Adding a caching volatile pool to a DPM - case study

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INFN - Napoli
DPM Work Shop - Bern 13-14 June 2019

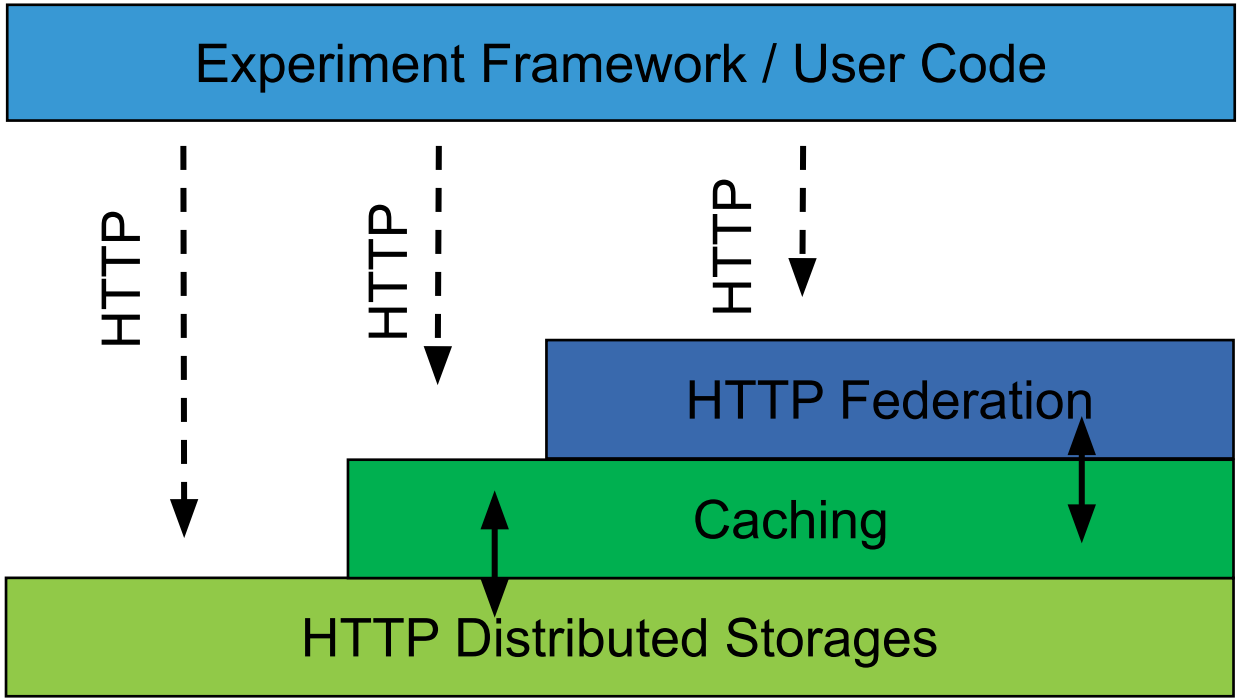
Outline

- ➔ DPM Testbed setup in Napoli
- ➔ Cache Setup: Volatile Pool + Dynafed
- ➔ Script details
- ➔ Cloud-Hammer test
- ➔ Plans

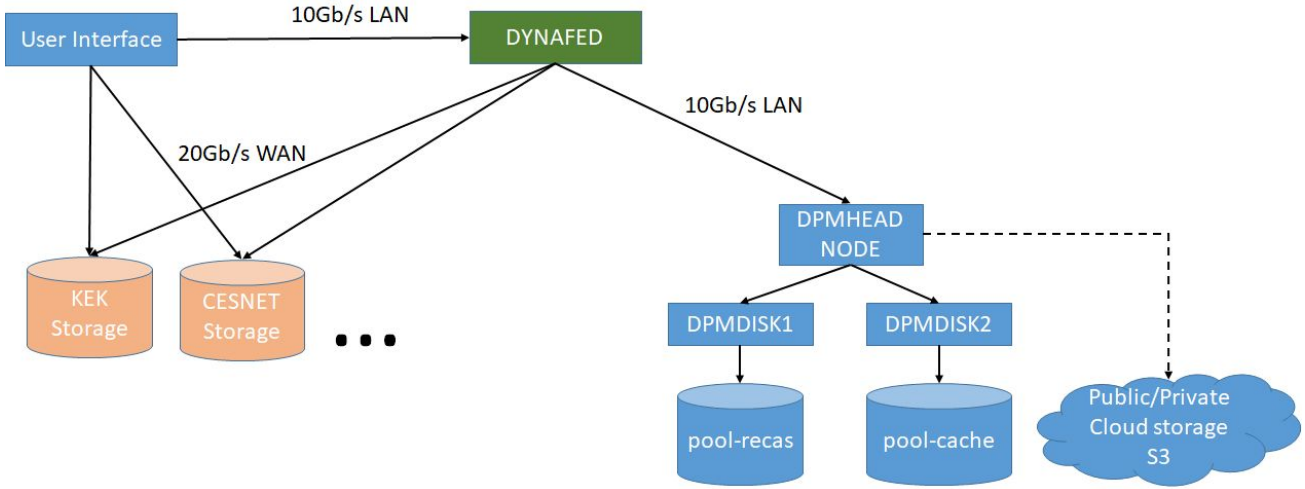
DPM Cache Setup

- 1 Physical Head Node
- 1 Physical disk node
  - 4x 19TB filesystems
- 1x 19TB “traditional” pool
- 1x 19TB “volatile” pool
- CentOS7 & Dmlite version 1.12 with dome fully enabled
- Gridftp redirection
- Custom scripts for stat/pull operations

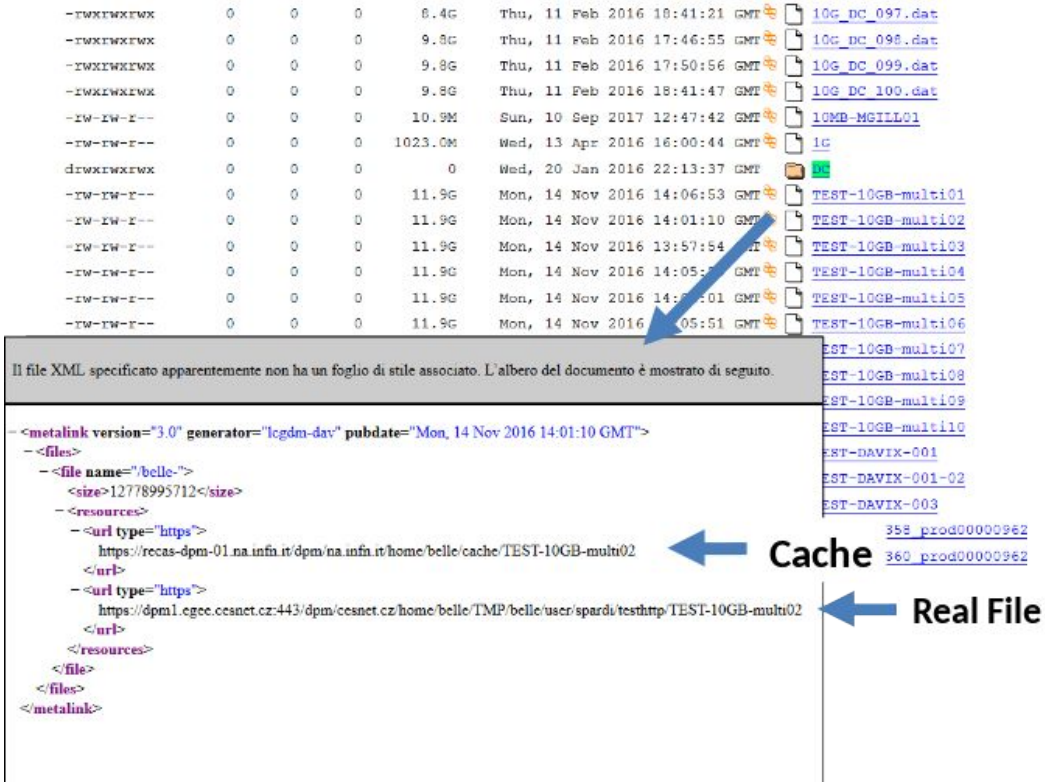
Cache Architecture



Cache Setup: Volatile Pool + Dynafed

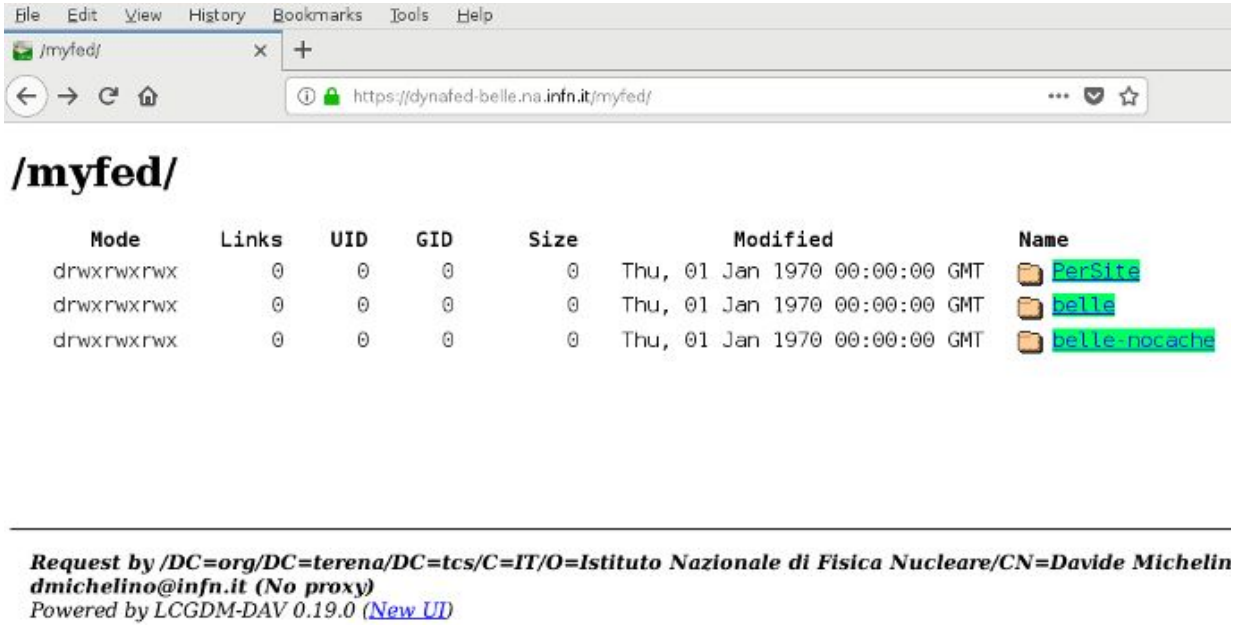


Dynafed configuration



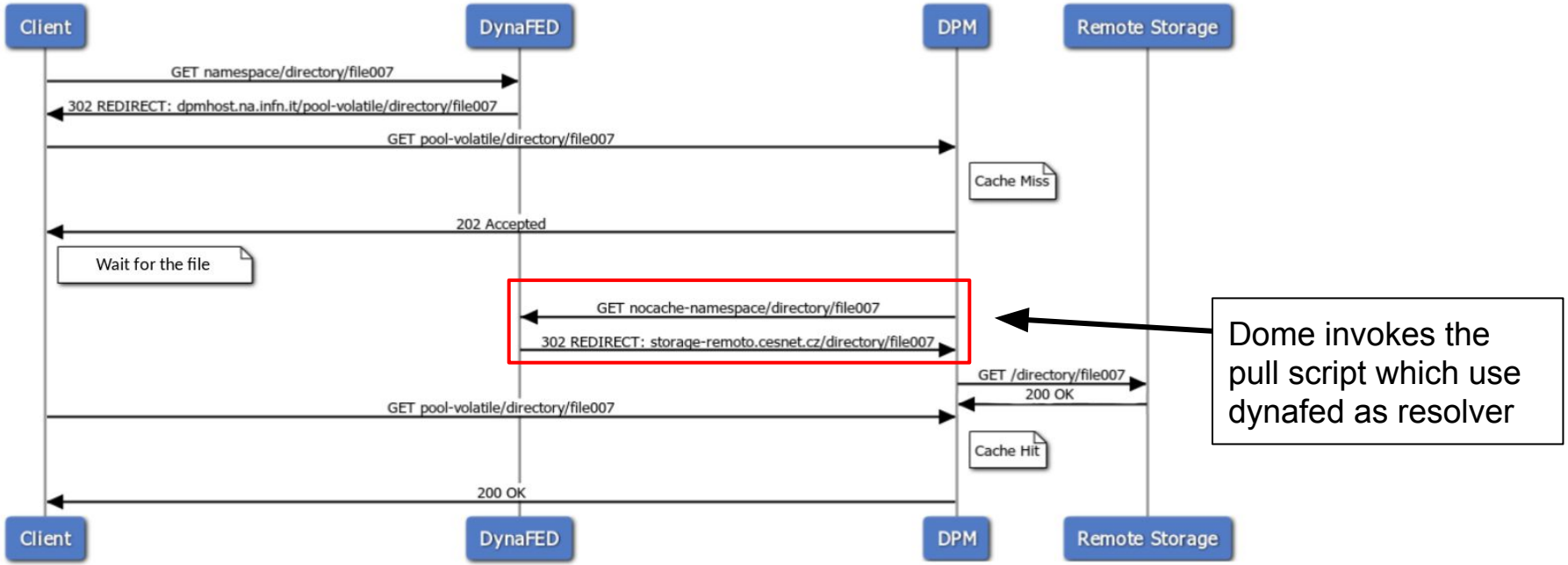
Dynafed is configured to aggregate the volatile pool with all the experiment endpoints, so every file has at least two replicas: the one in the actual storage and the one provided by the volatile pool (even if the latter does not exist yet).

Dynafed as resolver



Dynafed provides an additional aggregation with all the experiment storage but the volatile pool. This aggregation is used by dome's scripts to resolve the location where fetch the requested data.

Dynafed as resolver



Dome scripts details - File Stat

```
PATHL=`echo $1 |cut -d/ -f 7-`
DYNAPATH="davs://dynafed-belle.na.infn.it/myfed/nocache/$PATHL"
STAT=$(gfal-stat $DYNAPATH; exit $?)
STATout=$?
stat_size=`echo $STAT|cut -d' ' -f 4`
stat_type=`echo  $STAT|cut -d' ' -f 5`
if [ "$stat_type" = "regular" ]; then
   echo ">>>>> STAT $stat_size"
elif [ "$stat_type" = "directory" ]; then
   echo ">>>>> STAT 0 16384"
else
   exit 1
fi
exit 0
```

Resolver url

Just a stat!

Check if it was a file or a directory and tell it dome

Dome scripts details - File Pull

```
PATHL=`echo $1 |cut -d/ -f 7-`
DYNAPATH="davs://dynafed-belle.na.infn.it/myfed/nocache/$PATHL"
echo `date` pull: download of $DYNAPATH in $2 >> /tmp/pull.log
davix-get $DYNAPATH $2 >> /dev/null 2>&1
PULLstatus=$?
if [ $PULLstatus -eq "0" ];then
   echo "`date`: OK ($PULLstatus)" >> /tmp/pull.log
else
   echo "`date`: KO ($PULLstatus)" >> /tmp/pull.log
   exit 1
fi
echo `date` pull: Done >> /tmp/pull.log
exit 0
```

Resolver url

Just a get!

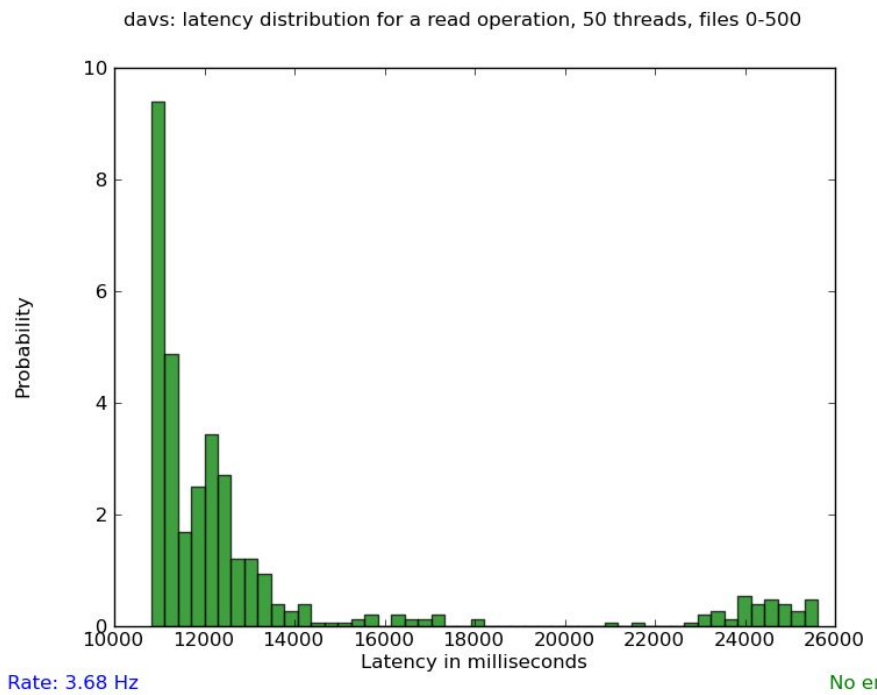
Check if the get was successful and tell it dome.

Grid-Hammer test

- Some tests have been performed with the “grid-hammer” framework in order to simulate concurrent access and test the system stability and its performance.
  - 1 grid-hammer instance with 50 parallel threads to test 500 operations
  - Dpm with 1 disknode configured with a limit of >50 parallel pulls per node
  - Tested read operations both with the cold and warm cache
  - The same tests have been performed regarding stat operations
  - Something to remember:
    - Hammer-cloud performs read tests with very small files (few bytes)
    - Davix by default waits 10 seconds on 202
    - All the requests target dynafed

Grid-Hammer - Read operations

Cold cache

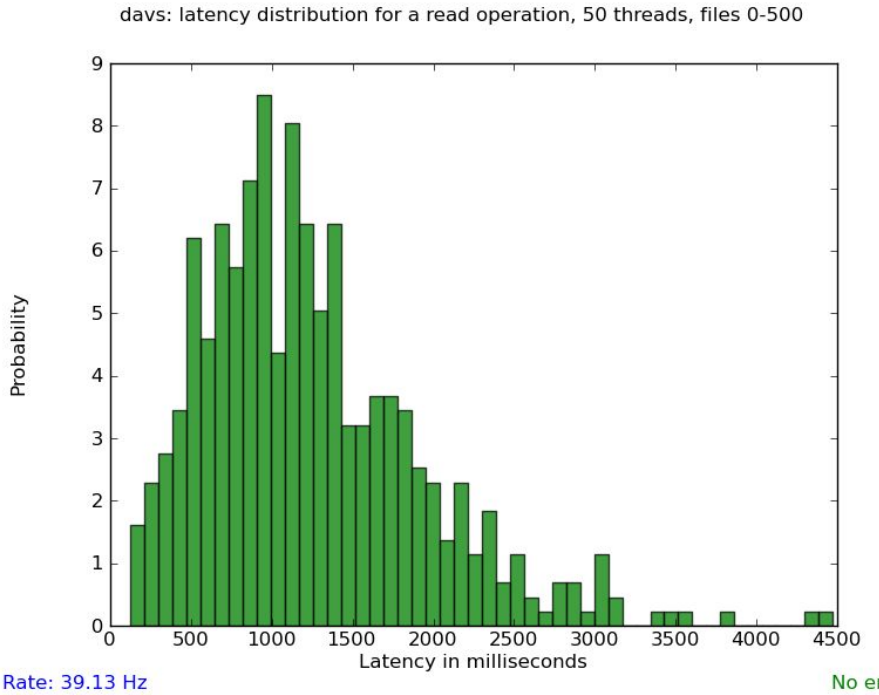


Rate: 3.68 Hz

No errors

Min 10.82 Max 25.62

Warm cache



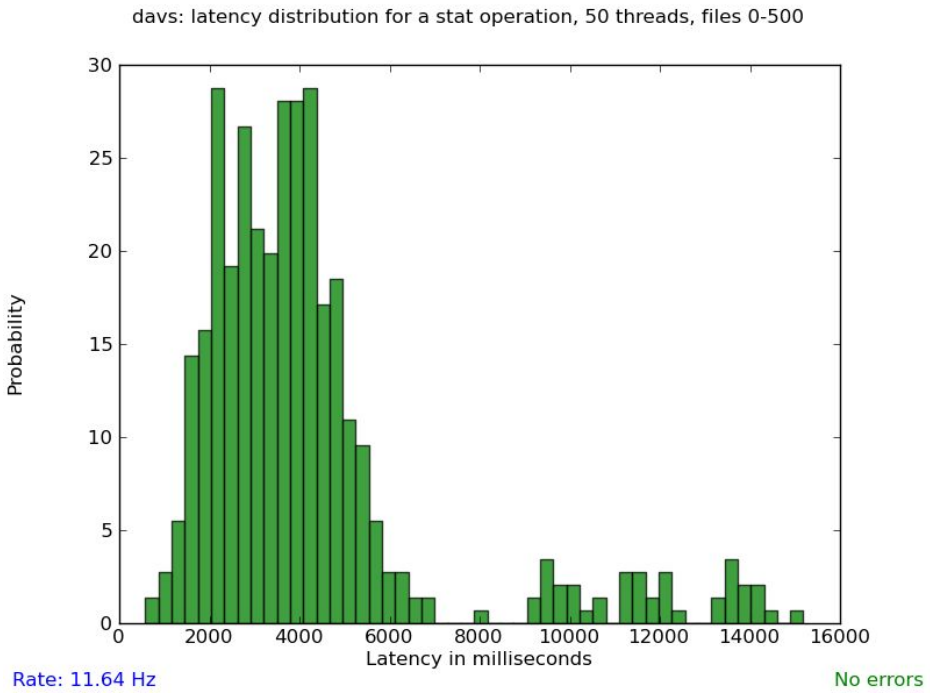
Rate: 39.13 Hz

No errors

Min 0.12 Max 4.47

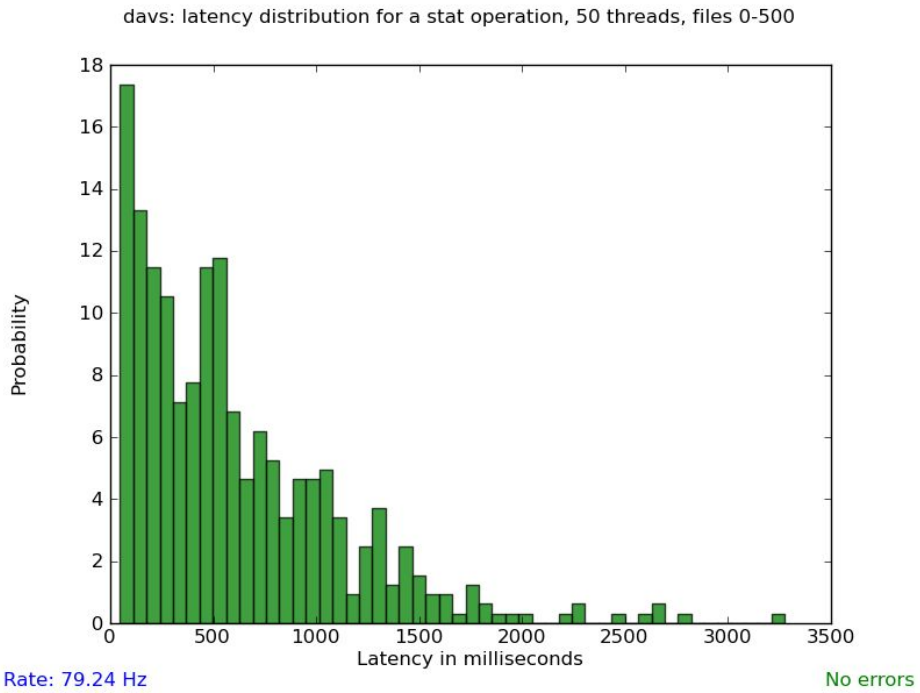
Grid-Hammer - Stat operations

Cold cache



Min 0.58 Max 15.19

Warm cache



Min 0.05 Max 3.27

Grid-Hammer - Outcome

- Performed tests prove the overall system reliability
- More performance oriented test can be done with **bigger files** or with **shorter waiting time**
- Something can be tuned or investigate more
  - In case of transfer failure investigate the use of metalink

Polling issues with Dynafed

Sometime dynafed fail to poll some of storages (the volatile pool for example), after this event the storage is removed from the list in all metalinks for a while. The procedure seems to be affected by an high rate of “false positive”

Suggestion:

Allow admins to tune the polling parameters in the configuration file i.e.:

- Number of polling failures before remove a storage temporarily
- # of positive test required before put the storage in the list again
- Related timeouts (if any)

Projects and collaborations

- IDDLS (Italian distributed datalake for science, INFN internal project)
- XDC project
- DOMA Access

Plans

In Belle II we are starting to discuss how to use/integrate new storage service in the computing model.

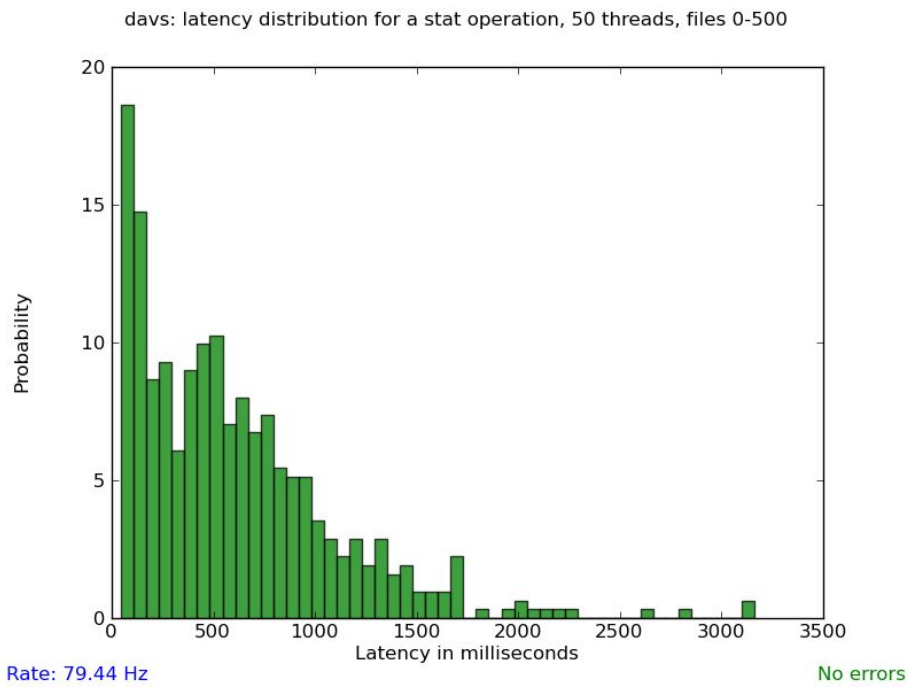
Among them Dynafed and Volatile pools will be presented as possible tools for the community.

- In the current computing model jobs go where data is. Can resource usage be improved running analysis jobs in a site hosting a Cache? (merging and skimming jobs).

BACKUP

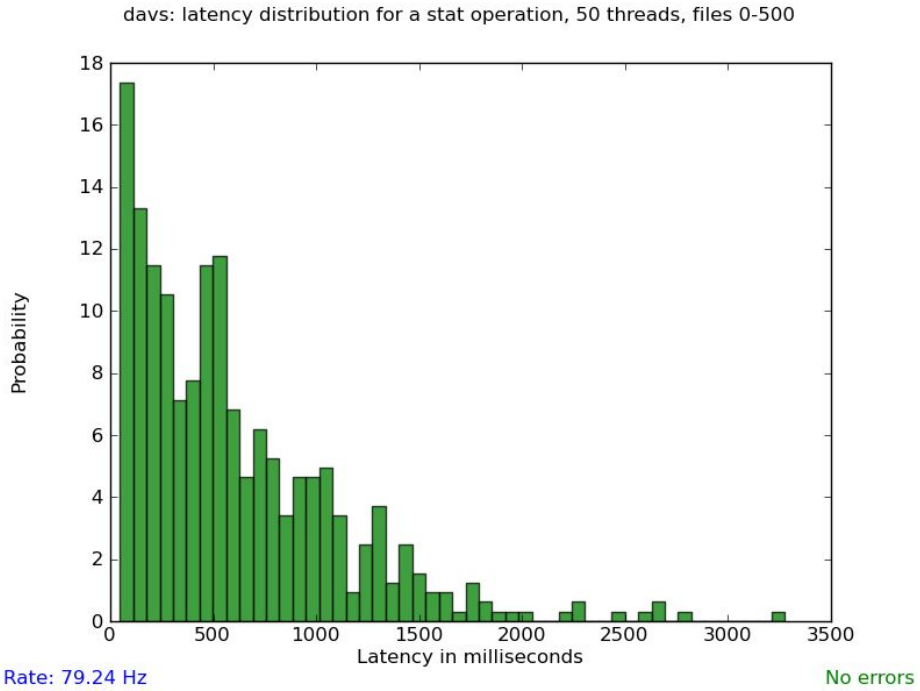
Backup 1: Grid-Hammer - Stat operations cold cache w/ metadata cached by dynafed

Cold cache

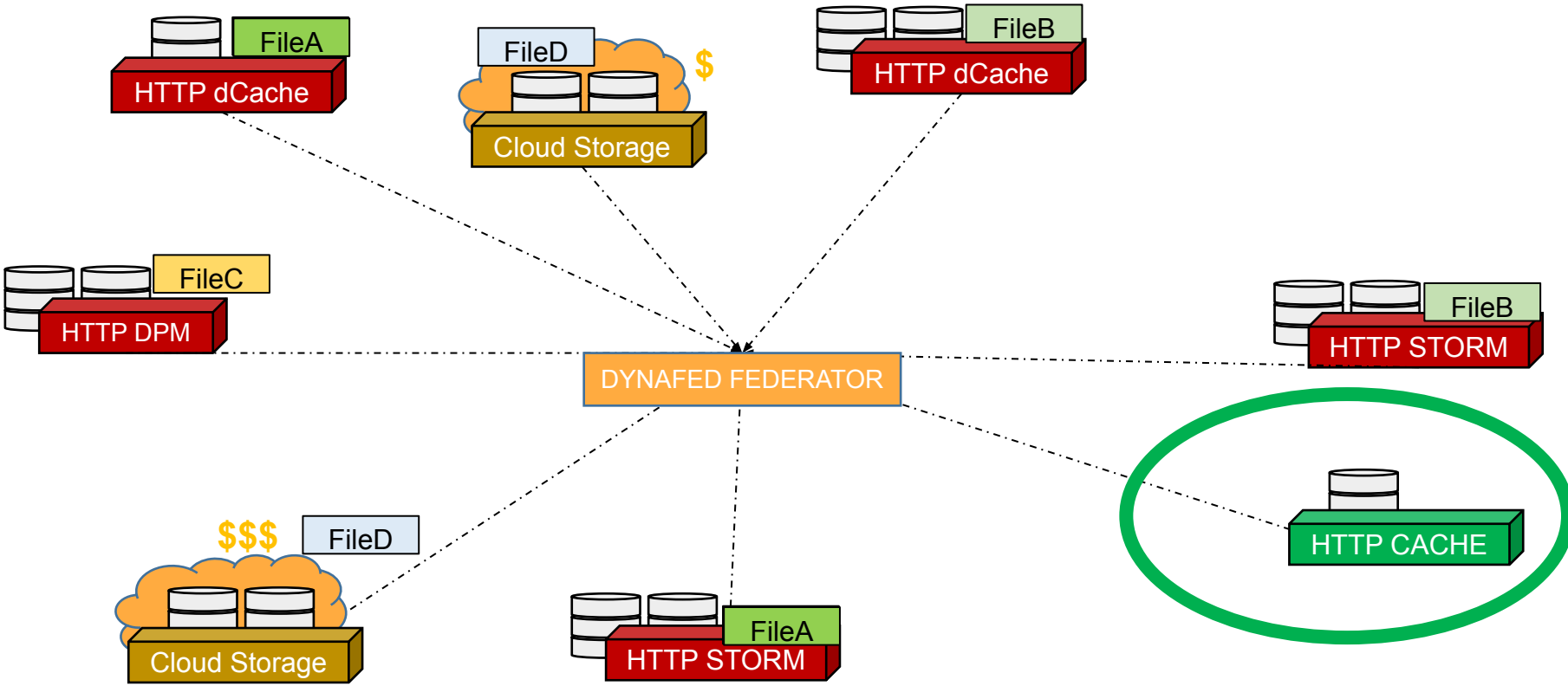


Min 0.05 Max 3.16

Warm cache



Min 0.05 Max 3.27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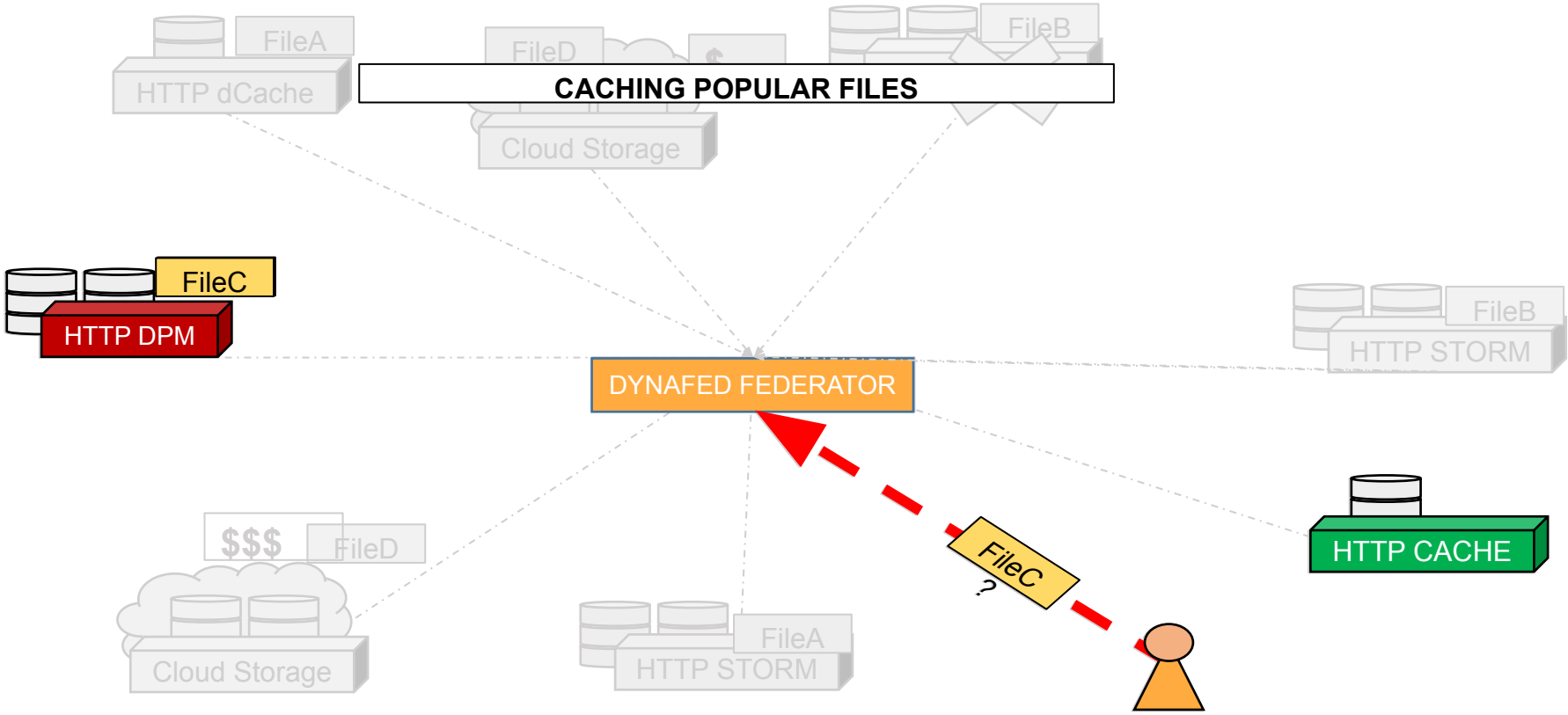
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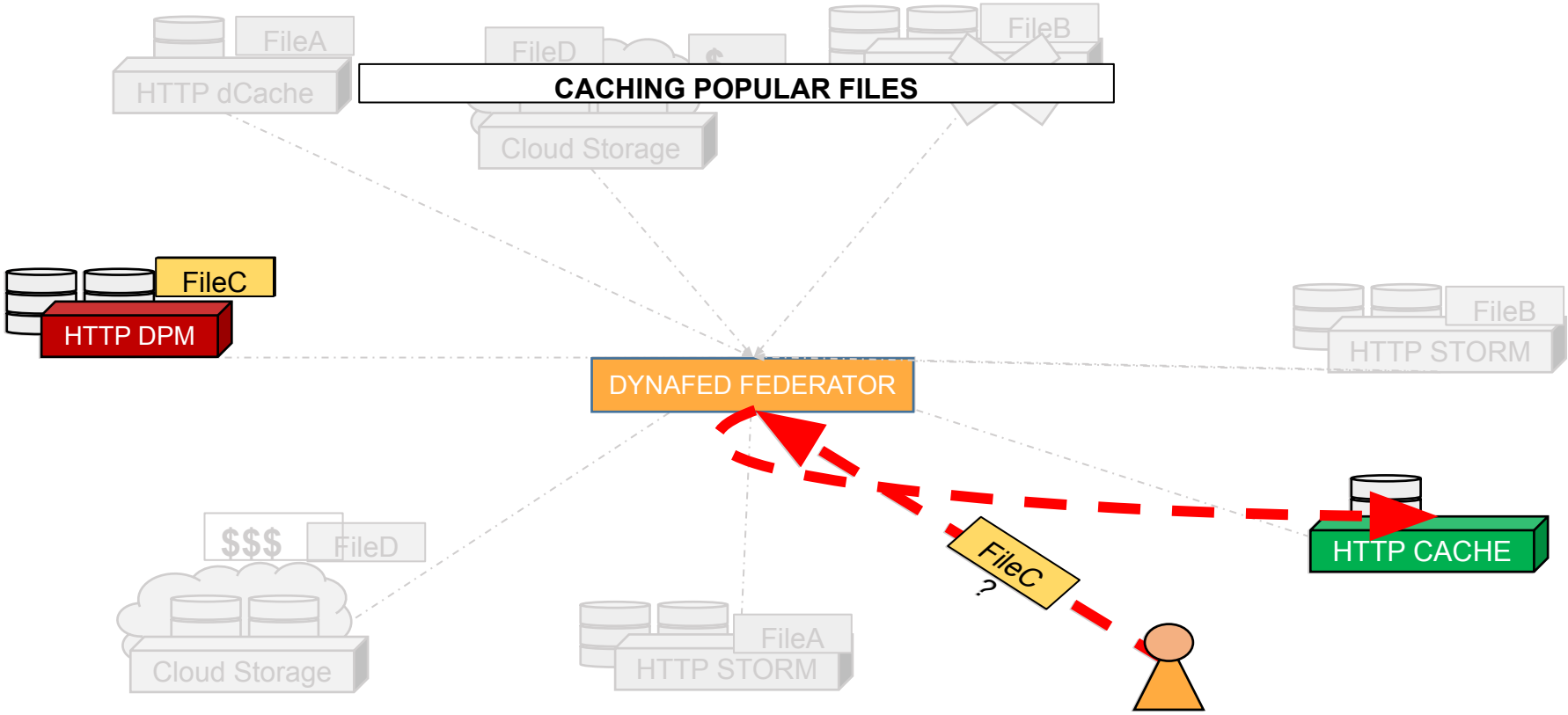
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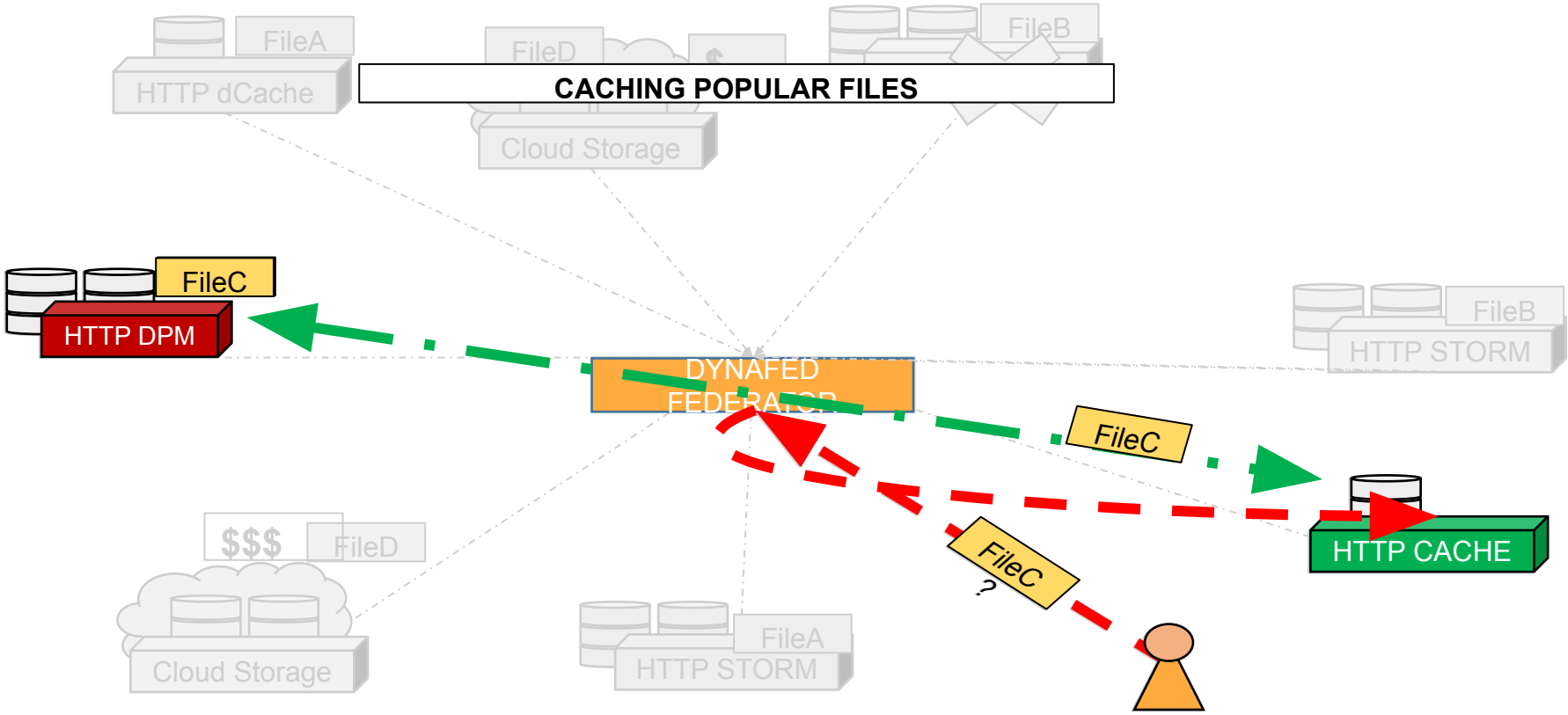
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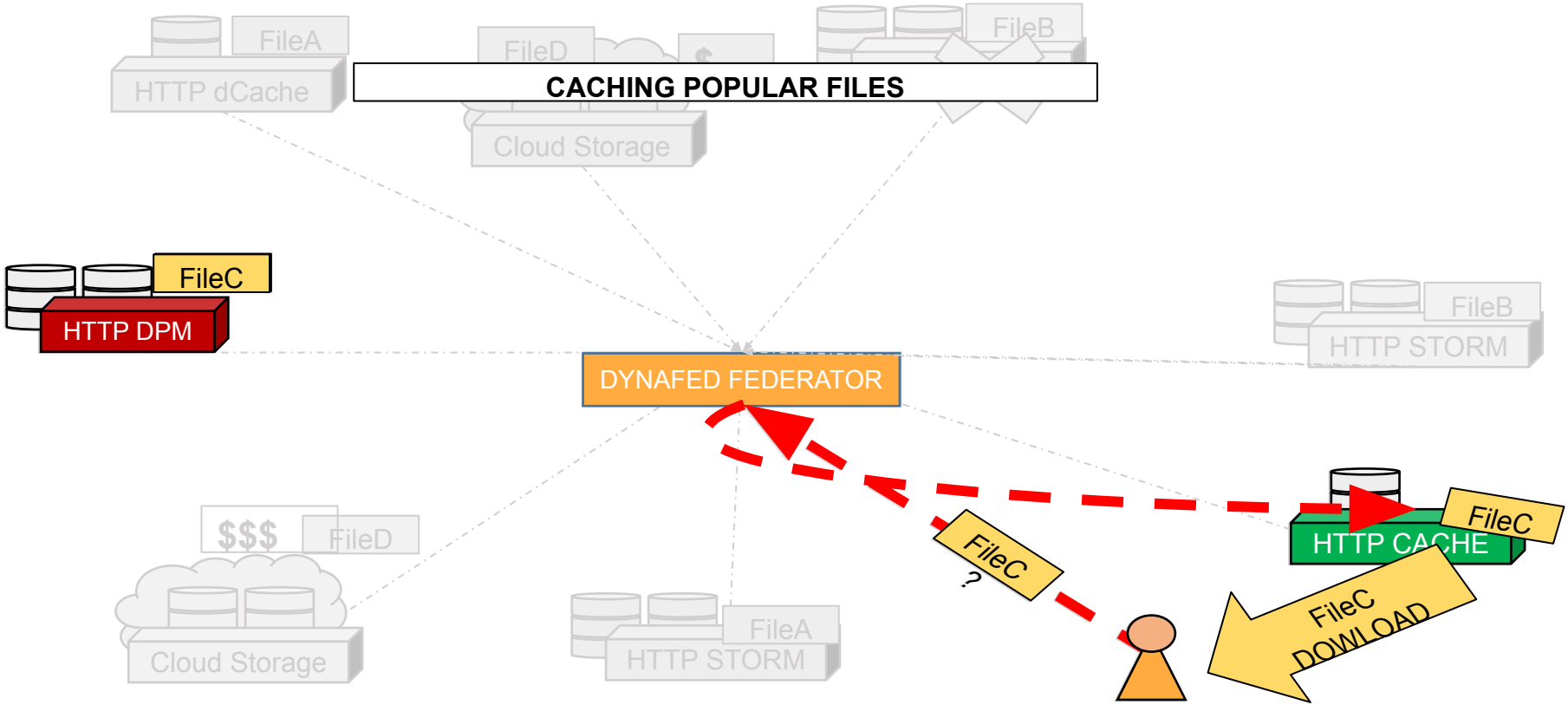
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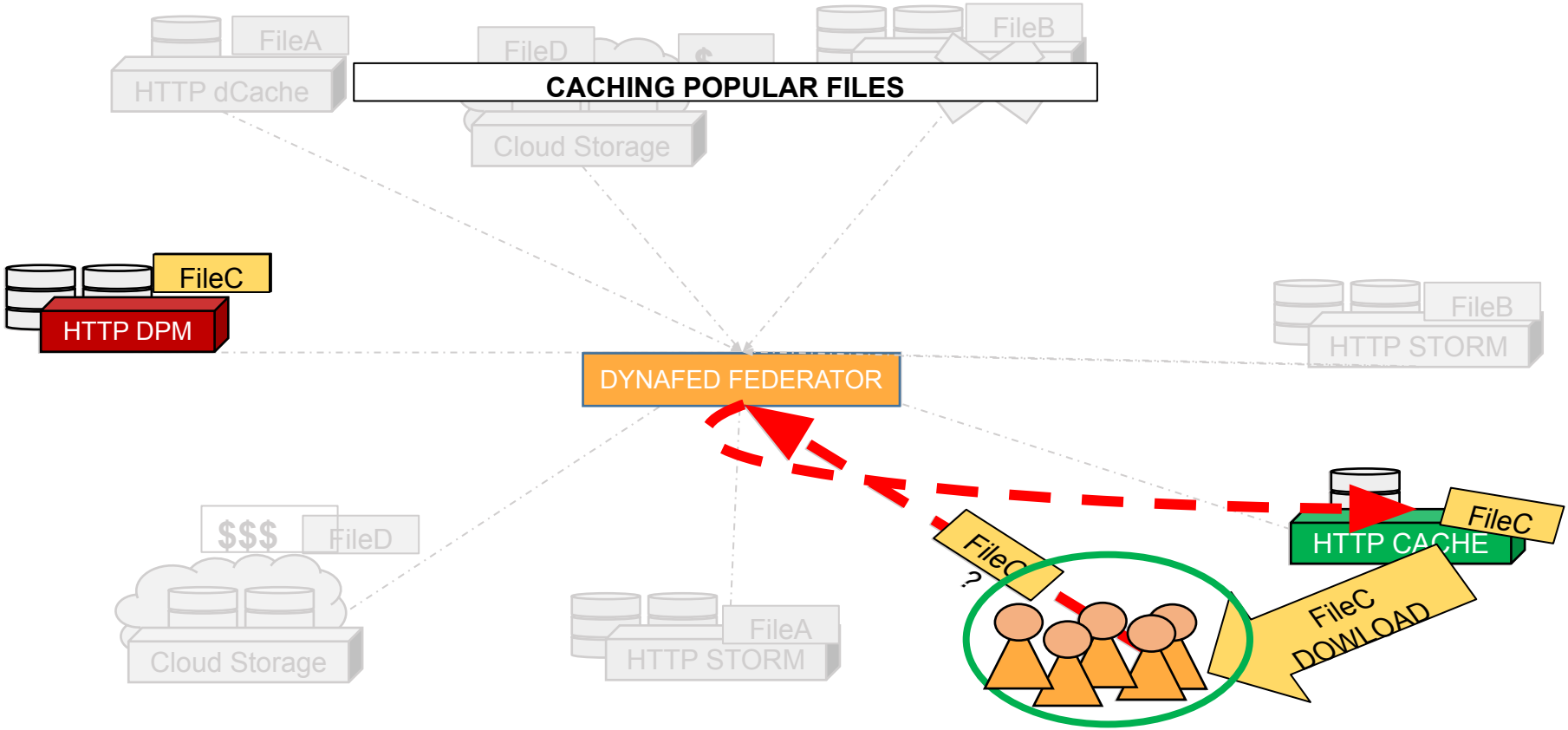
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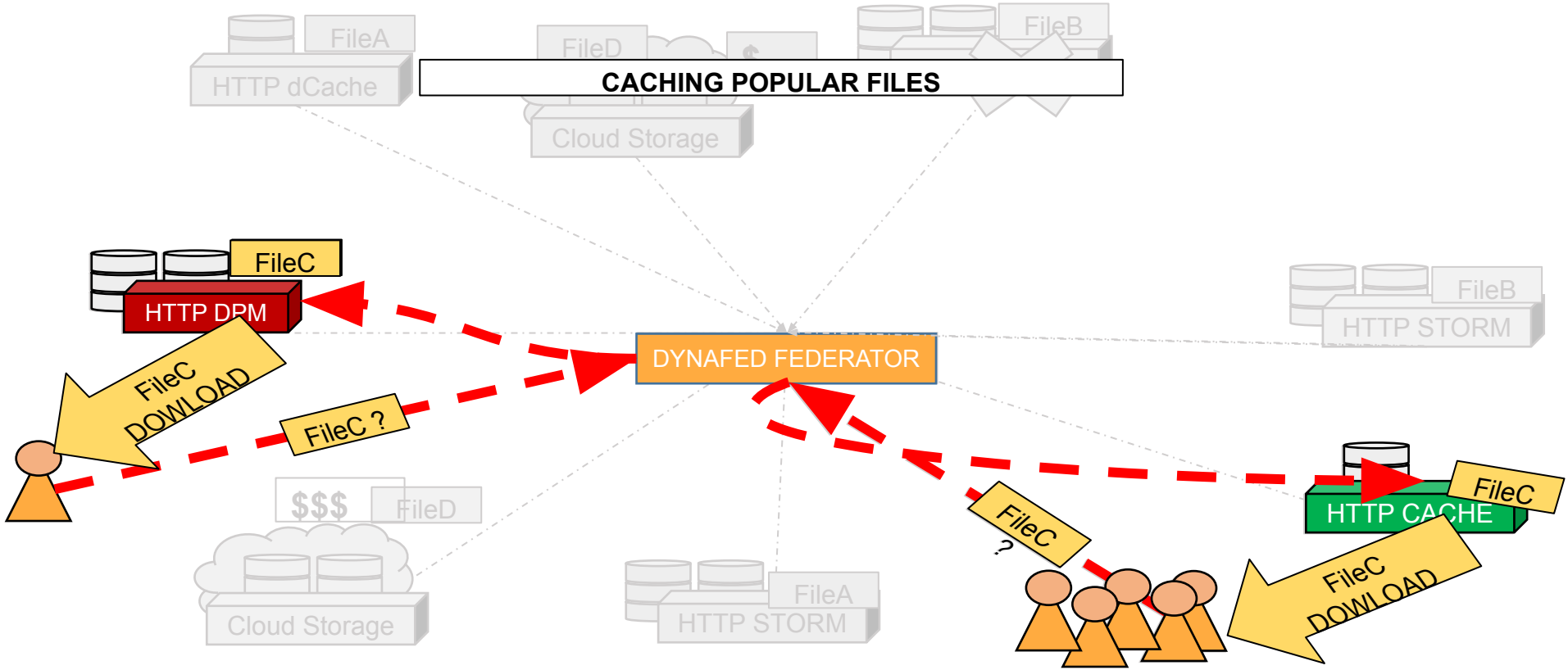
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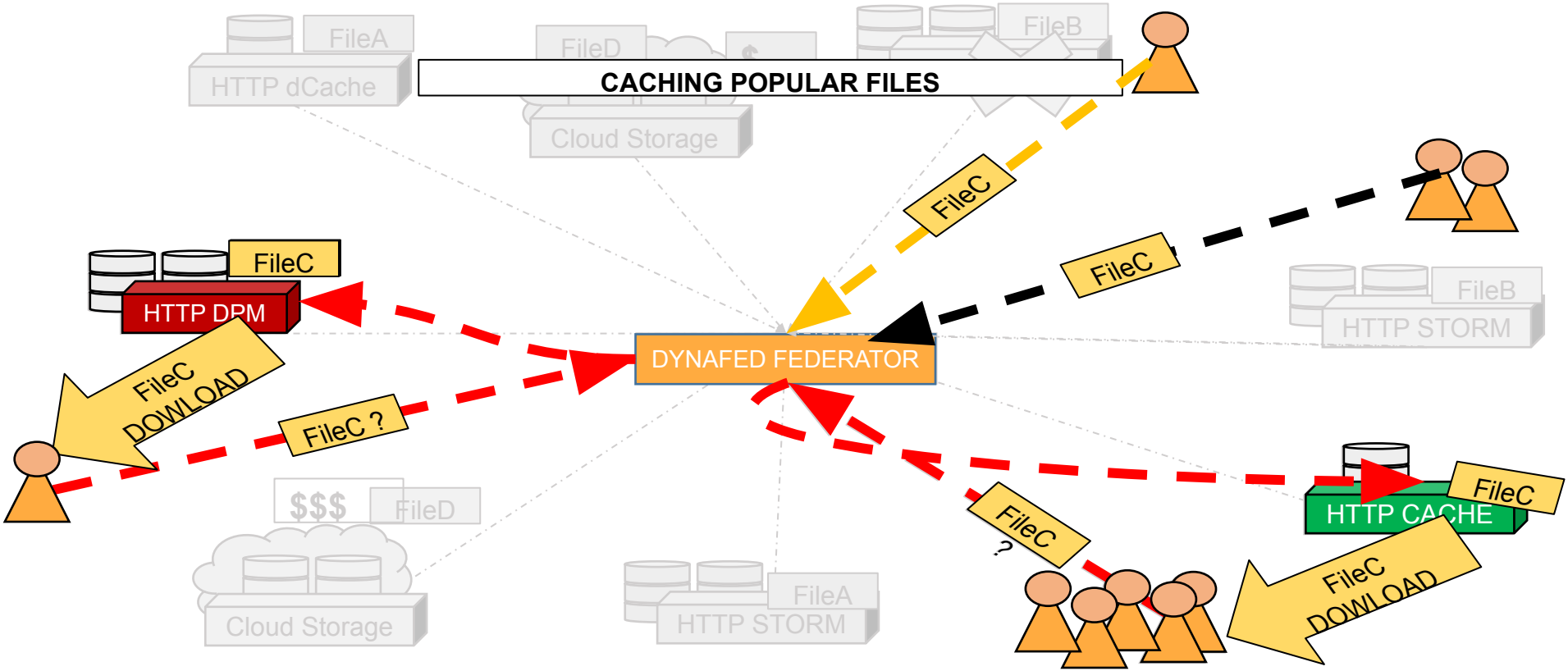
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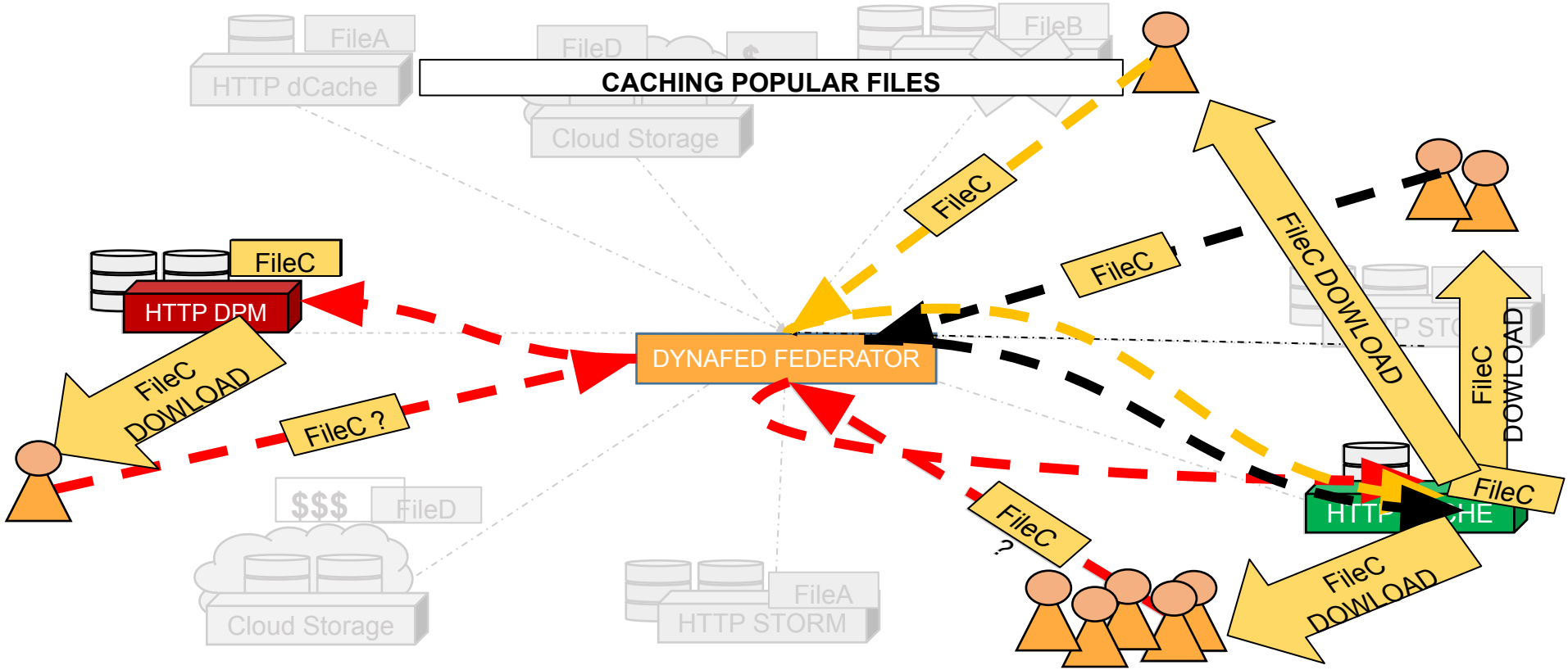
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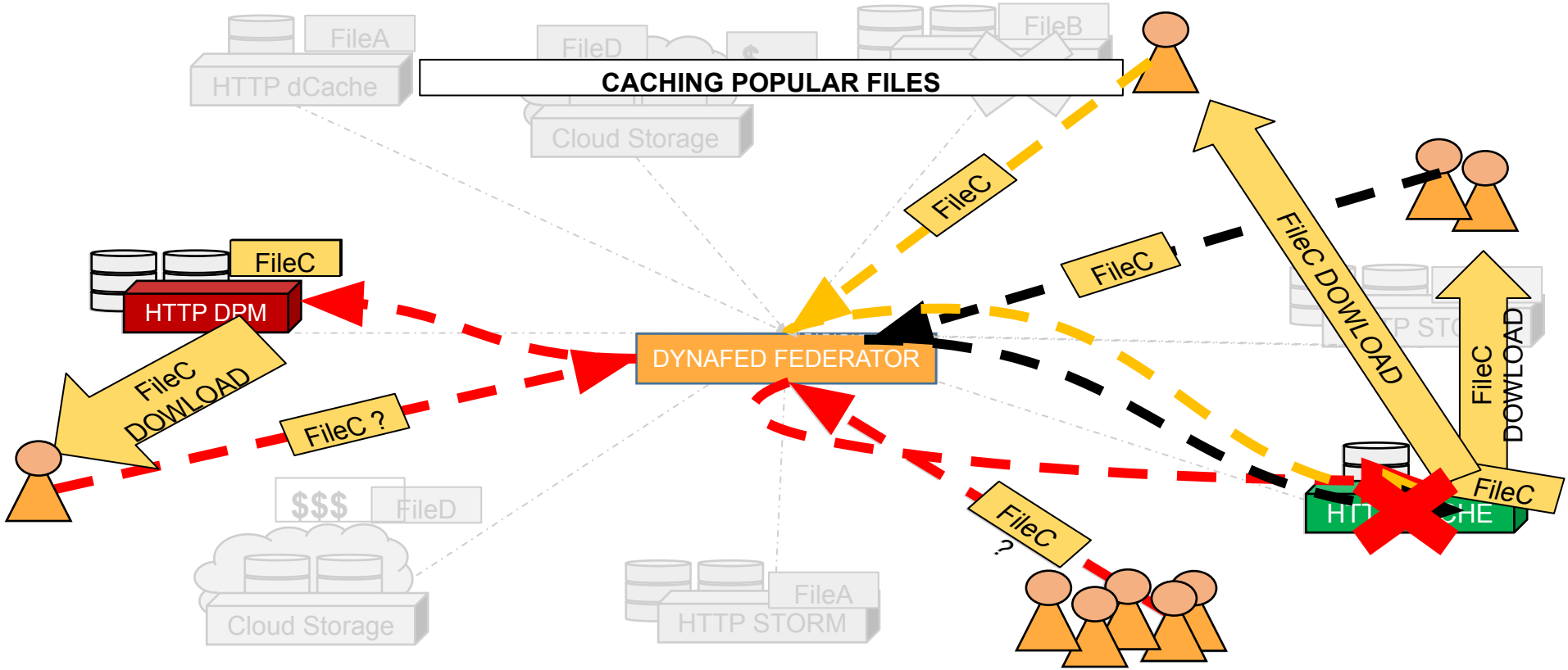
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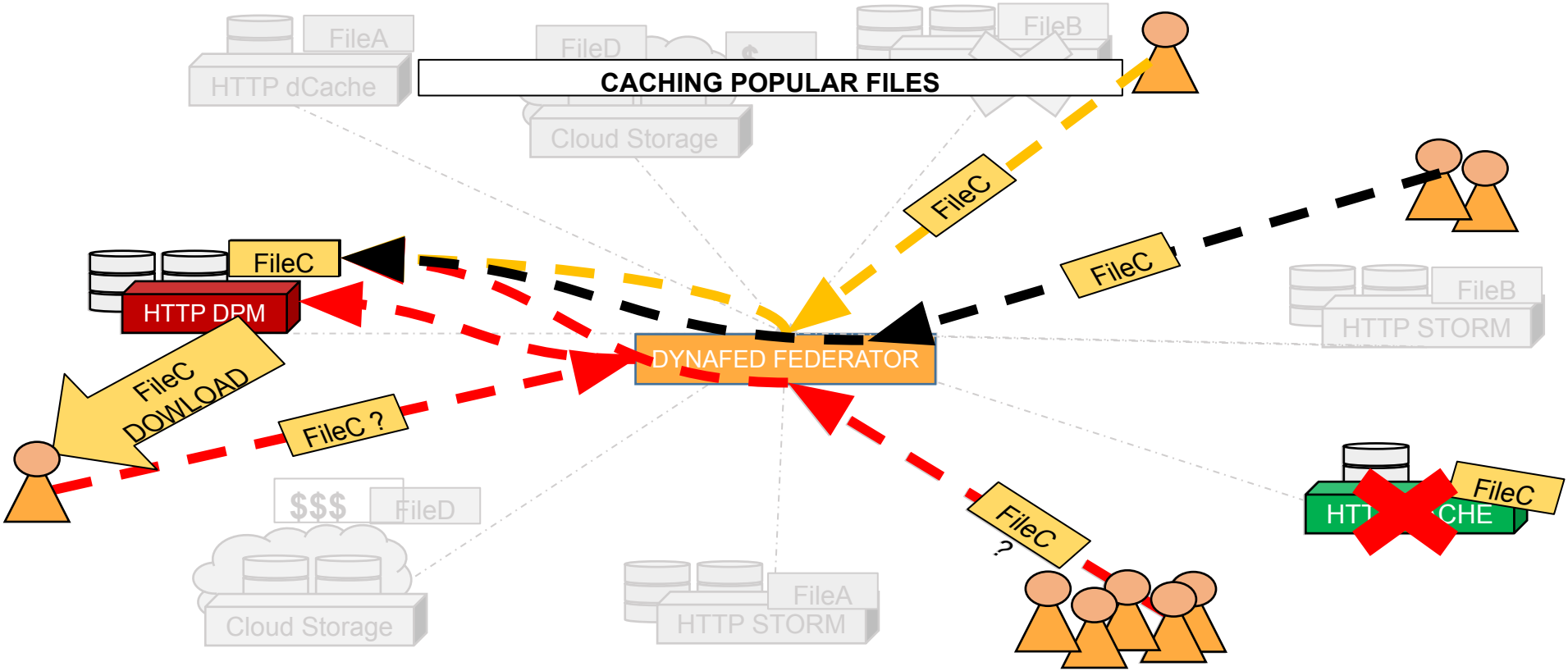
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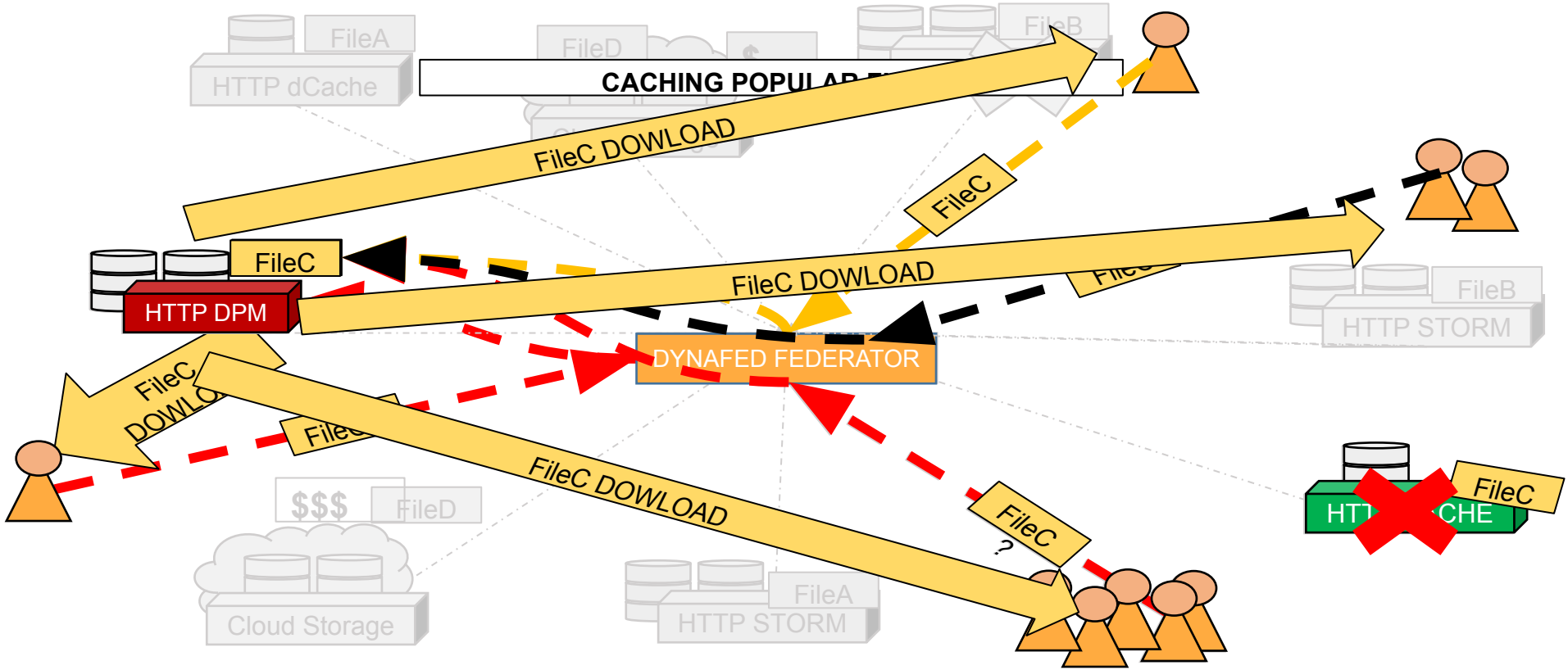
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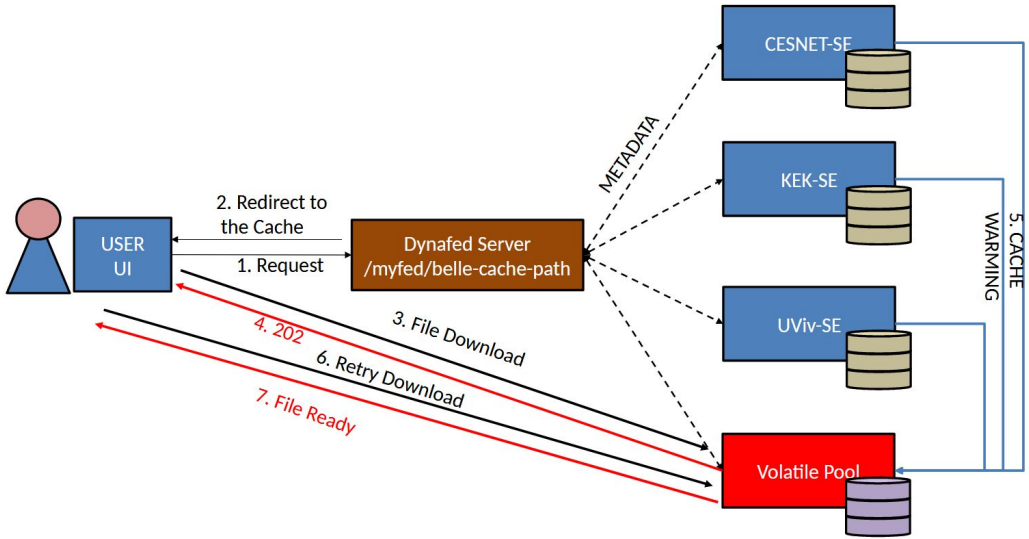
USE CASE Belle II: testbed

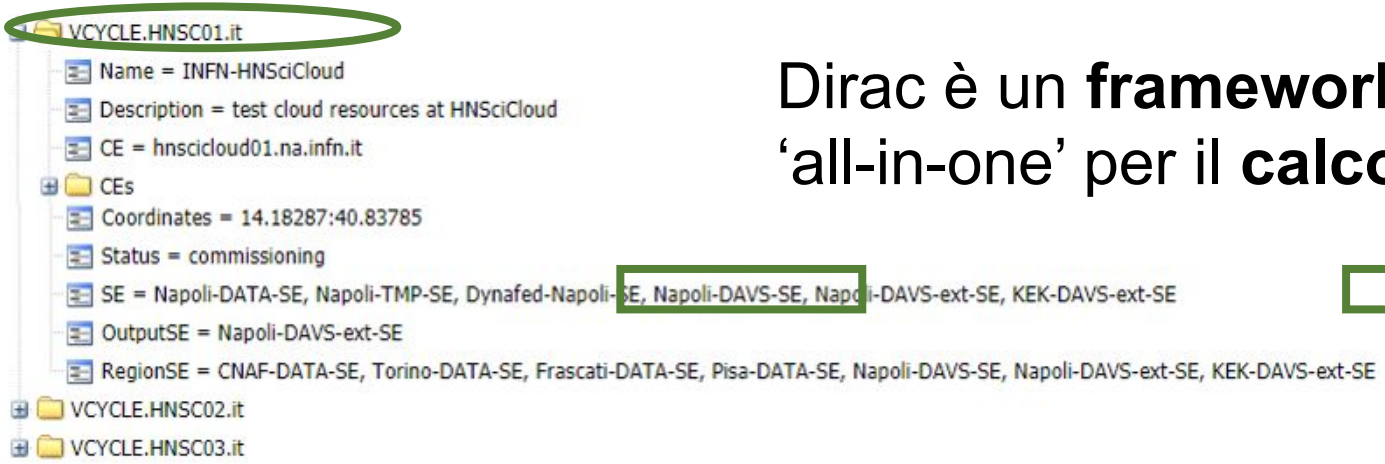
#	STORGE NAME	HOSTNAME	TYPE
1	DESY-DE	dcache-belle-webdav.desy.de	DCACHE
2	GRIDKA-SE	f01-075-140-e.gridka.de	DCACHE
3	NTU-SE	bgrid3.phys.ntu.edu.tw	DCACHE
4	SIGNET-SE	dcache.ijs.si	DCACHE
5	UVic-SE	charon01.westgrid.ca	DCACHE
6	BNL-SE	dcbldoor01.sdcc.bnl.gov	DCACHE
7	Adelaide-SE	coepp-dpm-01.ersa.edu.au	DPM
8	CESNET-SE	dpm1.egee.cesnet.cz	DPM
9	CYFRONNET-SE	dpm.cyf-kr.edu.pl	DPM
10	Frascati-SE	atlasse.lnf.infn.it	DPM
11	HEPHY-SE	hephyse.oeaw.ac.at	DPM
12	Melbourne-SE	b2se.mel.coepp.org.au	DPM
13	Napoli-SE	belle-dpm-01.na.infn.it	DPM
14	ULAKBIM-SE	torik1.ulakbim.gov.tr	DPM
15	IPHC-SE	sbgse1.in2p3.fr	DPM
16	CNAF-SE	ds-202-11-01.cr.cnaf.infn.it	STORM
17	ROMA3-SE	storm-01.roma3.infn.it	STORM
18	KEK-SE	Kek-se03.cc.kek.jp	STORM
19	McGill-SE	gridftp02.clumeq.mcgill.ca	STORM

- DynaFED aggregates almost all **production storage**
- Heterogeneous tecnologies
- Storages **distributed** all over the world

USE CASE Belle II

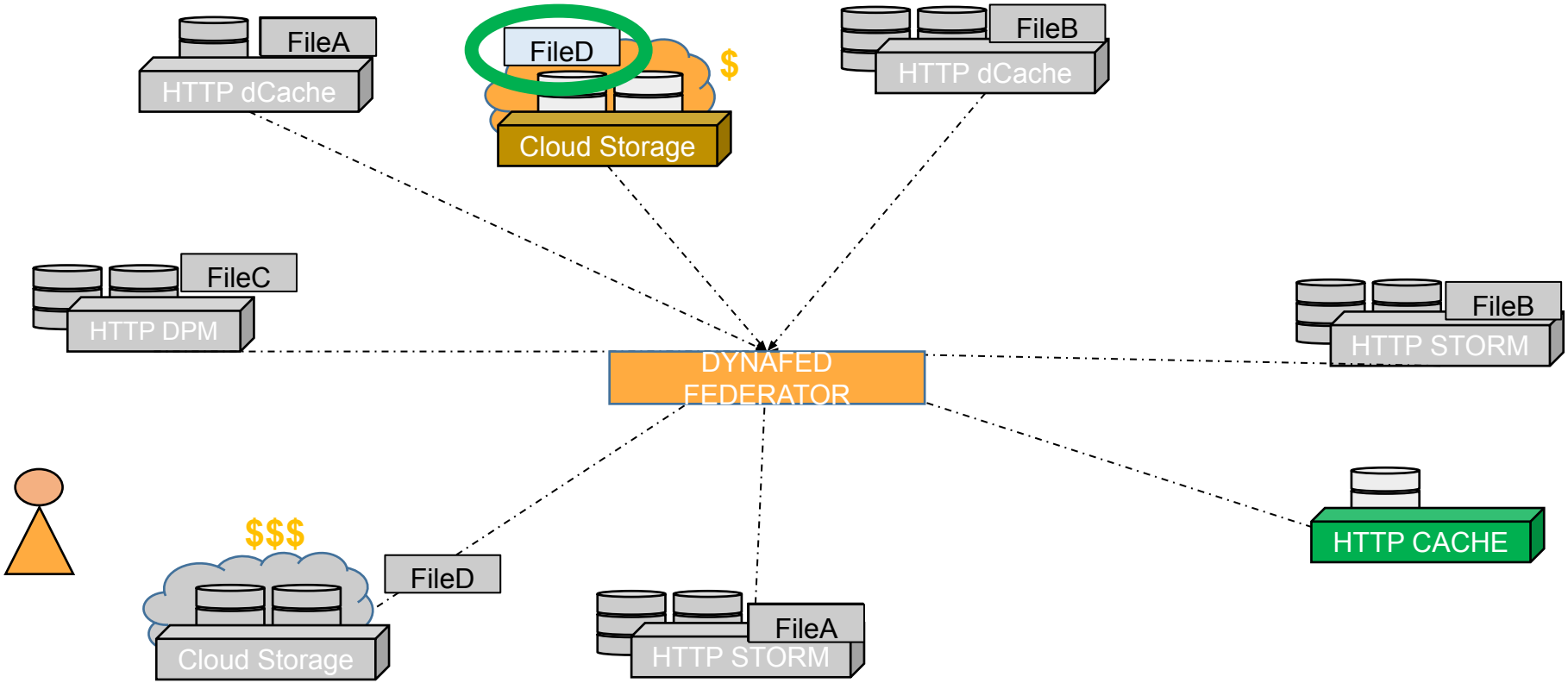


USE CASE Belle II: DIRAC



Dirac è un **framework** per la gestione ‘all-in-one’ per il **calcolo distributo**.

- VCYCLE.HNSC01.it site in DIRAC is configured to use **HTTP endpoints**, including **DynaFed**.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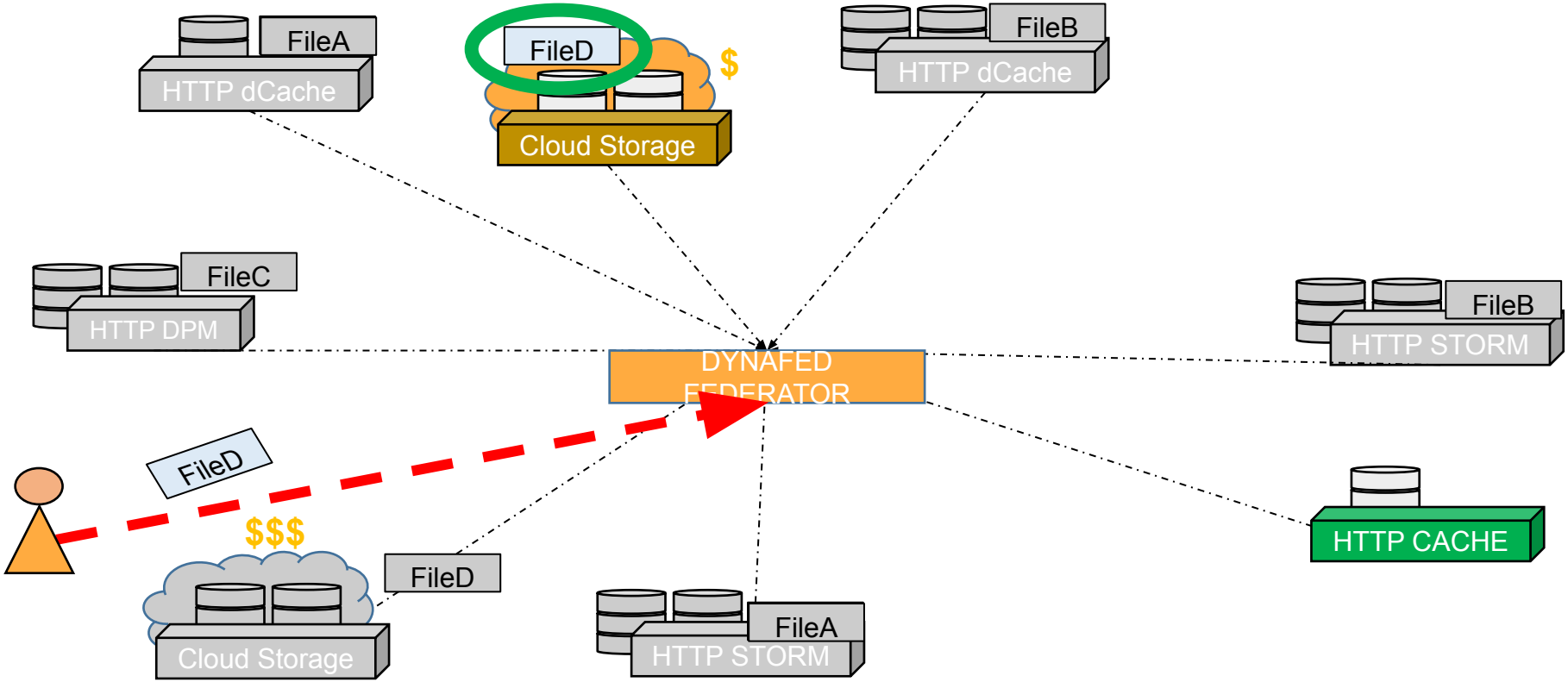
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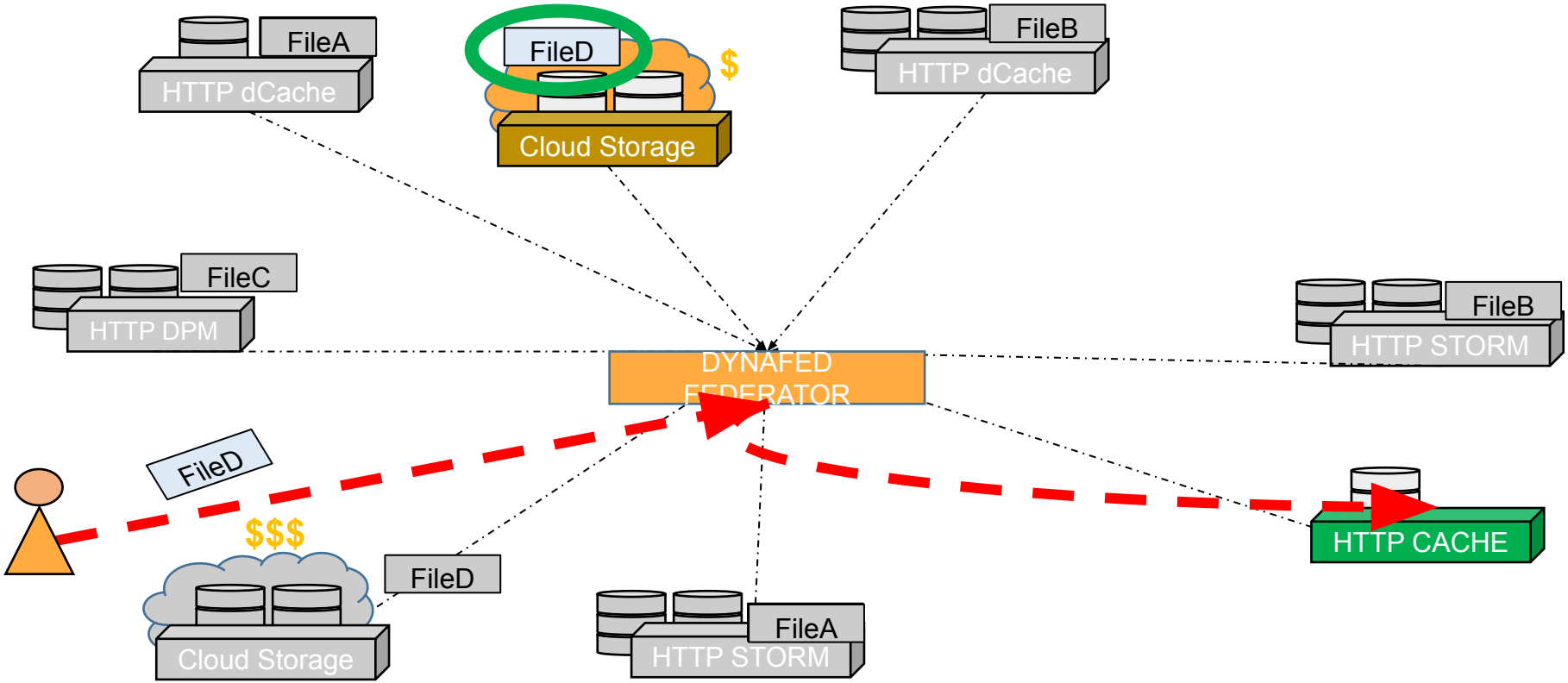
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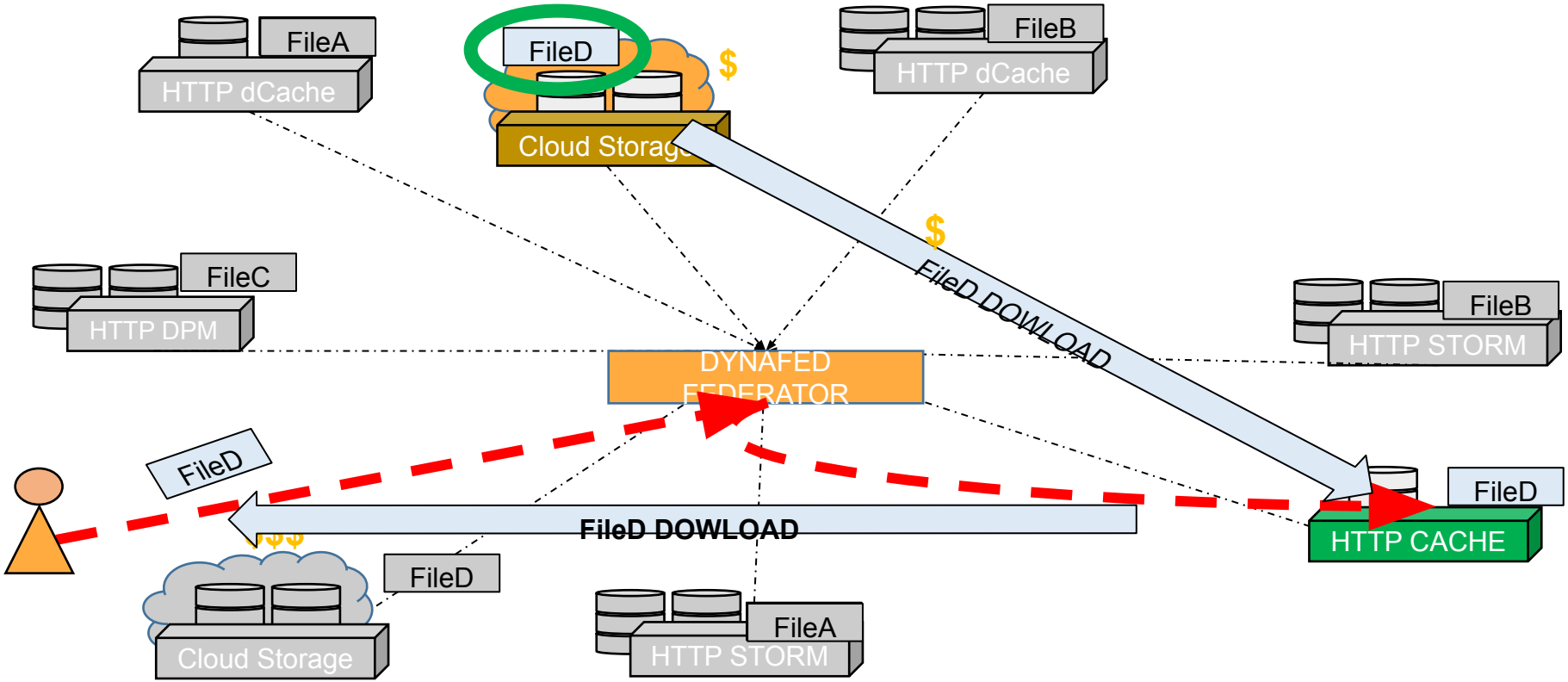
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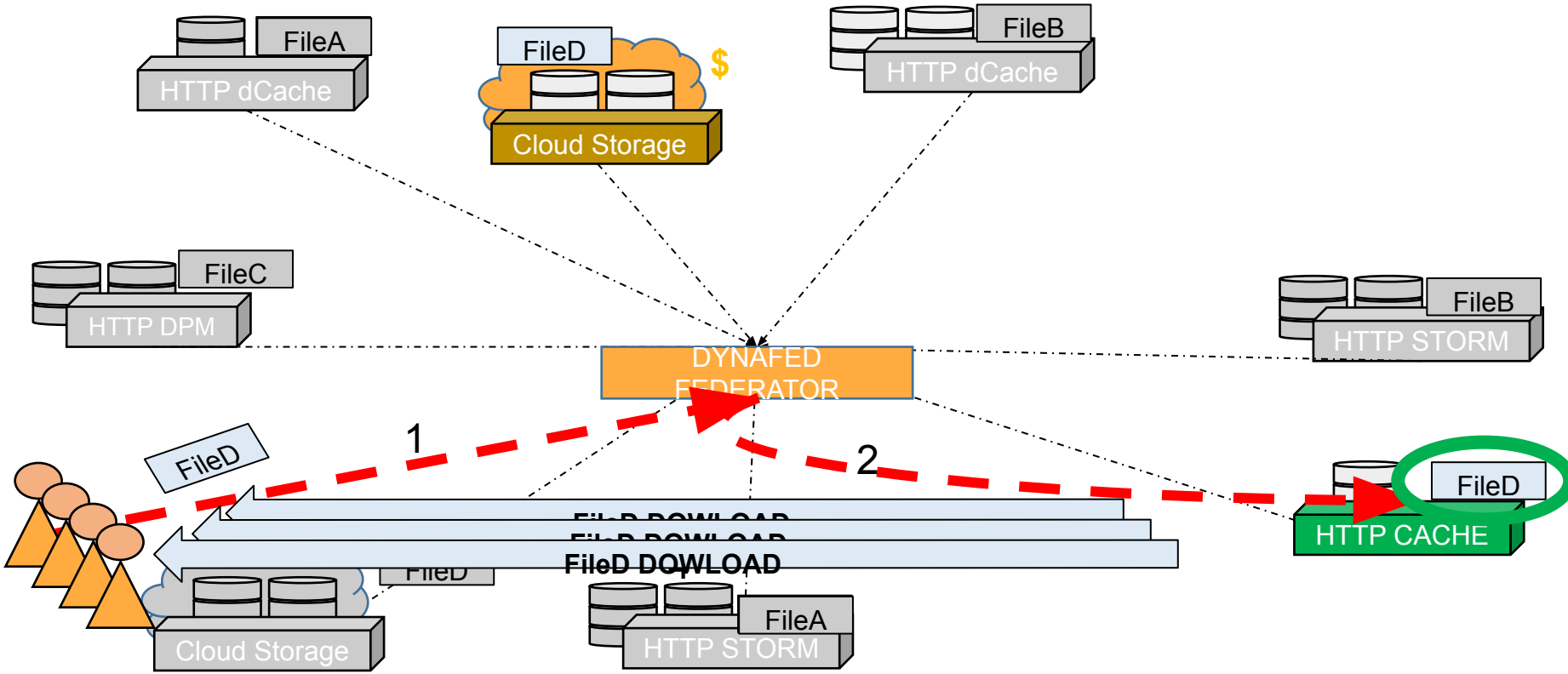
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