ATLAS Production System in ATLAS Data Challenge 2

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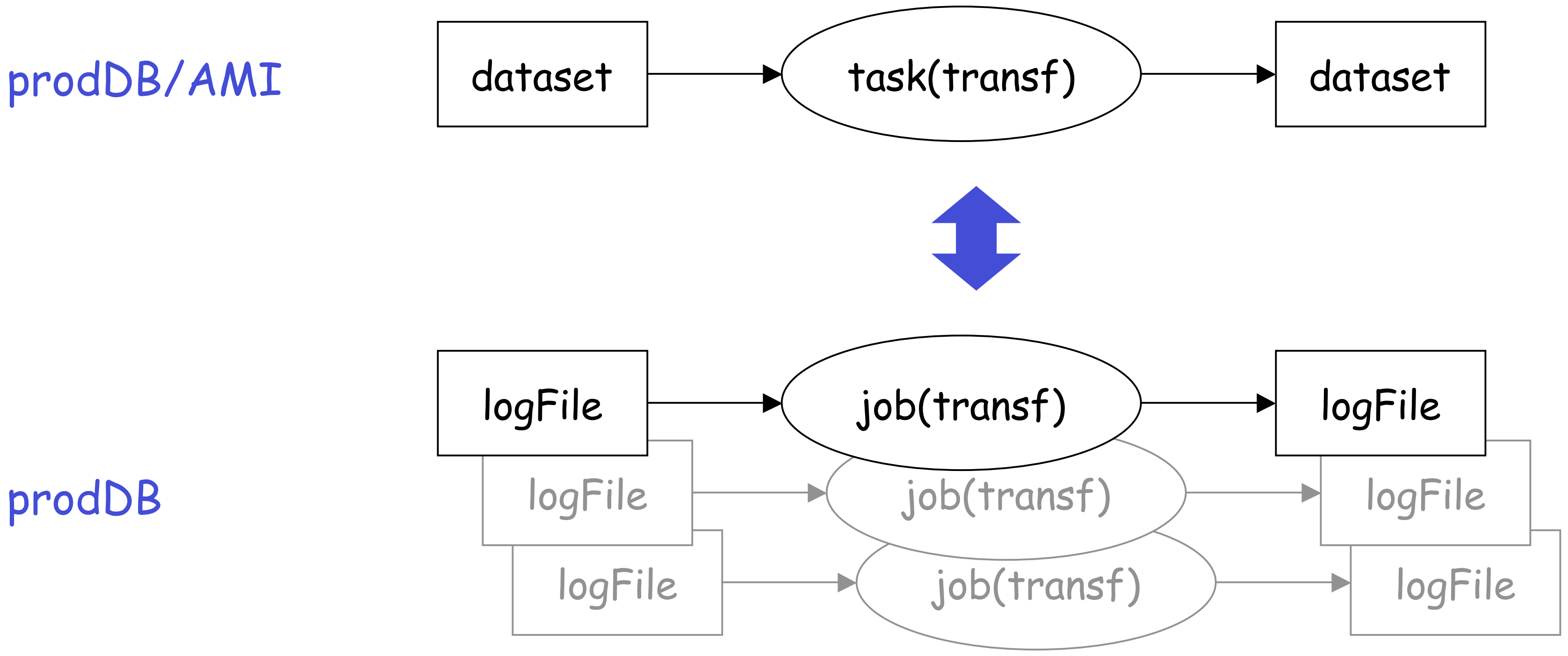
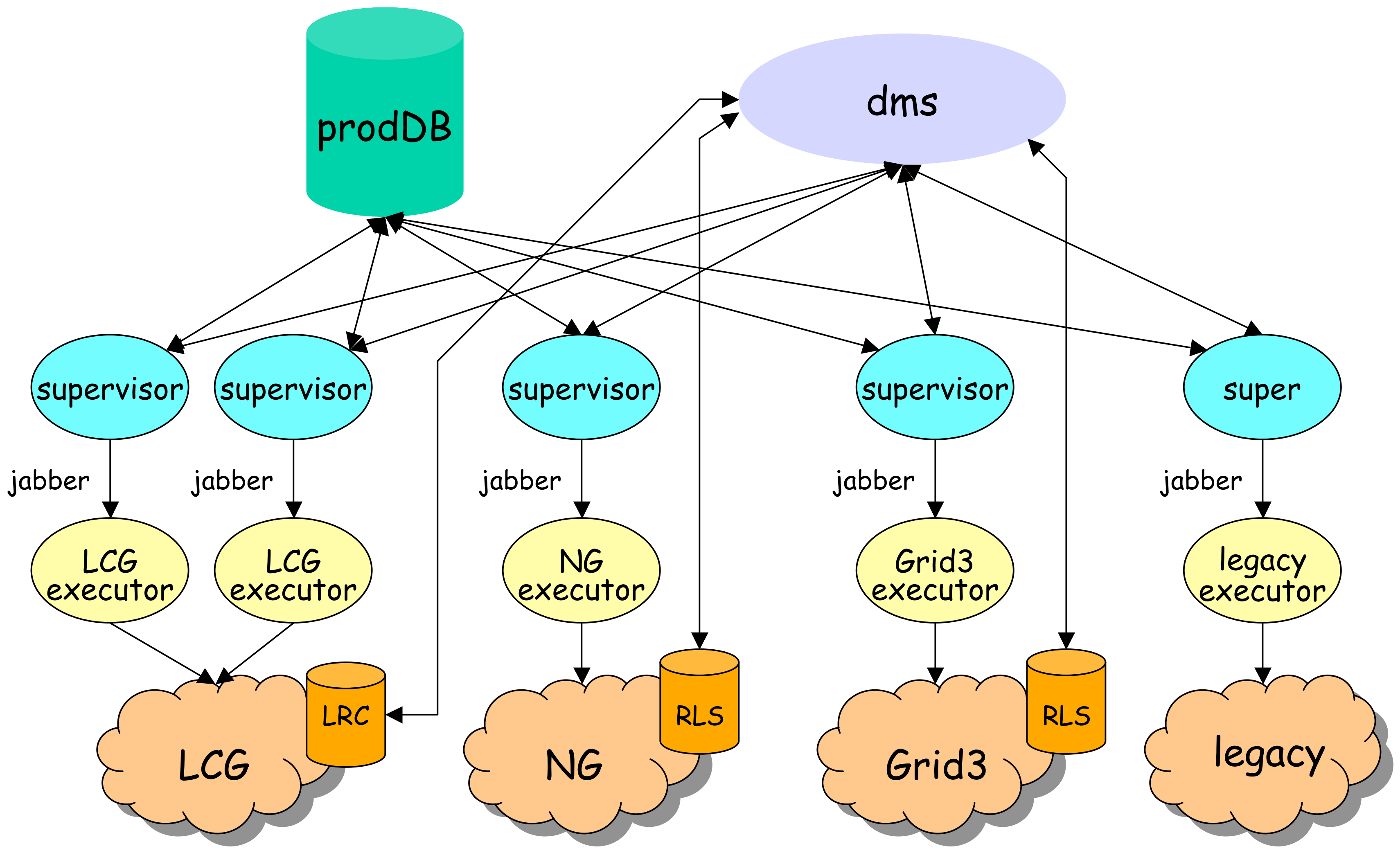
- in this talk
  - introduction
  - terminology and conceptual model
  - architecture and components
  - experience so far
  - conclusions and outlook

- introduction
  - ATLAS decided to undertake a series of Data Challenges (DC) in order to validate its Computing Model, its software, its data model
  - DC2 started July 2004:
  - introduced the new ATLAS Production System (prodsys) :
    - unsupervised production across many sites spread over three different Grids (US Grid3, NorduGrid, LCG-2)
    - 4 major components:
      - production supervisor
      - executor –
        - one executor per "grid-flavor" developed by corresponding grid experts
      - common data management system
      - common central production database for all ATLAS

- terminology and conceptual model



- architecture
  - as simple as possible (well almost)
  - flexible
  - target automatic production
  - based on DC1 experience with AtCom (DC1 interactive production system) and GRAT
    - core engine with plug-ins
  - some buzz technologies
    - XML, Jabber, Webservices, ...
  - federation of grids
    - LCG, Nordugrid, Grid3
    - legacy systems only as backup
  - use middleware components as much as possible
    - avoid inventing ATLAS' own version of grid
      - broker, catalogs, information system, ...
    - risky dependency !


prodDB
dms
supervisor
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LCG executor
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NG executor
Grid3 executor
legacy executor
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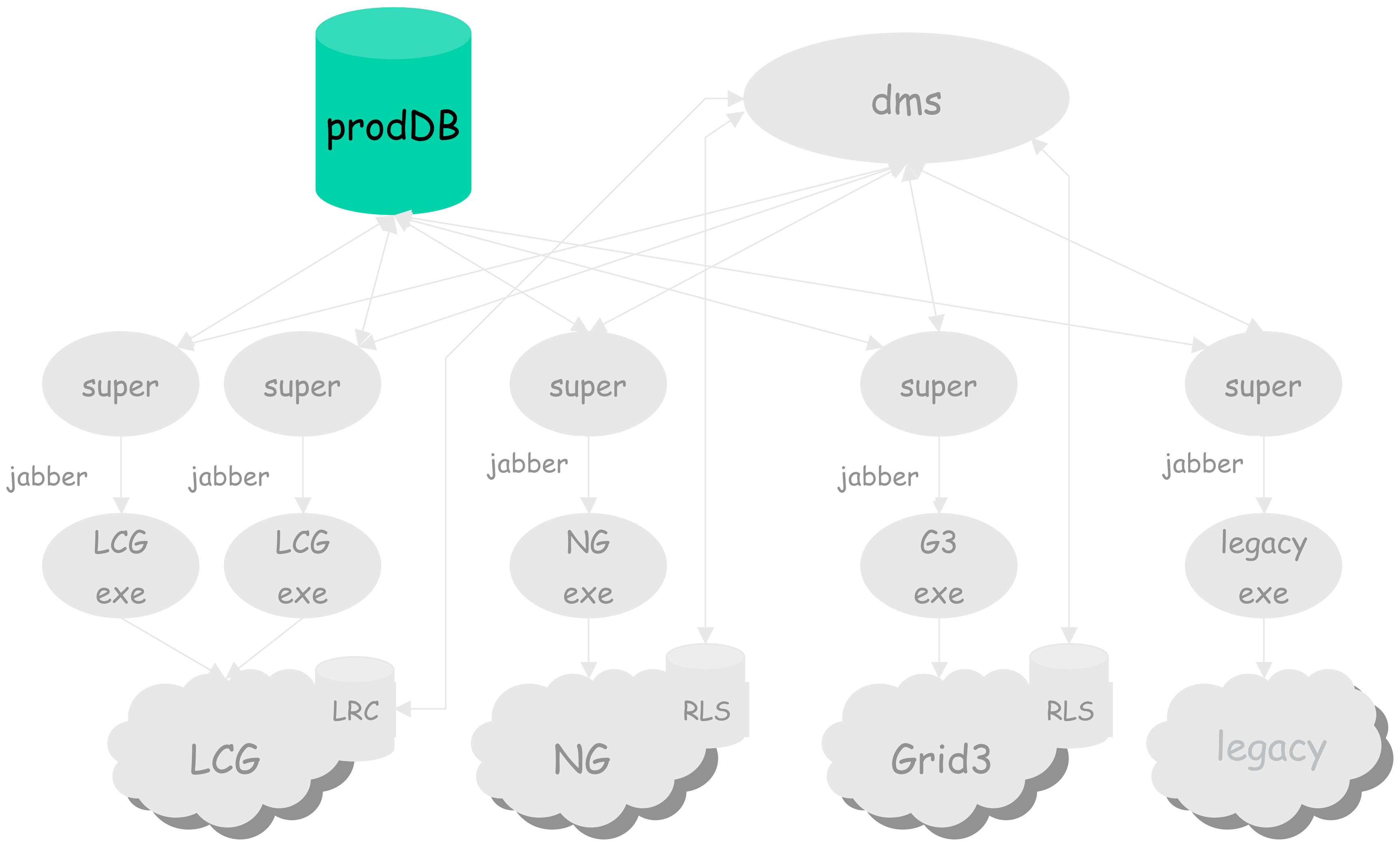
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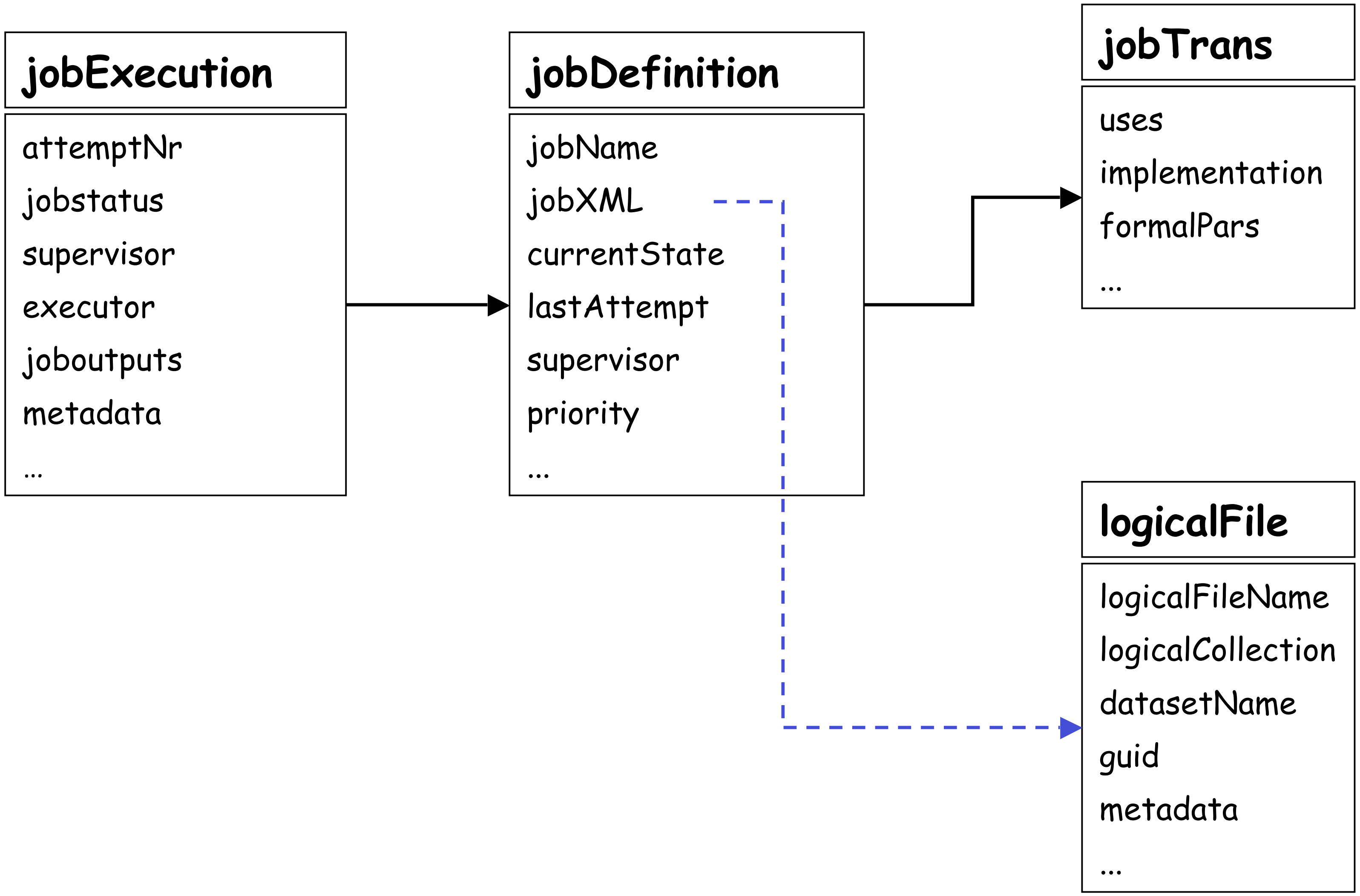
- prodDB = production database
  - holds records for
    - job transformations
    - job definitions
      - status of jobs
    - job executions
    - logical files
  - Oracle database hosted at CERN


jobExecution
attemptNr
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jobDefinition
jobName
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supervisor
priority
...
jobTrans
uses
implementation
formalPars
...
logicalFile
logicalFileName
logicalCollection
datasetName
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jobTrans:formalPars

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jobDefinition:jobXML

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jobDefinition:jobXML

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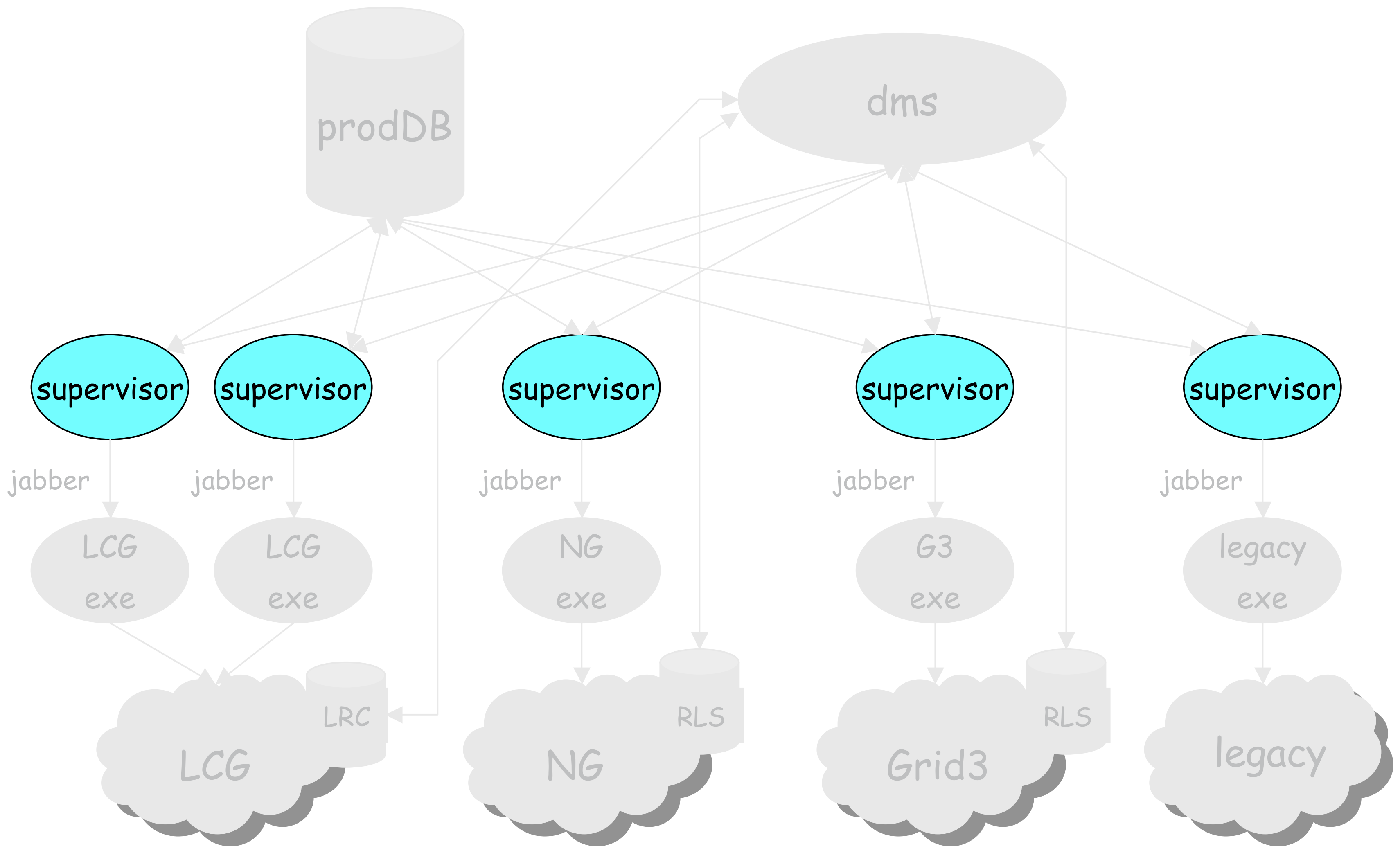
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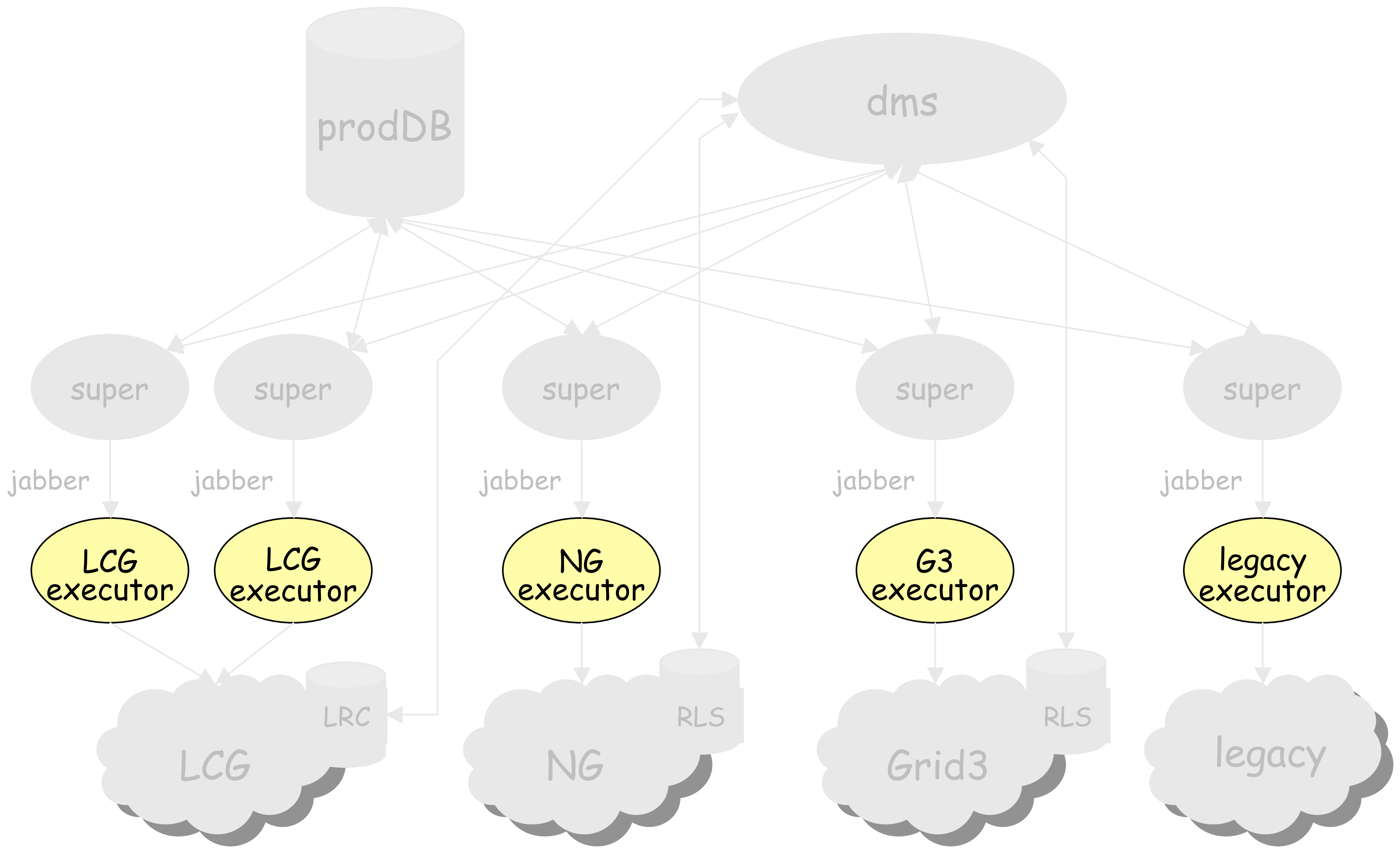
- supervisor
  - consumes jobs from the production database
  - submits them to one of the executors it is connected with
  - follows up on the job
  - validates presence of expected outputs
  - takes care of final registration of output products in case of success
  - possibly takes care of clean-up in case of failure
  - will retry n times if necessary
  - implementation -> Windmill
    - http://heppc12.uta.edu/windmill/
  - no brokering
    - "how-many-jobs-do-you-want" protocol
  - possibly stateless
  - uses Jabber to communicate with executors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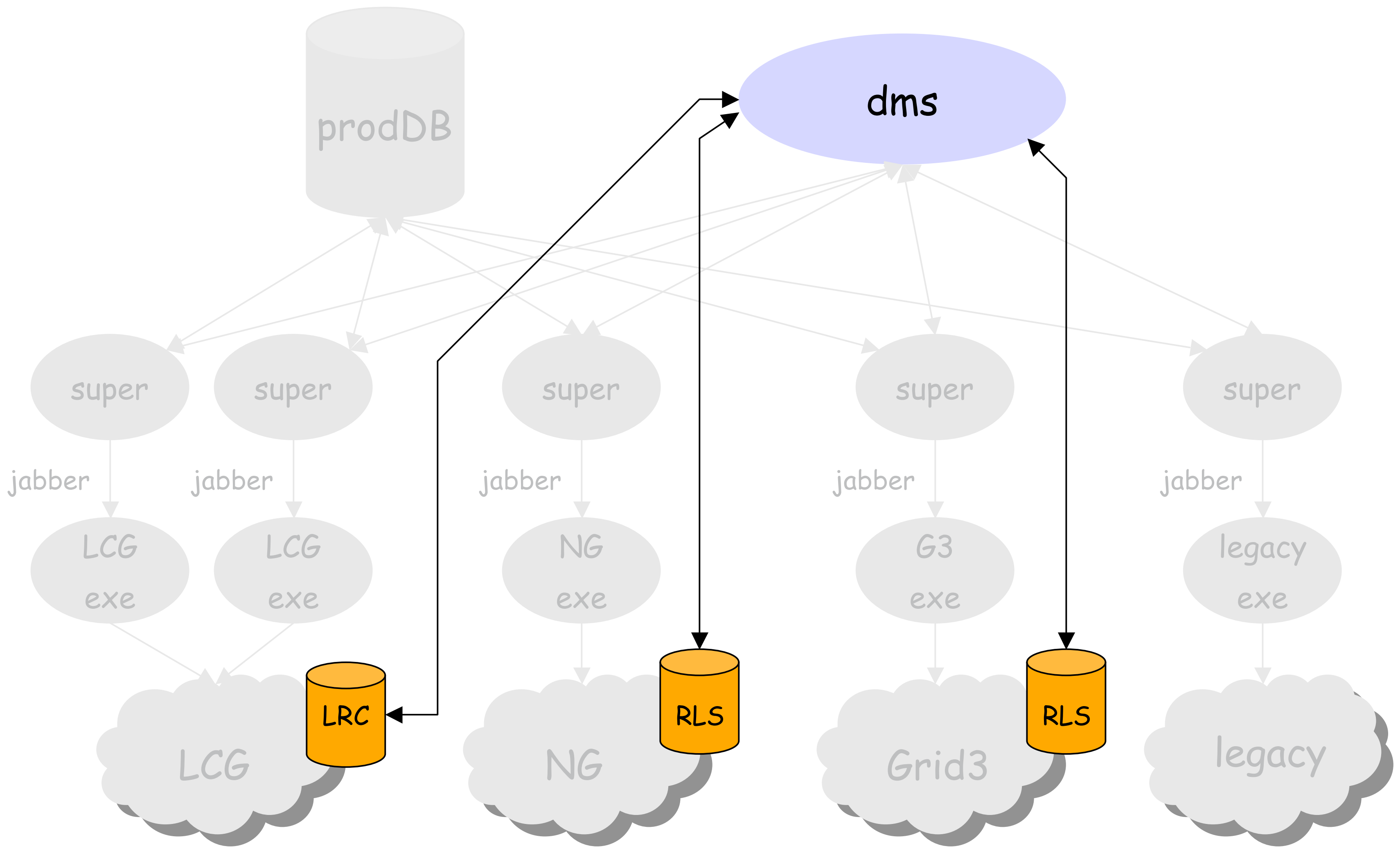
- executor
  - one for each facility flavor
    - LCG (lexor), NG (dulcinea), GRID3 (capone), PBS, LSF, BQS, Condor?, …
  - translates facility neutral job definition into facility specific language
    - XRSL, JDL, wrapper scripts, …
  - implements facility neutral interface
    - usual methods: submit, getStatus, kill, …
  - possibly stateless
  - two implementation strategies
    - executor subclass
    - SOAP adapter + executor webservice (Capone)
  - see other talks in this conference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- data management system
  - allows global cataloguing of files
    - we have opted to interface to existing replica catalog flavors
  - allows global file movement
    - an ATLAS job can get/put a file anywhere
  - presents a uniform interface on top of all the facility native data management tools
  - we only counted on ability to do inter-grid file transfers
    - ideally jobs should be able to use input files located in other grids and write output files into other grids
    - this was not exercised
  - stateless
  - implementation -> Don Quijote
    - see separate talk by Miguel Branco

- experience
  - since start of DC2 (July) the system has
    - 235000 jobexecution, 158000 jobdefinition, 251000 logicalfile
      - approx. evenly distributed over the three Grid flavors
    - 157 task, 22 jobtrans
    - consumed ~ 1.5 million SI2k months of CPU (~ 5000 CPU months)
  - we had high dependency on middleware
    - broker in LCG, RLS in Grid3/NG, ...
    - we suffered a lot !
    - many bugs were found and corrected
  - DC2 started before development was finished
    - we suffered a lot !
    - many bugs were found and corrected
  - detailed experience reports per Grid in other talks

- conclusion
  - for DC2 ATLAS relies completely on a federation of grid systems (LCG, Nordugrid, Grid3)
  - the ATLAS production system allows for an automatic production on this federation of grids
  - the ATLAS production system is based directly on the services offered by these grids
  - stress-testing these services in the context of a major production was a new experience and many lessons were learned
  - it was possible, but not easy
    - a lot of manpower was needed to compensate for missing and/or buggy software