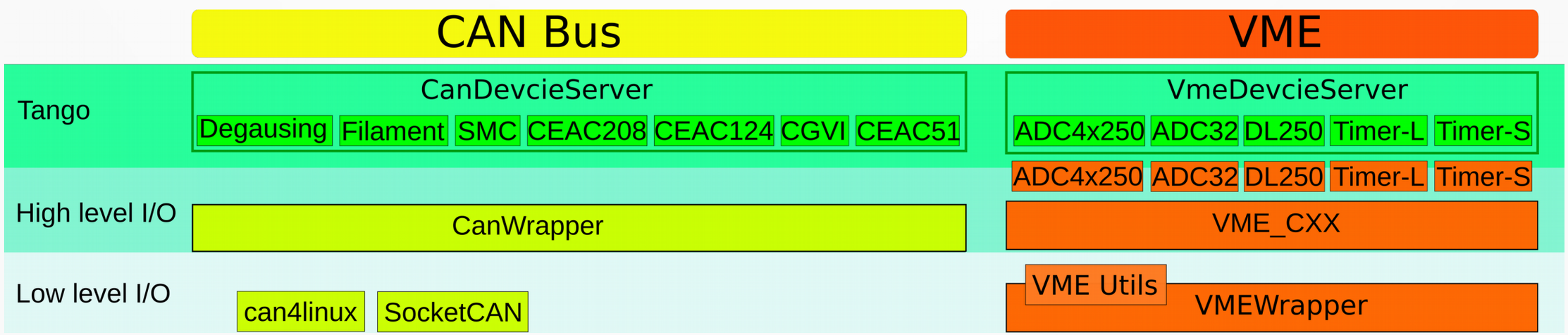
- Life-time > 10 years
  - Maintainability
  - Extensibility
  - Reusability
  - No out-dated technologies
- Distributed
  - Required
  - Is not enough
- Ecosystem
  - Utilities
  - Scripting (python)
  - UI rapid development
  - Archiving

TANGO

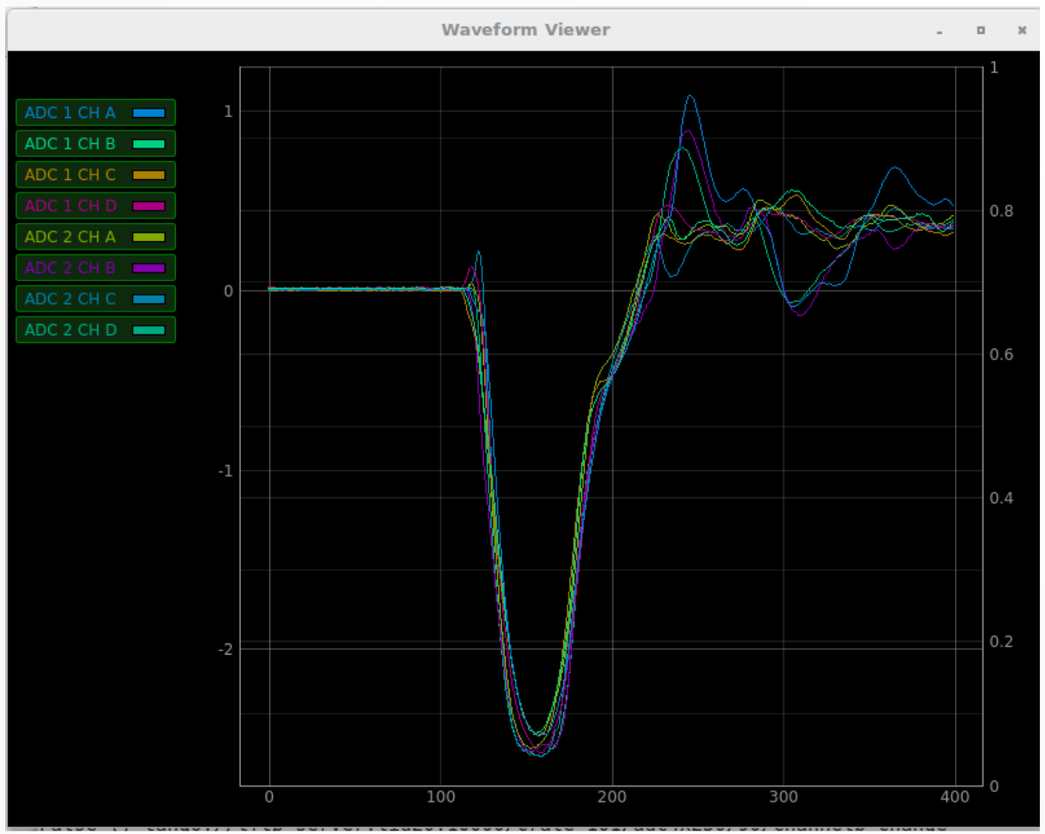
- Consortium
  - ESRF, ALBA, MAX IV, SOLEIL, SOLARIS, SKA …
- NICA
- Ecosystem
  - Pogo, Jive, Astor
  - Taurus
  - HDB++
  - ……

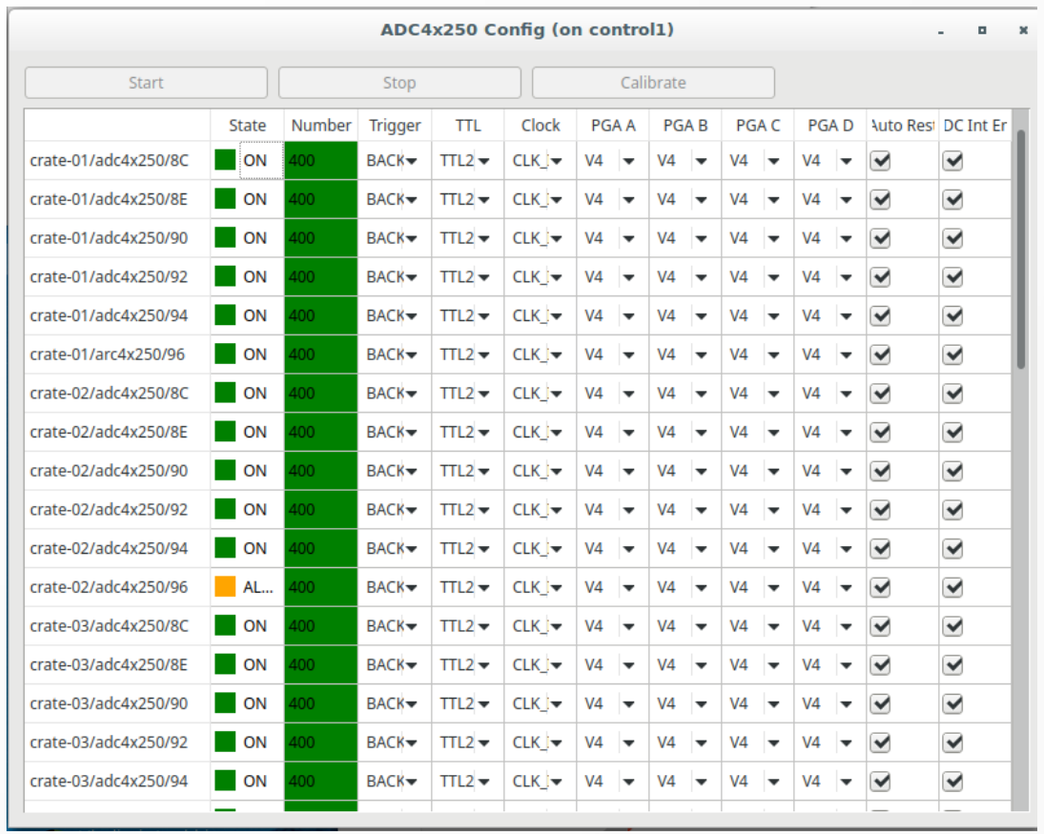
TANGO@LIA-20

- 2016-2018
  - Few dozens of devices were supported
- In operation (5MeV) since Q1 2018

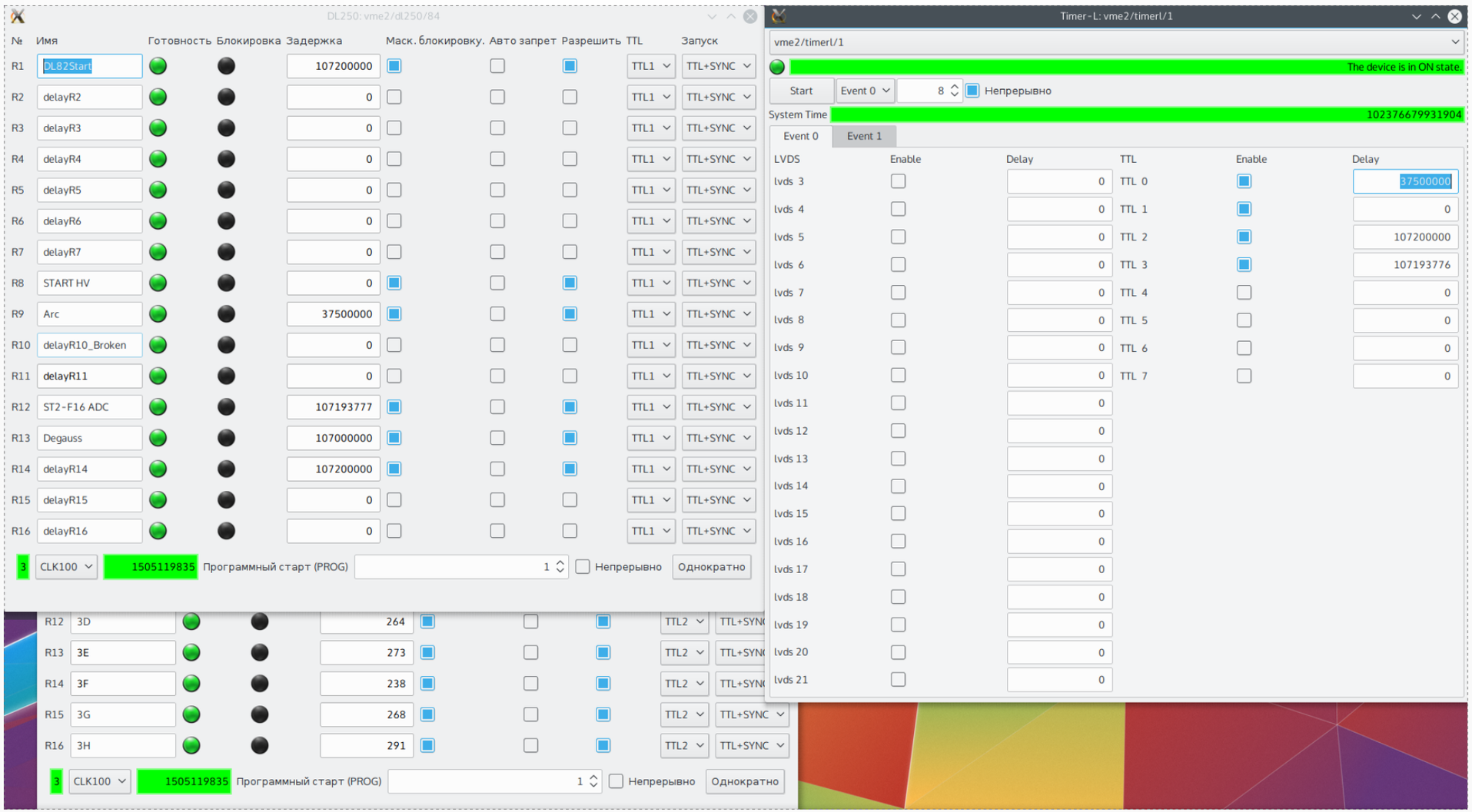


TANGO@LIA-20

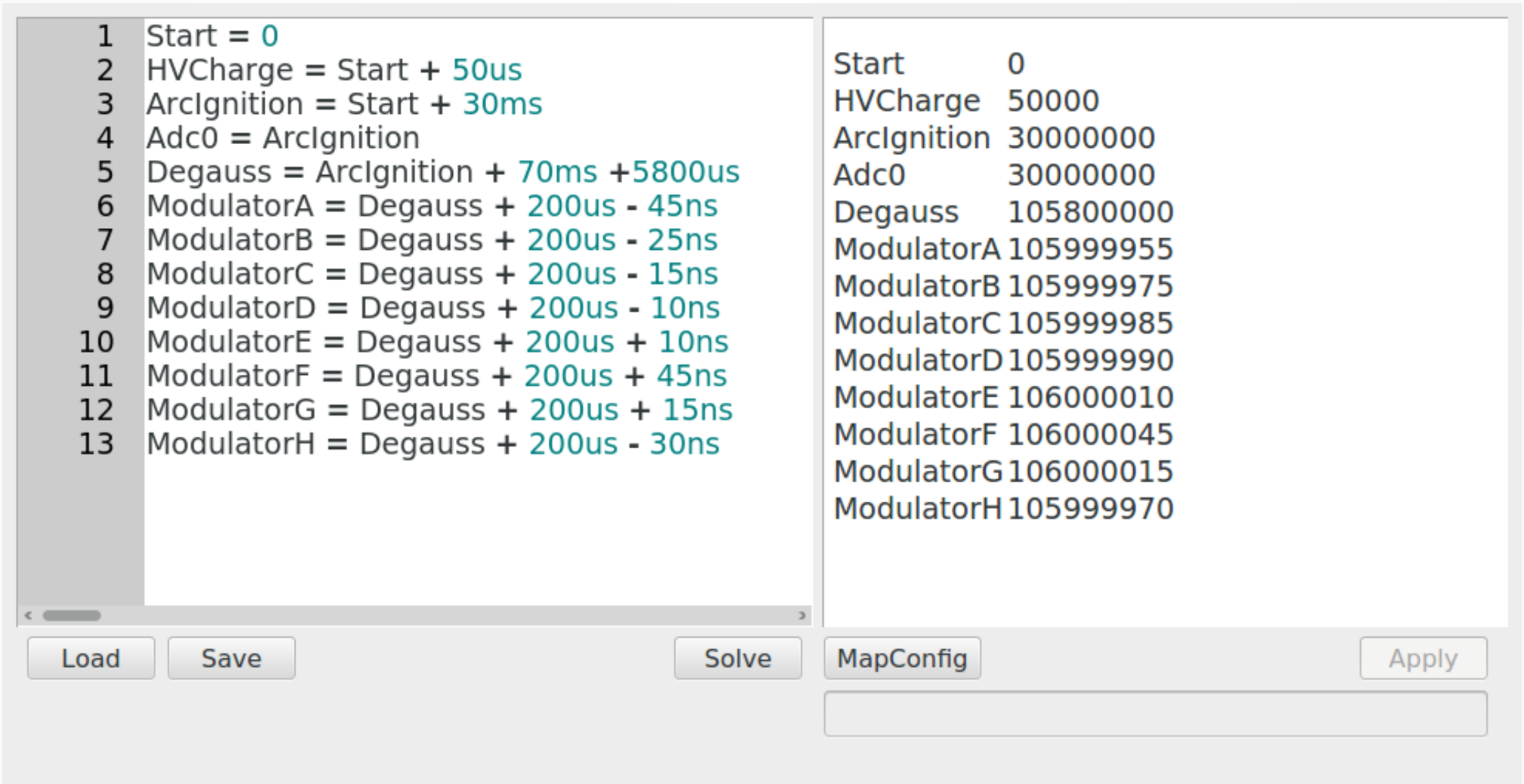

Waveform Viewer
ADC 1 CH A
ADC 1 CH B
ADC 1 CH C
ADC 1 CH D
ADC 2 CH A
ADC 2 CH B
ADC 2 CH C
ADC 2 CH D
1
0
-1
-2
0
100
200
300
400
1
0.8
0.6
0.4
0.2
0


ADC4x250 Config (on control1)
Start
Stop
Calibrate
State
Number
Trigger
TTL
Clock
PGA A
PGA B
PGA C
PGA D
Auto Res
DC Int Er
crate-01/adc4x250/8C
crate-01/adc4x250/8E
crate-01/adc4x250/90
crate-01/adc4x250/92
crate-01/adc4x250/94
crate-01/arc4x250/96
crate-02/adc4x250/8C
crate-02/adc4x250/8E
crate-02/adc4x250/90
crate-02/adc4x250/92
crate-02/adc4x250/94
crate-02/adc4x250/96
crate-03/adc4x250/8C
crate-03/adc4x250/8E
crate-03/adc4x250/90
crate-03/adc4x250/92
crate-03/adc4x250/94
ON
AL...
400
BACK
TTL2
CLK_
V4

TANGO@LIA-20


DL250: vme2/dl250/84
№ Имя Готовность Блокировка Задержка Маск. блокировку. Авто запрет Разрешить TTL Запуск
R1 DL82Start 107200000 TTL1 TTL+SYNC
R2 delayR2 0 TTL1 TTL+SYNC
R3 delayR3 0 TTL1 TTL+SYNC
R4 delayR4 0 TTL1 TTL+SYNC
R5 delayR5 0 TTL1 TTL+SYNC
R6 delayR6 0 TTL1 TTL+SYNC
R7 delayR7 0 TTL1 TTL+SYNC
R8 START HV 0 TTL1 TTL+SYNC
R9 Arc 37500000 TTL1 TTL+SYNC
R10 delayR10_Broken 0 TTL1 TTL+SYNC
R11 delayR11 0 TTL1 TTL+SYNC
R12 ST2-F16 ADC 107193777 TTL1 TTL+SYNC
R13 Degauss 107000000 TTL1 TTL+SYNC
R14 delayR14 107200000 TTL1 TTL+SYNC
R15 delayR15 0 TTL1 TTL+SYNC
R16 delayR16 0 TTL1 TTL+SYNC
3 CLK100 1505119835 Программный старт (PROG) 1 Непрерывно Однократно
Timer-L: vme2/timerl/1
vme2/timerl/1
The device is in ON state.
Start Event 0 8 Непрерывно
System Time 102376679931904
Event 0 Event 1
LVDS Enable Delay TTL Enable Delay
lvds 3 0 TTL 0 37500000
lvds 4 0 TTL 1 0
lvds 5 0 TTL 2 107200000
lvds 6 0 TTL 3 107193776
lvds 7 0 TTL 4 0
lvds 8 0 TTL 5 0
lvds 9 0 TTL 6 0
lvds 10 0 TTL 7 0
lvds 11 0
lvds 12 0
lvds 13 0
lvds 14 0
lvds 15 0
lvds 16 0
lvds 17 0
lvds 18 0
lvds 19 0
lvds 20 0
lvds 21 0
R12 3D 264 TTL2
R13 3E 273 TTL2
R14 3F 238 TTL2
R15 3G 268 TTL2 TTL+SYNC
R16 3H 291 TTL2 TTL+SYNC
3 CLK100 1505119835 Программный старт (PROG) 1 Непрерывно Однократно

TANGO@LIA-20


1 Start = 0
2 HVCharge = Start + 50us
3 ArcIgnition = Start + 30ms
4 Adc0 = ArcIgnition
5 Degauss = ArcIgnition + 70ms +5800us
6 ModulatorA = Degauss + 200us - 45ns
7 ModulatorB = Degauss + 200us - 25ns
8 ModulatorC = Degauss + 200us - 15ns
9 ModulatorD = Degauss + 200us - 10ns
10 ModulatorE = Degauss + 200us + 10ns
11 ModulatorF = Degauss + 200us + 45ns
12 ModulatorG = Degauss + 200us + 15ns
13 ModulatorH = Degauss + 200us - 30ns
Start 0
HVCharge 50000
ArcIgnition 30000000
Adc0 30000000
Degauss 105800000
ModulatorA 105999955
ModulatorB 105999975
ModulatorC 105999985
ModulatorD 105999990
ModulatorE 106000010
ModulatorF 106000045
ModulatorG 106000015
ModulatorH 105999970
Load
Save
Solve
MapConfig
Apply

Training Course

- June 2017
- 10 hours
- 14 participants
  - CS Developers
  - Physicists

Sections

- Overview.
- Users
  - Interaction and UI prototyping
- Developers
  - Writing servers (Python, C++)

Training Course

- Tango 8
- Taurus + PyTango
- NI-PXI-6251 (TANGO Class,NICA, JINR)
  - ADC
  - DAC
  - I/O Port

Contributing to TANGO

- Bug reports and patches
  - HDB++ viewer
  - Taurus (python3 support)
- New development
  - HDB++ Postgresql backend

Contributing to TANGO

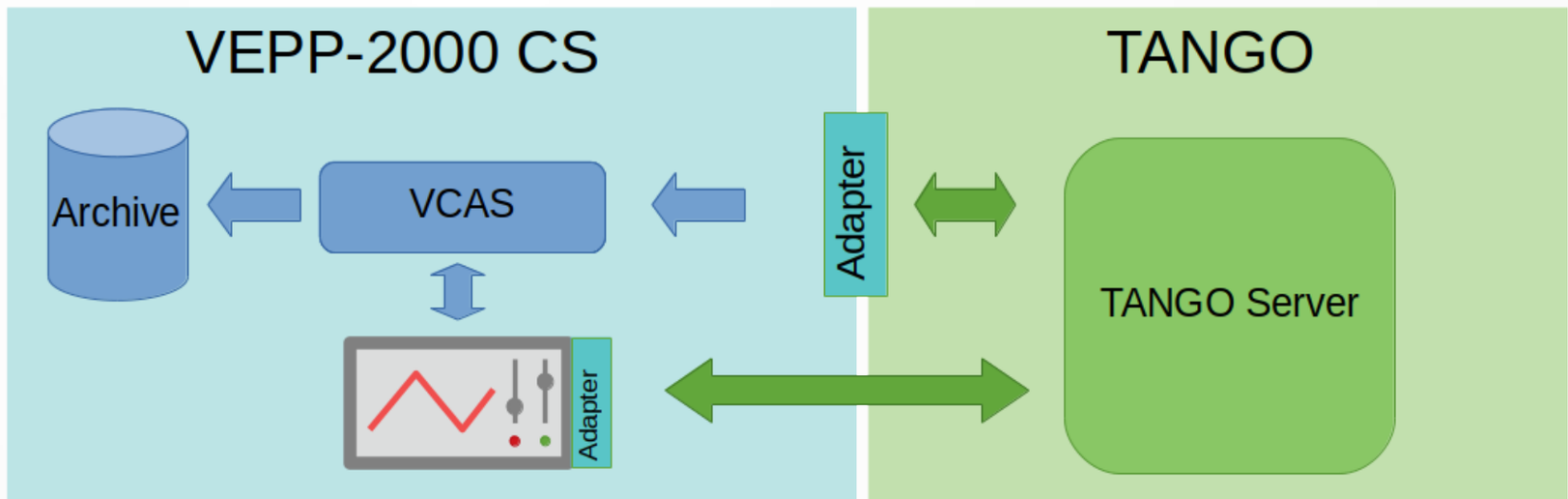
HDB++ Postgresql backend

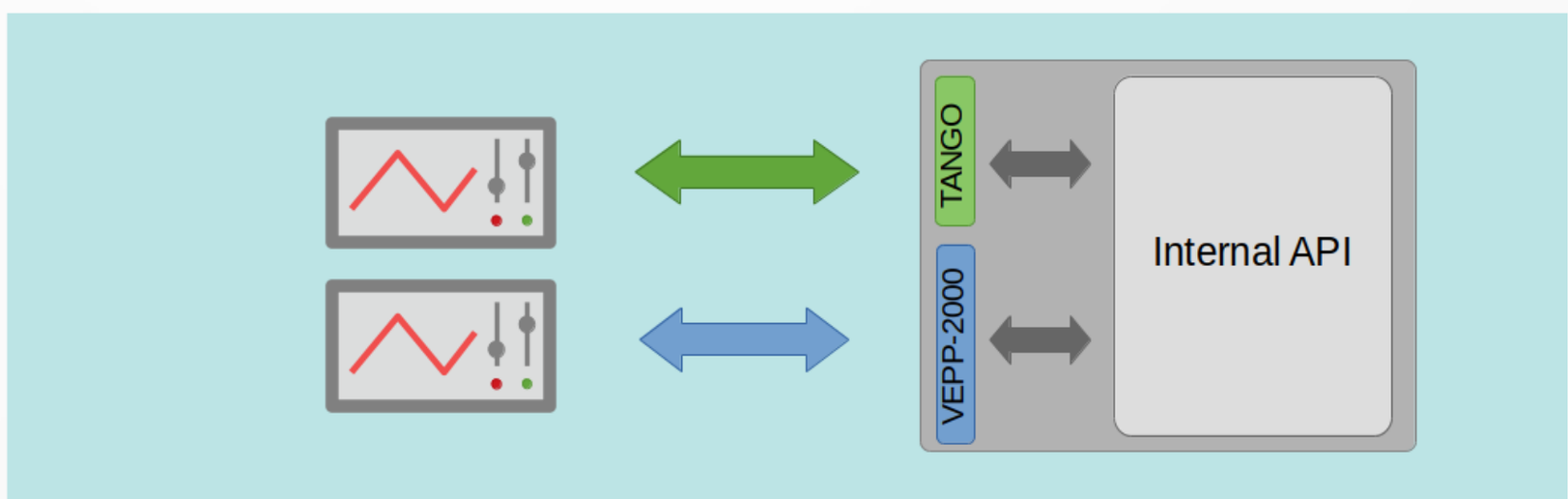
- Rationals
  - ~2000 oscillograms
  - 500-1000 samples per oscillogram
  - Significant experience in usage for archiving

VEPP-2000 Integration

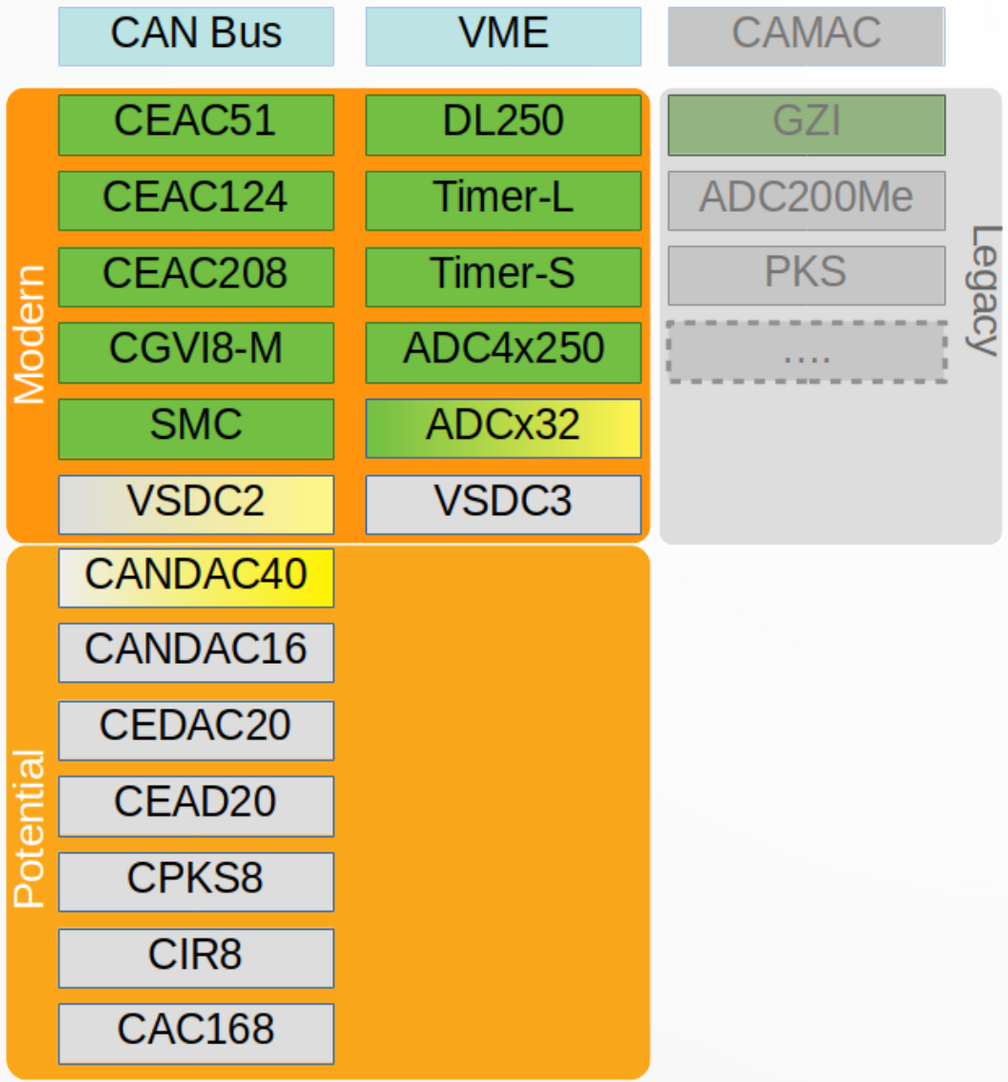
Adapter
- BEP SR Beamline (LHC-HL)
- BeamShaker
- Water cooling system

Gateway
- *Pulse Subsystem*





Support matrix



- Modern
  - Supported or will be supported soon
- Potential
  - Could be provided
- Legacy
  - Unsupported

What’s next?

- BINP&NSU TANGO training course
- Publishing HDB++ PostgreSQL
- SARDANA + TANGO on “SKIF” Beamlines
- Evaluation for C-Tau
- Electron-cooling for NICA