

Scale CES S3 with watsonx.ai & Db2 DWH & watsonx.discovery

IBM Storage Scale Days 2025 DE

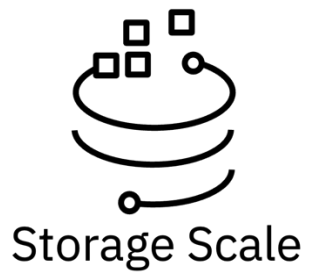
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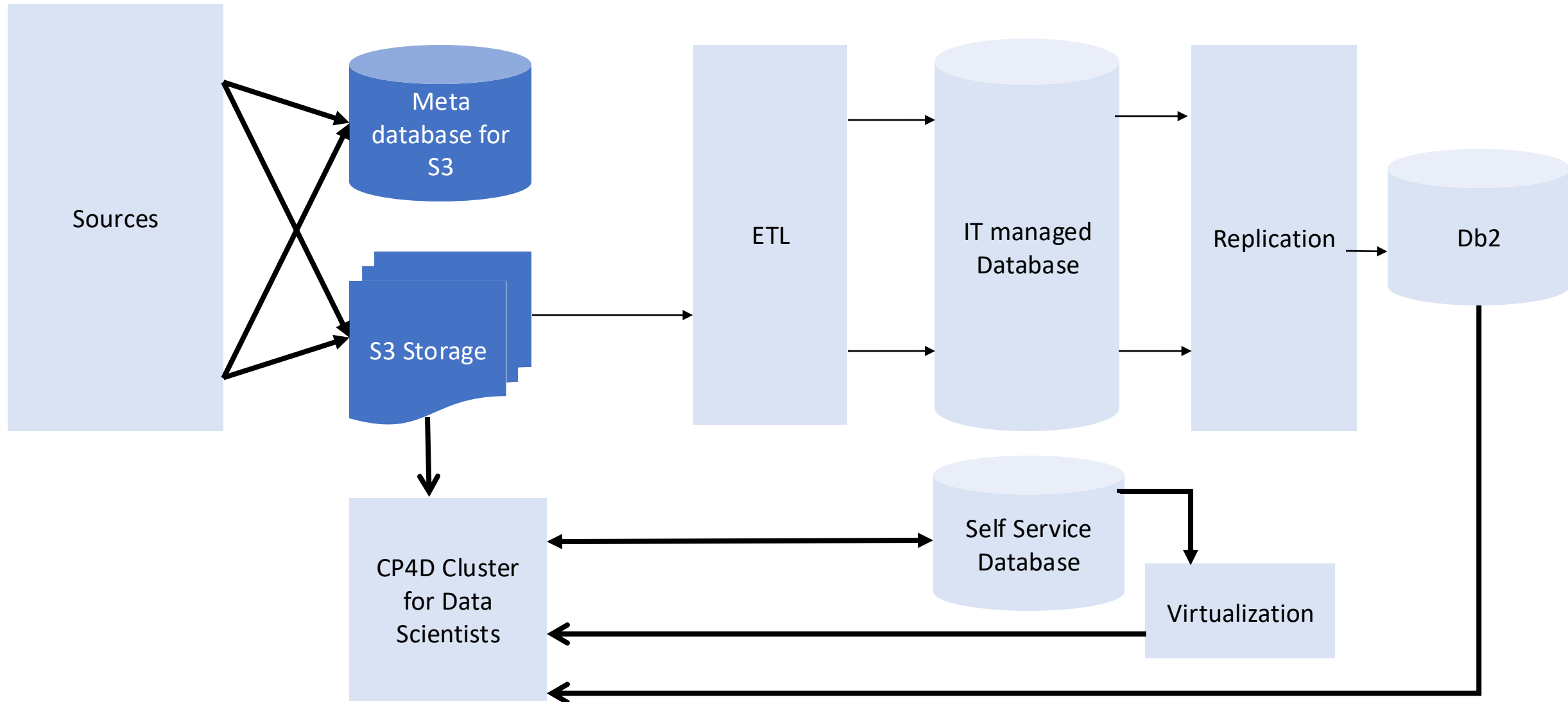


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Use Case 1: S3 and Generative AI

- Runtime environment for RAG application (frontend and backend): OpenShift
- LLM provider: watsonx.ai, IBM's AI & data platform
- Document database : Elasticsearch Enterprise, a search solution enhanced with vector embedding and hybrid search capabilities (provided through IBM watsonx discovery)
- IBM CES S3 as central object store for documents, Elasticsearch snapshots, ...

Use Case 2: S3 as central „Landing Zone“



Main Requirements for Solution Architecture

Data must not leave the data center

On-Premise

Some documents that will be analyzed contain sensitive information. Even sending parts of documents as context to LLM hosted externally is currently not possible.

Existing toolset

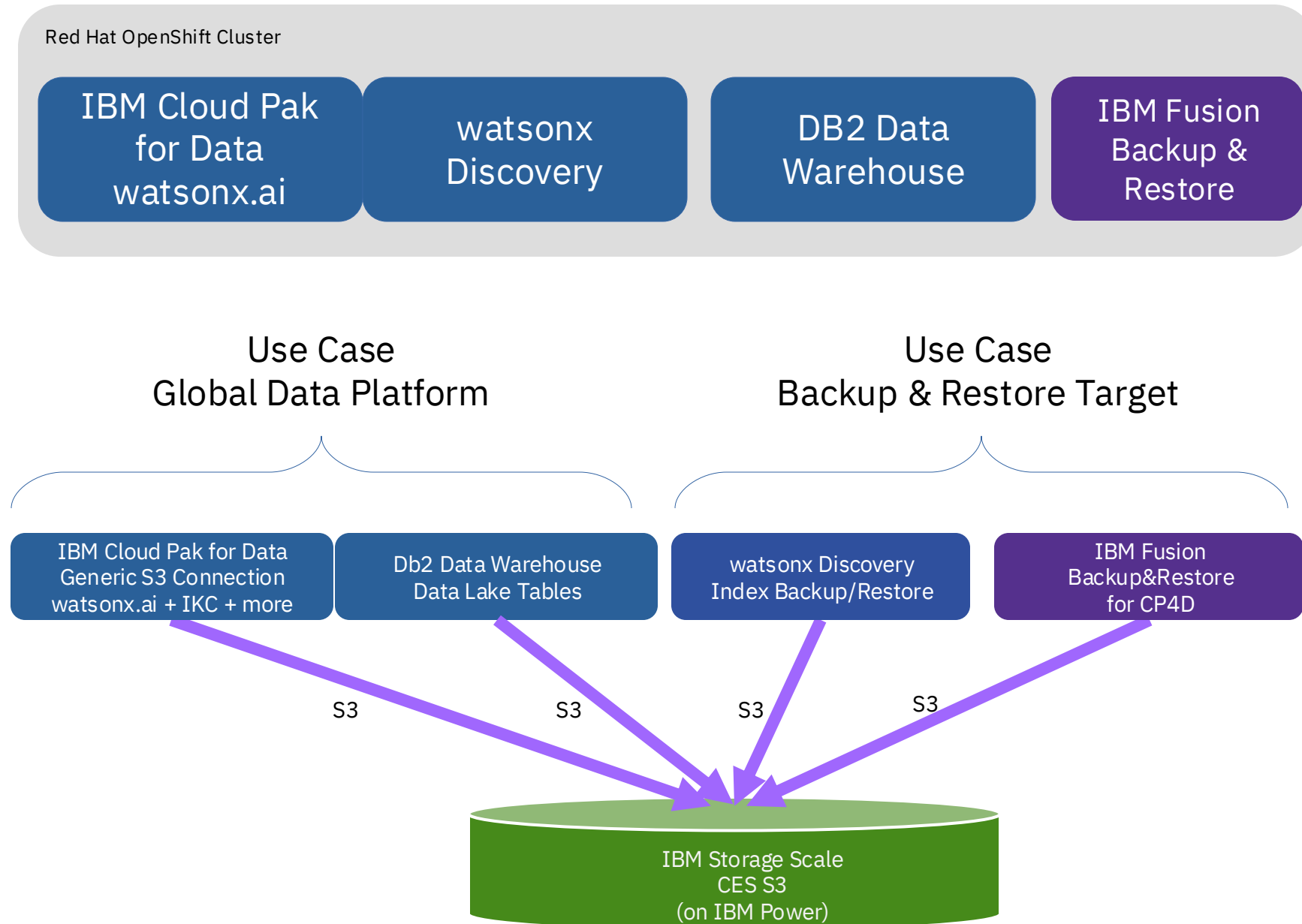
Existing CP4D cluster as endpoint for all “classical” ML deployments.

Private cloud

Consolidate workload around a private cloud setup on top of Cloud Pak for Applications (OpenShift).

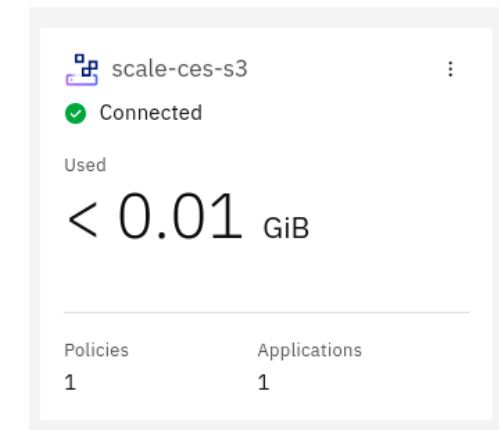
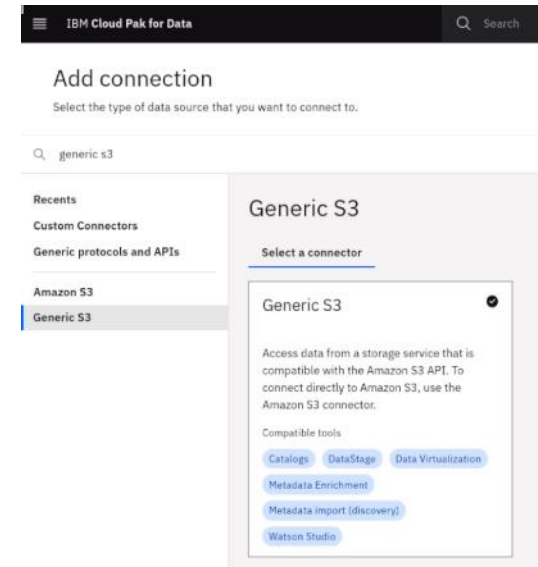
Pilot Overview

- Pilot motivation: Although IBM Software products state S3 protocol support, interoperability validation with Storage Scale CES S3 was required
- Pilot target: Prove that product integration works to get IBM Product Management support statements
- Pilot methodology: test the four products in separate sprints with weekly playbacks
 - 3 products tested at IBM
 - wx.discovery at client
- Overall duration: 4 wks



Pilot Summary

- Some challenges setting up TLS certificates for S3 clients
 - Lesson learned: Client uses an own CA, so the client software needs to be configured with either the CA certificate or the full certificate chain
- All test were successful
- The involved product teams provided a support statement for the client



Cloud Pak for Data testing

- Use CP4D Generic S3 Connection
- Jupyter Notebook deployed within CP4D to test
 - Connectivity
 - Read/Write data
 - Multipart upload
 - Bucket operations
 - Read/Write Object metadata
- Used IBM Knowledge Catalog to import Metadata from a CES S3 connection

The screenshot displays the IBM Cloud Pak for Data interface. At the top, the 'Edit connection: Generic S3' page is visible, showing the endpoint URL 'https://fusion-sds-scale.ibmlab.de:6443', bucket 'cp-data-1', and region. Below this, a Jupyter notebook titled 'Notebook to test Storage Scale CES S3 with CP4D Generic S3 Connection' is open. The notebook contains a code snippet for testing data ingestion from a CSV file stored on the Storage Scale CES S3 bucket. The output of the code shows a table with two columns: 'Insurance_Claim' and 'Summary'. The table contains two rows of data. Below the notebook, the 'DataFin Metadata Import Test' page is visible, showing a list of imported assets with columns for Name, Asset type, Format, Content, Last imported, and Status. The assets are listed in a table with 11 rows. On the right side of the interface, there is a sidebar with a search bar and a list of projects, including 'the project' and 'Scale_CES_S3_metadata'.

Edit connection: Generic S3

Review the connection information.

Connection overview

Connection details

Credentials

Certificates

Endpoint URL (required) ⓘ

https://fusion-sds-scale.ibmlab.de:6443

Bucket ⓘ

cp-data-1

Region ⓘ

IBM Cloud Pak for Data

Projects / hs-sandbox / Connection-Test

Notebook to test Storage Scale CES S3 with CP4D Generic S3 Connection

Test 1 - Use the Code Snippets Data Ingestion feature

In this test, we ingest a CSV file stored on the Storage Scale CES S3 bucket using the Code Snippets->Data Ingestion feature. We load the data as a pandas DataFrame.

```
In [1]: import itc_utils.flight_service as itcfs

# NOTE:
# A limit of 5000 rows has been applied to the request to enable sample previewing.
# Edit or comment-out row_limit to change or disable the row limit.
#
nb_data_request = {
    'connected_data_name': 'claim_summarization_validation.csv',
    'interaction_properties': {
        'row_limit': 5000
    }
}

flight_descriptor = itcfs.get_flight_descriptor(nb_data_request=nb_data_request)

flightClient = itcfs.get_flight_client()
flightInfo = flightClient.get_flight_info(flight_descriptor)

df_0 = itcfs.read_pandas_and_concat(flightClient, flightInfo, timeout=240)
df_0.head(10)
```

Out [1]:

	Insurance_Claim	Summary
0	On November 1st, 2023, at 11:00 AM, my vehicle...	My 1998 Nissan Maxima was involved in a severe...
1	On October 29th, 2023, at 11:00 AM, the insure...	On October 29th, 2023, at 11:00 AM, the insure...

DaFin Metadata Import Test

Imported assets

Name	Asset type	Format	Content	Last imported	Status
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed
AssetType	Data	AssetType	AssetType	Nov 30, 2023, 10:27 PM	Completed

the project

Scale_CES_S3_metadata['.']['description'], Scale_CES_S3_metadata['url'], Scale_CES_S3_metadata['bucket']

S3 cluster

Db2 Data Warehouse testing

- Db2 11.5.9 with Db2 BigSQL 11.3.0, db2uinstance CR, 3 nodes
- archive logs persistent volume must use ReadWriteMany access mode
- CES S3 TLS certificate must be imported to Db2 Java Keystore (default password: changeit)
- Undocumented command to set Path-style S3 access
db2 "CALL SYSHADOOP.SET_DATALAKE_CONFIG('CORE', 'fs.s3a.bucket.user1.path.style.access', 'true')"
- Data import is supported for Parquet data but not for Iceberg tables written outside Db2

```
$ db2 "CREATE DATALAKE TABLE t2 (i INT, s VARCHAR(10)) STORED BY \
ICEBERG LOCATION 'DB2REMOTE://cesnode1-user1//t2-iceberg' \
TBLPROPERTIES ('external.table.purge'='true');"
DB20000I The SQL command completed successfully.
```

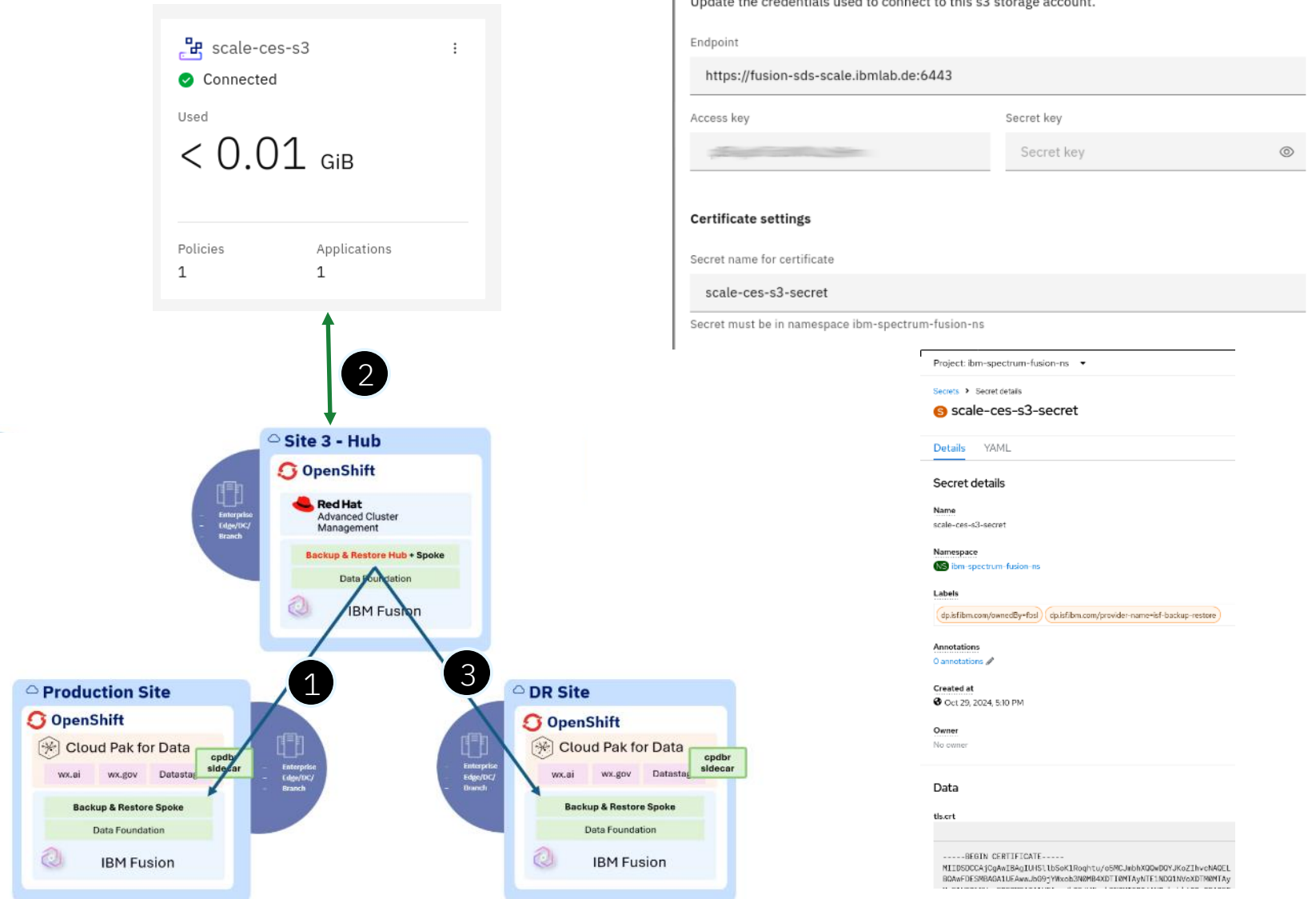
```
$ db2 "INSERT INTO t1 VALUES (55131, 'Mainz');"
DB20000I The SQL command completed successfully.
$ db2 "INSERT INTO t1 VALUES (55278, 'Udenheim');"
DB20000I The SQL command completed successfully.
$ db2 "INSERT INTO t1 VALUES (55270, 'Zornheim');"
DB20000I The SQL command completed successfully.
```

```
$ db2 "SELECT * FROM t1"
I          S
-----
55131 Mainz
55270 Zornheim
55278 Udenheim
3 record(s) selected.
```

```
# ls -lR t2-iceberg
t2-iceberg:
total 1
drwxrwx---. 2 root root 4096 Nov 21 11:19 metadata
drwxrwx---. 2 root root 4096 Nov 21 11:19 data
t2-iceberg/metadata:
total 80
-rw-rw----. 1 root root 4416 Nov 21 11:19 00003-bd1ab615-1ad4-4c12-9f3c-747311f536dc.metadata.json
-rw-rw----. 1 root root 4368 Nov 21 11:19 snap-8275370836592526925-1-0ef1dca6-5a24-4a64-8fbc-
cfac7ac2948e.avro
-rw-rw----. 1 root root 6677 Nov 21 11:19 0ef1dca6-5a24-4a64-8fbc-cfac7ac2948e-m0.avro
-rw-rw----. 1 root root 3478 Nov 21 11:19 00002-c97e146c-907f-41e6-a97d-4c802f296799.metadata.json
-rw-rw----. 1 root root 4316 Nov 21 11:19 snap-1379196754593492153-1-ba4dc5c7-d7b5-40b6-bab1-
a23cd8401545.avro
-rw-rw----. 1 root root 6679 Nov 21 11:19 ba4dc5c7-d7b5-40b6-bab1-a23cd8401545-m0.avro
-rw-rw----. 1 root root 2540 Nov 21 11:19 00001-7c66f0c6-8b6b-47ab-8be5-3f7da06e6e00.metadata.json
-rw-rw----. 1 root root 4244 Nov 21 11:19 snap-4061617877835189135-1-1444175c-403e-4c19-894d-
3f891932ba41.avro
-rw-rw----. 1 root root 6675 Nov 21 11:19 1444175c-403e-4c19-894d-3f891932ba41-m0.avro
-rw-rw----. 1 root root 1547 Nov 21 11:14 00000-86c3a4f8-4185-4fde-8b4e-88a69aacdef8.metadata.json
t2-iceberg/data:
total 24
-rw-rw----. 1 root root 685 Nov 21 11:19 239620564-0-20241121101943961-00001.parquet
-rw-rw----. 1 root root 692 Nov 21 11:19 1483219878-0-20241121101934442-00001.parquet
-rw-rw----. 1 root root 664 Nov 21 11:19 1093471490-0-20241121101918648-00001.parquet
```

Fusion Backup & Restore testing

- Backed up CP4D with the applications the client uses on one OpenShift cluster, restored on another OpenShift cluster
- Leveraging IBM Fusion recipes for CP4D application consistency
- Ensured that all components are functional after restore





Do you have a
GREAT IDEA
to solve and
improve a business
challenge?



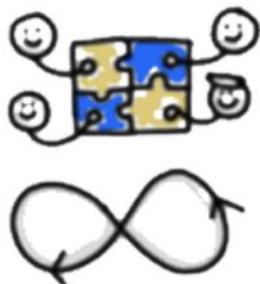
Start-up speed with Enterprise Scale

INNOVATE
in 4-10 hours



We **align** on a solution
and define a **scope**
to **prove value**.

PREPARE
in 1-5 days



We **prepare, plan,**
and commit to be
ready to rapidly build.

CO-CREATE
in 2-4 weeks



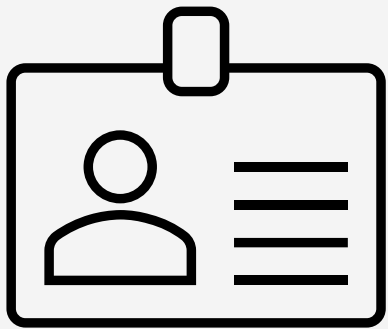
We **build, validate, and improve** over a series
of Agile Sprints and Playbacks with you.

TRANSITION
adapted for you



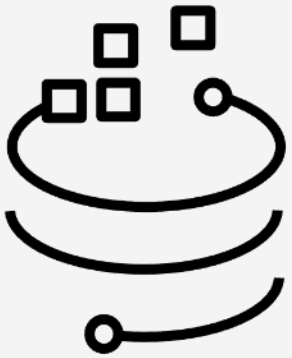
We get on path to bring
our solution into
scaled production!

Thank you

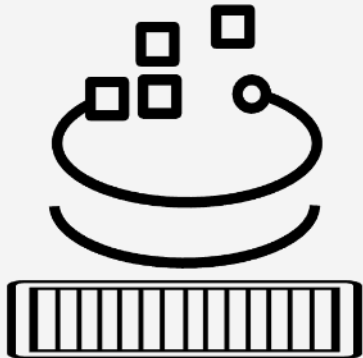


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Storage Scale



Storage Scale
System