VEPP-5 Injection Complex control system base software upgrade
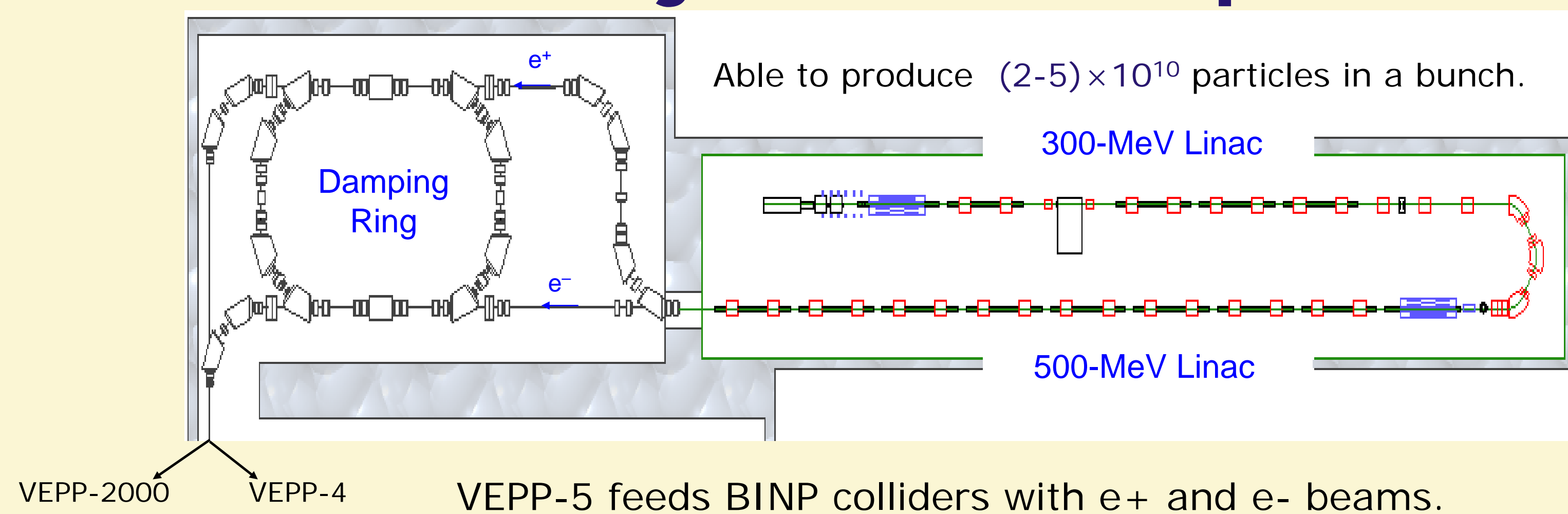
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CX framework

- 3-layer standard model
- Developed in BINP since late 1990s
- Runs on Linux and *NIX
- Supported hardware: CAMAC, VME, PCI/cPCI, CAN, RS485, Ethernet
- Used at VEPP-5, LIA-2 and several smaller facilities
- In 2015—2018 was upgraded to v4

VEPP-5 Injection Complex

Able to produce $(2-5)\times10^{10}$ particles in a bunch.

e+
Damping Ring
300-MeV Linac
e-
500-MeV Linac

VEPP-2000   VEPP-4

VEPP-5 feeds BINP colliders with e+ and e- beams.

CXv4 new features

- Highly modular; network communication separated from client and server cores
  - Clientside data access plugins.
  - Serverside data access frontends.
  - Server itself is a library.
  - Screen instruments in GUI apps are plugins.
  - Even config file readers are plugins.

- Unified API for remote and inter-driver comm.

- Data types (scalar, vector): integer 8/16/32/64-bit, float 32/64-bit, char/text; automatic data conversion.
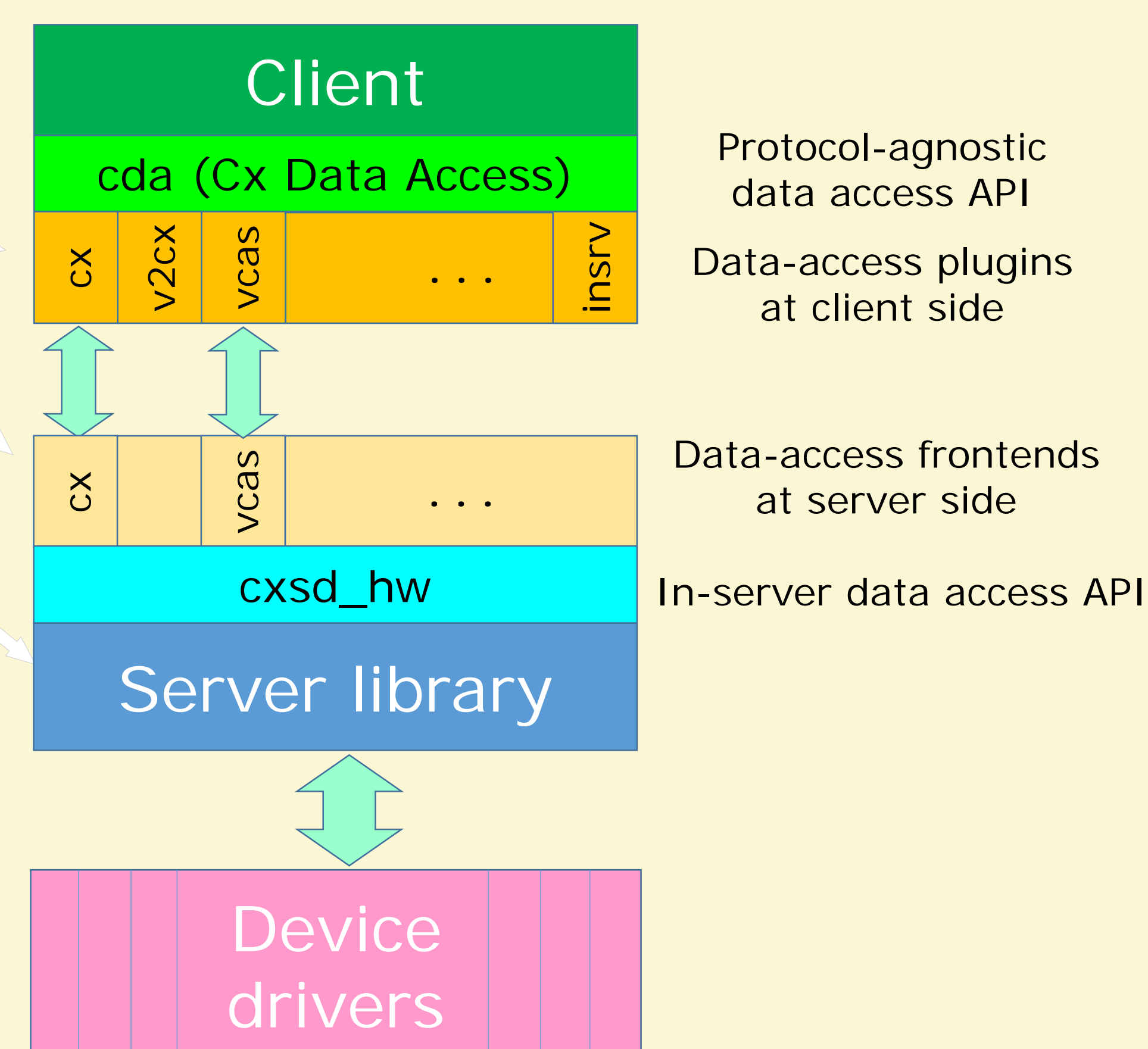
- High-performance Python binding simplifies development of machine monitoring and manipulation tools.

- Hostnameless addressing, channel aliasing.

- Configurable via plaintext files, suitable for both manual programming (via M4) and for generation from DB.

- VEPP-5-specific DB with high-level config information, machine mode manipulation system, automatic control and data analysis programs.

CXv4 modular structure

Client
cda (Cx Data Access)
cx | v2cx | vcas | ... | insrv

Protocol-agnostic data access API
Data-access plugins at client side

cx | vcas | ...

Data-access frontends at server side

cxsd_hw

In-server data access API

Server library

Device drivers

"insrv" is a null-link plugin, providing CDA access to server's channels from inside of the server process

Network

cx | data-access frontends
cxsd_hw
insrv | Server library
cda | Drv1 | Drv2

Drivers can access channels from neighbor drivers like clients.