# Kindura Cloud Computing Pilot
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# Kindura Project

- 12 month project in JISC Flexible Service Delivery Programme
- Centre for e-Research at King's College London
- Science and Technology Facilities Council (STFC)
- DuraSpace
  - Not for profit organisation
  - Specialises in open source technologies in the fields of digital repositories and clouds
  - Created in 2009 from a merger of Fedora Commons and the DSpace Foundation

# Objectives

- Develop and pilot a hybrid cloud storage solution for research data at King's and STFC
- Study user requirements for large scale storage of research data.
- Integrate multiple cloud services into Kindura application including
  - iRODS
  - NGS cloud
  - Commercial cloud providers.
  - Private cloud (e.g. Based on Eucalyptus)

# Objectives (ctd)

- Develop brokerage services to provide mediation between storage providers.
- Integrate digital repository to provide archival services for researchers.
- Provide common services for such purposes as data replication, format conversion and digital preservation.
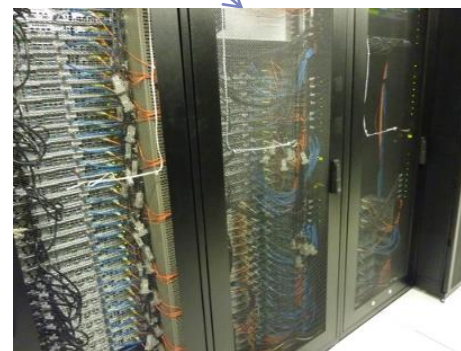- Provide integration with cloud compute services.

# Kindura Services



Researcher

Kindura
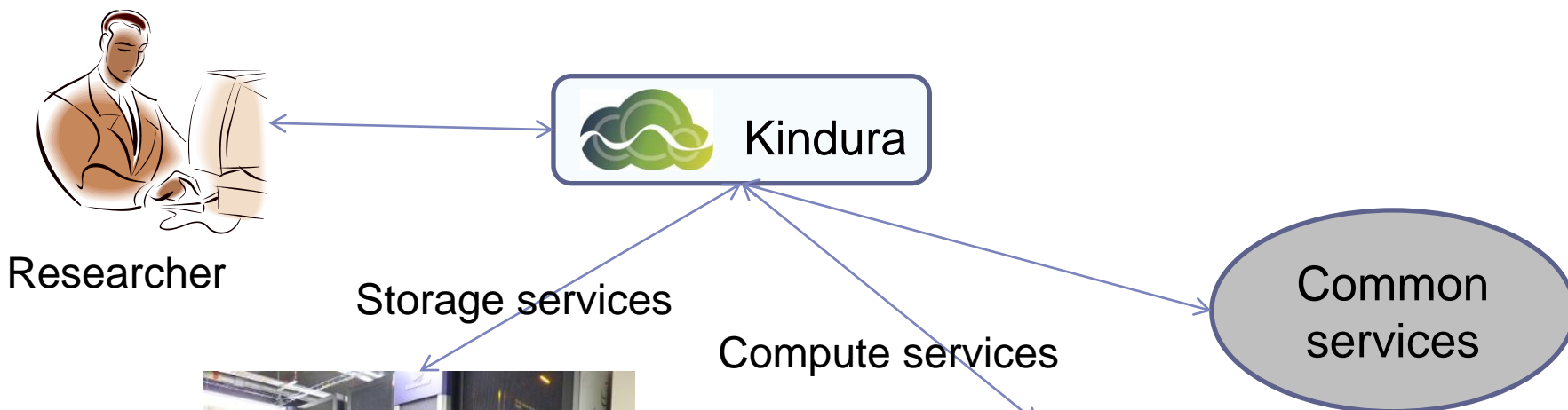
Common services

Storage services

Compute services

NGS

iRODS
Integrated Rule-Oriented Data System

Federated iRODS dataservers

Eucalyptus Systems

amazon webservices™

rackspace

# Specific scenarios



- *Environmental Science*
  - including the monitoring and modelling of environmental change
  - e.g.remote sensing, real-time data feeds, and large scale simulations of environmental models.



- *Financial Mathematics*
  - execute complex mathematical models, for scenarios such as contract pricings or risk computation.
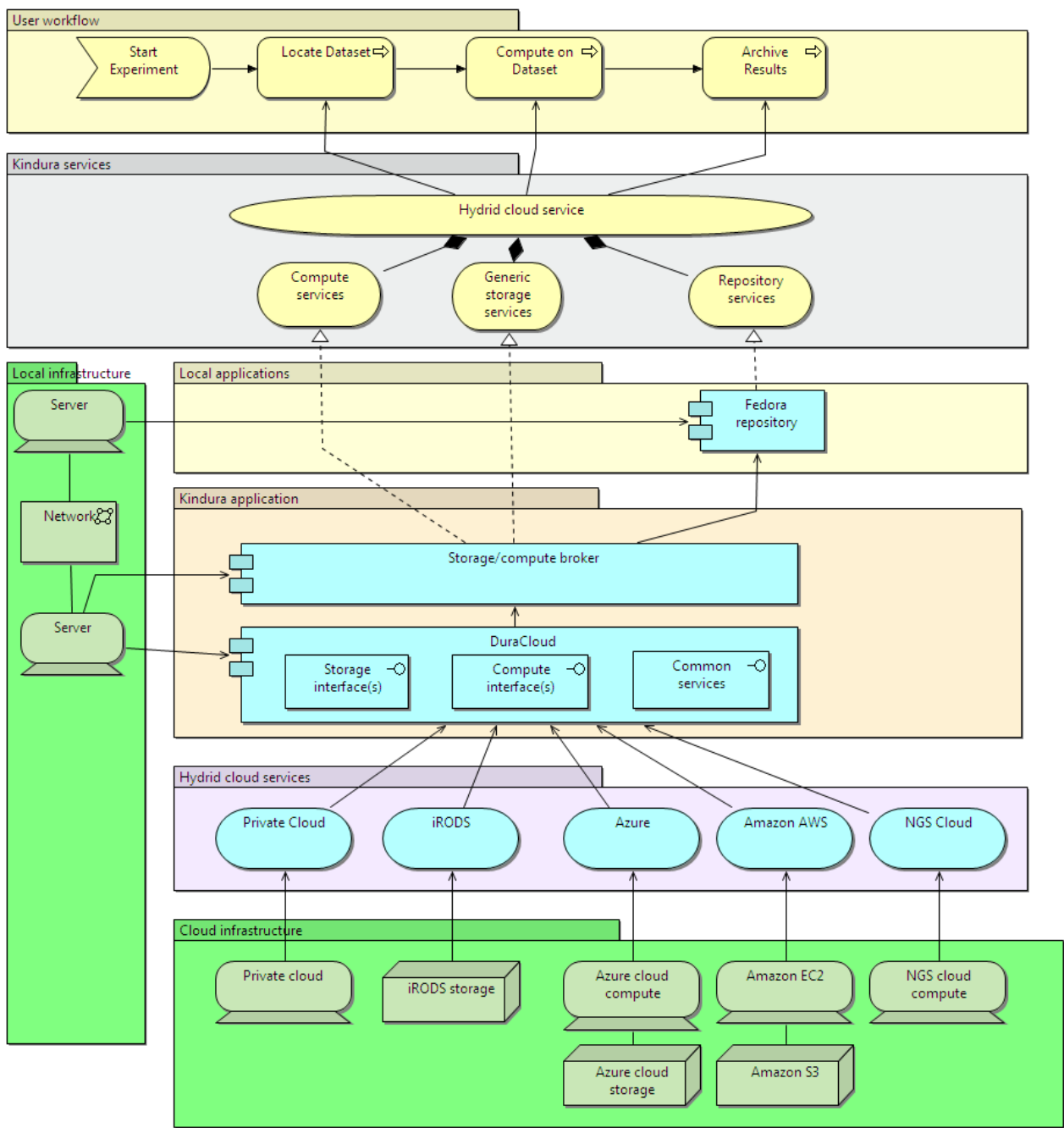


- *Biomedical sciences*
  - crystallography (e.g. determination of protein structures from diffraction images),
  - nanoimaging (e.g. microscopy techniques for cell biology)
  - molecular neurobiology (e.g. determining factors influencing gene expression).
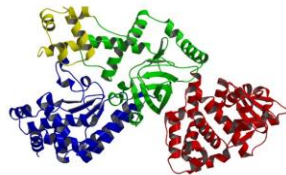


- *Humanities* – textual scholarship

# Architecture

# Technical Approach

Pilot makes use of:

- **DuraCloud**, developed by the DuraSpace organisation.
  - Available as a service or software download
  - Java open source software
  - Provide a common REST API to multiple cloud providers.
  - Pilot programme - Kindura is the only UK participant .
  - Common services
    - Replication
    - Bit integrity checking
    - Format conversion
- **Fedora Commons** repository
  - Open source repository.

# Brokerage
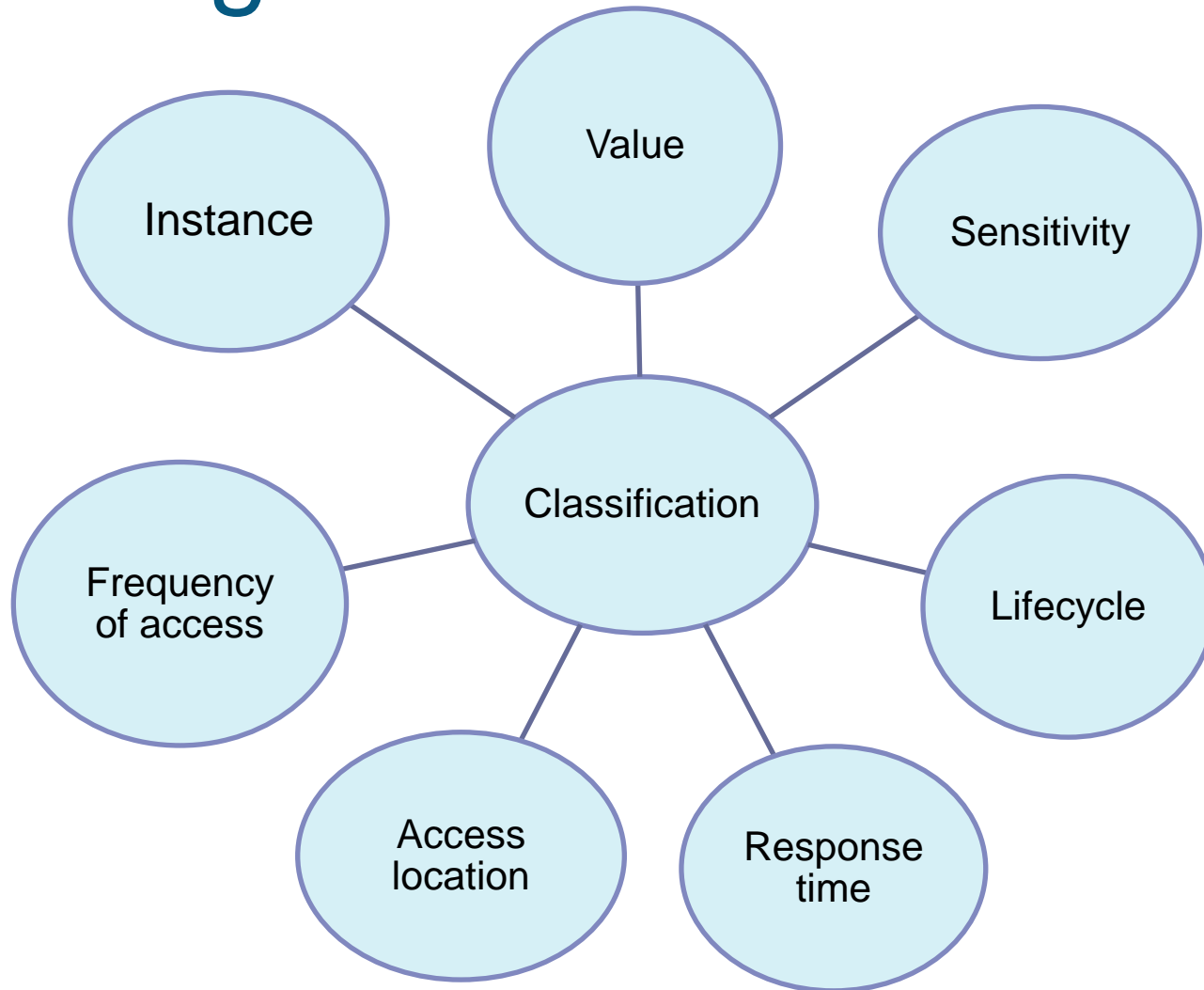
# Emerging standards

*OGF OCCI*

- OGF – Open Grid Forum
- Open Cloud Computing Interface (OCCI) is a free, open, community consensus driven API, targeting cloud infrastructure services.
- Provides standard CRUD interface

*SNIA CMDI*

- SNIA – Storage Networking Industry Association
- Cloud Data Management Interface (CDMI) enables interoperable cloud storage and data management.
- Standardises notion of container

# Outputs

- Pilot model of ICT provision that uses both cloud and shared services.
- Use cases representing the requirements and activities of targeted researchers.
- Pilot evaluation to demonstrate the potential to increase efficiency and effectiveness.

# Further Information

Project blog

http://kindura.cerch.kcl.ac.uk