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Friedrich Schiller University

HELIPORT Ecosystem and Use Cases @ HI-Jena

Chien-Li Lee and Alexander Kessler

I. Polaris Laser @ Hi Jena

II. HELIPORT + SciCat + UI Plug-in

III. User Manual

POLARIS-Petawatt Optical Laser Amplifier for Radiation Intensive ExperimentS

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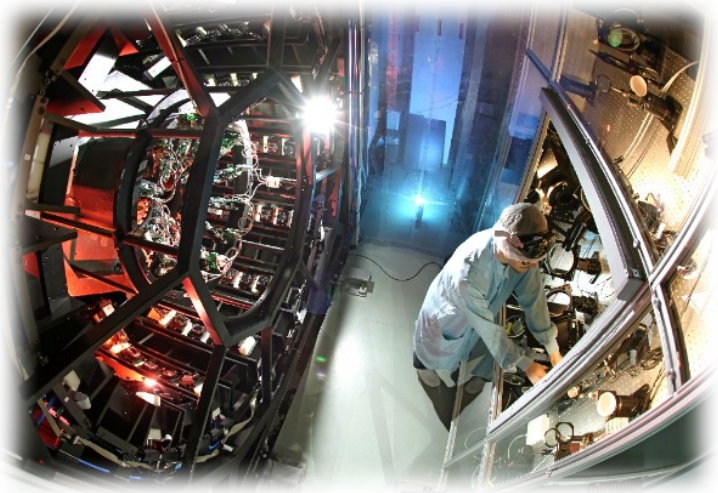
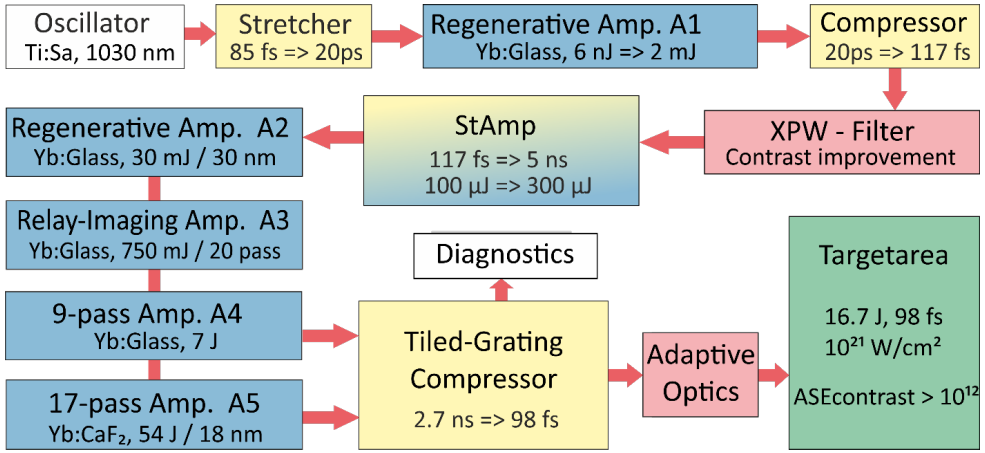
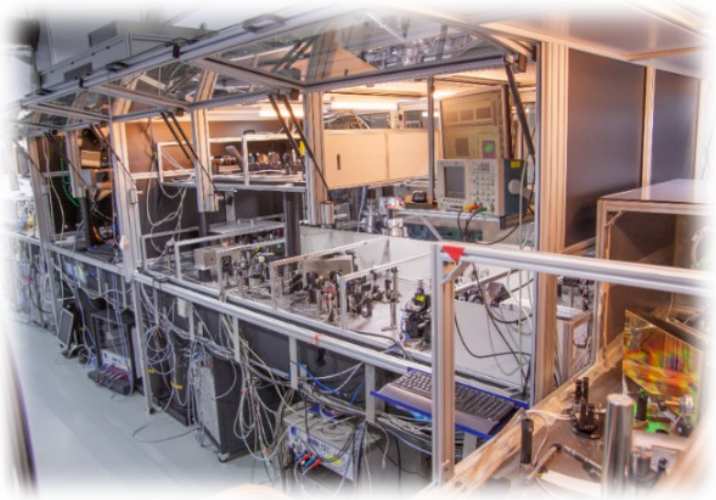
- Worldwide unique fully-diode pumped, PW-class laser facility
- Experimental program for high-energy particle acceleration
- Test-bed for development and implementation of novel laser technologies and improvements



System overview



- Pulse energy: E_L > 54 J (17 J on target)
- Pulse duration: t_L ~ 100 fs
- Peak intensity: I_L > 10^{21} W/cm²
- Repetition rate: 1/50 Hz, toward 1 Hz using cryogenic cooling
- Temporal intensity contrast: ASE-level < 2.2×10^{-13}
- Plasma-mirror option
- SHG-option for ultrahigh contrast



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POLARIS

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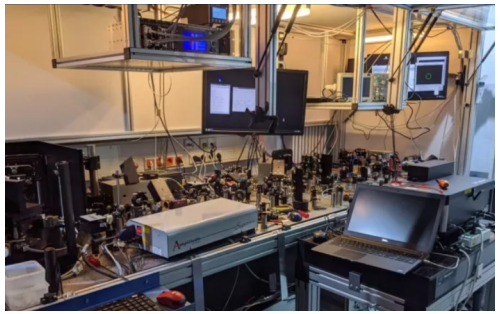
Current developments & fields of research:

- Improvement of beam profile with adaptive optics system in final amplifier
- Reduction of coherent noise to improve the rising edge temporal contrast
- Installation of a 10-fs NOPCPA target probing system



Why SciCat?

- MongoDB(non-relational DB): flexible document schemas
- Open source, BSD-3 clause license
- Python client library (pyscicat): used by LabView and HELIPORT

Coming soon:

- Combine Two Laser Systems in Target Area: JETi200 & POLARIS

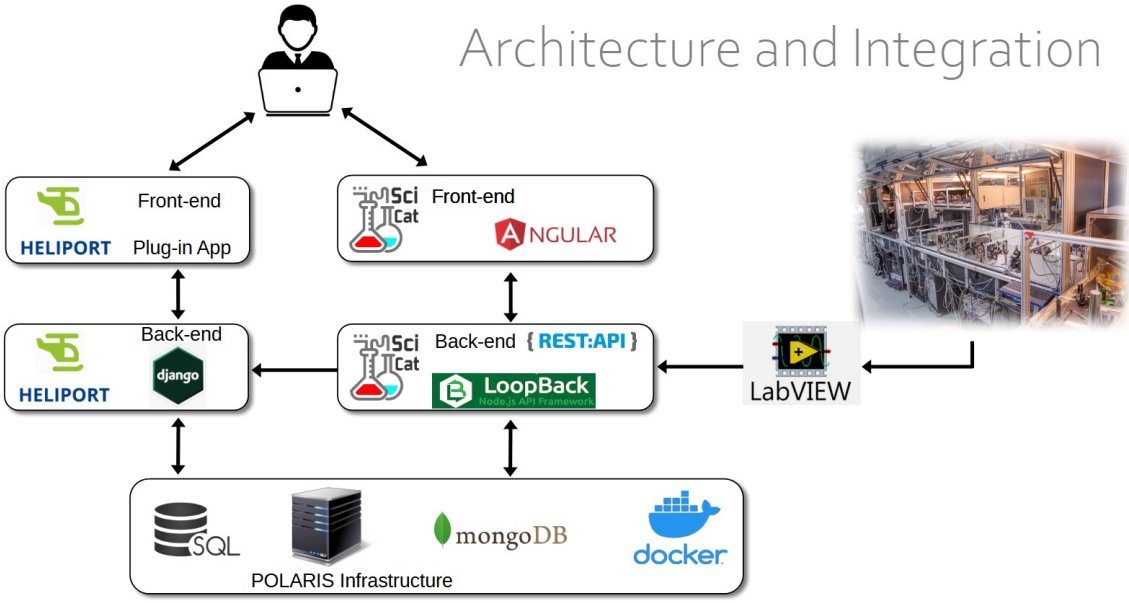
Software Challenges:

- LabView => Find a Control System (Tango or EPICS)
- Make Data FAIRer => HELIPORT (2022)
- Storage (Repository in PCs) => SciCat with MongoDB

New Installations:

- HELIPORT v.0.5 was installed on Polaris server on 15.5.2023
- SciCat was installed on 09.01.2023

Architecture and Integration



Connect to SSH Files/Directories

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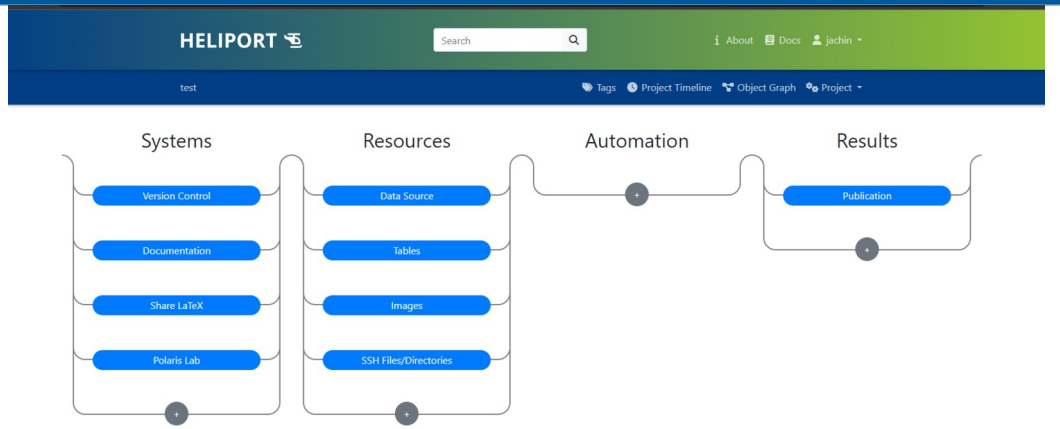
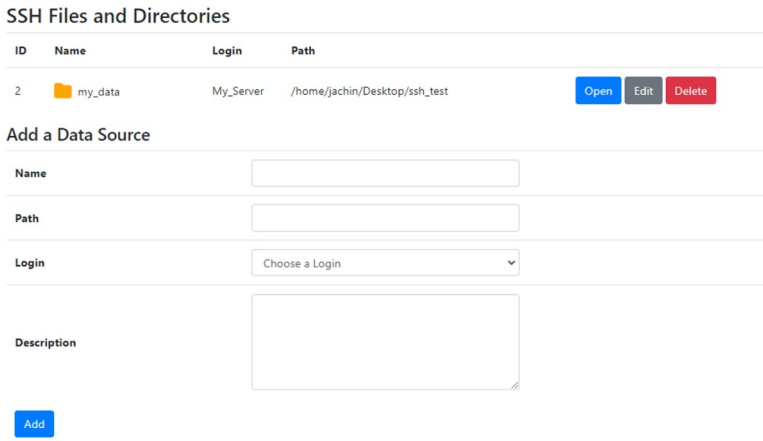
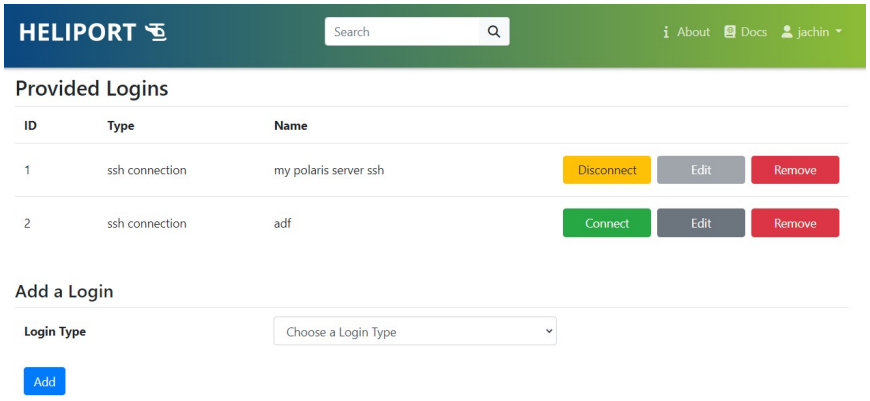
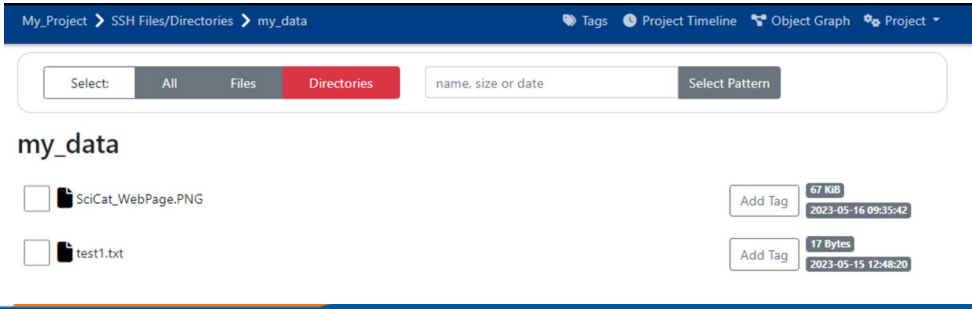
Connect Data in HELIPORT

- Create a log-in in your HELIPORT
- add a data source in “SSH Files/Directories”
- SSH Files/Directories
- Download the file
- Run codes by celery job (in the future)









Connect to Dtatsets in SciCat

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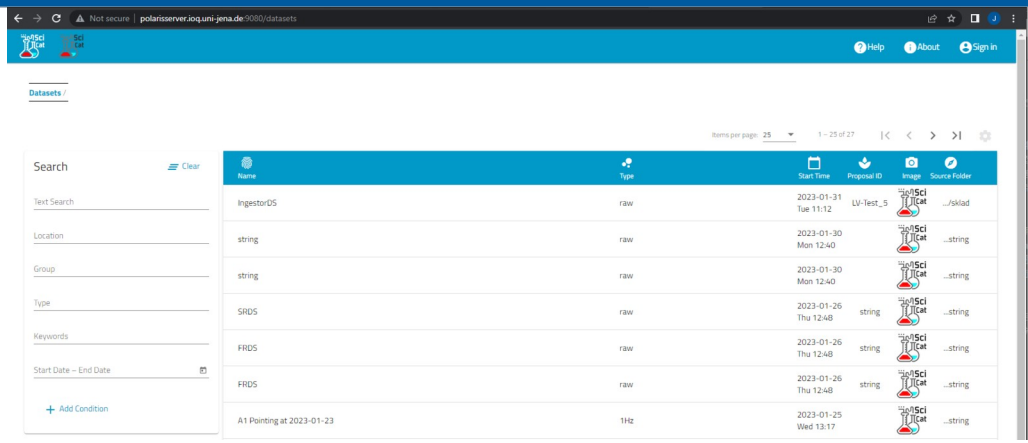
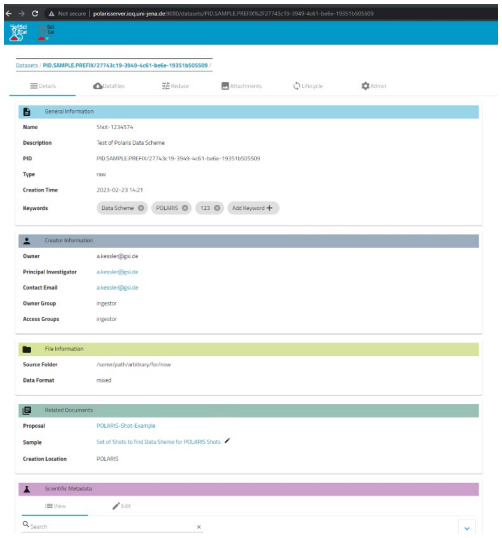
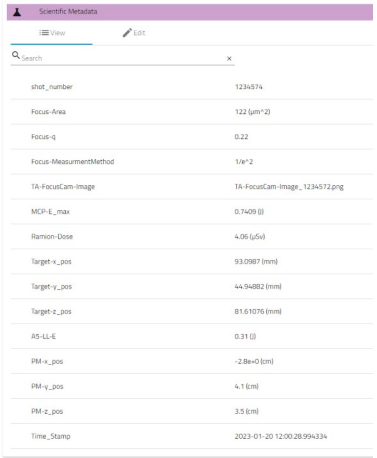
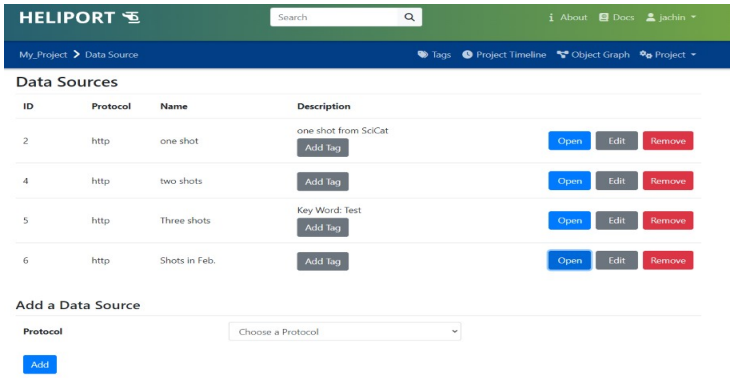
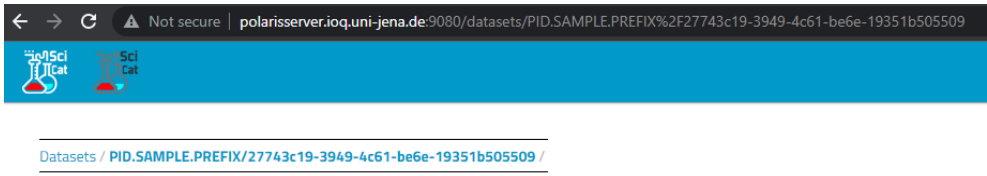
- Meta-data Catalog System provides a Mano database, a UI with a powerful searching capability , REST APIs and more.
- LabView program will collect data/metadata and call Pyscicat (Python library) to write them into SciCat's database via REST APIs.
- Every shot will be provided with a persistent ID and unique URL.
- This URL can be manually stored within the HELIPORT Project





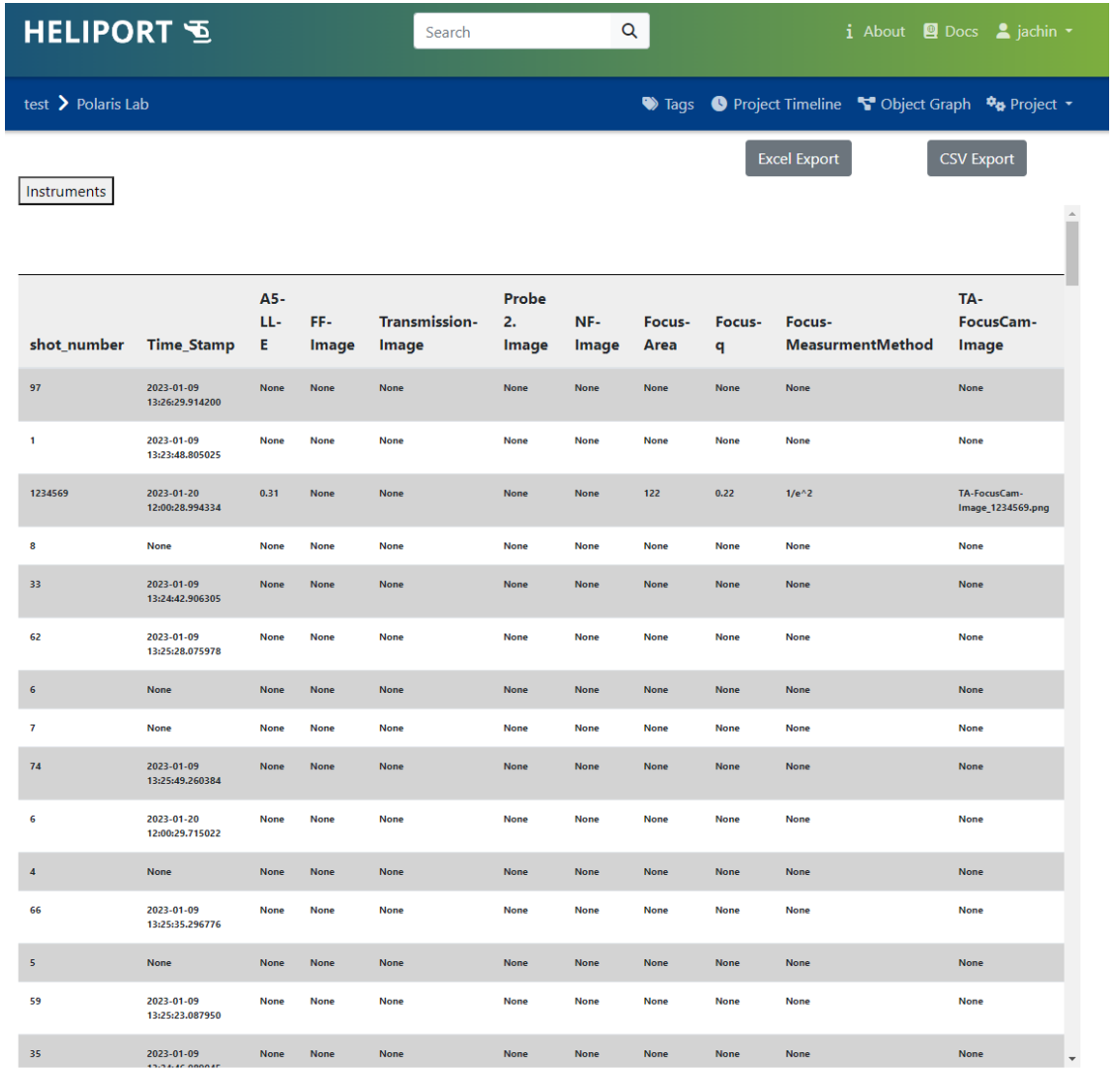






UI Plug-in in HELIPORT

- We developed an plug-in UI for our POLARIS users.
- Access under “System”.
- Fetch data from SciCat and display it in a table.
- Functions: export in Excel and CSV file, hide/show columns.



shot_number	Time_Stamp	A5-LL-E	FF-Image	Transmission-Image	Probe 2. Image	NF-Image	Focus-Area	Focus-q	Focus-MeasurmentMethod	TA-FocusCam-Image
97	2023-01-09 13:26:29.914200	None	None	None	None	None	None	None	None	None
1	2023-01-09 13:23:48.805025	None	None	None	None	None	None	None	None	None
1234569	2023-01-20 12:00:28.994334	0.31	None	None	None	None	122	0.22	1/e^2	TA-FocusCam-Image_1234569.png
8	None	None	None	None	None	None	None	None	None	None
33	2023-01-09 13:24:42.906305	None	None	None	None	None	None	None	None	None
62	2023-01-09 13:25:28.075978	None	None	None	None	None	None	None	None	None
6	None	None	None	None	None	None	None	None	None	None
7	None	None	None	None	None	None	None	None	None	None
74	2023-01-09 13:25:49.260384	None	None	None	None	None	None	None	None	None
6	2023-01-20 12:00:29.715022	None	None	None	None	None	None	None	None	None
4	None	None	None	None	None	None	None	None	None	None
66	2023-01-09 13:25:35.296776	None	None	None	None	None	None	None	None	None
5	None	None	None	None	None	None	None	None	None	None
59	2023-01-09 13:25:23.087950	None	None	None	None	None	None	None	None	None
35	2023-01-09	None	None	None	None	None	None	None	None	None

User Manual

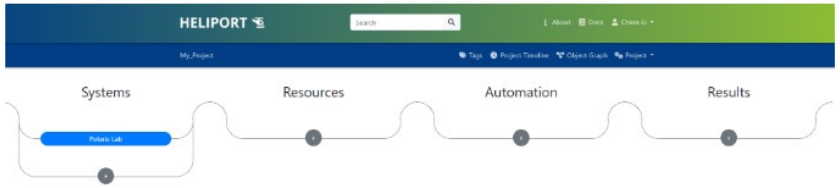
- We are currently writing the User Manual or Instruction for Polaris users.
- Step by step guidance for new users.

Official HELIPORT Documentation: Link

From above link, you can visit the official HELIPORT documentation and find guides for HELIPORT users! As this documentation will be completed in the future, for the time being, I would make a simple user guide for HELIPORT that is installed in Polaris Lab.

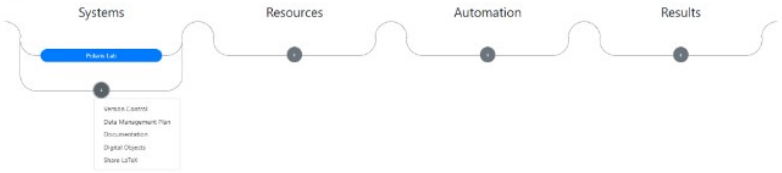
▸ How to get started?

▾ User Interface (Project Graph)



In the page of Project Graph, there are "Systems", "Resources", "Automation" and "Results".

▾ Systems



▾ Polaris Lab

1. In the systems, there is a plug-in app called "Polaris Lab". This is only relevant to the experiments performed in polaris lab.

Benefits and Work in future

Benefits:

- Users can retrieve their experimental data even after many years
- Users can view their data in “table-like” displays
- With the help of HELIPORT and SciCat, the data are now one step further towards FAIR

Work in future:

- Complete user manual
- Optimize plug-in app
- Automatic analysis and display results
- Integration of HELIPORT to new CS
- Make datasets AI-ready

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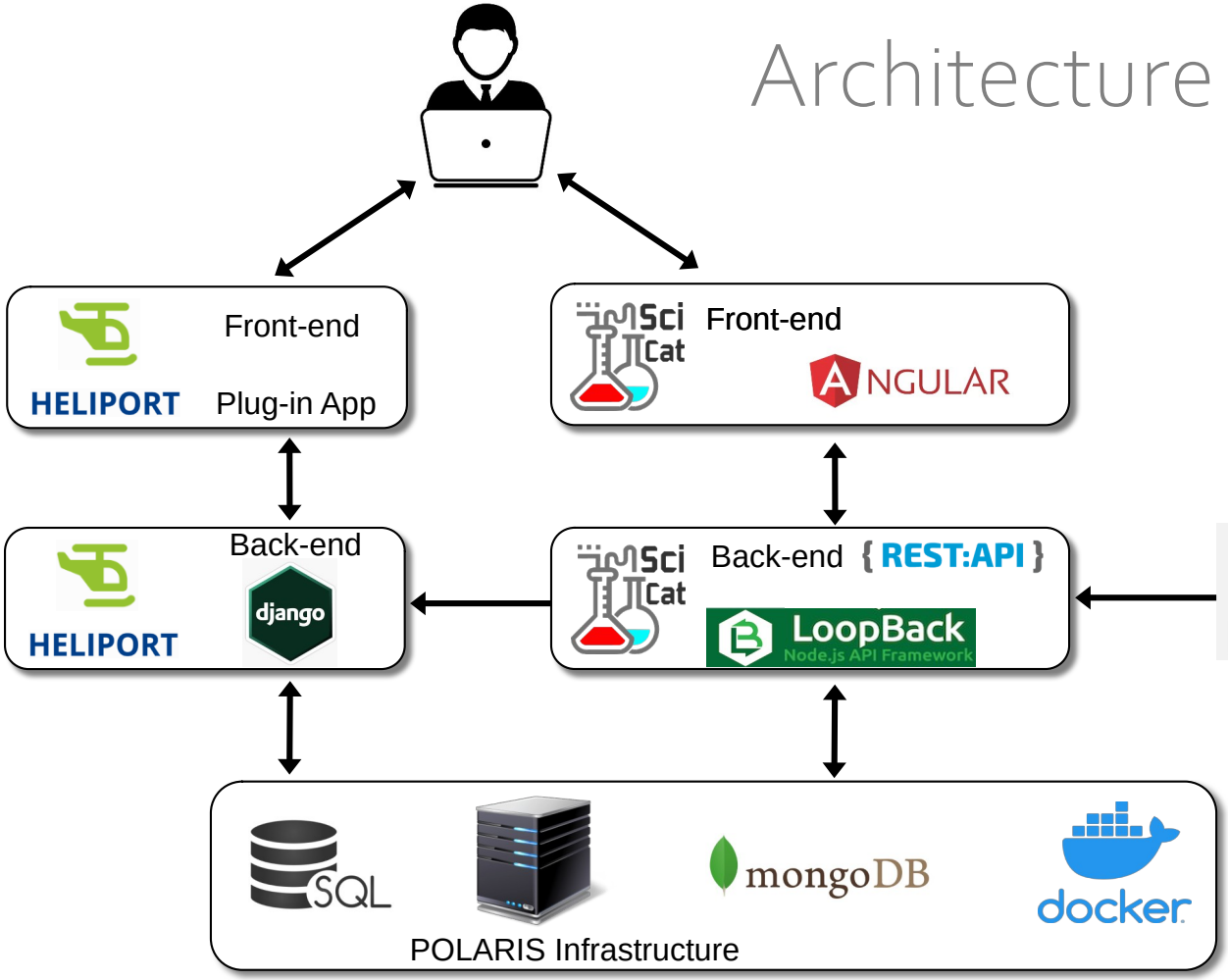
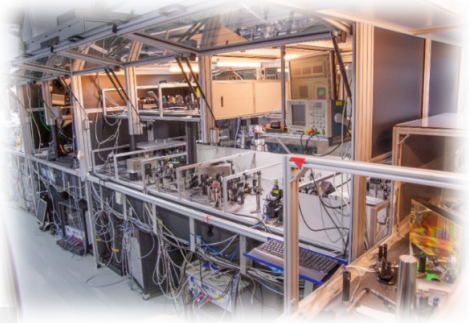
THANK YOU FOR YOUR ATTENTION!

Architecture and Integration