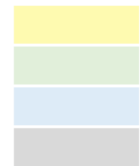


**EuroHPC**  
Joint Undertaking

## Federation Platform



## EFP Workflows

11<sup>th</sup> June 2026

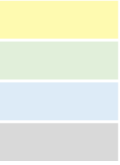
Martin Golasowski

IT4Innovations National Supercomputing Center, Czechia

<https://my-eurohpc.eu>



# The EuroHPC Federation Platform (EFP)



*"A one-stop-shop for accessing and utilizing EuroHPC systems and services"*

A platform and federation framework which provides a **streamlined, single point of onboarding** and via which user can **access all systems and services** available to them in the EuroHPC ecosystem.

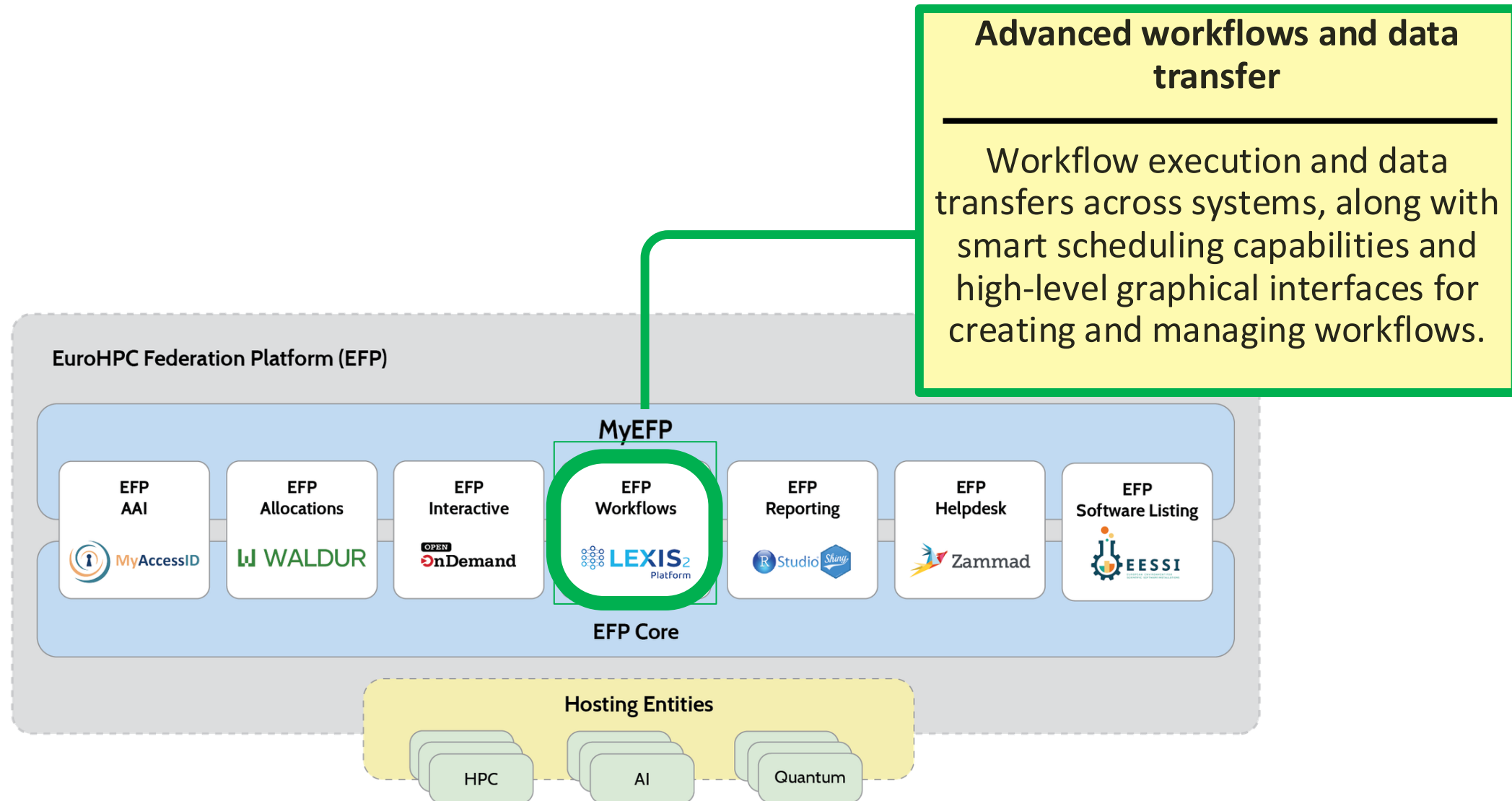
**Direct access | Interactive interfaces | Programmatic APIs | Unified software stack**



## Federation Platform

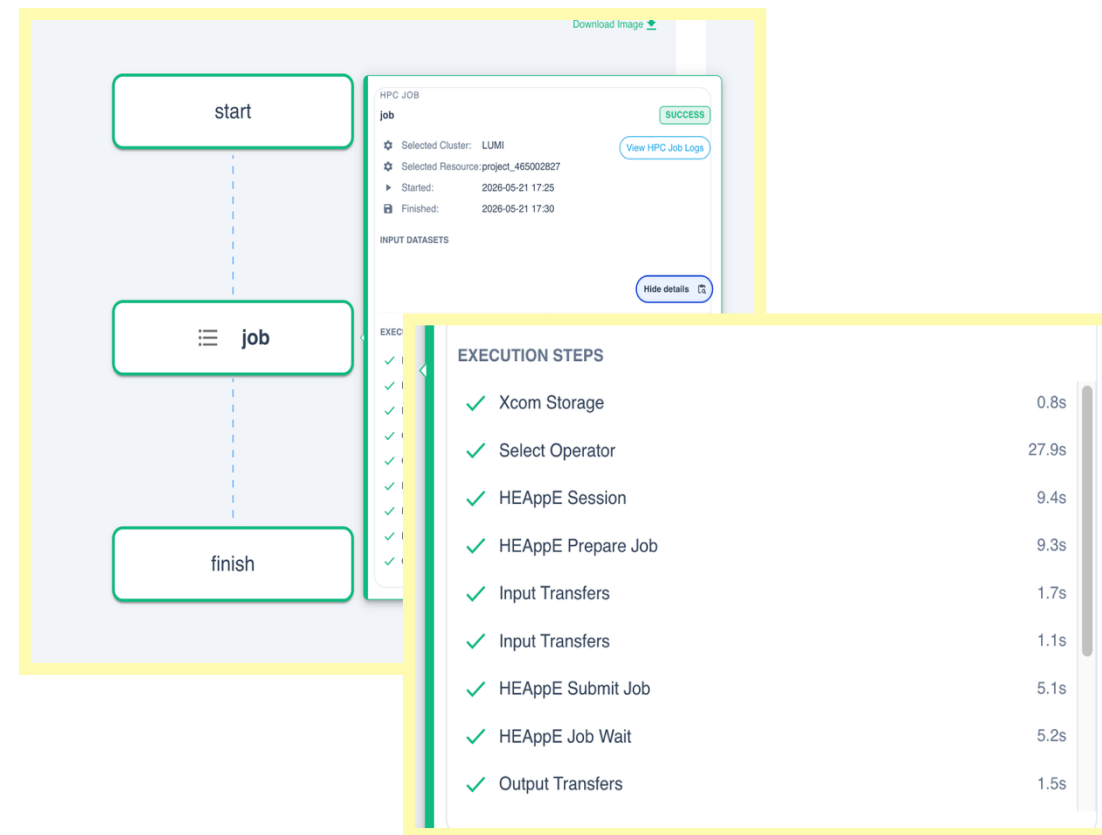


# EFP Architecture



# EFP Workflows – a way for Easy and Safe Supercomputing

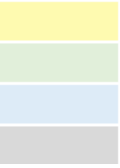
- Run your **job scripts, containers** or use a **local workflow** (e.g. CWL, HyperQueue) from a web interface
- Use **your EuroHPC allocations** across multiple systems from a single place
- **Automated data staging** to job's execution directory and straightforward dataset management
- Define and run **custom workflows** across multiple systems using **visual workflow builder** and **YAML syntax**
- Python **CLI** and **API** access included



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[www.lexis.tech](http://www.lexis.tech)



# How to run a simple HPC workflow



1.Upload your input data

2.Create your jobscript or upload a container

3.Create workflow

4.Run it

5.View results and logs

Prepare job  
directory



Stage input data



Submit an HPC  
job



Wait until  
finished



Download result

Simple HPC workflow steps



# Step 1a. Upload input dataset with metadata

The screenshot displays the EFP Workflows web interface. The left sidebar contains a menu with options: Dashboard, Data Management, Data Sets, Containers, Job Scripts, Remote File Manager, Workflows, Projects, and Documentation. The main content area shows the 'Upload Dataset' step for a project named 'ehpc-dev-d'. A progress bar indicates 78% completion. A modal window titled 'File Upload' is overlaid, showing the upload progress and a log of events.

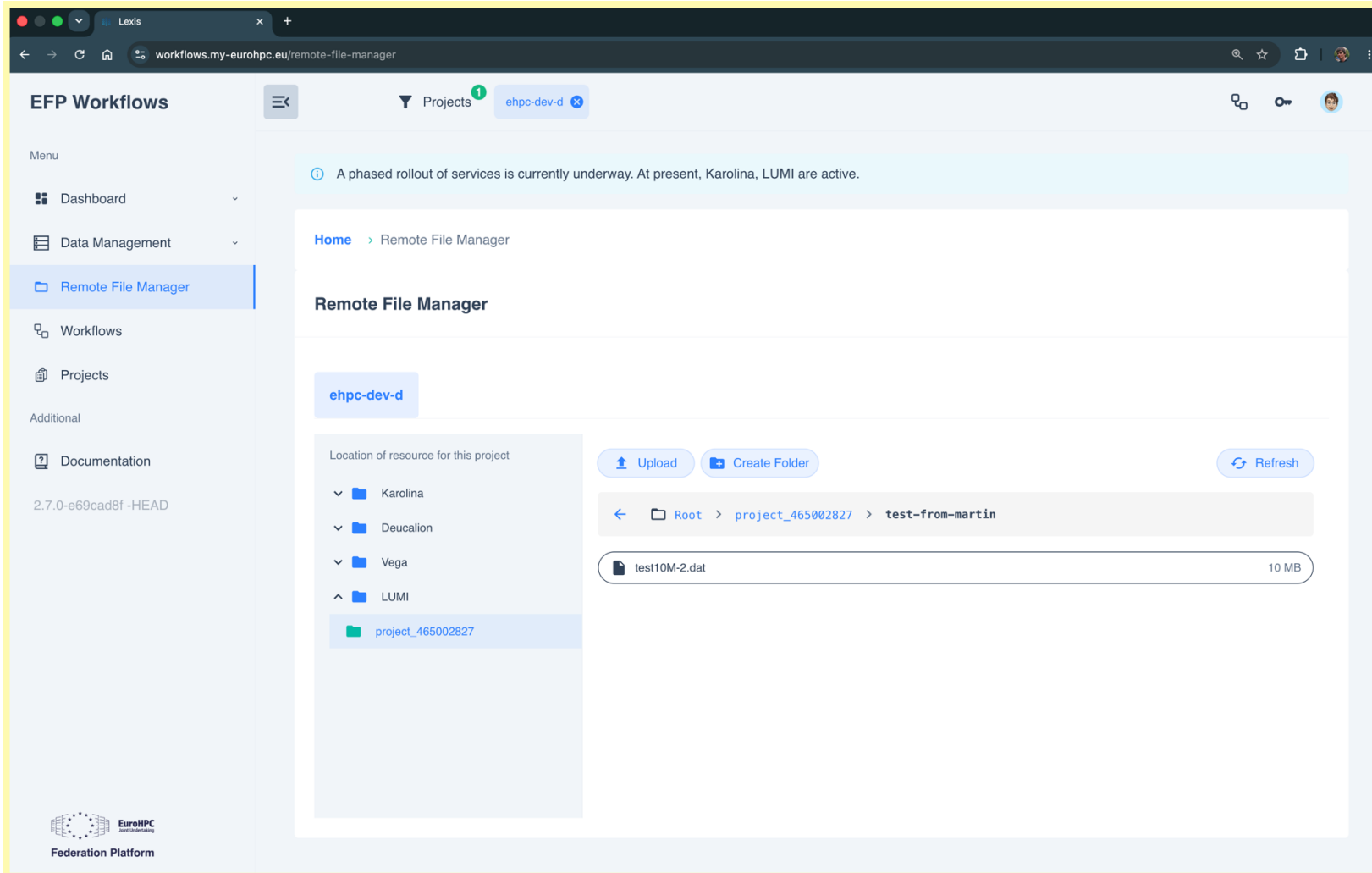
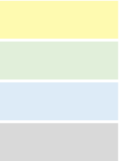
**File Upload Modal:**

- Uploaded: 7.77 MB / 10 MB
- Speed: 2.35 MB/s
- Time Remaining: 1s
- Log:
  - [2026-06-09 18:29:51] 🚀 Starting stream upload: test10M-2.dat
  - [2026-06-09 18:29:51] 📊 Total size: 10 MB
  - [2026-06-09 18:29:52] 📡 Upload endpoint: https://data.it4i.wf.my-eurohpc.eu/api/ddiapi/v2/transfer/upload
  - [2026-06-09 18:29:52] 🚀 Starting standard stream upload...

**Dataset Details (Test10MB):**

| Attribute          | Value                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------|
| Relative Path      | /IT4I/LEXIS/resc5a7284b7cb7bda1f8a3103035c99292/project/72079f9c-6420-11f1-8efb-e2bb3f2b926a |
| Last Modified Date | 2026-06-09 18:29:54                                                                          |
| Creation Date      | 2026-06-09 18:29:54                                                                          |
| Location           | IT4I                                                                                         |
| Source Name        | eu-26-41                                                                                     |
| Source Hash        | resc5a7284b7cb7bda1f8a3103035c99292                                                          |
| Location Name      | IT4I iRODS                                                                                   |
| Access             | project                                                                                      |

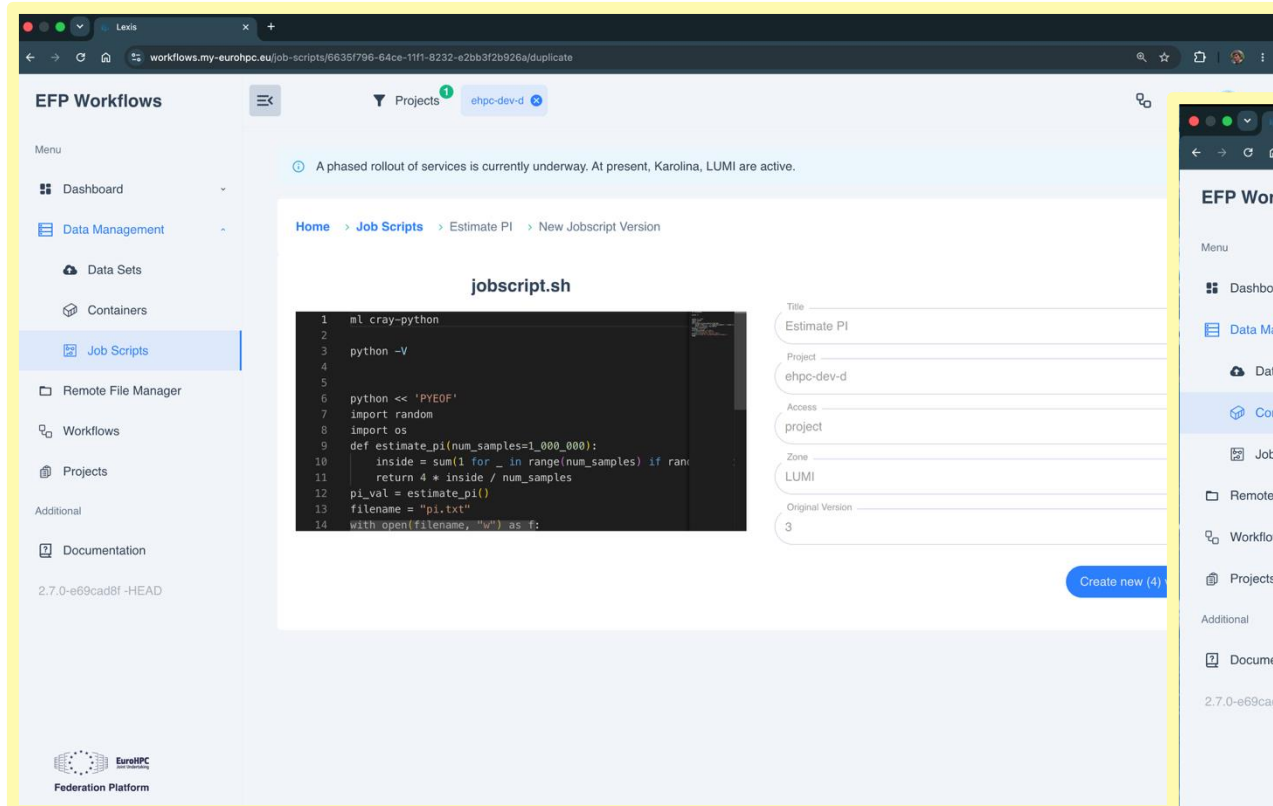
# Step 1b. Upload data directly to HPC cluster



- Use direct upload and download to the HPC cluster
- Access to a directory assigned to the allocation (scratch) via web UI
- Based on HTTP/2 streaming API
- Bulk data copy between clusters included



# Step 2. Create a job script or upload a container

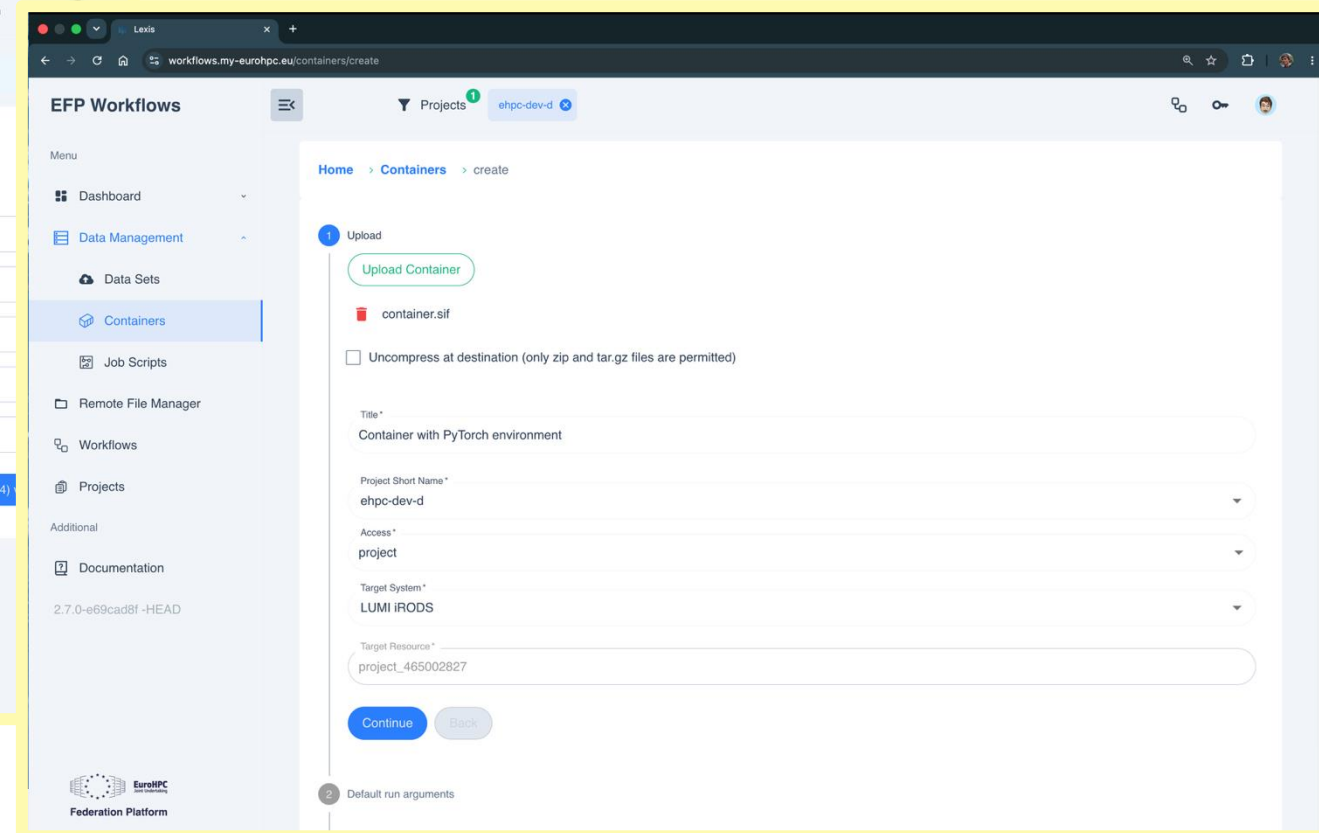


The screenshot shows the 'New Jobscrip Version' page in the EFP Workflows interface. The left sidebar contains a menu with options: Dashboard, Data Management, Data Sets, Containers, Job Scripts (selected), Remote File Manager, Workflows, Projects, and Documentation. The main content area has a breadcrumb trail: Home > Job Scripts > Estimate PI > New Jobscrip Version. A message at the top states: 'A phased rollout of services is currently underway. At present, Karolina, LUMI are active.' Below this, a code editor displays a shell script named 'jobscrip.sh' with the following content:

```
1 #!/bin/bash
2
3 python -V
4
5 python << 'PYEOF'
6 import random
7 import os
8
9 def estimate_pi(num_samples=1_000_000):
10     inside = sum(1 for _ in range(num_samples) if ran
11         return 4 * inside / num_samples
12 pi_val = estimate_pi()
13 filename = "pi.txt"
14 with open(filename, "w") as f:
```

On the right side of the code editor, there are input fields for: Title (Estimate PI), Project (ehpc-dev-d), Access (project), Zone (LUMI), and Original Version (3). A blue button labeled 'Create new (4)' is at the bottom right.

Custom job script

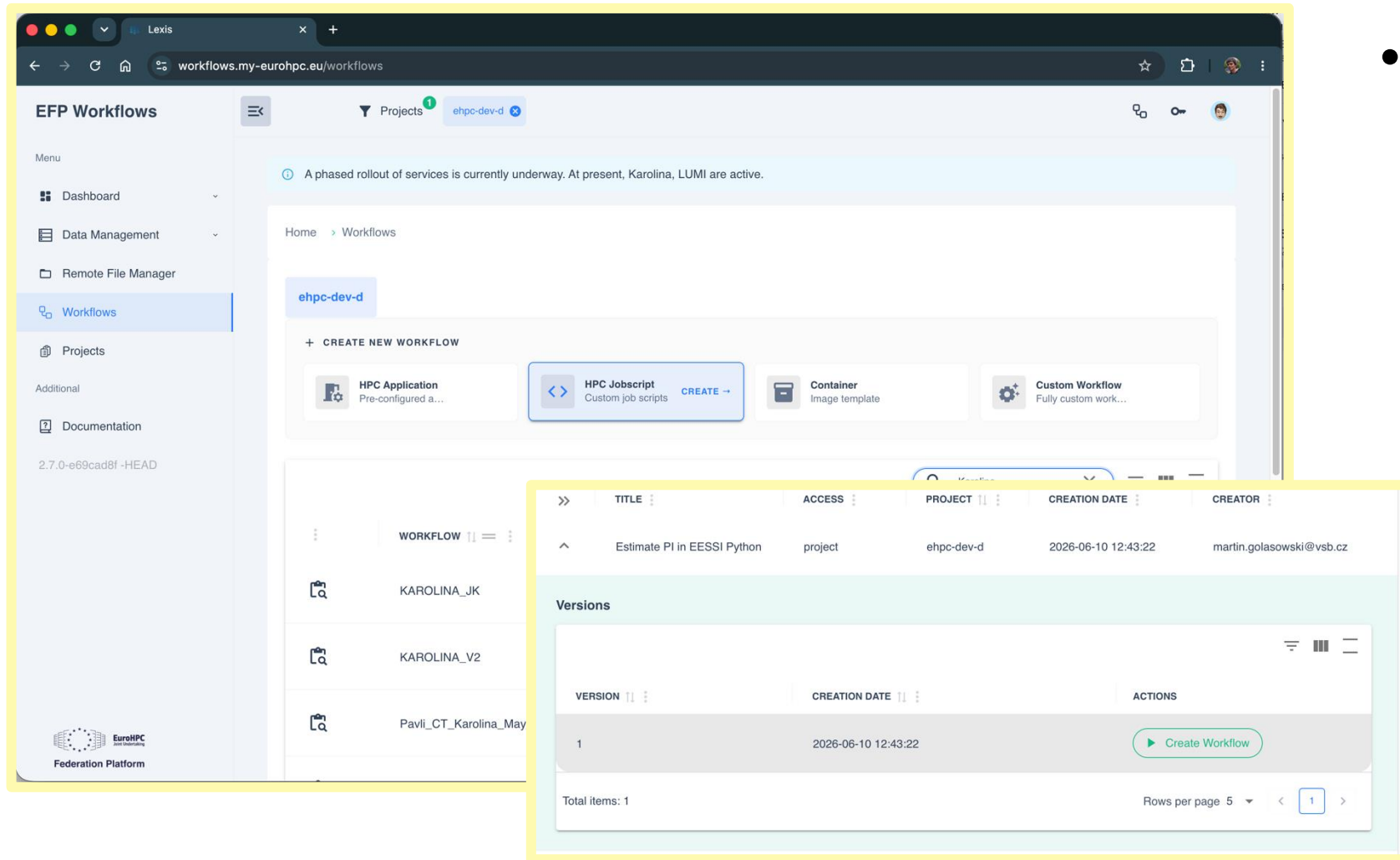


The screenshot shows the 'create' page for uploading a container in the EFP Workflows interface. The left sidebar is identical to the previous screenshot, with 'Containers' selected in the menu. The main content area has a breadcrumb trail: Home > Containers > create. A message at the top states: 'A phased rollout of services is currently underway. At present, Karolina, LUMI are active.' Below this, a section titled '1 Upload' contains an 'Upload Container' button and a file input field with 'container.sif' selected. There is an unchecked checkbox for 'Uncompress at destination (only zip and tar.gz files are permitted)'. Below this, there are input fields for: Title\* (Container with PyTorch environment), Project Short Name\* (ehpc-dev-d), Access\* (project), Target System\* (LUMI iRODS), and Target Resource\* (project\_465002827). At the bottom of this section are 'Continue' and 'Back' buttons. A second section titled '2 Default run arguments' is partially visible at the bottom.

Apptainer container (SIF file)



# Step 3. Create a workflow – select a pattern



The screenshot displays the EFP Workflows web interface. The main section, 'CREATE NEW WORKFLOW', offers four options: 'HPC Application' (Pre-configured a...), 'HPC Jobscript' (Custom job scripts, CREATE →), 'Container' (Image template), and 'Custom Workflow' (Fully custom work...). An inset window shows a table of existing workflows and a 'Versions' table for a specific workflow.

| WORKFLOW              | TITLE                       | ACCESS  | PROJECT    | CREATION DATE       | CREATOR                  |
|-----------------------|-----------------------------|---------|------------|---------------------|--------------------------|
| KAROLINA_JK           | Estimate PI in EESSI Python | project | ehpc-dev-d | 2026-06-10 12:43:22 | martin.golasowski@vsb.cz |
| KAROLINA_V2           |                             |         |            |                     |                          |
| Pavli_CT_Karolina_May |                             |         |            |                     |                          |

| VERSION | CREATION DATE       | ACTIONS         |
|---------|---------------------|-----------------|
| 1       | 2026-06-10 12:43:22 | Create Workflow |

- Use a pre-defined HPC workflow template with
  - Pre-defined job script (e.g. CWL runtime)
  - Custom job script
  - Container

Or create a custom workflow using

- YAML syntax
- Visual workflow builder

# Step 3. Create a workflow – default parameters

The screenshot displays the EFP Workflows interface with the 'Create Workflow with JobScript' wizard. The wizard consists of four steps:

- Step 1: Workflow name and project** - Shows a code editor for 'jobscript.sh' with a Python script for estimating Pi. Below the editor, fields for 'Name' (My\_PI\_Estimation), 'Description' (EFP Workflow that estimates Pi), and 'Project Short Name' (ehpc-dev-d) are visible.
- Step 2: Cluster selection** - A form with fields for 'Cluster\*' (LUMI), 'Partition\*' (debug), 'Resource\*' (project\_465002827), and buttons for 'Continue' and 'Back'.
- Step 3: Enable output dataset staging** - A form with a checked checkbox 'Enable output dataset staging'. It includes fields for 'Output Dataset #1' (Pi estimation output), 'Location Output\*' (LUMI iRODS), 'Source Path from Cluster (relative path from root)', 'Target Path in Created Dataset', and 'Output dataset access level\*' (Project).
- Step 4: Advanced settings** - A form titled 'Application Environment Variables' with fields for 'Walltime Limit (seconds)\*' (400) and 'Max cores\*' (1), along with 'Continue' and 'Back' buttons.

- Set default parameters for your HPC workflow via Graphical wizard
  - Title & description
  - Optional data input & output staging
  - Default location
  - Walltime, Cores/GPUs
  - Environment vars

# Step 4. Execute the workflow

Workflow Execution Name\*  
Run1

Configure Job

job1

Data Inputs Data Outputs Requirements

Requirements :

environment\_variables

+ Add New Variable

Job Name  
My\_PI\_Estimation

Locations

Location 1

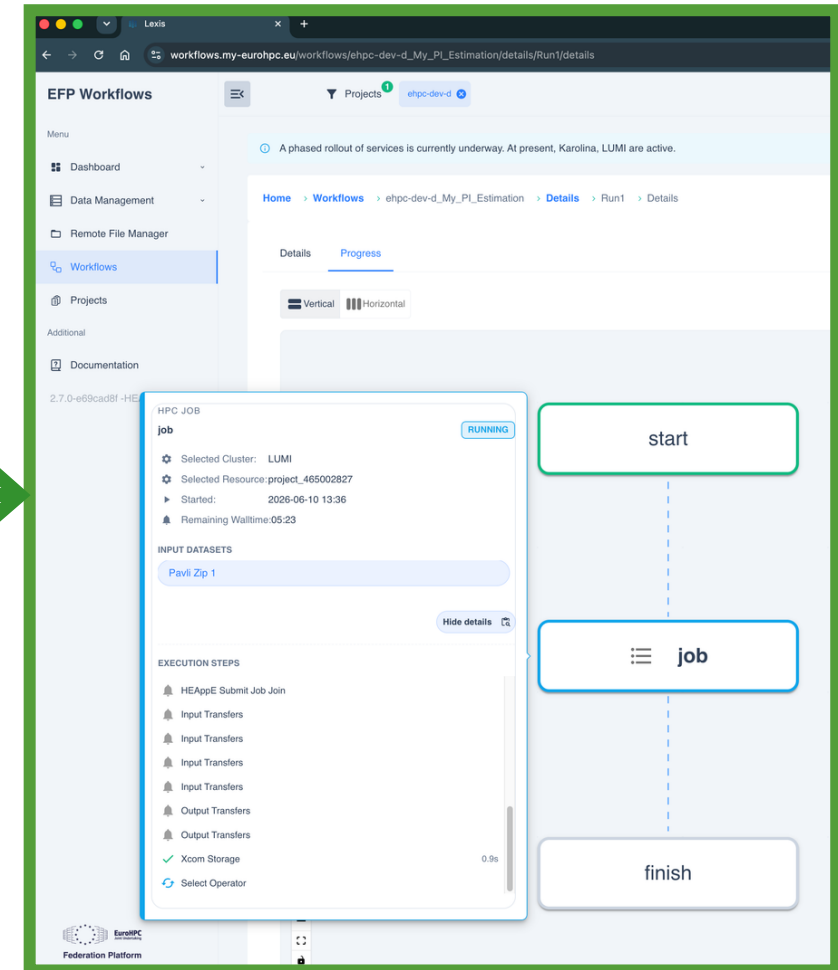
Cluster\*  
LUMI

Node Type\*  
debug

Resource\*  
project\_465002827

Policy  
preferred

Project Short Name  
ehpc-dev-d



Modify run-time parameters and execute

Watch the progress

# Step 5. Access output data

Data Outputs

Source Path

/

Target Details

Location

LUMI iRODS

Resource

project\_465002827

Path

Generated Dataset 1

Title

EFP PI Estimation output

Zone

LUMI

Access

project

Path

/LUMI/LEXIS/reseb90699896faf40b5a12dd5902cea220e2bb3f2b926a

Lexis

workflows.my-eurohpc.eu/data-sets/1f6f203c-64d1-11f1-8232-e2bb3f2b926a/details

EFP Workflows

Menu

Dashboard

Data Management

Data Sets

Containers

Job Scripts

Remote File Manager

Workflows

Projects

Documentation

Additional

2.7.0-e69cad8f -HEAD

EuroHPC

Federation Platform

Projects

ehpc-dev-d

A phased rollout of services is currently underway. At present, Karolina, LUMI are active.

Home

Data Sets

EFP PI Estimation output

Details

View Files

Update Metadata

EFP PI Estimation output

Absolute Path

/LUMI/LEXIS/reseb90699896faf40b5a12dd5902cea220e2bb3f2b926a

Last Modified Date

2026-06-10 15:34:36

Creation Date

2026-06-10 15:34:36

Zone

LUMI

Resource Name

project\_465002827

Resource Hash

reseb90699896faf40b5a12dd5902cea220

Location Name

LUMI iRODS

Access

project

← EFP PI Estimation output

jobscript.sh

pi.txt

stderr

stdout

test10M-2.dat

# Step 5. Access HPC job logs

The diagram illustrates the process of accessing HPC job logs. It shows a job details panel on the left and a job details view on the right. A green arrow points from the 'View HPC Job Logs' button in the job details panel to the 'Logs' tab in the job details view.

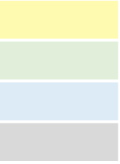
**Job Details Panel (Left):**

- HPC JOB**
- job**
- Selected Cluster:** LUMI
- Selected Resource:** project\_465002827
- Started:** 2026-05-21 17:25
- Finished:** 2026-05-21 17:30
- INPUT DATASETS**
- Show details...**
- View HPC Job Logs** (button highlighted with a green circle)

**Job Details View (Right):**

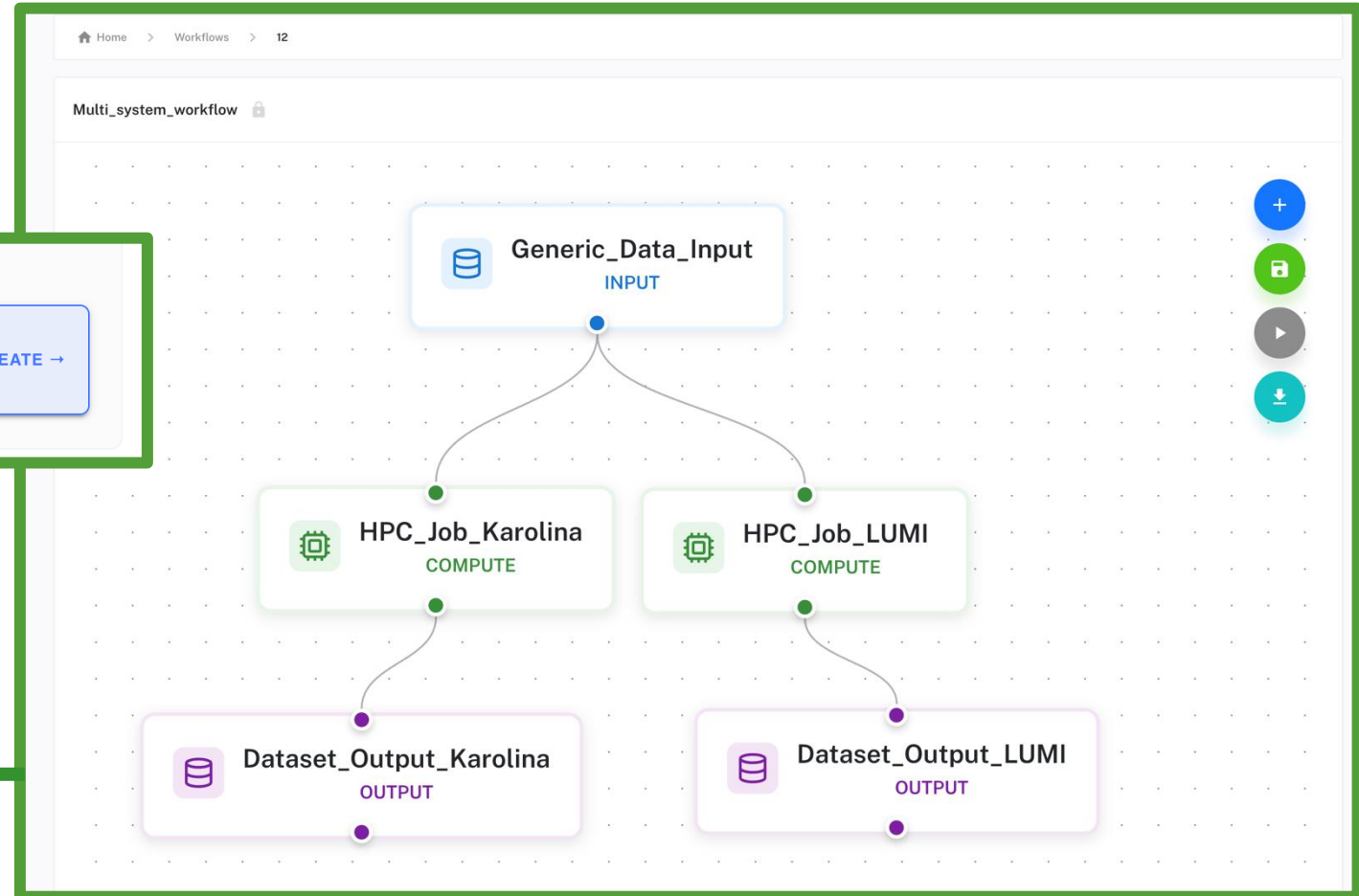
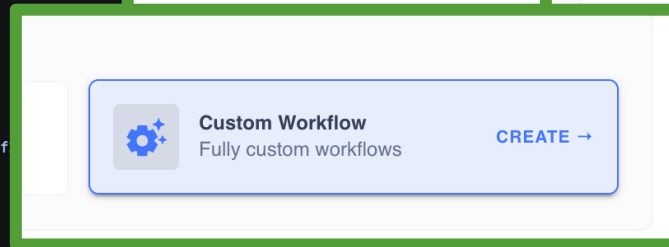
- Home > Workflows > ehpc-dev-d\_EFP\_Workflow\_PI > Details > Run1 > Details > job.heappe\_submit\_job > Logs**
- Search in logs...**
- === /110/stderr ===**  
No content available
- === /110/stdout ===**  
Python 3.11.7  
✓ Estimated PI: 3.1438080000  
Saved to: /pfs/lustrep4/scratch/project\_465002827/efp-lumi/HEAppE/Executions/mgolasowski/110/110/pi.txt

# Extra: Define custom workflow patterns



```
1 id: ehpc-dev-d_Multi_system_workflow
2 desc: Workflow generated from Builder application
3 project_shortname: ehpc-dev-d
4 jobs:
5   HPC_Job_Karolina:
6     requirements:
7       command_template_name: TestTemplate
8       node_type_name: qcpu
9       locations:
10        - location_name: Karolina
11          location_resource: eu-26-41
12       walltime_limit: 600
13       max_cores: 0
14       template_parameters:
15         inputParam: Hello from Karolina
16       environment_variables: {}
17   data_inputs:
18     - source: ddi://0feff268-64cb-11f1-8efb-e2bb3f
19       target: /
20   data_outputs:
21     - source: /
22       metadata:
23         $name: Dataset_Output_Karolina
24         title: Output
25         access: project
26         target: ddi://~/
27         storage:
28           resource: eu-26-41
29           location: IT4I iRODS
30   HPC_Job_LUMI:
31     requirements:
32       command_template_name: TestTemplate
33       node_type_name: qcpu
34       locations:
35        - location_name: Karolina
36          location_resource: eu-26-41
37       walltime_limit: 400
38       max_cores: 11
39       template_parameters:
40         inputParam: Hello from LUMI
41       environment_variables: {}
42   data_inputs:
43     - source: ddi://0feff268-64cb-11f1-8efb-e2bb3f2b926a/
44       target: /
45   data_outputs:
```

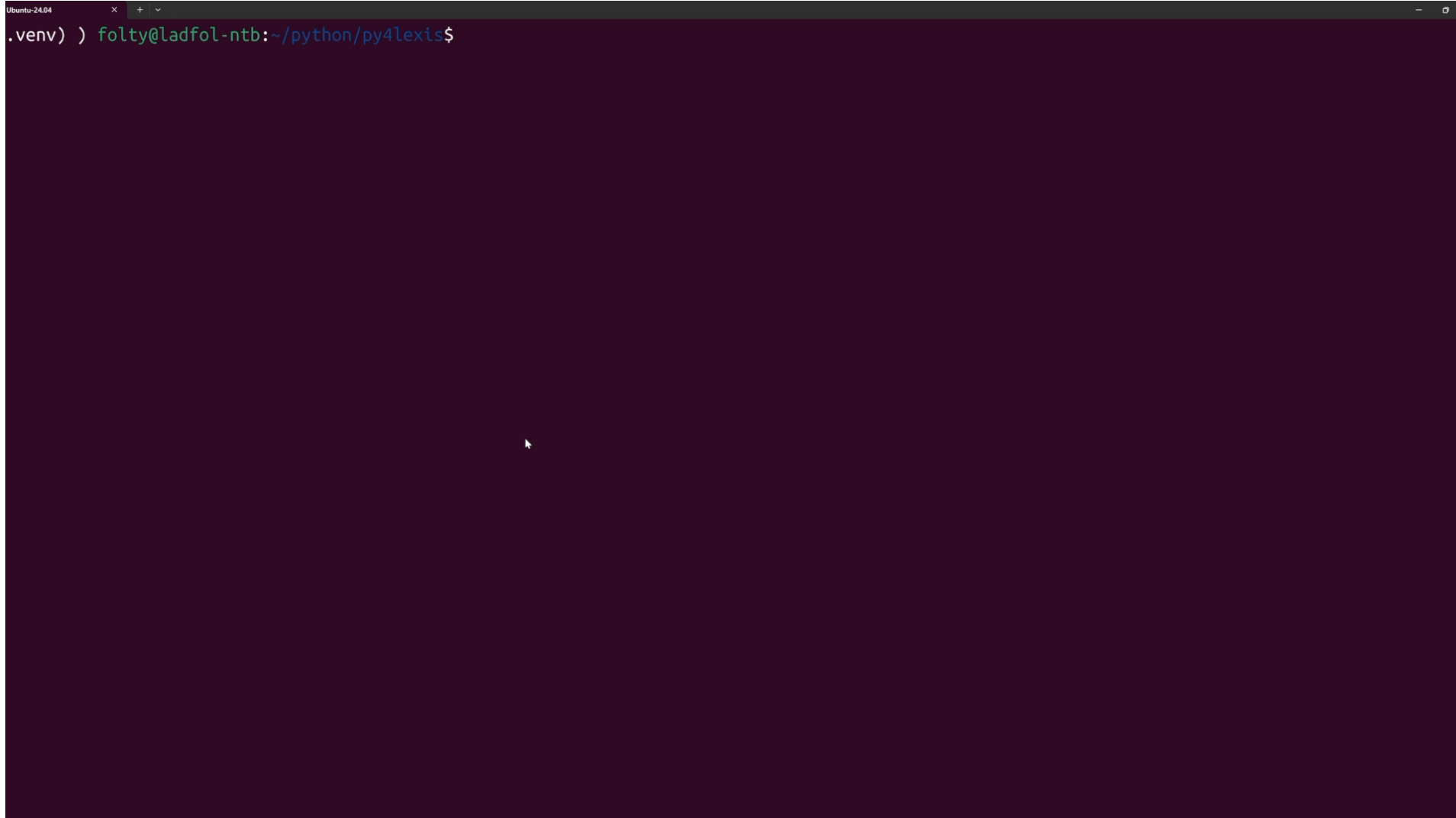
YAML Specification



Visual workflow builder with templates



# Extra: Access the EFP Workflows via Py4Lexis



```
Ubuntu-24.04
.venv) ) folty@ladfol-ntb:~/python/py4lexis$
```

# Accessing the EFP Workflows



**Your EuroHPC allocation will automatically appear in EFP Workflows as a project**



**Visit main web interface at:**

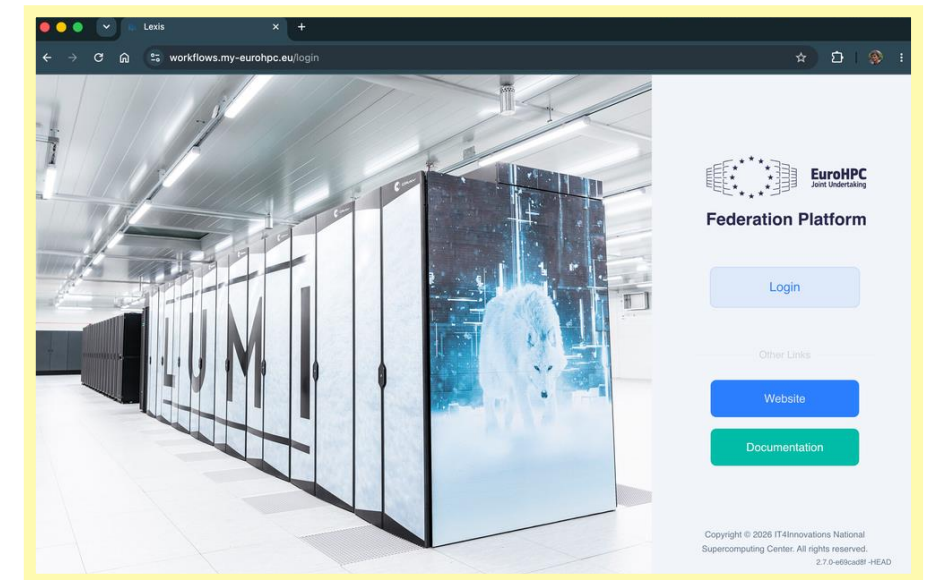
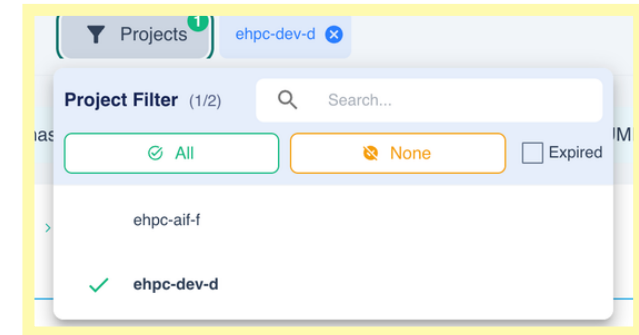
**<https://workflows.my-eurohpc.eu>**



**Check the documentation at**

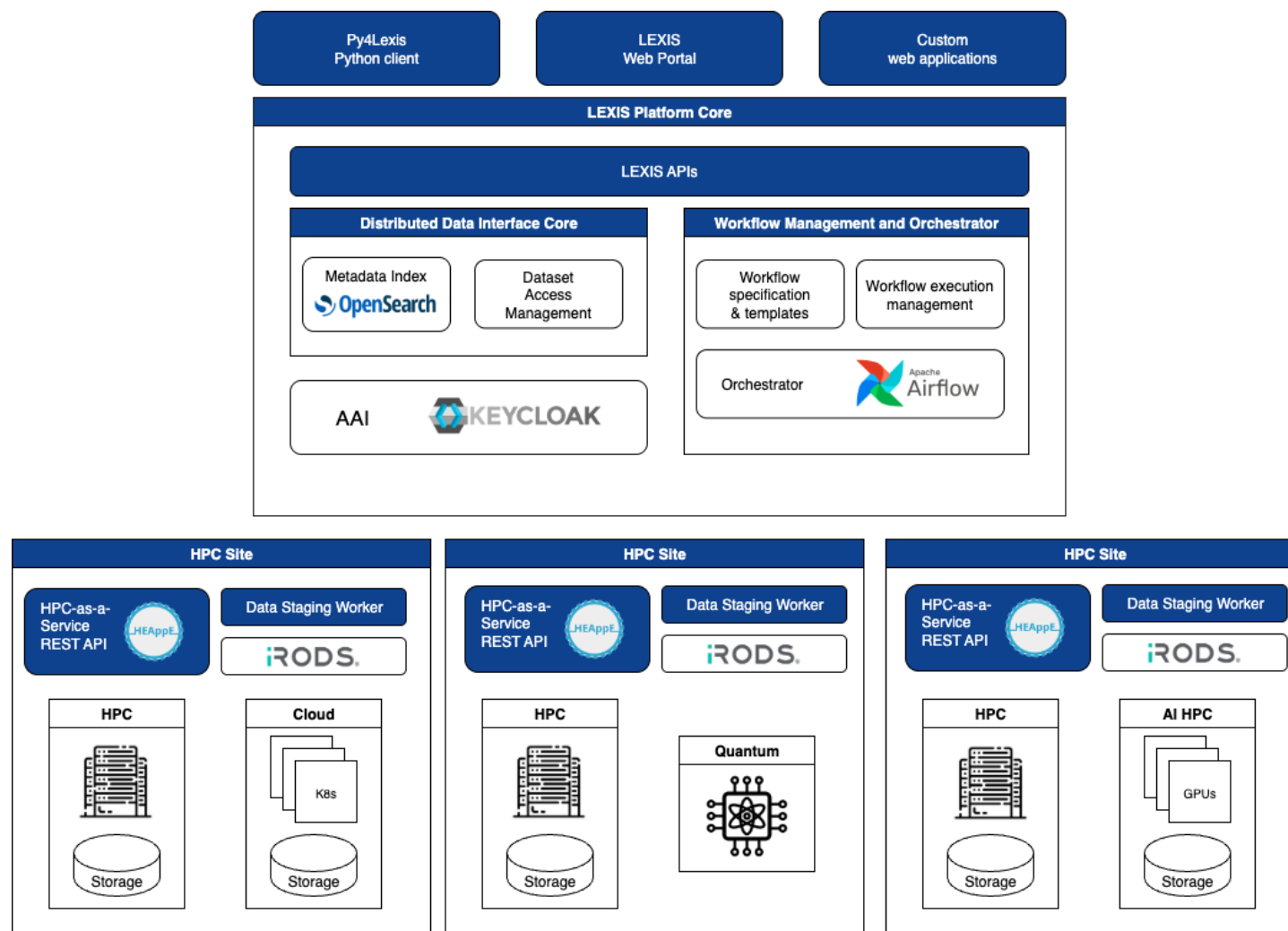
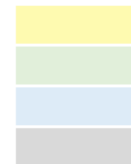
**<https://docs.my-eurohpc.eu/workflows/overview>**

**<https://docs.lexis.tech>**





# The LEXIS Platform in context of the EFP Workflows



- **Hiding** of technical and **operational differences** across systems
- **HPC & Cloud** service providers, Data providers
- Unified & distributed **workflow & data management**
- Connected to the **EFP Allocations**
- Workflow tasks can use the **EESSI modules** as part of the EFP Federated Software Catalog (e.g. GROMACS)
- **Connected to federated Authentication & Authorization Infrastructure** (MyAccessID)
- **Smart Scheduling capabilities** will be available in the next EFP release



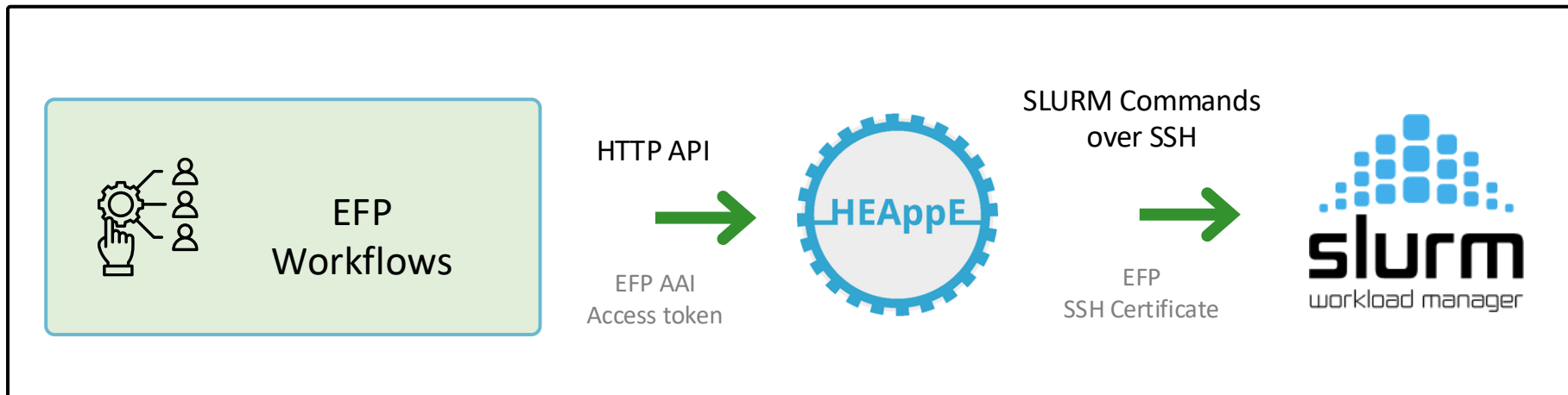
# Job Management in EFP Workflows with HEAppE

## High-End Application Execution Middleware (HEAppE)

- Unified HTTP API across HPC sites connected to common EFP AAI
- Abstraction of job lifecycle (prepare, execute, monitor, clean-up)
- Templated job scripts - command templates
- Job logs and audit trail never leaves the target site infrastructure
- Works only in user space - non-intrusive integration with HPC sites

| JobManagement |                                              |                          |
|---------------|----------------------------------------------|--------------------------|
| POST          | /heappe/JobManagement/CreateJob              | Create job specification |
| PUT           | /heappe/JobManagement/SubmitJob              | Submit job               |
| PUT           | /heappe/JobManagement/CancelJob              | Cancel job               |
| DELETE        | /heappe/JobManagement/DeleteJob              | Delete job               |
| GET           | /heappe/JobManagement/ListJobsForCurrentUser | Get all jobs for user    |
| GET           | /heappe/JobManagement/CurrentInfoForJob      | Get current info for job |

Part of the HEAppE API



Visit HEAppE web  
<https://heappe.eu>

# Data management in EFP Workflows

- **Datasets with metadata**

- Stored in object storage at the target site
- Centralised metadata index

- **File management on HPC clusters**

- Directly manage files on scratch

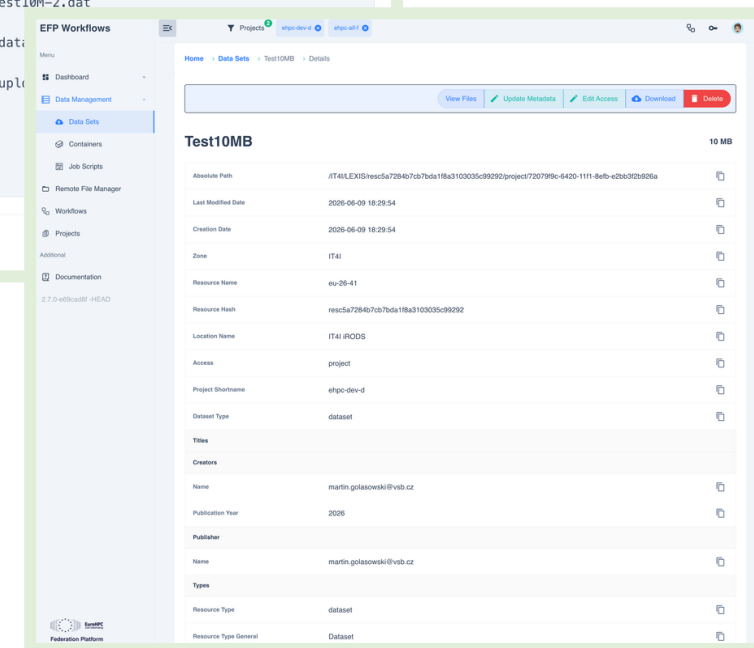
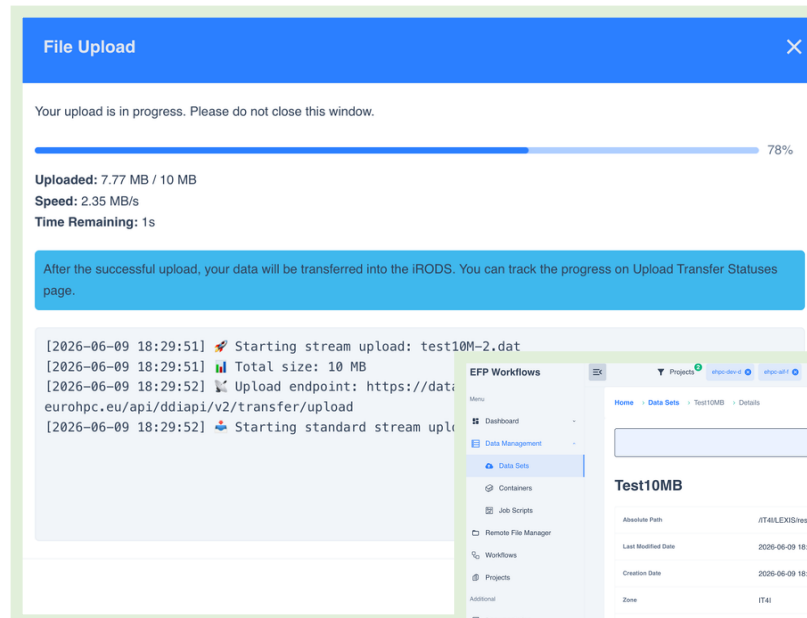
- **HTTP/2 Upload / Download via**

- Web browser
- Python CLI

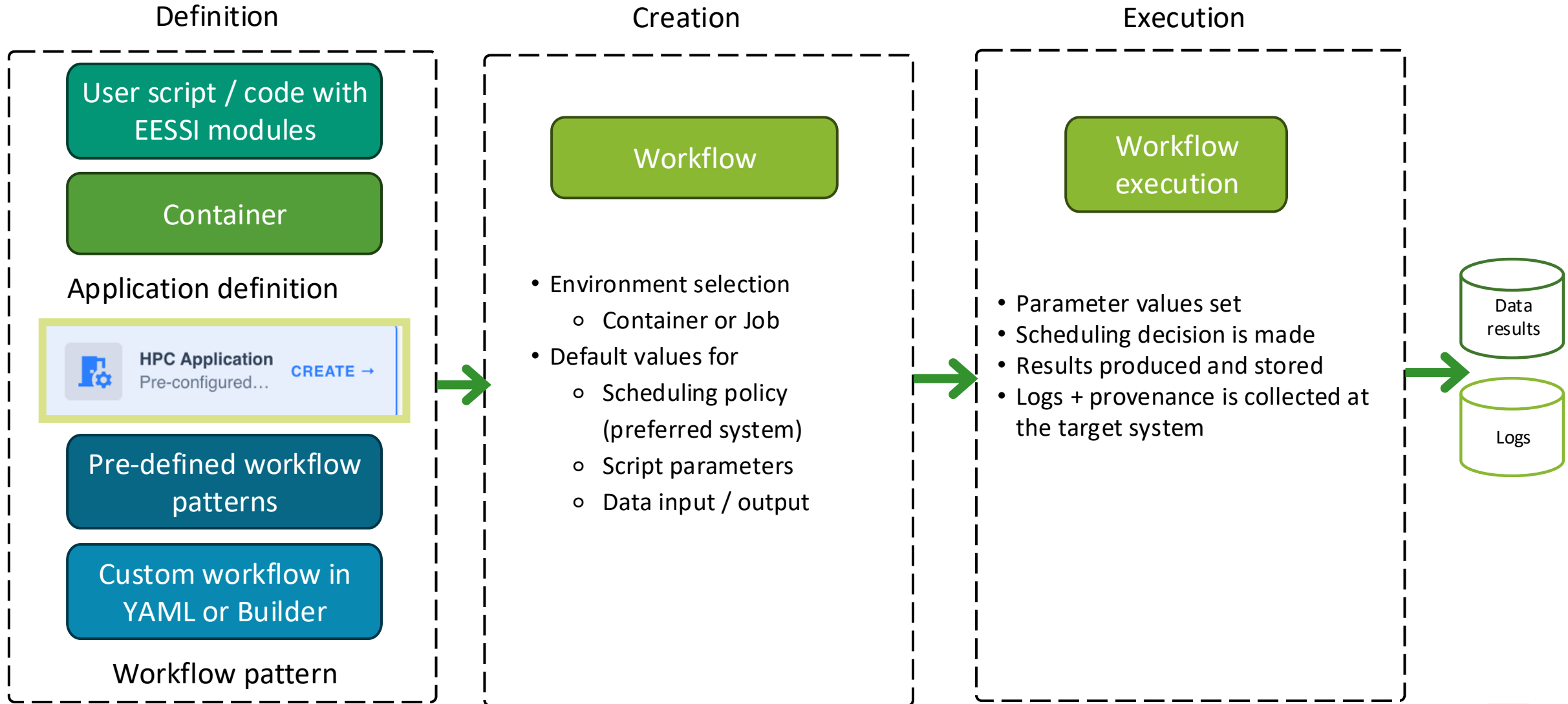
- **Automated data staging in workflows**

- **Access as part of compute time allocation,  
quota differs per center**

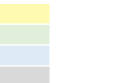
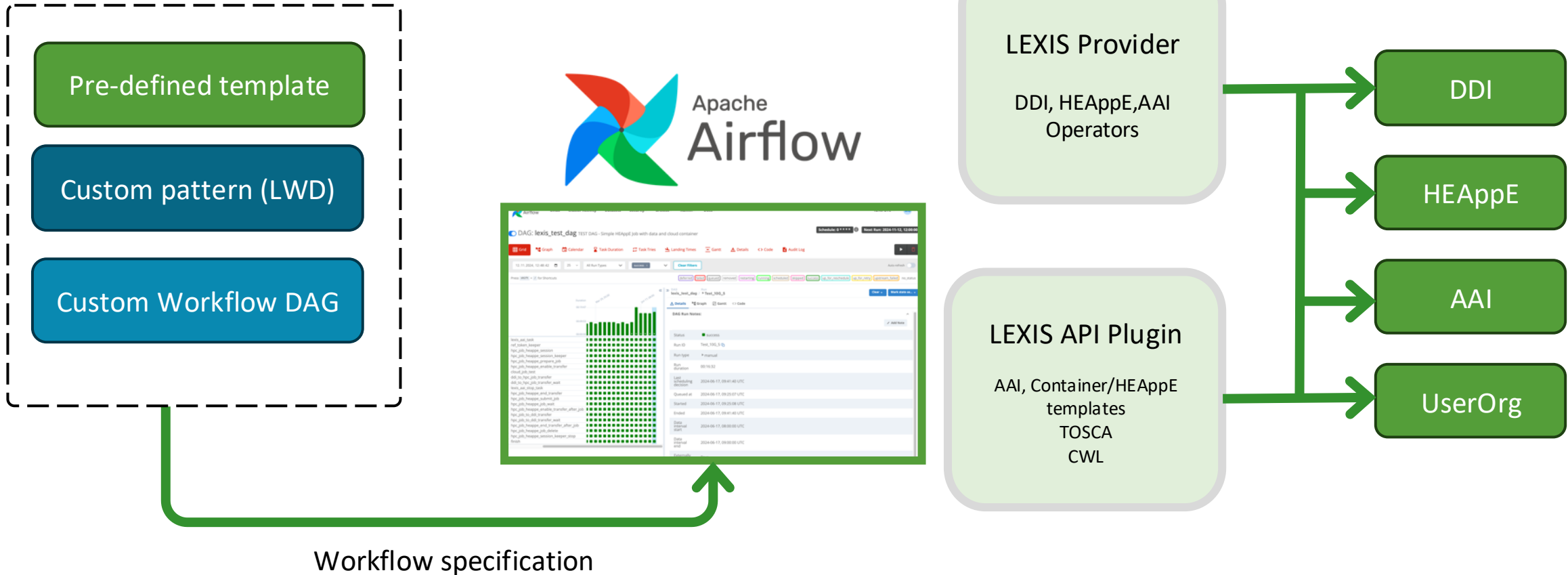
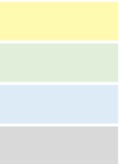
- Bulk copy between allocations and systems



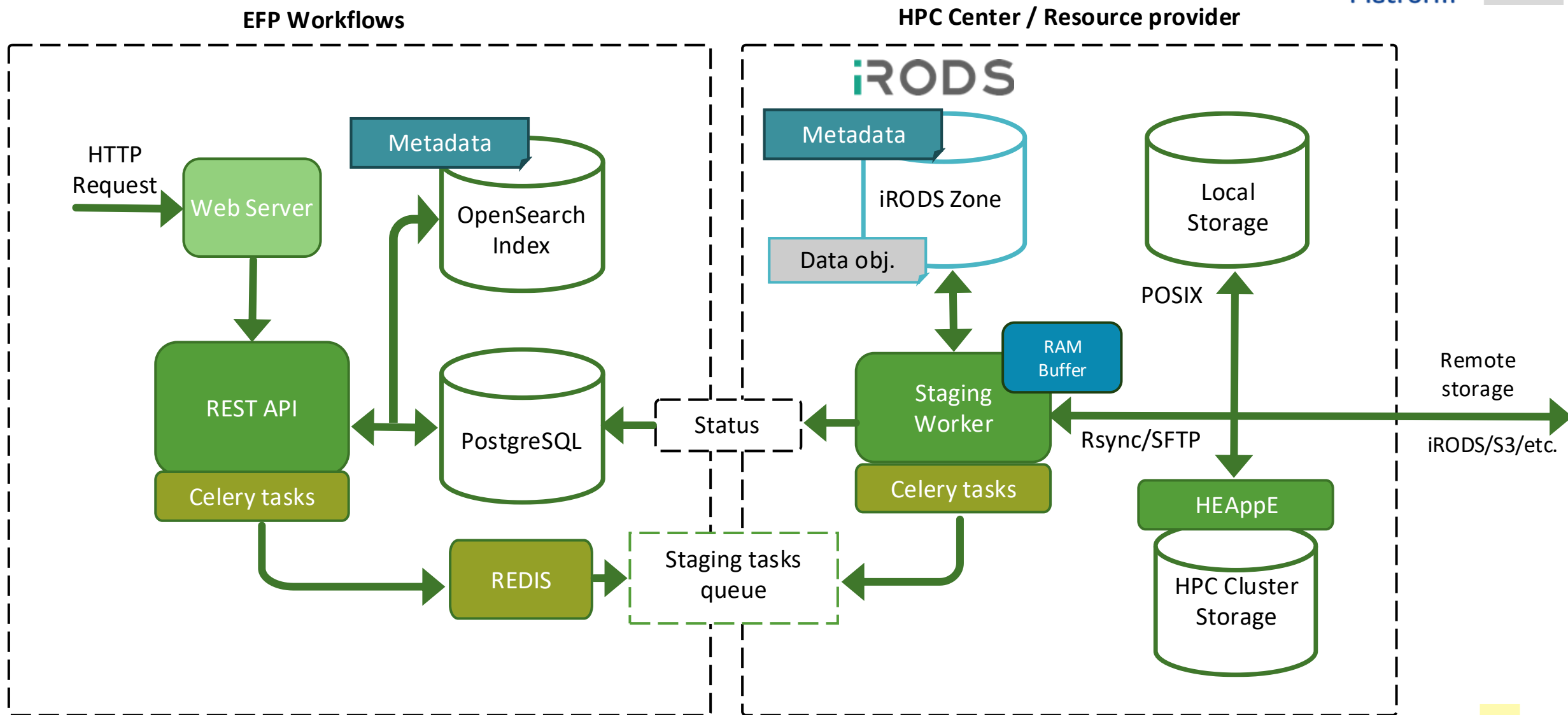
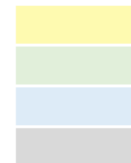
# Workflow execution model



# Apache Airflow in LEXIS Platform



# LEXIS Distributed Data Interface - DDI



# Getting help for EFP Workflows

Contact EFP Helpdesk at: [helpdesk@my-eurohpc.eu](mailto:helpdesk@my-eurohpc.eu)

## We can help you with



Managing your data in EFP Workflows



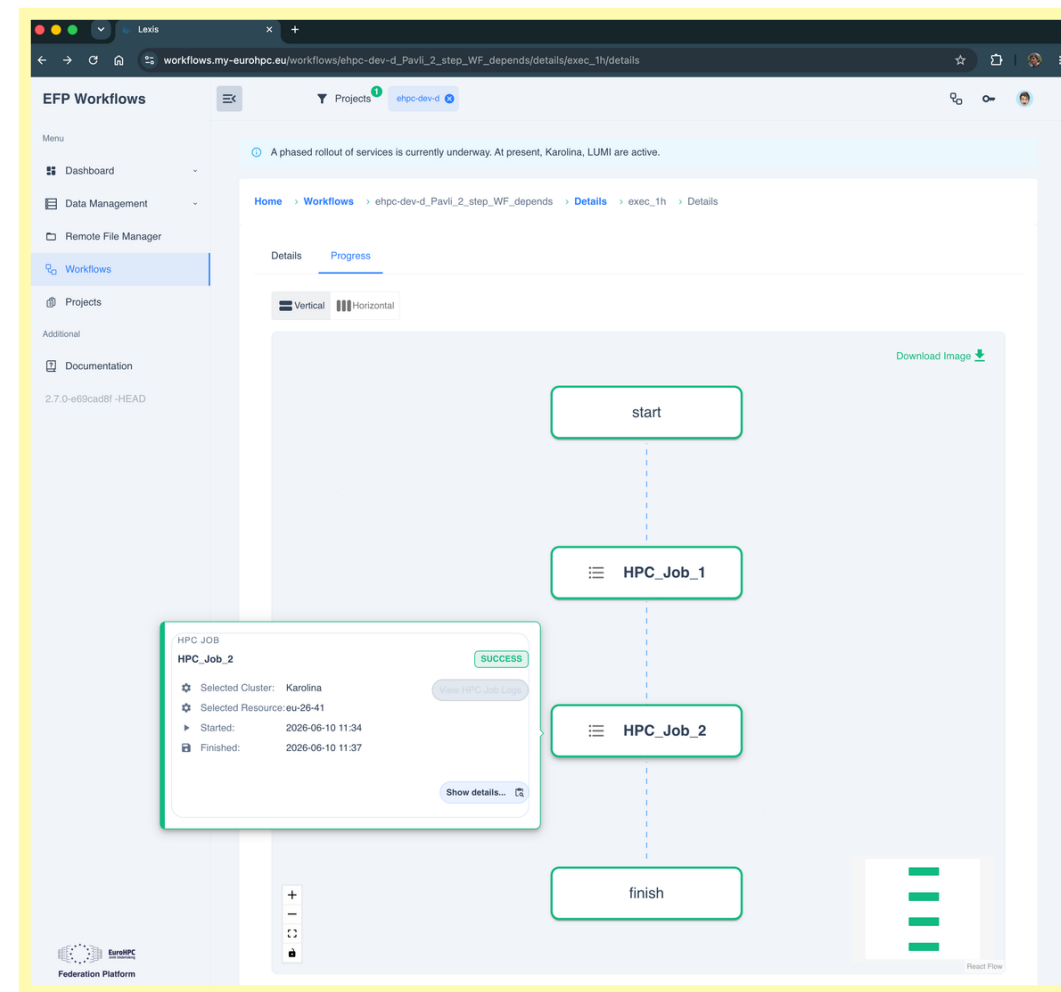
Onboarding your applications



Defining custom workflow patterns



... and many more



# Upcoming topics for next webinars on EFP Workflows

- Custom workflow building using GUI and YAML syntax
- Running workflows specified in systems CWL or HyperQueue
- Data management, transfers and bulk copy
- Smart scheduler use cases

Watch recordings of all previous EFP webinars at:

<https://docs.my-eurohpc.eu/training/#first-efp-webinar-series-feb-may-2026>



*Scan me for more information  
on past and upcoming EFP webinars!*

In case of questions, contact EFP consortium via: [helpdesk@my-eurohpc.eu](mailto:helpdesk@my-eurohpc.eu)



ICT Solutions for Brilliant Minds



IT4INNOVATIONS  
NATIONAL SUPERCOMPUTING  
CENTER

