ICALEPCS 2015
International Conference on Accelerator
& Large Experimental Physics
Control Systems
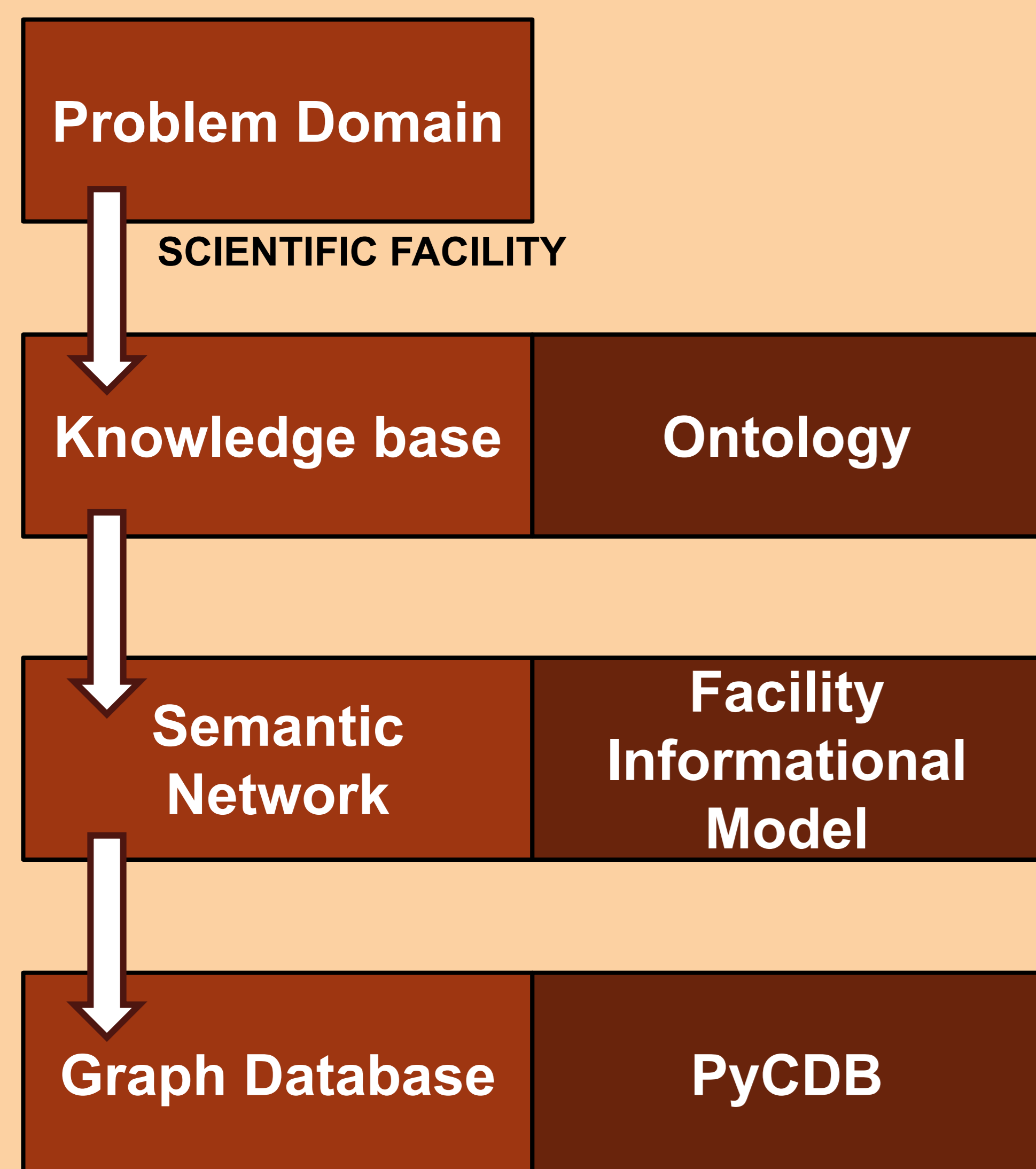
Application of PyCDB for K-500 Beam Transfer Line

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Facility Informational Model

- **Scientific Facility** – is a large and diverse system.
- It is necessary to collect and store all relevant information about subsystems and their relationships.
- This information is unstructured and non-formalized.
- **Knowledge Base** is essential idea for storing and handling such data.
- **Semantic Network** is a form of knowledge representation; it represents semantic relations between concepts.
- **Ontology** is used to name and define types, properties, and interrelationships of a problem domain.
- Semantic Network designed for a problem domain (a Scientific Facility) is a **Facility Informational Model.**
- **Graph database** is used to store and handle a Facility Informational Model.

K-500 is a transfer line for electrons and positrons from Injection Complex VEPP-5 to VEPP-4 and VEPP-2000 colliders. It is under construction in Budker Institute of Nuclear Physics, Novosibirsk, Russia.
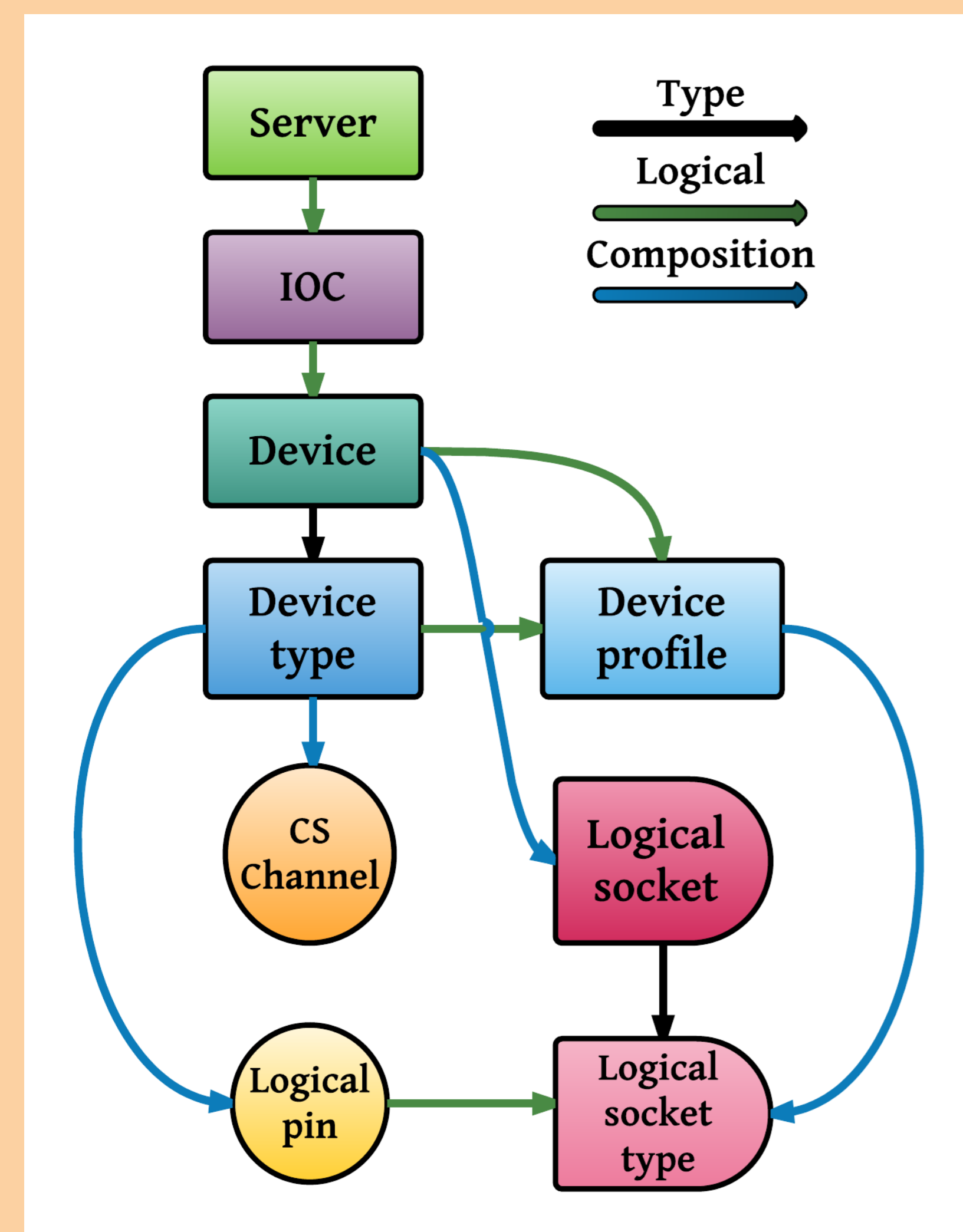
Device	Number
VSDC2	9
CEAC124	1
CGVI	5
CPKS8	1
CEAC208	1
CDAC20	1
CEAC124	1

Electronics for Power Supply Control of K-500 Transfer Line

| Power Supply	Number.
Dipole	1
DC Corrector	4
Pulsed Quad	10
Pulsed Corrector	4
Pulsed Magnet	1

Power Supplies of K-500 Transfer Line

Part of K-500 Facility Informational Model (Control System)

- **Server** is a hardware server hosting EPICS IOC.
- **Device** is any power supply, electronic device or even magnet.
- **Device Type** defines a set of associated **control system (CS) channels**, **logical pins,** and associated **Device Profile**
- **Logical Pins** are a representation of device's physical pins.
- **Logical Socket** is an instance of Logical Socket Type.
- **Logical Socket Type** combines Logical Pins together for grouped connection with another Device.
- **Device Profile** defines a set of Logical Sockets for specific Device.

The conceptual data scheme
for K-500's Power Supply System.

Data model example
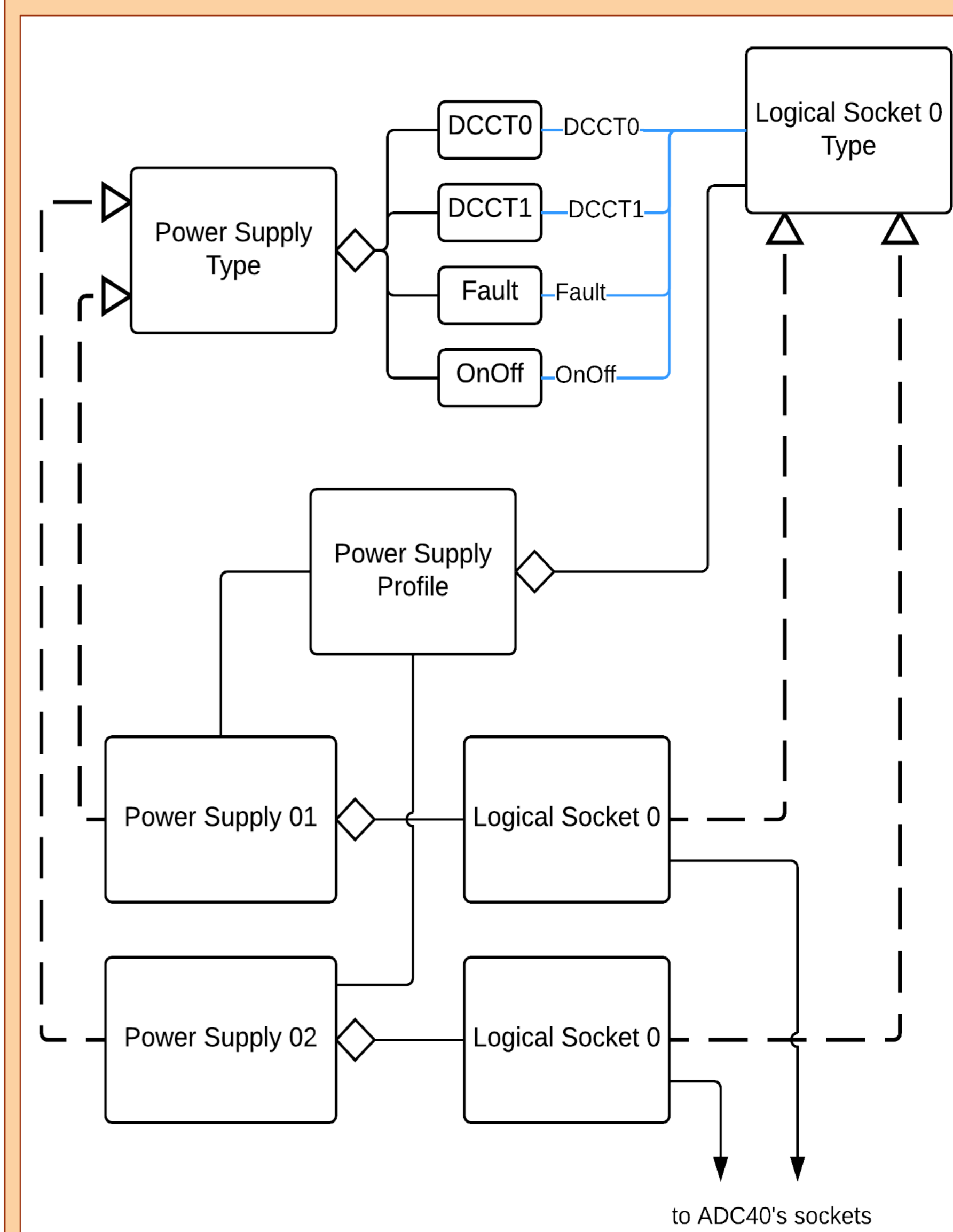
- **Power Supply Type** represents power supply of certain type; it has four Logical Pins: **DCCT0**, **DCCT1**, **Fault** and **OnOff**.
- **Power Supply 01** and **Power Supply 02** are instances of Power Supply Type.
- **Logical Socket 0 Type** defines socket type which has four "wires" for connection with ADC40 controller.
- **Power Supply Profile** is associated with Logical Socket 0 Type and applied to both power supplies. Therefore each power supply has Logical Socket 0 and able to be connected with ADC40 controller

Visual Graph Editor for PyCDB
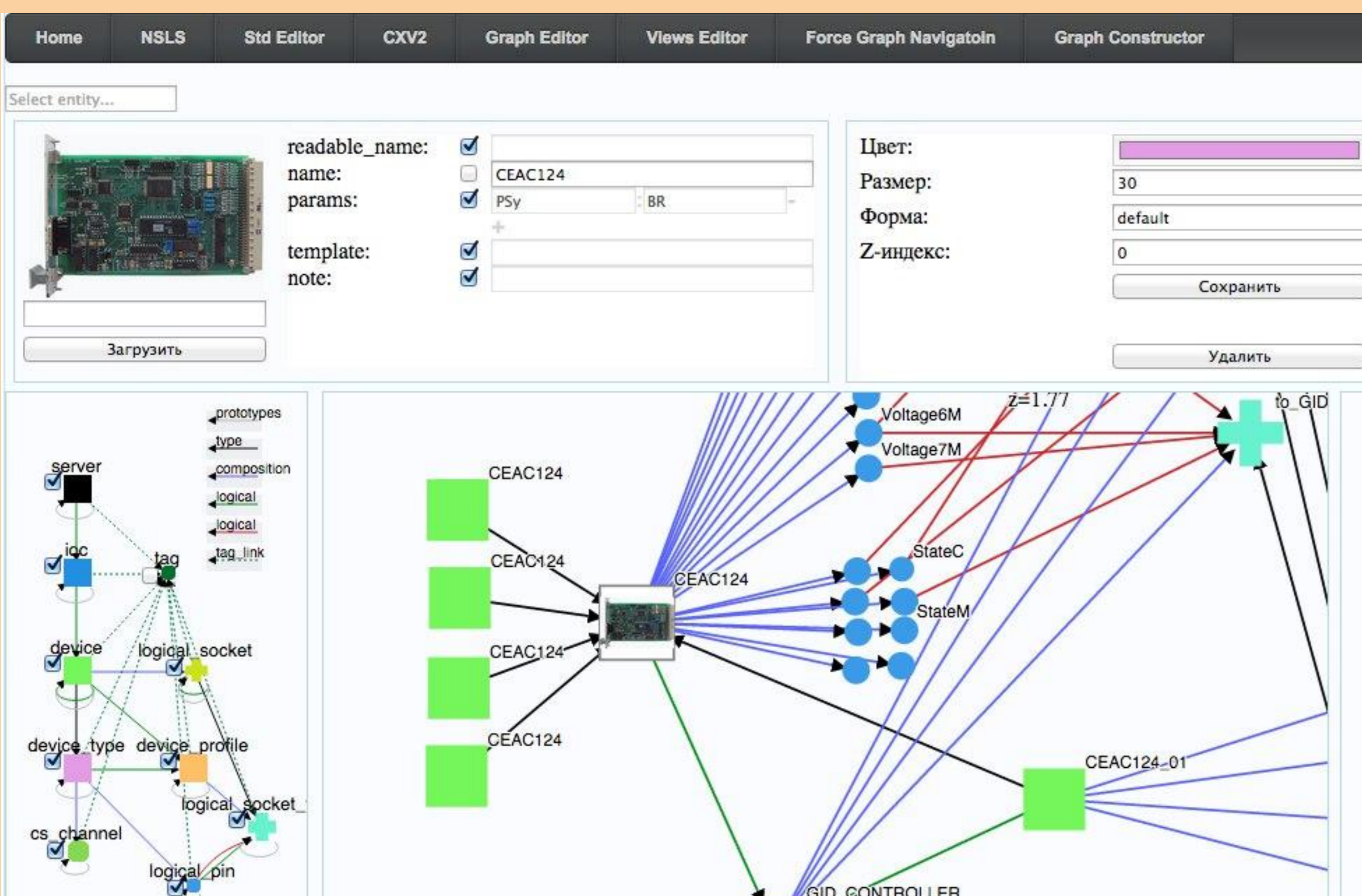
The Graph Editor's main window
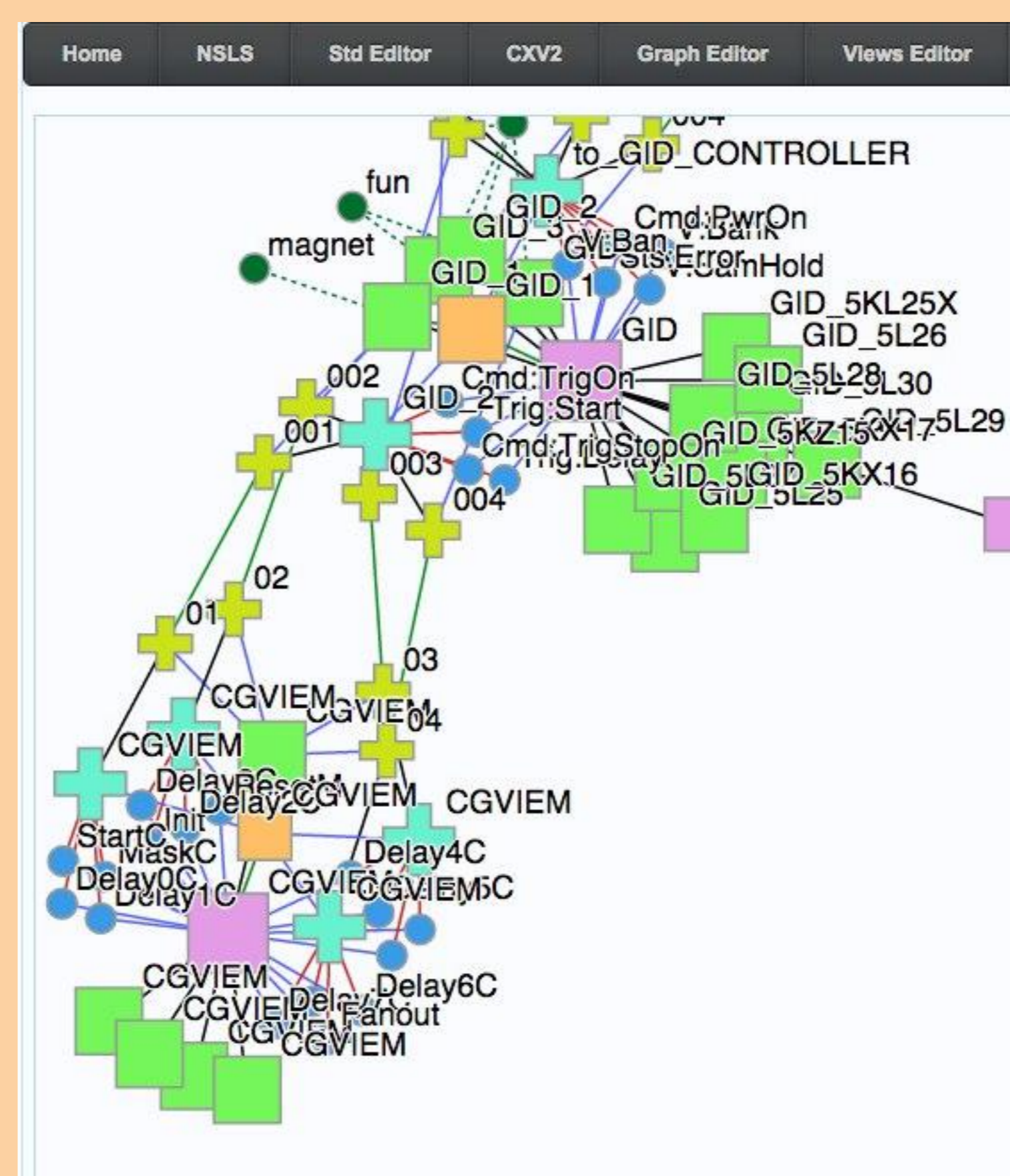
The experimental force graph layout and navigation