Integration of a Specific Hardware through HTTP-server
Budker Institute of Nuclear Physics SB RAS
Alexey Panov

**MAX IV and Solaris are new synchrotrons third generation. MAX IV synchrotron consist of 1.5 GeV storage ring, 3.0 GeV storage ring and linac. Structure of storage rings contains several pulse magnets (kicker and jigger). Control system of pulse power supplies based on LTR crate with several modules (ADC, DAC, input/output registers etc.). LTR crate is product Russian firm L-CARD. In order to communicate with crate native LTR-server is used. LTR-server is a Windows application based on use of sockets. Control system of MAX IV and Solaris uses TANGO. For integration LTR-crates in final structure, special software gateway (csMAXIVitr) is used. This gateway is a set of several specific Windows applications implemented by using Qt5 libraries. Gateway allow communicating TANGO-server with crate through built-in HTTP-server.**

**csMAXIVitr software package consists of four components:**
- **Starters** - start and control other applications (BINP)
- **LTR-target** - high-level interaction with LTR-crates (BINP)
- **HTTP-server** - communication to the power supply in remote mode (BINP)
- **LTR-server** - low-level interaction with LTR-crates (L-CARD)

**csMAXIVitr gateway structure**

Switch on/off
Reset interlocks
Changing settings
Example: &.HVPS=ON;
SettingHVPS_U=VALUE;
Read measurements
Read states/interlocks
Changing csMAXIVitr settings:
Write: http://lx.x.x.x/PATH=??
Read: http://lx.x.x.x/PATH=VALUE!

Each module operates in its qthread and communicate with SIGNAL/SLOT mechanism. HTTP-server based on QHttpServer by Nikhil Marathe

**Typical response on POST or GET request**

```
<root>
<body>
<SettingHVPS_U=98.596>
<SettingHVPS_P=35.288>
<MeasuredHVPS_U=82.578>
<MeasuredHVPS_P=25.439>
<MeasuredHVPS_T=22.28>
>Status=3171416
>Interlocks=638
>TriggerCounter=1890852
</body>
</root>
```

**Tango PPS State Machine**

**Simple tests**

- **DAC response time detection**
  - Conditions: Input command sequence for \( m = 0 \) to \( m = 10 \) for \( i = \) 1
  - SettingHVPS_U = i;
  - Delay 2000 ms.

- **Write command time detection**
  - Delta - time between command "reset interlocks" and action