Configuration Management for the Integrated Control System Software of ELI-ALPS

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Outline

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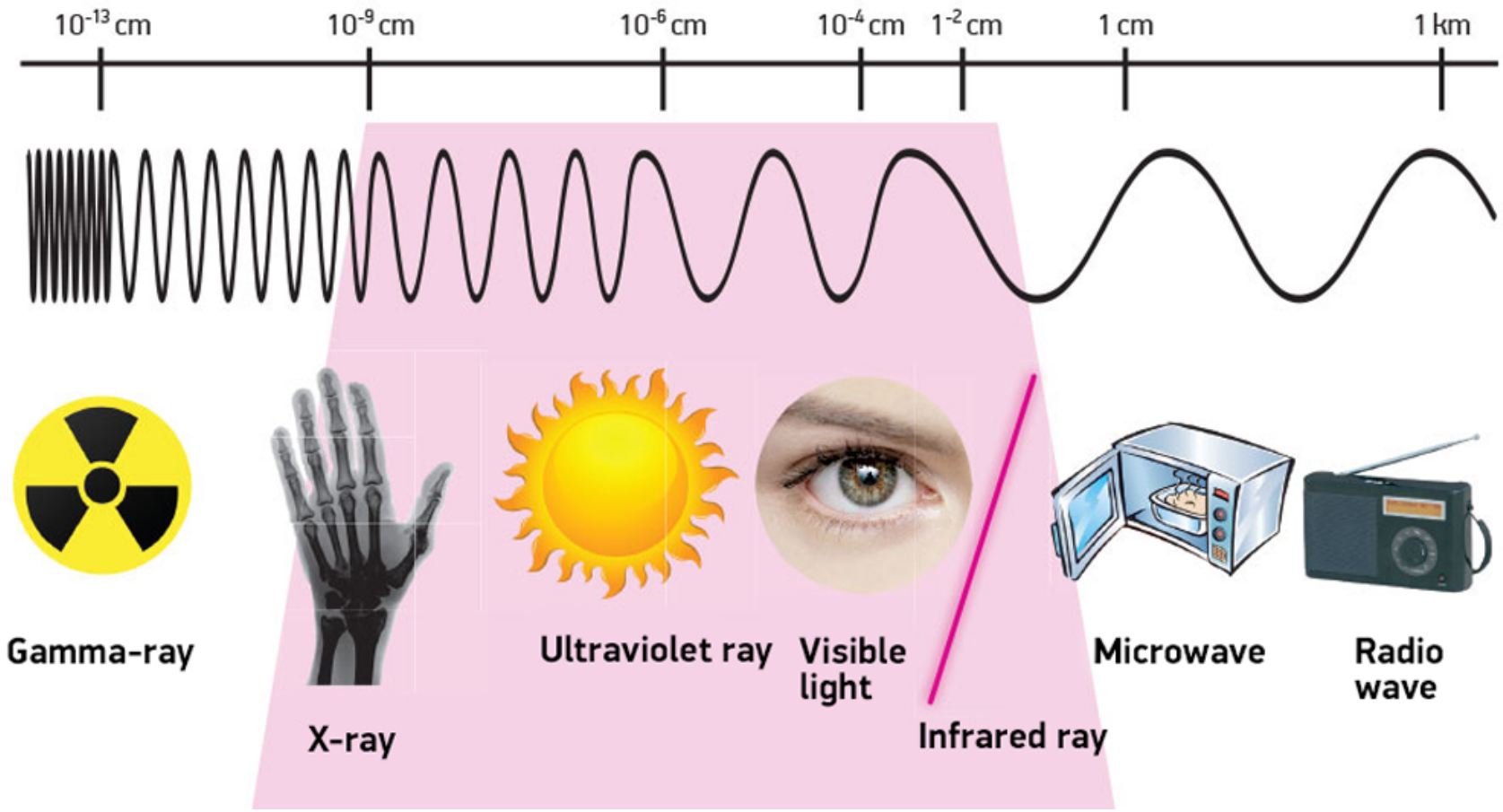
ELI-ALPS

Research areas

ELI-ALPS Extreme Light Infrastructure – Attosecond Light Pulse Source

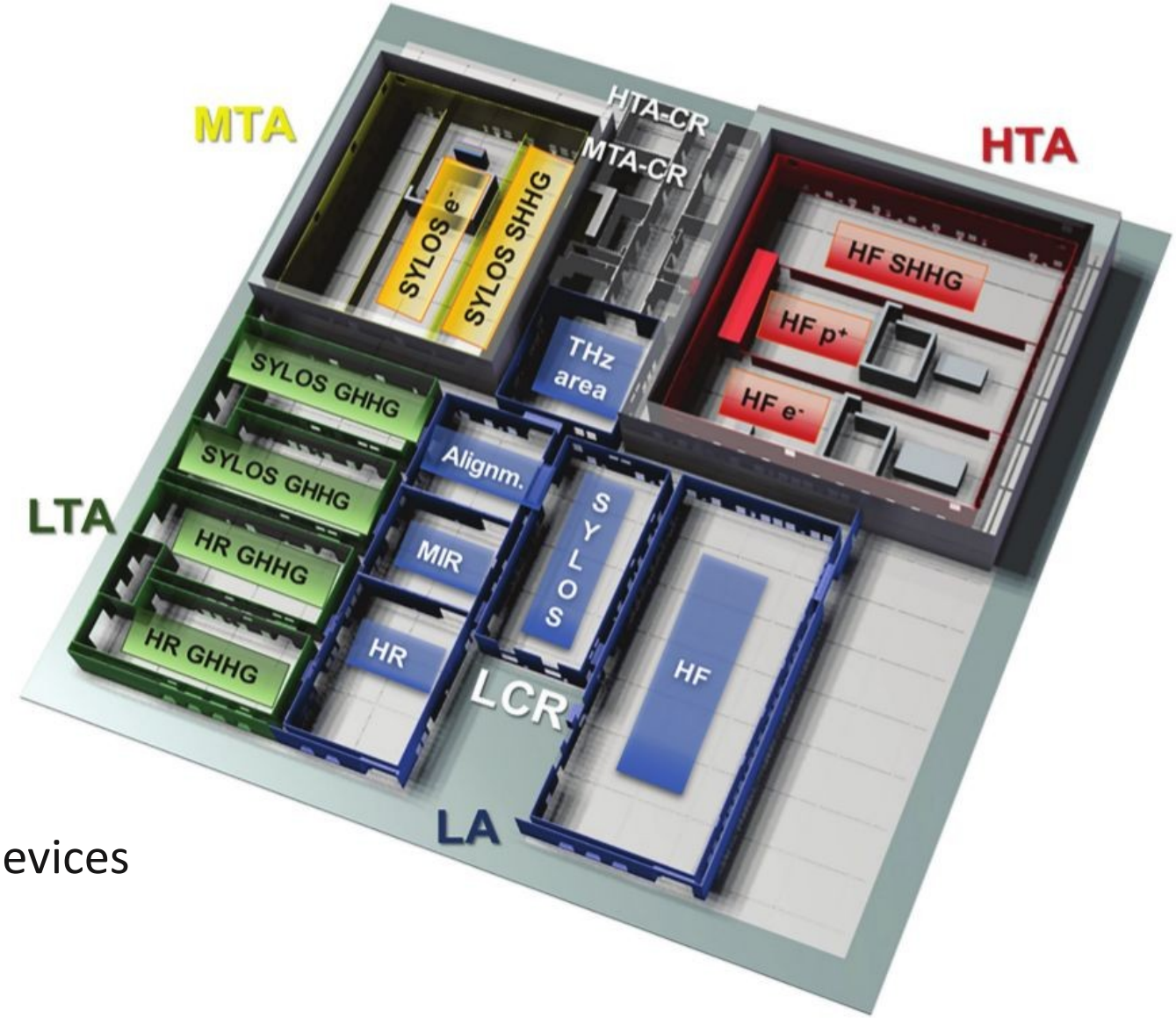
- Valence and core electron science
- 4D imaging
- Relativistic interactions
- Biological, medical applications



Research technology

- Building infrastructure
- Laser systems
  - Primary laser sources
  - Beam transport
  - Secondary sources
  - End-stations
- Equipment
  - Vacuum devices
  - Optical configuration and alignment
  - Cameras, other detectors

- Control system is built on top of low level devices



Control system configuration

Background

- Some form of configuration is present in all control systems
- Contains one or more of:
  - Equipment (IT infrastructure, hardware devices)
  - Control system elements (drivers, logical devices, GUI components, ...)
  - Virtualization information (in case real equipment is unavailable)
- Supports various tasks during the control system lifecycle

Lifespan of data used by the control system (NOT experimental data)

- **Transient**: runtime data, in memory
- **Persistent**: data saved to secondary storage for later use (survives restarts)
- **Permanent**: static data – tied to a particular version of the control system

Requirements for configuration model

Content related

- Modeling physical reality
  - Space subdivision, locations
  - Hardware for executing the control system
  - Hardware to be controlled by the control system
- Control system software structure
  - High level software
  - Virtualization elements
- Connections between the above

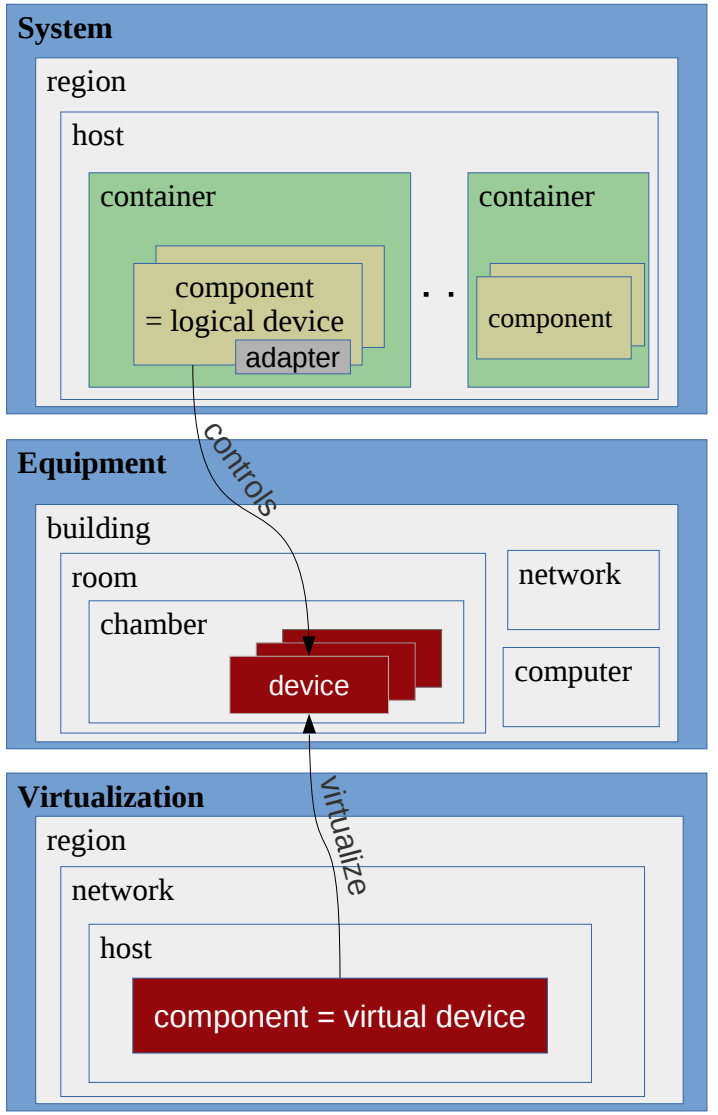
Usage/process related

- Identifiers (unique, comprehensive)
- Data extraction: convenient API
- Integrity/consistency checking
- Storage in text based, human readable format
  - Support for version control
  - Manual editing
- Custom graphical editor

Configuration model implementation

Mapping content related requirements

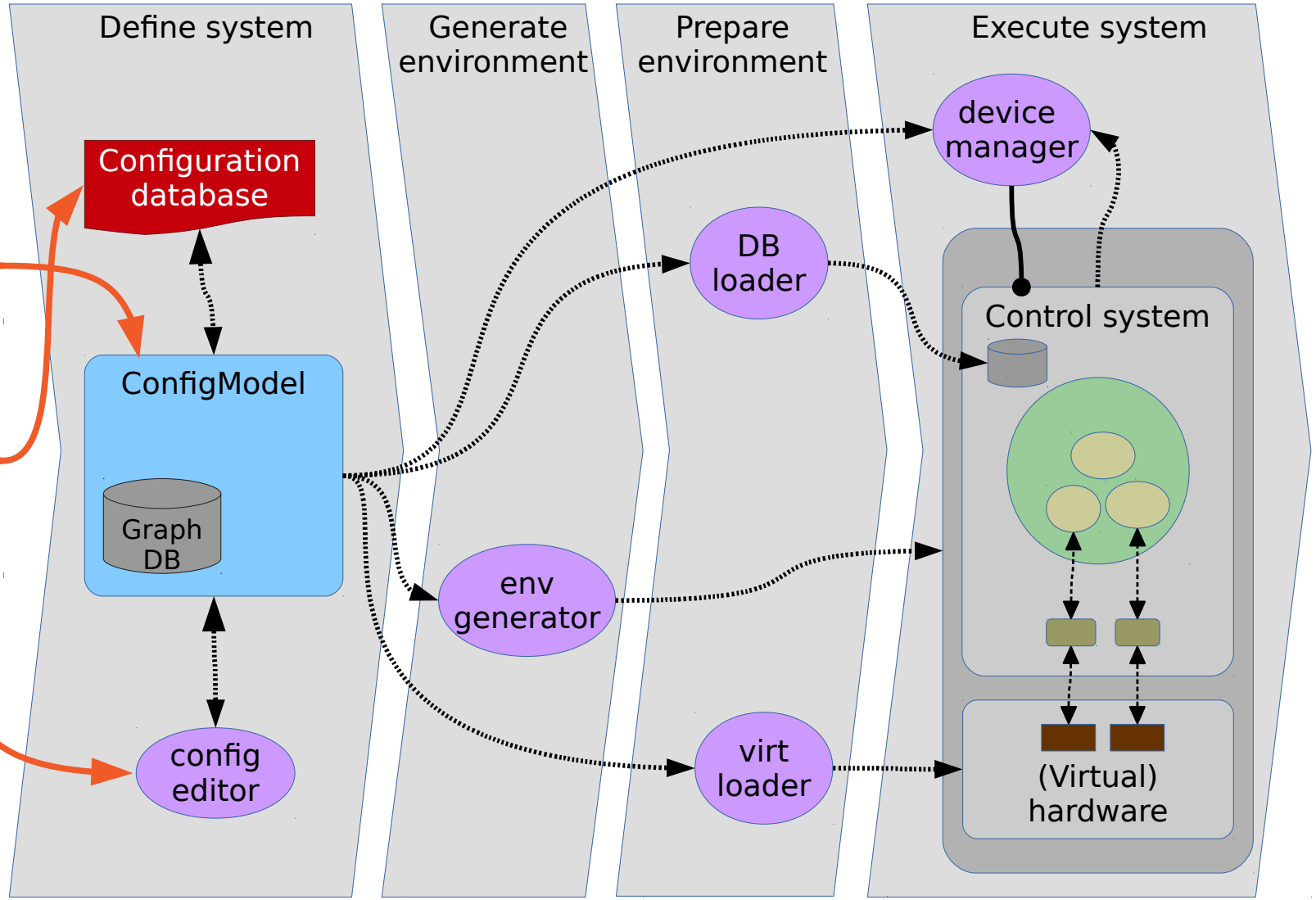
- Physical reality
  - Space subdivision, locations
  - Hardware for executing the control system
  - Hardware to be controlled
- Control system structure
  - High level software
  - Virtualization elements
- Representation of connections



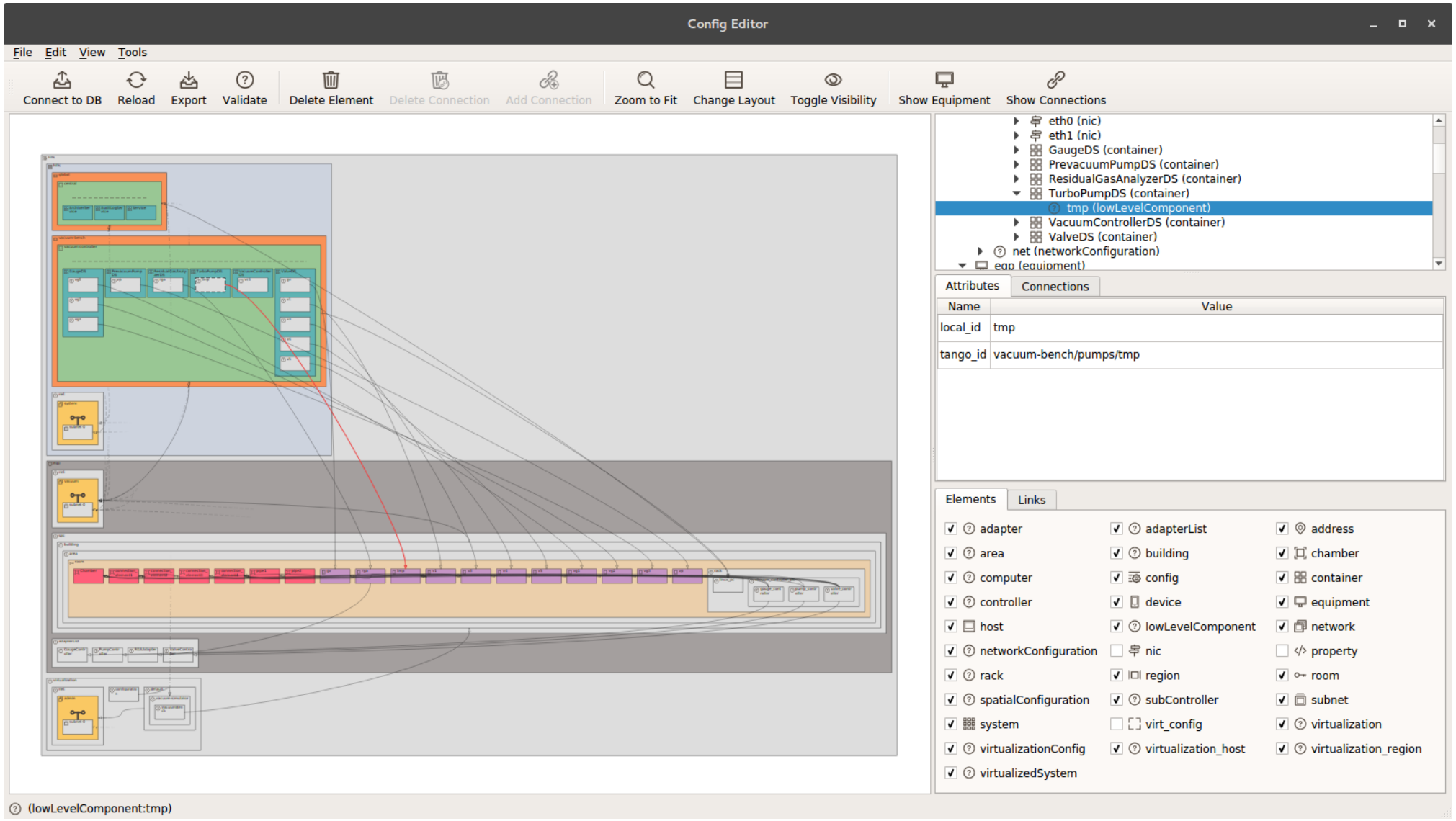
Configuration model usage

Usage related requirements

- Data extraction: convenient API
- Integrity/consistency checking
- Storage in text based, human readable format
  - Support for version control
  - Manual editing
- Custom graphical editor



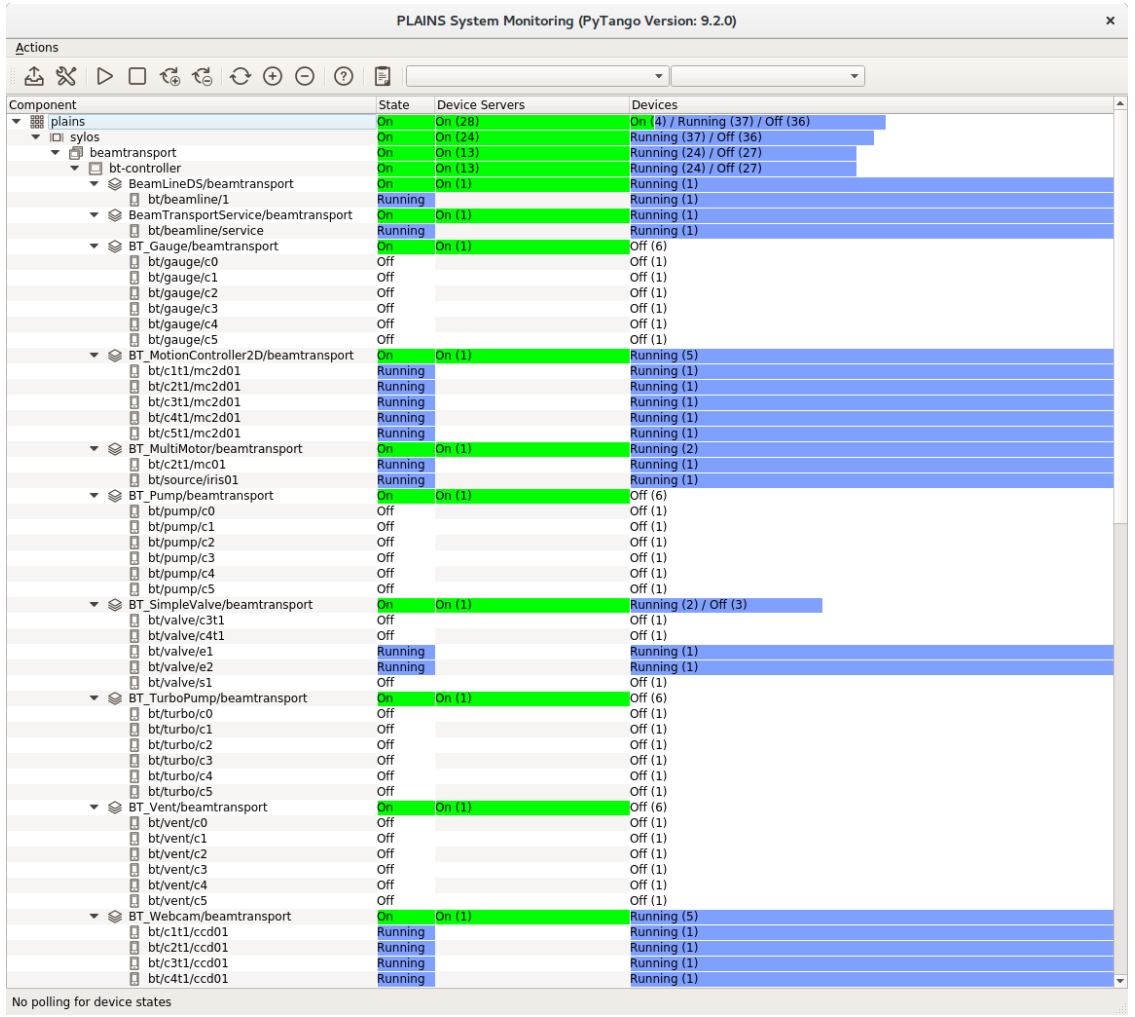
Toolkit – Config Editor



Toolkit – Device Manager

Device Manager

- Monitoring of a running system
- Managing of a running system
  - Start/stop devices (one-by-one or in groups)
  - Issue commands on devices
- API → GUI, CLI, custom managers
  - Full sequence control at system startup
- Compare the set of
  configured devices and running devices



Conclusions

- Configuration is part of any control system
- We tried to give a clear definition of what configuration is – based on lifespan of data
- Formulated requirements for configuration model
- Implemented a system that satisfies the requirements
- We have experience with moderate sized systems so far
  - Vacuum test station
  - Optical test station
  - HR laser system with virtual devices
- So far the system performs well, further development is expected

THANK YOU FOR YOUR ATTENTION!

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