FENIX

RESEARCH INFRASTRUCTURE

# Integrating FTS in the Fenix HPC Infrastructure

Shiting Long (Forschungszentrum Jülich)

Dirk Pleiter (KTH Royal Institute of Technology), Mihai Patrascoiu (CERN), Cristiano Padrin and Michele Carpene (CINECA), Sergi More and Miguel Carpio (Barcelona Supercomputing Center)

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# Agenda

1. Fenix Research Infrastructure
2. FTS as Fenix Data Transfer Service
3. Facilitating Scientific Workflows in Fenix and Beyond

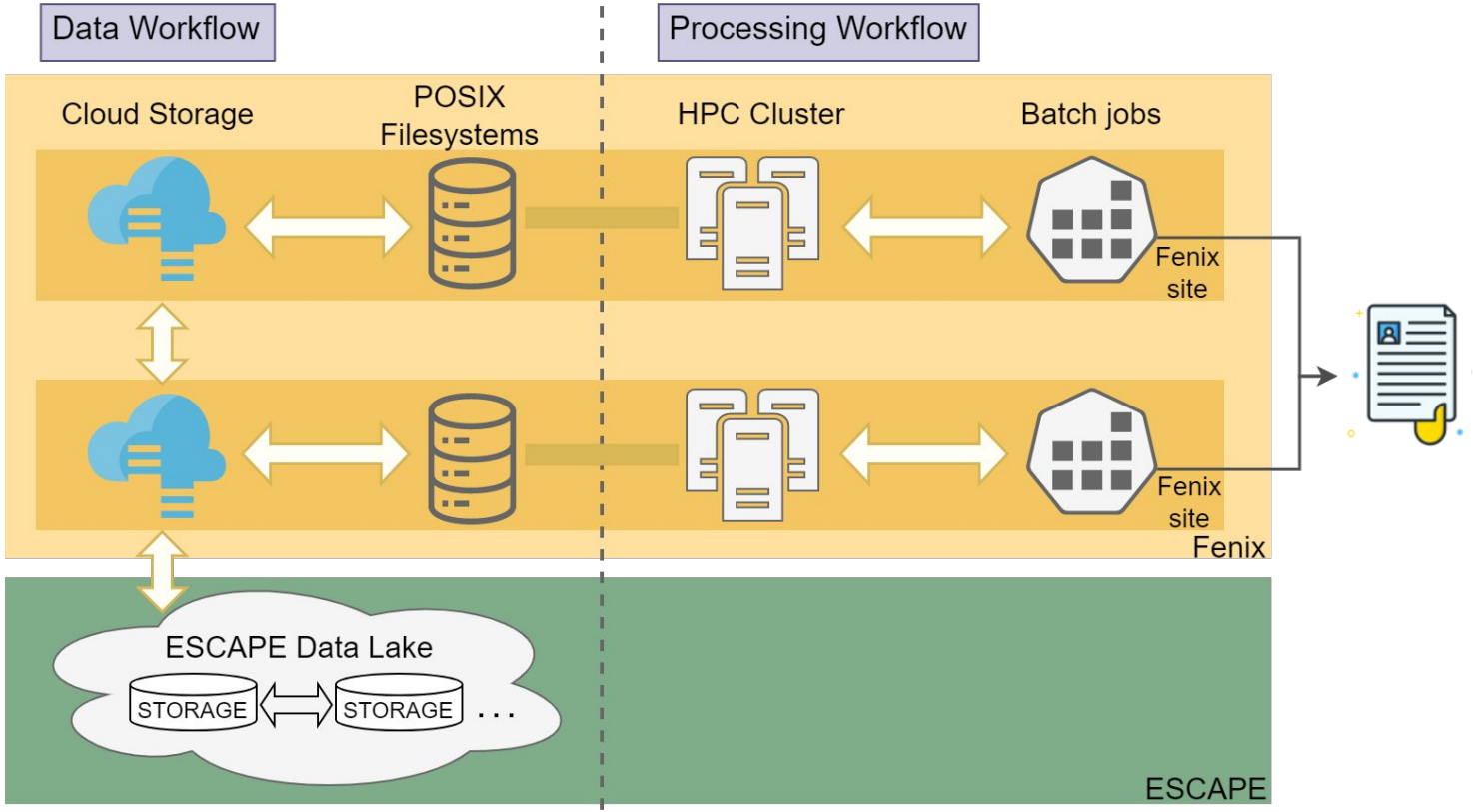
# Fenix

- Long term effort of European supercomputing centres on harmonizing and federating both HPC and Cloud services.
- Based on a MoU of 6 European supercomputing centres: BSC (Spain), CEA (France), CINECA (Italy), CSCS (Switzerland), CSC (Finland), JSC (Germany).
- **Goal**: establish an infrastructure with jointly agreed set of services to leverage HPC and Cloud resources at multiple sites.






# Fenix

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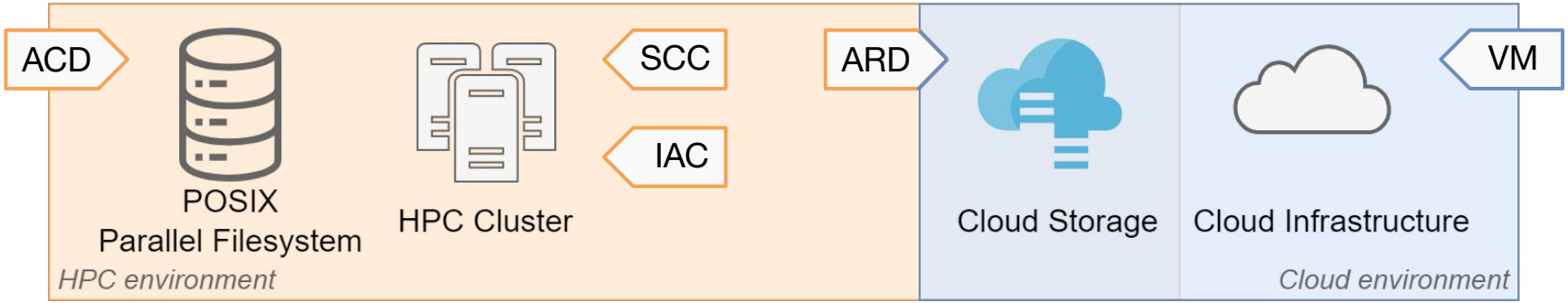
# Fenix - Resources

- **Scalable Computing Services (SCC)**: *massively parallel HPC systems for scalable and/or compute heavy applications.*
- **Interactive Computing Services (IAC)**: *interactive access to powerful servers and large-scale data stores.*
- **Virtual Machine (VM) Services**: *services for deploying virtual machines in a stable and controlled environment.*
- **Archival Data Repositories (ARD)**: *federated data storage, optimized for capacity, reliability and availability that is used for long-term storage of large data sets. They have an Openstack Swift interface.*
- **Active Data Repositories (ACD)**: *site-local data repositories close to computational and/or visualization resources that are used for storing temporary data sets. They are typically POSIX parallel file systems.*

# Fenix - Resources




| | |
|---|---|
| Protocol access | SSH or similar shell Access |
| Access authentication | Password, ssh keys, … |
| Management of resources | Batch Scheduling system |
| Compute resources | Node-hours, core-hours |
| Storage access | POSIX, direct … |
| Workload | simulation - result based |

| | |
|---|---|
| Protocol access | HTTP |
| Access authentication | Token-based |
| Management of resources | Cloud Management software |
| Compute resources | RAM, vCores |
| Storage access | Swift, S3 (based on HTTP) |
| Workload | Service-oriented |

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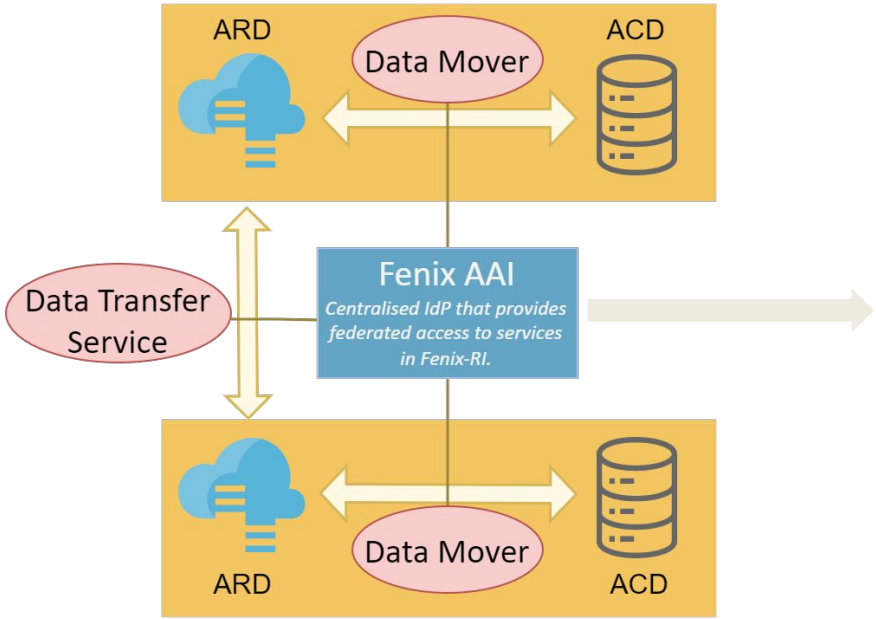
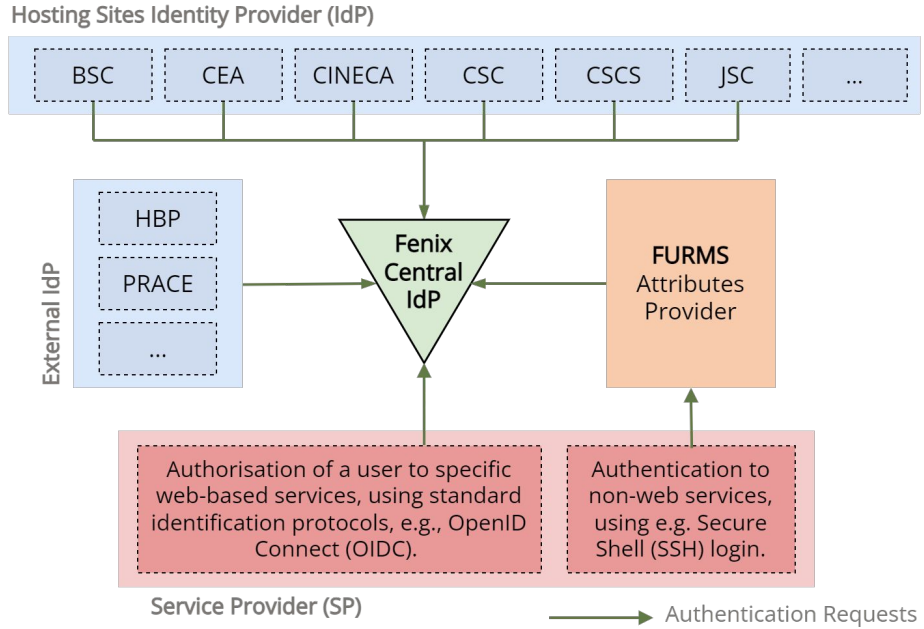
# Fenix - Data Services & Fenix AAI




*Fenix Central IdP (based on SaToSa Proxy) design is in line with the AARC Blueprint Architecture (https://aarc-community.org/architecture).

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# FTS as Data Transfer Service

- Diverse Interfaces
  Python CLI, Python API, WebFTS…
- Multidimensional Scheduler
  Parallel transfers scheduling and optimization.
- Multiprotocol
  Common grid and cloud file access protocols: HTTP, GridFTP, SRM etc. Extendable with Swift.
- AAI Integration
  OIDC support since FTS 3.10. Fenix AAI compatible.

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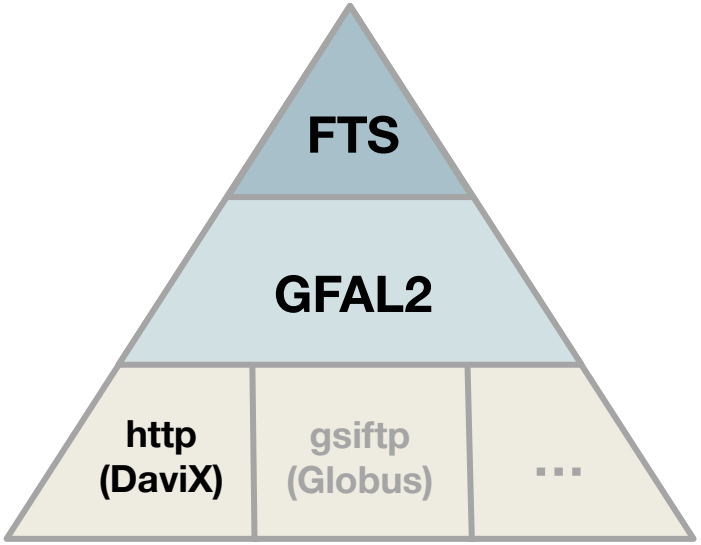
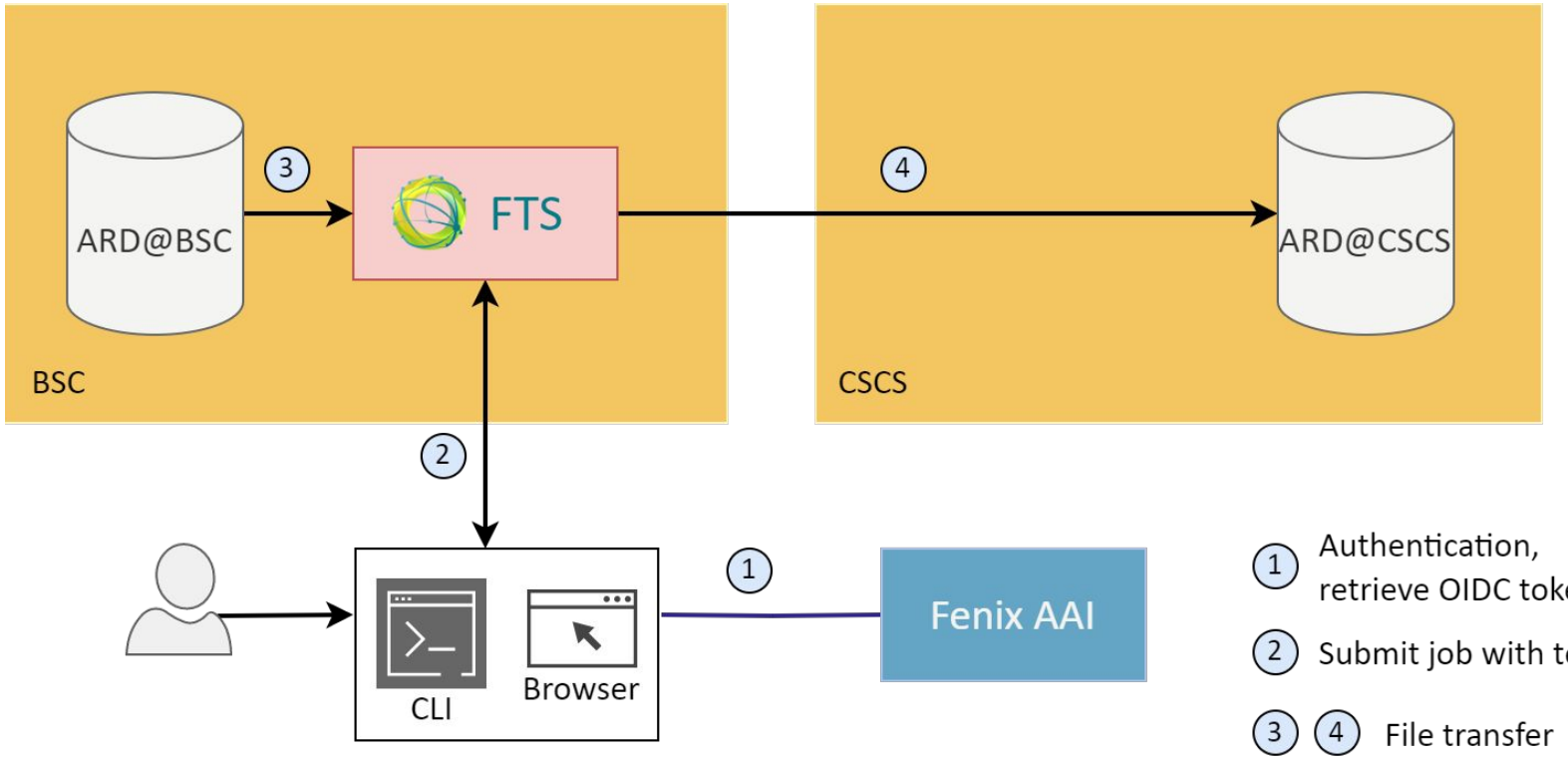
# Features added to the FTS stack

- Parameters and options for FTS to use Swift protocol; OIDC to Keystone token workflow.
- Swift-specified parameter settings in GFAL2 to call DaviX.
- File operations in DaviX for Swift using Swift REST API, authentication is done with Keystone token.
- Elements to use Swift in WebFTS; functions to integrate with Fenix.




# Data Transfer Service Workflow

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# Demo: BSC→CSCS Data Transfer

- Link:

  https://swift.bsc.es/v1/AUTH_a66b36d32f864e8bb09585cd13481bb7/public/webfts-demo.webm

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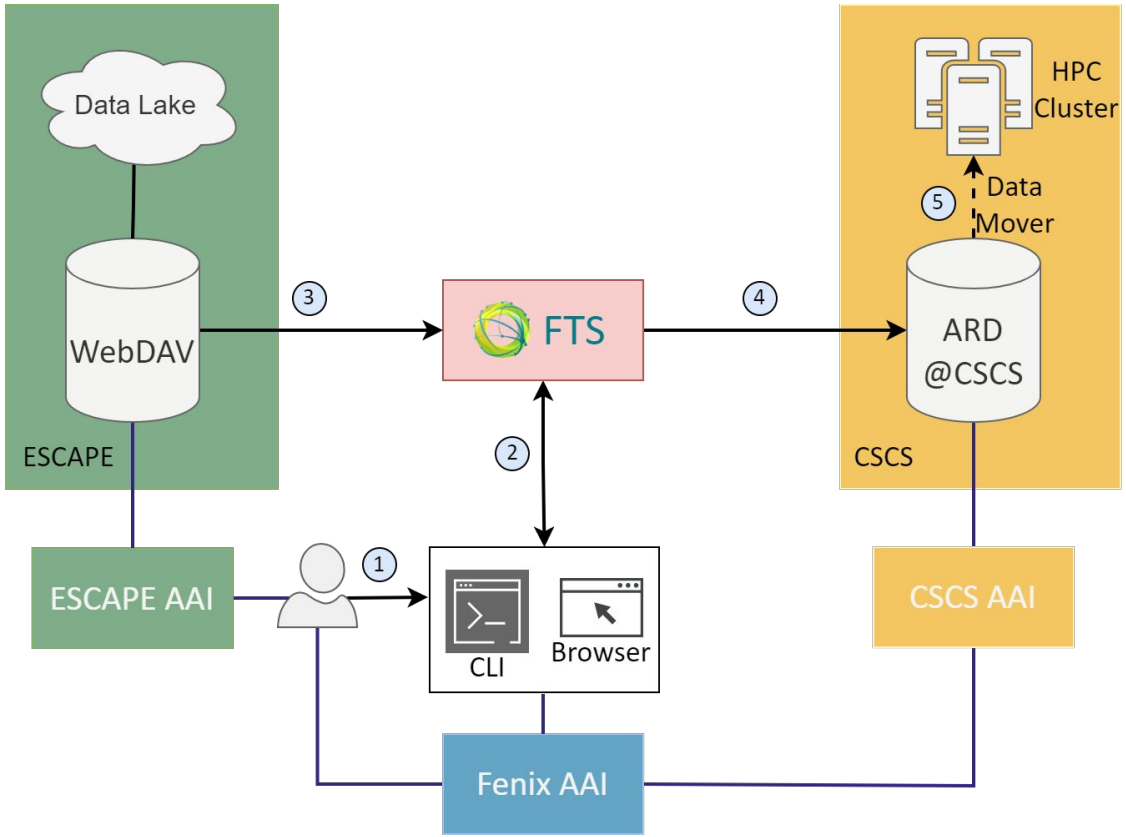
# Data Transfer Beyond Fenix

- EOSC (European Open Science Cloud): aim to provide an operation platform for European researchers to access an enormous amount of data and its related services, which includes HPC resources.
- Bridge between EOSC and Fenix: establish data transfer interoperability.
- ESCAPE (European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures): chosen as an example project in EOSC to connect with Fenix.

# Data Transfer Beyond Fenix Workflow




*User need to authenticate to both ESCAPE and Fenix AAI.*

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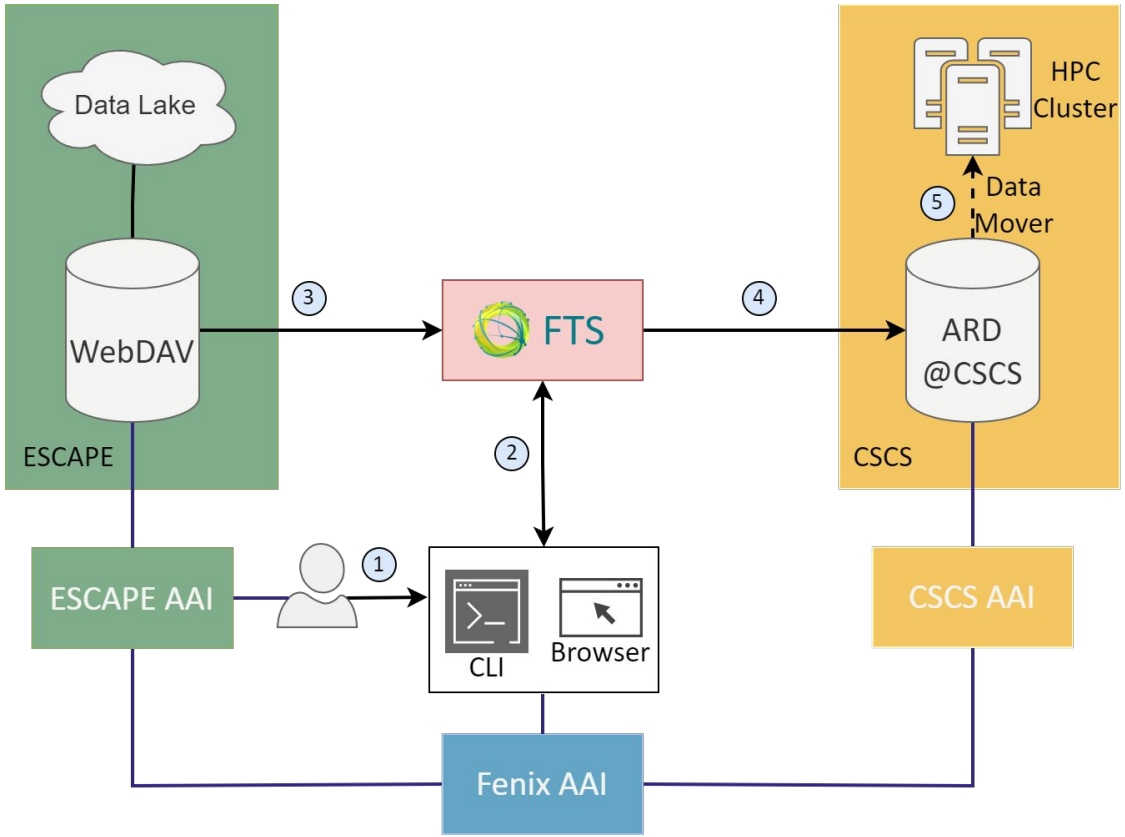
# Data Transfer Beyond Fenix Workflow cont.




*User authenticate and receive an ESCAPE token (OIDC), this token can be validated with Fenix AAI, and Fenix ARDs allow its access.*

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# Data Transfer Beyond Fenix: Challenges

- ESCAPE AAI needs to integrate with Fenix AAI, such that Fenix AAI can validate ESCAPE token.
- FTS should be integrated with Fenix AAI in this case, it should validate tokens against Fenix AAI regardless of the issuer of the tokens.
- Fenix AAI needs to be able to perform OIDC token exchange requests with ESCAPE tokens.

# THANK YOU

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icei-coord@fz-juelich.de