Tango Based Software of Control System of LIA-20

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Introduction

The linear induction accelerator LIA-20 for radiography is a pulsed machine designed to provide three consecutive electron bunches. Since every pulse is a distinctive experiment, it is of high importance to provide coherence of the facility state and the experimental data. This paper presents overall software architecture. Challenges and particular approaches to designing of a pulsed machine control system using Tango are discussed.

Control System Project
For more details visit THPHA052

The software of the control system is based on Tango 8. At the current moment almost all VME modules are provided with tango devices and GUI clients. Low-level tango devices are implemented in C++. Client applications are created using Python language and PyQt/PyTango/Taurus. HDB++ with Mysql backend was chosen as an archival system.

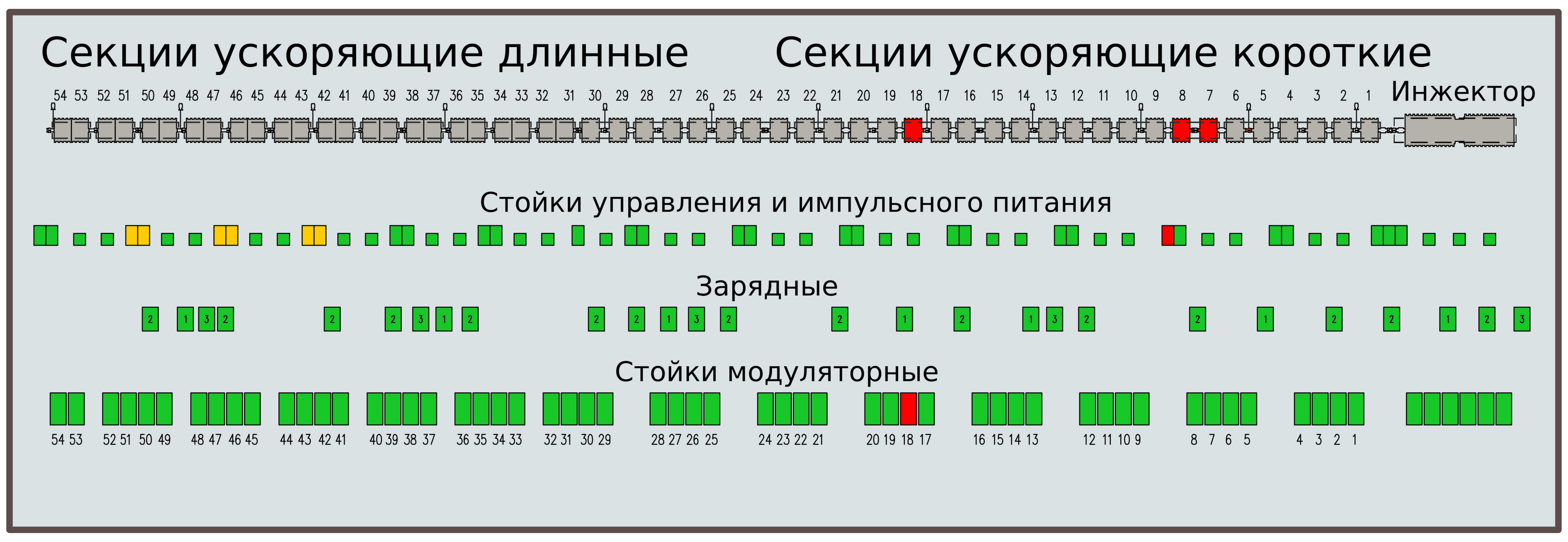
Further development will be directed to the creation of high-level tango devices and possible introduction of Sardana. Another important field of research is the Facility State And Regime Managment System.

Data Rates

Channel type	Number of channels		Data rate (1-bunch)	
	whole system	per VME crate	whole system	per VME crate
Fast (<10 us) oscillograms	594	22	5.7 MB/cycle	214 KB/cycle
Slow oscillograms	1485	55	13.5 MB/cycle	0.5 MB/cycle
Timing system	1485	55	13.5 KB/cycle	0.5 KB/cycle
Interlocks	1485	55	13.5 KB/cycle	0.5 KB/cycle
Technological controls	1000	~40	513 KB/min	19 KB/min
	6000	~280	19.3 MB/cycle + 540 KB/min	3.5 MB/cycle + 19.5 KB/min

Application Software

User software comprises Mimic Diagram, Time Editor, GUI for tango devices and common tango utils.
Mimic Diagram visualizes a summary of all subsystem's states. It is based on PyQt/QWebKit and SVG.
Time Editor is a editting tool for timing diagrams. It provides operator the ability to prepare, verify and apply timing diagrams.
For more details visit TUPHA 087



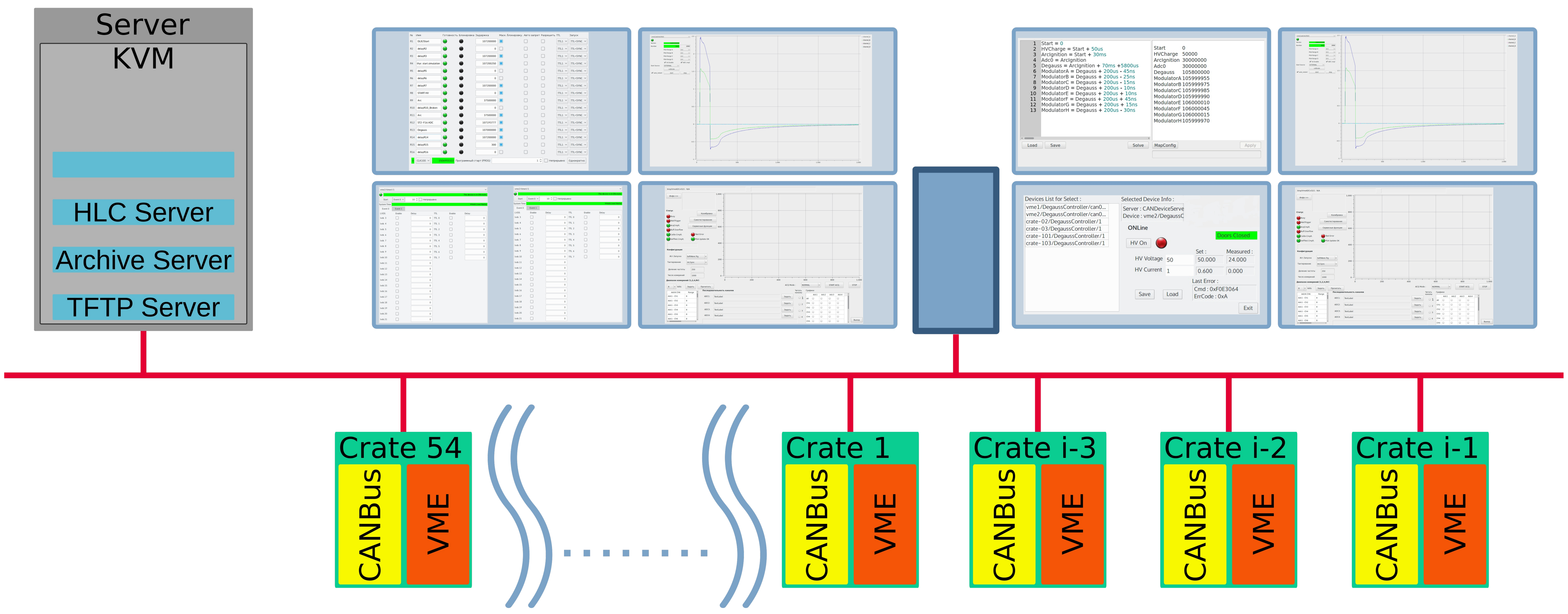
Dedicated virtual servers

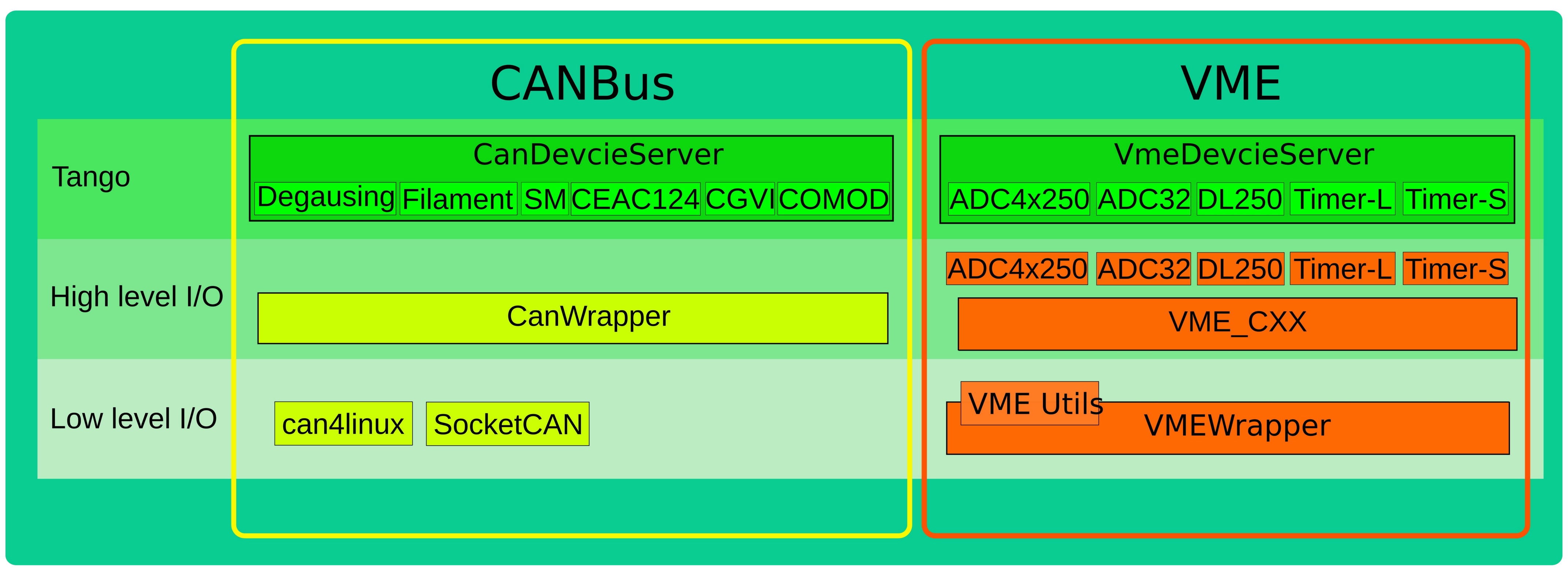
Virtualization
KVM

TFTP Server
Tango DB
TFTP, NFS

Archive Server
HDB++ MySQL / *Postgresql*

High-Level Control Server
FacilityStateMachine
Interlock, Timing, etc.





Low level I/O layer consists of CANBus driver (can4linux or SocketCAN) and VME wrapper.

High level I/O layer provides an abstraction libraries for access to CANBus and VME and hides implementation details. A set of Device Drivers is implemented on top of VME wrapper.

Tango is the top layer. It contains tango interfaces to the underlying Device Drivers. To reduce VME controller's resource consumption and simplify hardware access appropriate tango devices are aggregated in two device servers: CANBus and VME.

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