User interaction and workflow management in Grid enabled e-VLBI experiments

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The 8th International e-VLBI Workshop, Madrid, Spain 22-26 June 200

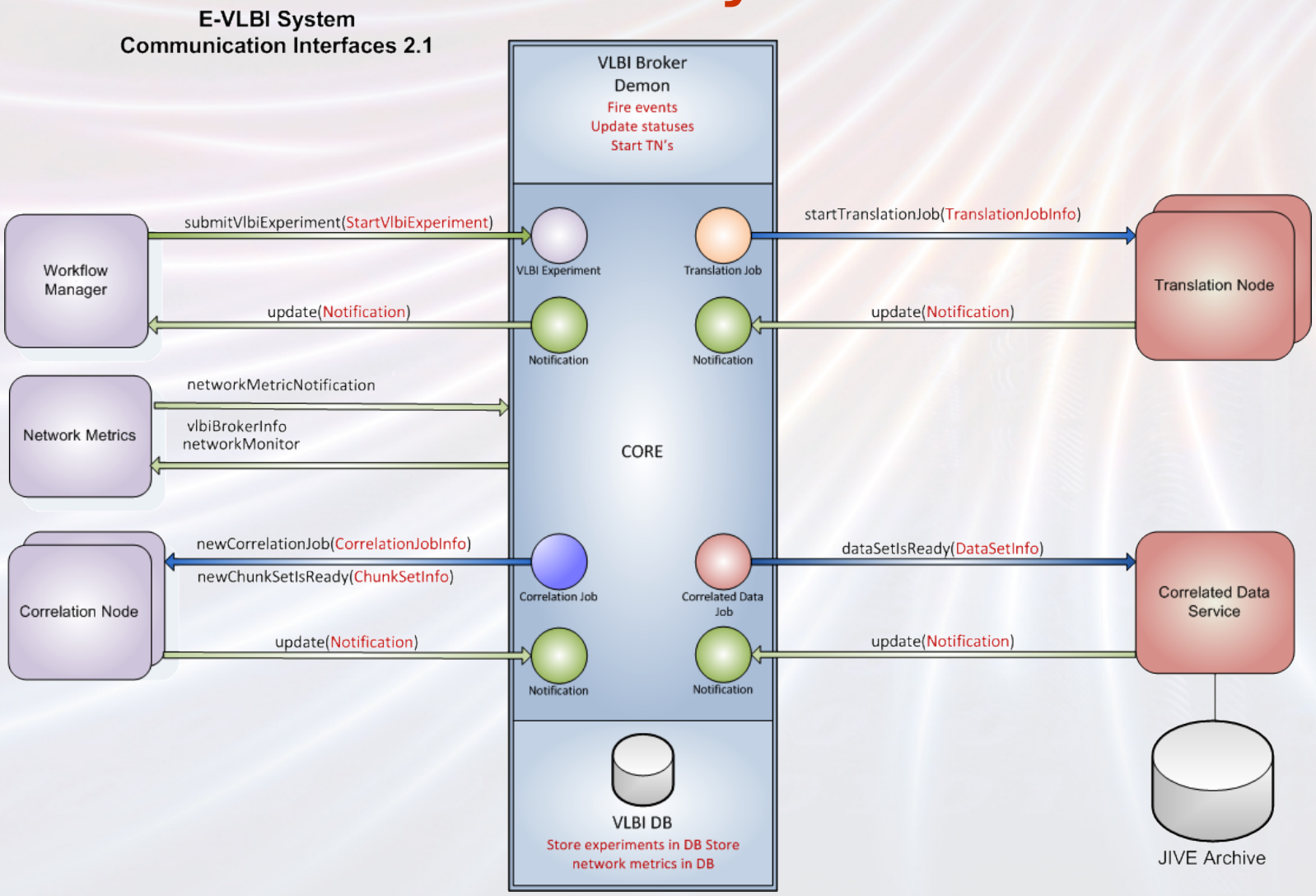
Outline

- **Motivation for distributed correlation**
- **E-VLBI System in practice**
- **E-VLBI system behind the scene**
- **Summary**

First glance at distributed correlation

- Data can be transferred over the network
- Each stage of the process can be speeded up
- GRID resources available
- Software correlator available

E-VLBI System



How to conduct an experiment

1. Creating observation workflow using WFM application
2. Submitting observation workflow for execution in the Grid environment
3. Workflow execution
4. Monitoring the VLBI experiment

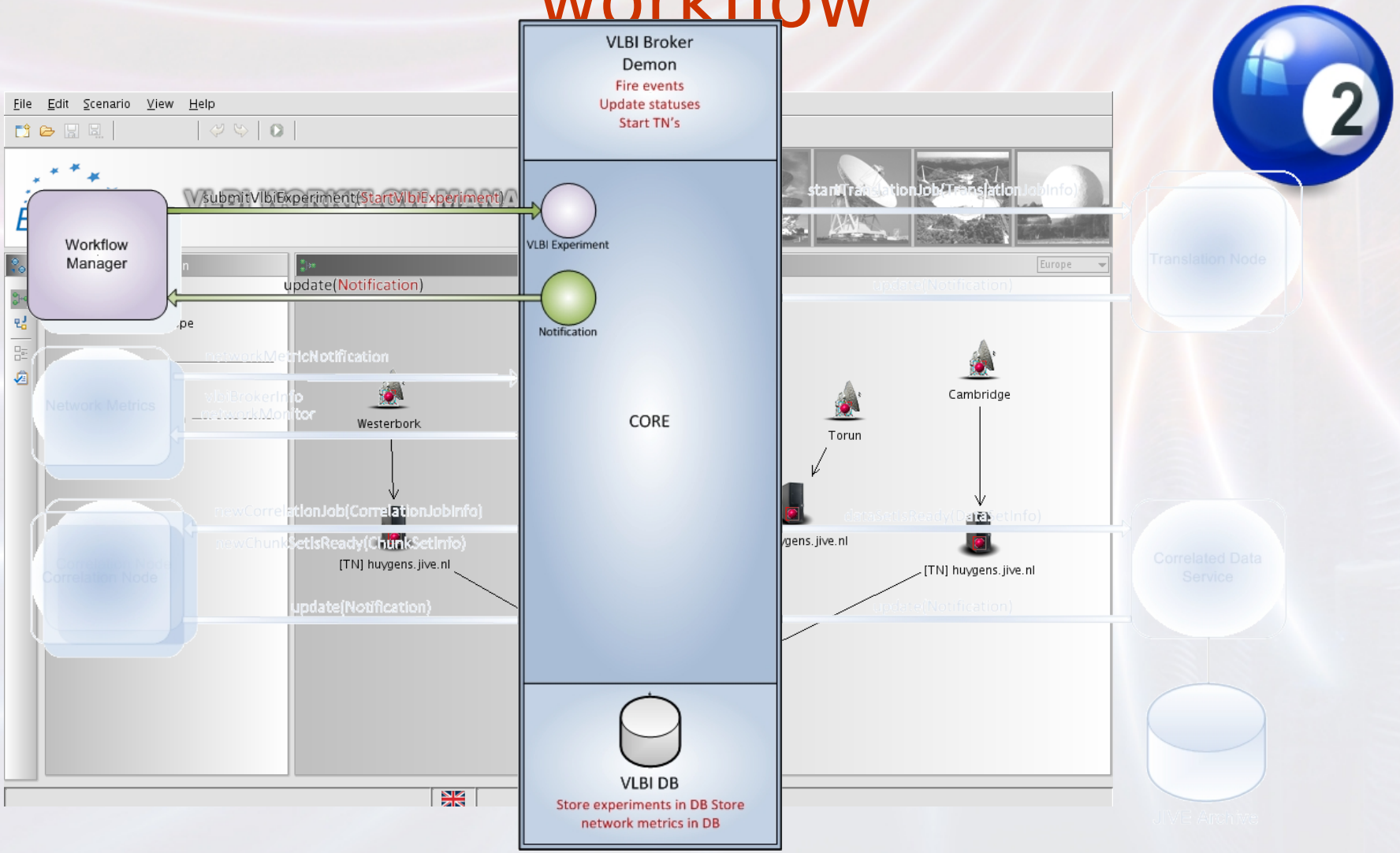
Observation workflow

Constructed:

- by VLBI operator
- based on the observation schedule (VEX)
- with Workflow Manager Application (WFM)

DEMO

Submitting the observation workflow



Workflow execution

Divided into the following phases:

1. Chunking data from radio telescopes
2. Submitting chunked data sets for correlation
3. Archiving the correlated data sets

(1) Workflow execution: chunking

Radio telescope A

VLBI Data Stream

Translation Node A

A 40 | A 30 | A 20 | A 10

VLBI Data chunks

Radio telescope B

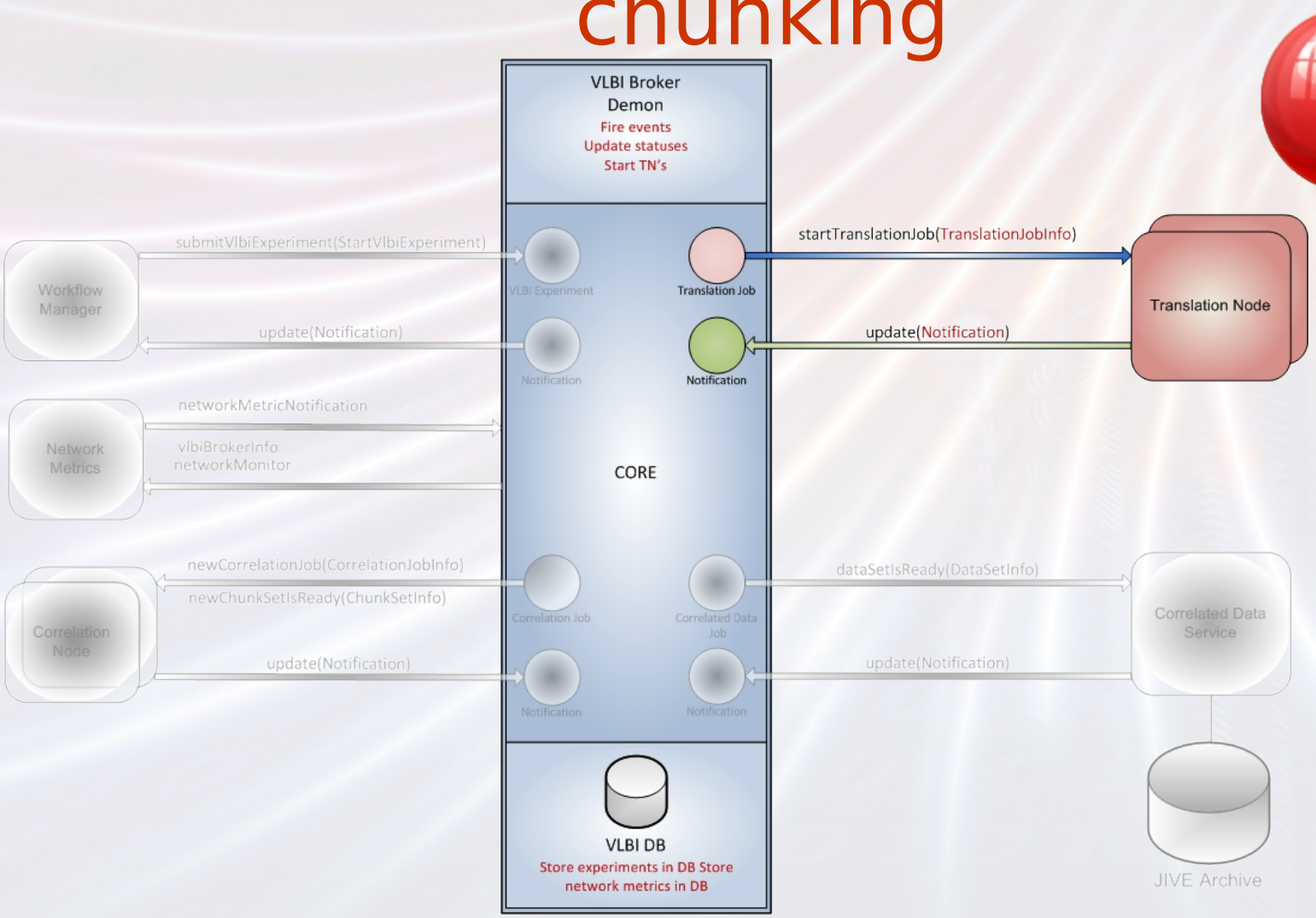
VLBI Data Stream

Translation Node B

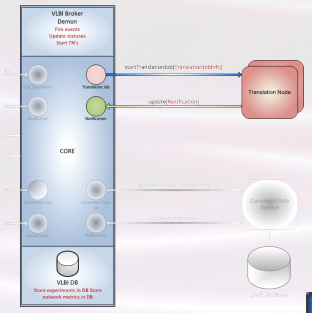
B 40 | B 30 | B 20 | B 10

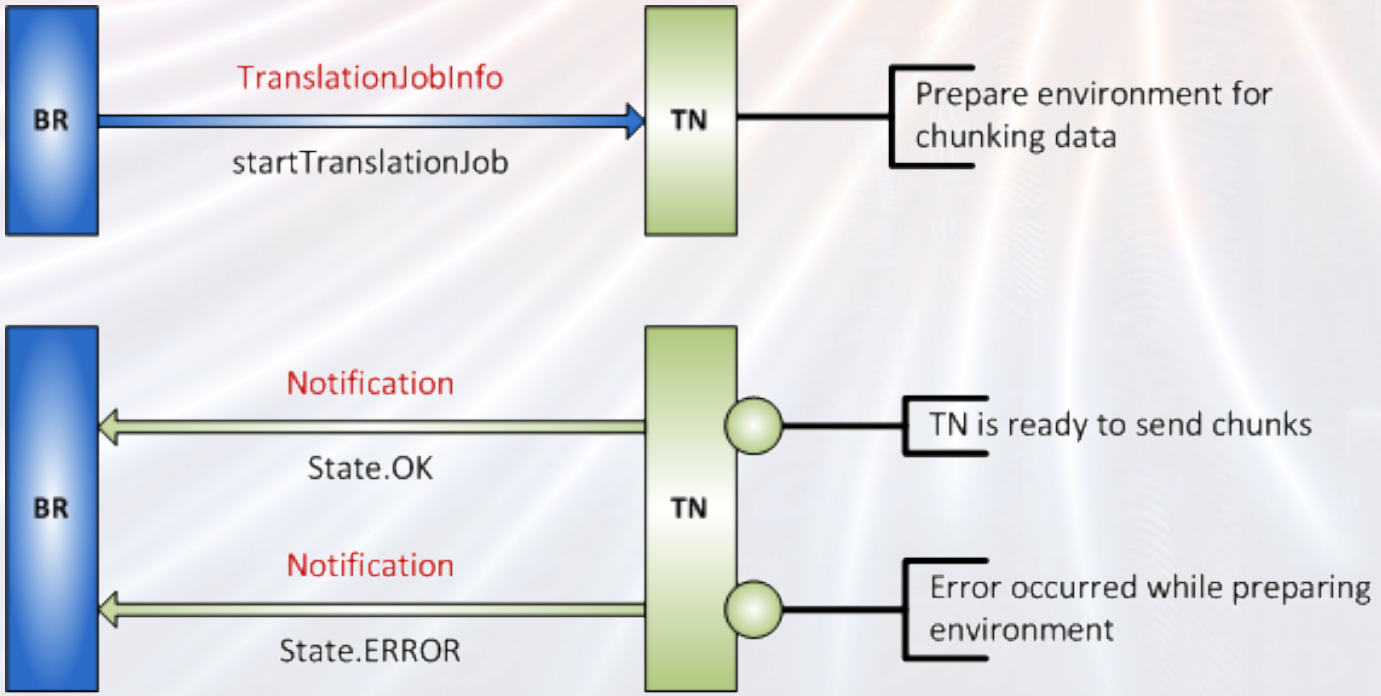
VLBI Data chunks

(1) Workflow execution: chunking

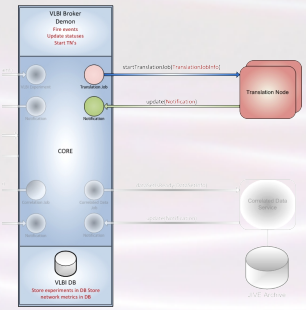


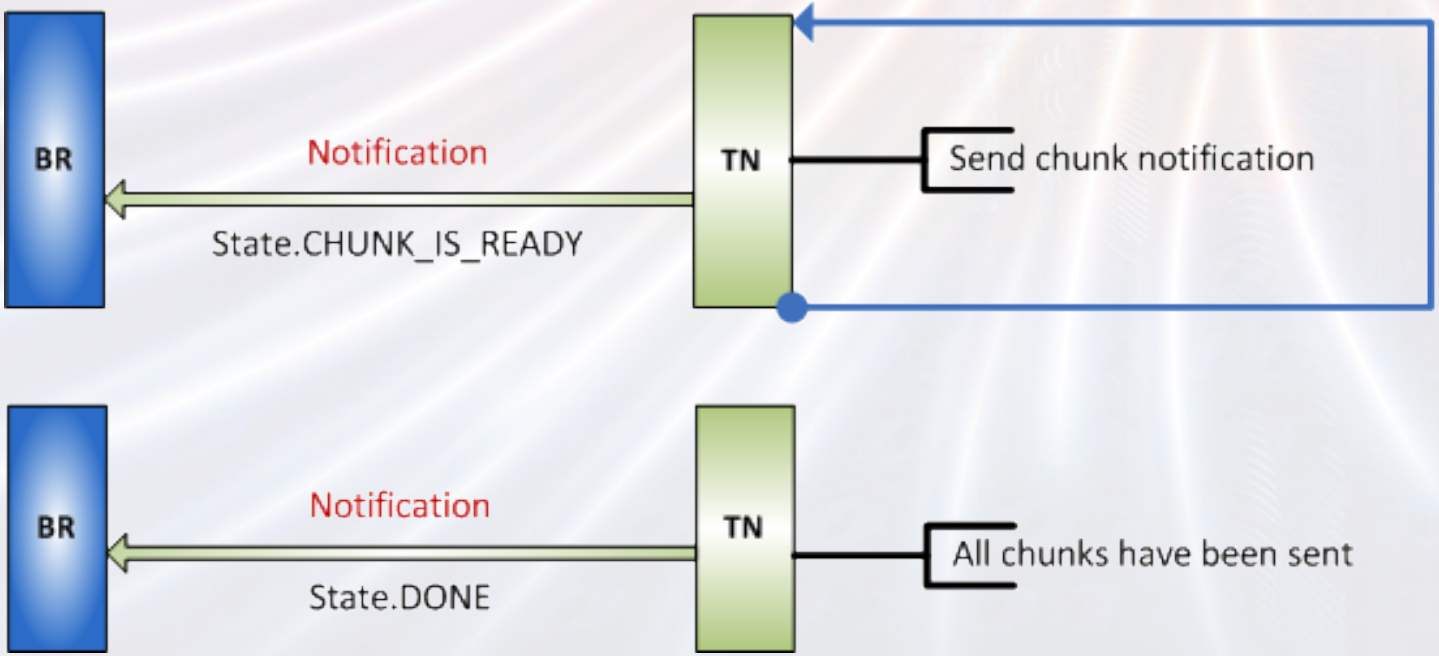
(1) Workflow execution: chunking process (Translation Node)





(1) Workflow execution: chunking

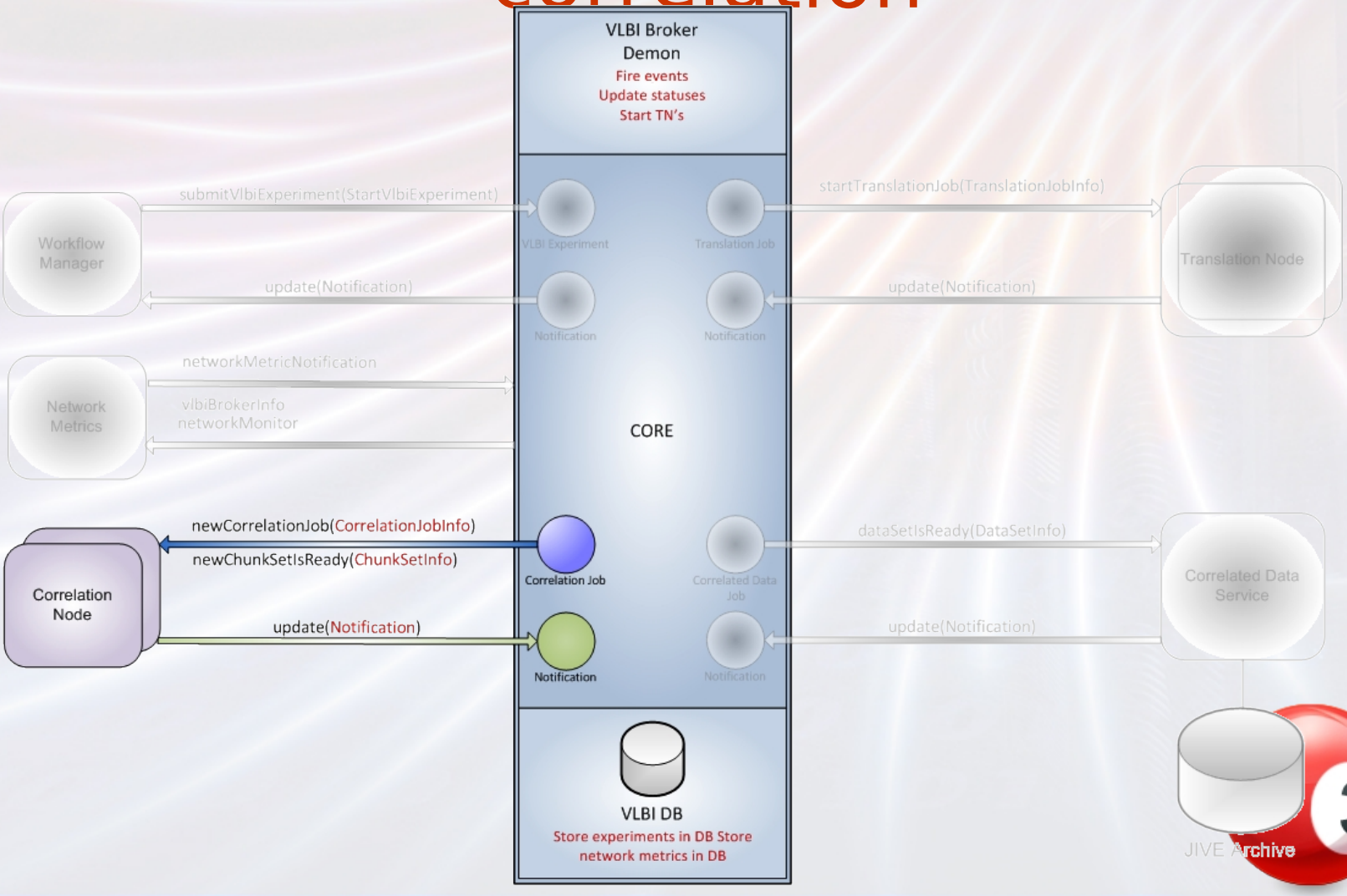




(2) Workflow execution: correlation

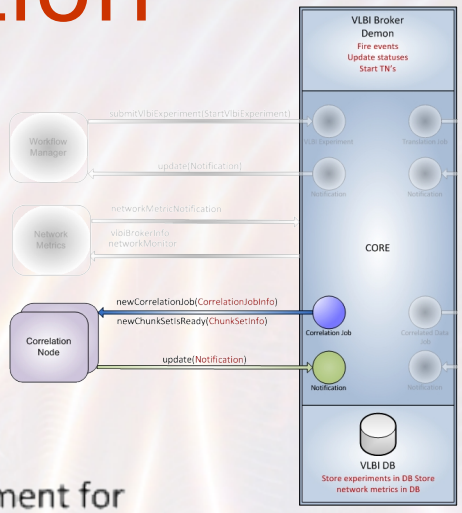
- First data chunks are available
- Step, where the real correlation takes place
- Computation on the Grid resources

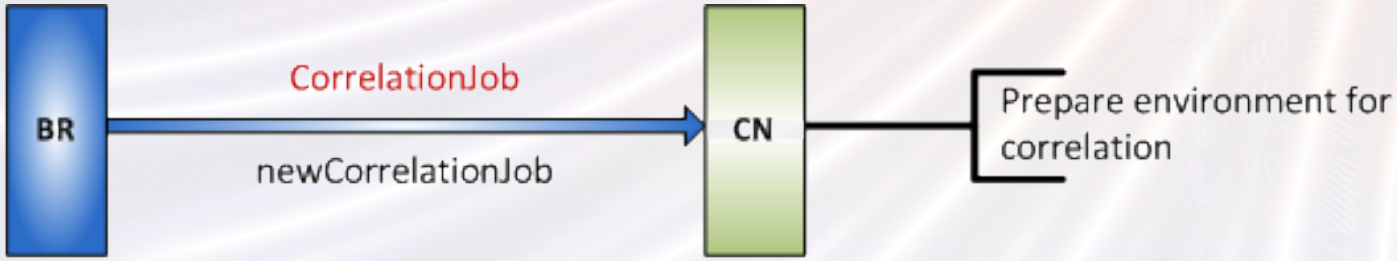
(2) Workflow execution: correlation

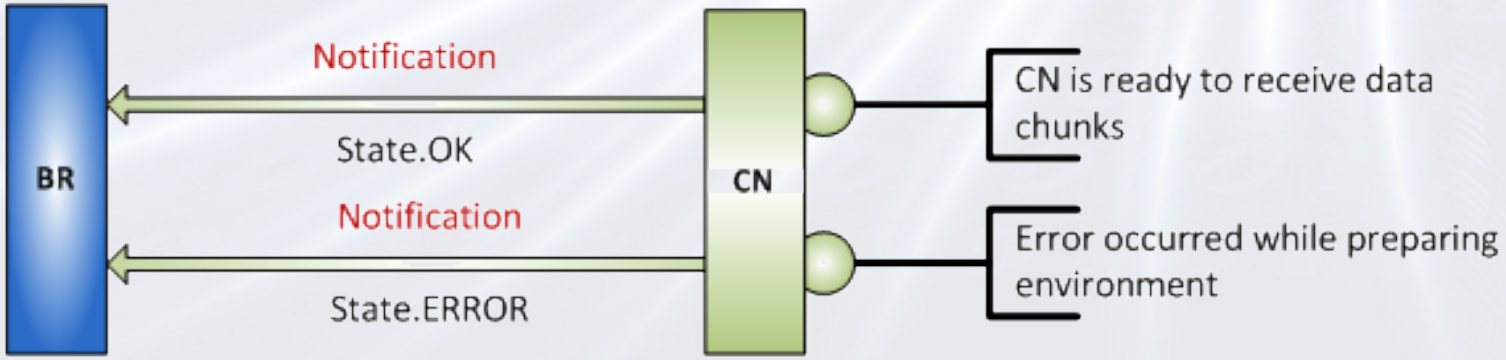


(2) Workflow execution

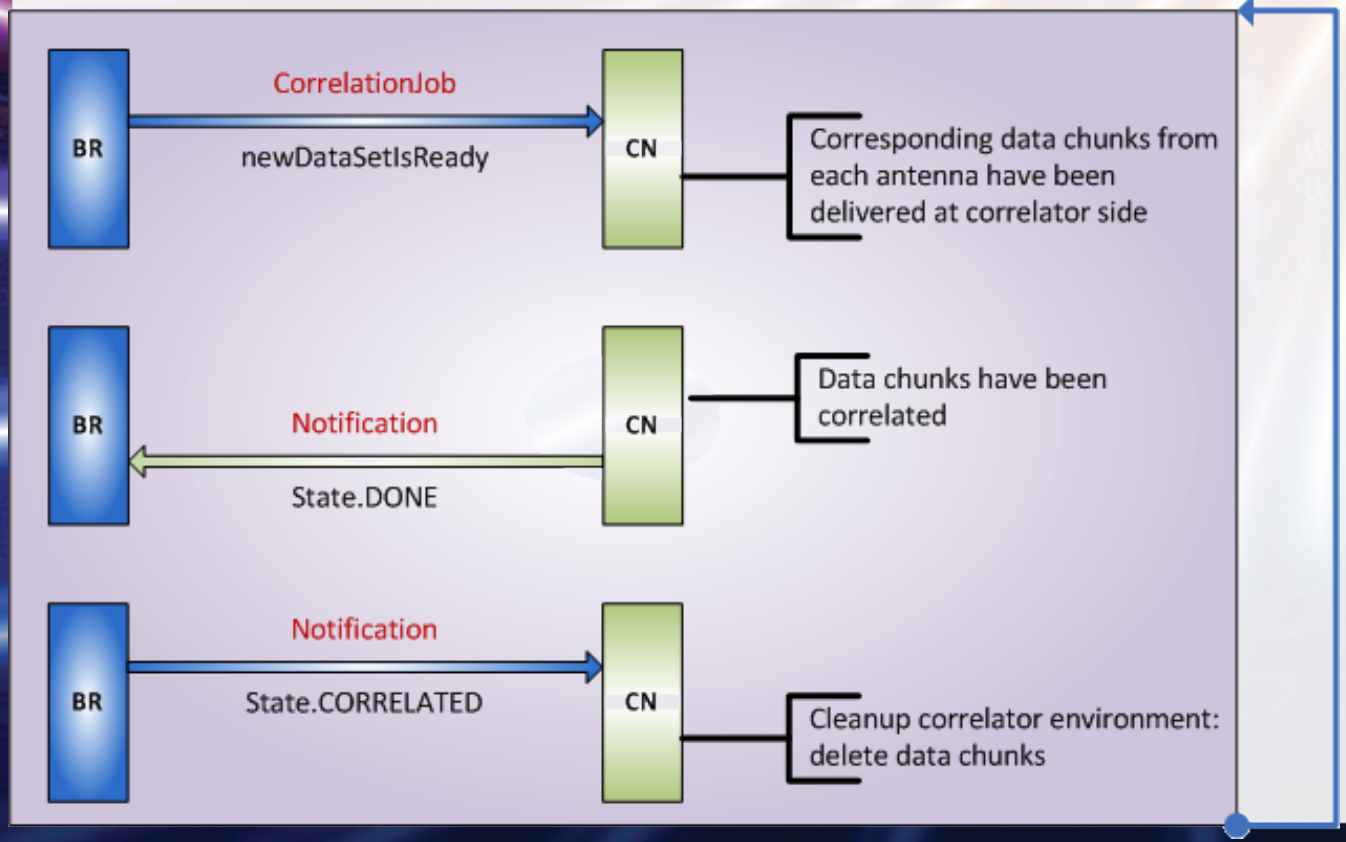
scheduling correlation jobs with Correlation Node ..

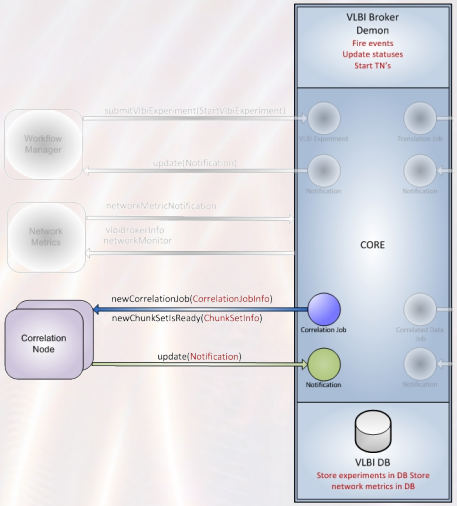






(2) Workflow execution: correlation

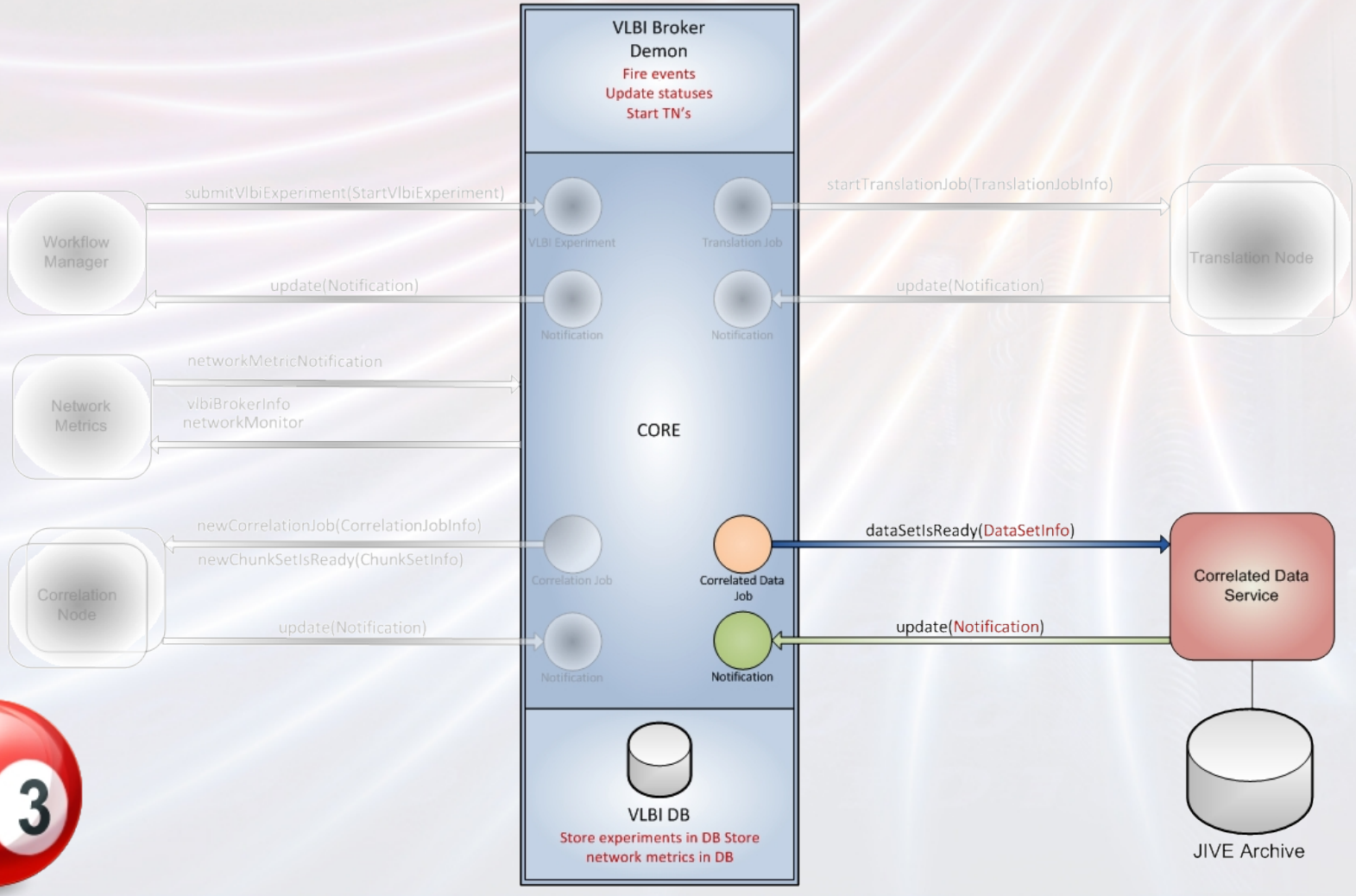




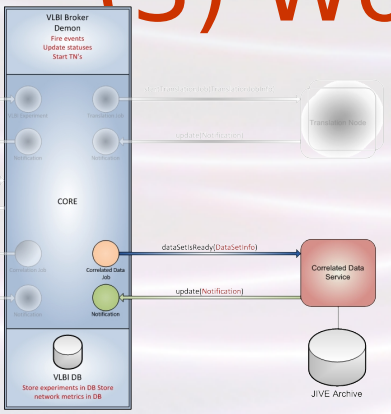
(3) Workflow execution: archive

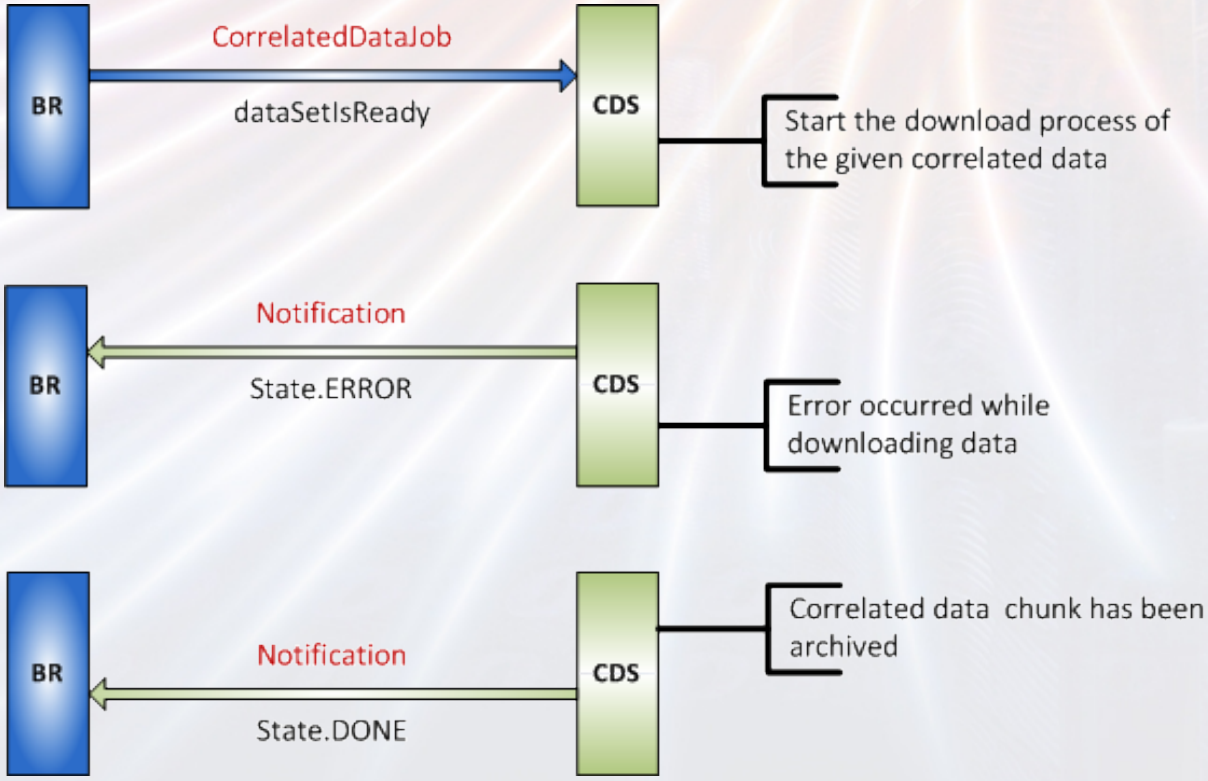
- First data sets have been correlated
- Store correlated data with Correlated Data Service (CDS)
- Clean up the Grid resources

(3) Workflow execution: archive



(3) Workflow execution: archive





Workflow monitoring

- Possibility to monitor the distributed correlation
- Monitoring perspective in WFM application
- Currently not available

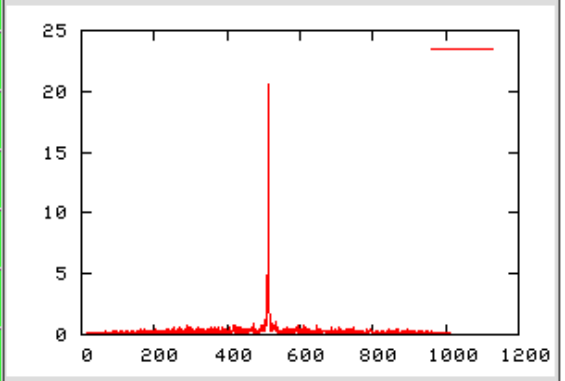
Success story

- Successful correlation with 2 clusters (PSNC)
- One File Server (Jive)
- Stations: Westerbork, Medicina, Torun, Cambridge

Success story (2)

Vex file -- Integration time: 1 s -- Start of the integration: 2008y070d18h30m14s0ms

N08C1	Auto correlations				Cross correlations					
	Cm	Mc	Tr	Wb	Mc-Cm	Mc-Tr	Tr-Cm	Wb-Cm	Wb-Mc	Wb-Tr
4974.49MHz, USB, Rcp-Rcp	A	A	A	A	4521 A P offset: 4	237 A P offset: 0	5.546 A P offset: -13	5.024 A P offset: -51	227.3 A P offset: 0	185.4 A P offset: 0
4974.49MHz, USB, Lcp-Lcp	A	A	A	A	4.159 A P offset: 208	267.4 A P offset: 0	6.639 A P offset: 68	5.617 A P offset: -53	374.1 A P offset: 0	279.2 A P offset: 0
4982.49MHz, USB, Rcp-Rcp	A	A	A	A	141.9 A P offset: 0	220.6 A P offset: 0	117 A P offset: 0	132.5 A P offset: 0	361.7 A P offset: 0	264.9 A P offset: 0
4982.49MHz, USB, Lcp-Lcp	A	A	A	A	181.2 A P offset: 0	252.1 A P offset: 0	137.3 A P offset: 0	180.6 A P offset: 0	364.8 A P offset: 0	287.3 A P offset: 0
4990.49MHz, USB, Rcp-Rcp	A	A	A	A	147.6 A P offset: 0	255.2 A P offset: 0	100.2 A P offset: 0	144.1 A P offset: 0	380 A P offset: 0	257.7 A P offset: 0
4990.49MHz, USB, Lcp-Lcp	A	A	A	A	188.4 A P offset: 0	255.9 A P offset: 0	143 A P offset: 0	195.9 A P offset: 0	395.1 A P offset: 0	280.7 A P offset: 0
4998.49MHz, USB, Rcp-Rcp	A	A	A	A	4.214 A P offset: -63	244.5 A P offset: 0	4.301 A P offset: 38	4.43 A P offset: -9	359.5 A P offset: 0	250.4 A P offset: 0
4998.49MHz, USB, Lcp-Lcp	A	A	A	A	5.564 A P offset: 162	237.3 A P offset: 0	4.192 A P offset: 76	4.313 A P offset: -61	324.6 A P offset: 0	221 A P offset: 0



Thank you for your attention

http://www.expres-eu.org/

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EXPReS is made possible through the support of the EC,
6th FP, Contract #026642