



Enabling Grids for E-scienceE

Geographical failover for the EGEE-WLCG Grid collaboration tools

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Information Society

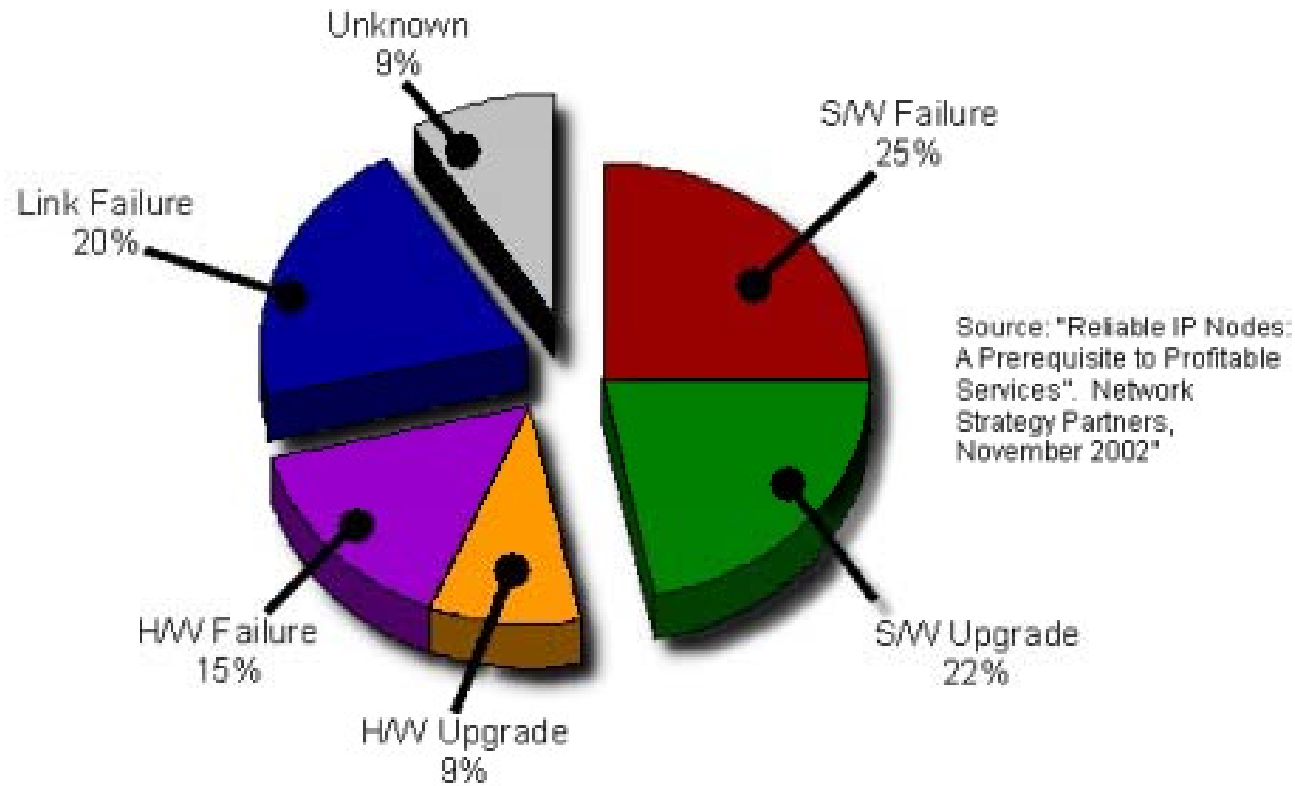


- **The Failover System**
- **Technical solution**
 - the DNS and the new domain
 - www.gridops.org
 - Geographical failover examples
- **Use cases**
 - CIC Portal
 - GOCDB, SAM
 - GSTAT, GRIDICE
 - SAMAP (SAM Admin Page)
- **Future plans and improvements**
 - Distributed agents and Monitoring system
 - Oracle replication
 - CIC Portal

- **A backup operation that automatically switches to a standby database, server or network if the primary system fails or is temporarily shut down for servicing.**
- **Failover is an important fault tolerance function of mission-critical systems that rely on constant accessibility.**
- **Failover automatically and transparently to the user redirects requests from the failed or down system to the backup system that mimics the operations of the primary system.**

- How much availability must we guarantee ?

	Availability	Downtime/Year	Examples
1	90.0%	36 days, 12 hours	Personal Computers
2	99.0%	87 hours, 36 min	Entry Level Business
3	99.9%	8 hours, 45.6 min	ISPs, Mainstream Business
4	99.99%	52 min, 33.6 sec	Data Centers
5	99.999%	5 min, 15.4 sec	Banking, Medical
6	99.9999%	31.5 seconds	Military Defense



- **Magic words are:**
 - Redundancy
 - Remove Single Points of Failure (SPOF)

- **Propose, implement and document failover procedures for the collaboration, management and monitoring tools used in EGEE/WLCG Grid.**
 - The mentioned tools (listed later in this talk) are daily and heavily used by COD teams, regional and sites operators and other user categories, for grid management and control purposes.
 - **These are the reasons for an availability requirement that is high and which tend to become higher in future.**

- **Born as EGEE SA1 Operations COD task**
- **Reminder: who are the “CODs” ?**
 - Teams provided by EGEE federations, working in pairs (one lead and one backup) on a weekly rotation
 - Role:
 - Watch the problems detected by the grid monitoring tools
 - Problem diagnosis
 - Report these problems (GGUS tickets)
 - Follow and escalate them if needed (well defined procedure)
 - Provide help, propose solutions
 - Build and maintain a central knowledge database (WIKI)

- **LCG-3D**
 - Some differences
 - Our failover activity deals with operational tools
 - LCG-3D deals with databases and data transfers.
 - Some similarities and shared goals
 - work on databases replication and switches
 - Same concern in disaster recovery solutions
 - Often involves the same (or at least related) teams.
 - discussions and working sessions engaged
- **Other failover related examples**
 - TODO

- **DNS choice:**
 - Well supported by local staff at our institutes
 - Easy to understand how to exploit its features
 - Very stable and consolidated (born in the '70s)
 - Widely used as element for failover solution by ISPs and IT companies
- **the DNS approach consist in:**
 - mapping the service name to one or more destinations
 - update this mapping whenever some failure is detected
- **this must be coupled with procedures that:**
 - keep data in sync where it is needed
 - kill unnecessary processes on the system in failure
 - enable needed processes on the replacing system.

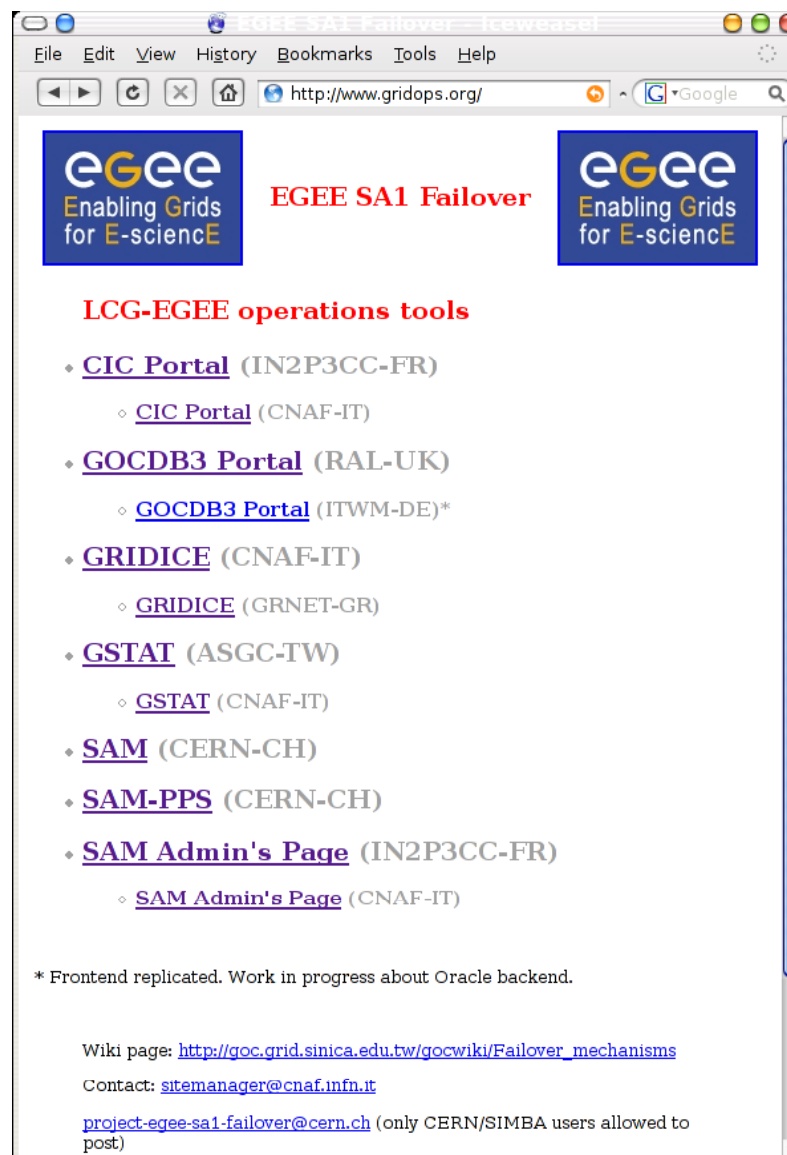
- **ISP caching policies**
 - Some provider could have caching policy longer than our TTL
 - The institutes participating to our Grid in general shouldn't
 - So user-service and service-service connections should be generally able to benefit from short TTLs, except rarely for some roaming user
- **Caching at OS level**
 - Local resolvers on MS Windows and Mac OS X provide caching, but they take into account possible shorter TTLs on DNS records
- **Caching by the web browsers**
 - MS Internet Explorer: 30 minutes
 - Mozilla Firefox: 60 seconds
 - A shorter time would be preferable for MSIE, but tolerable

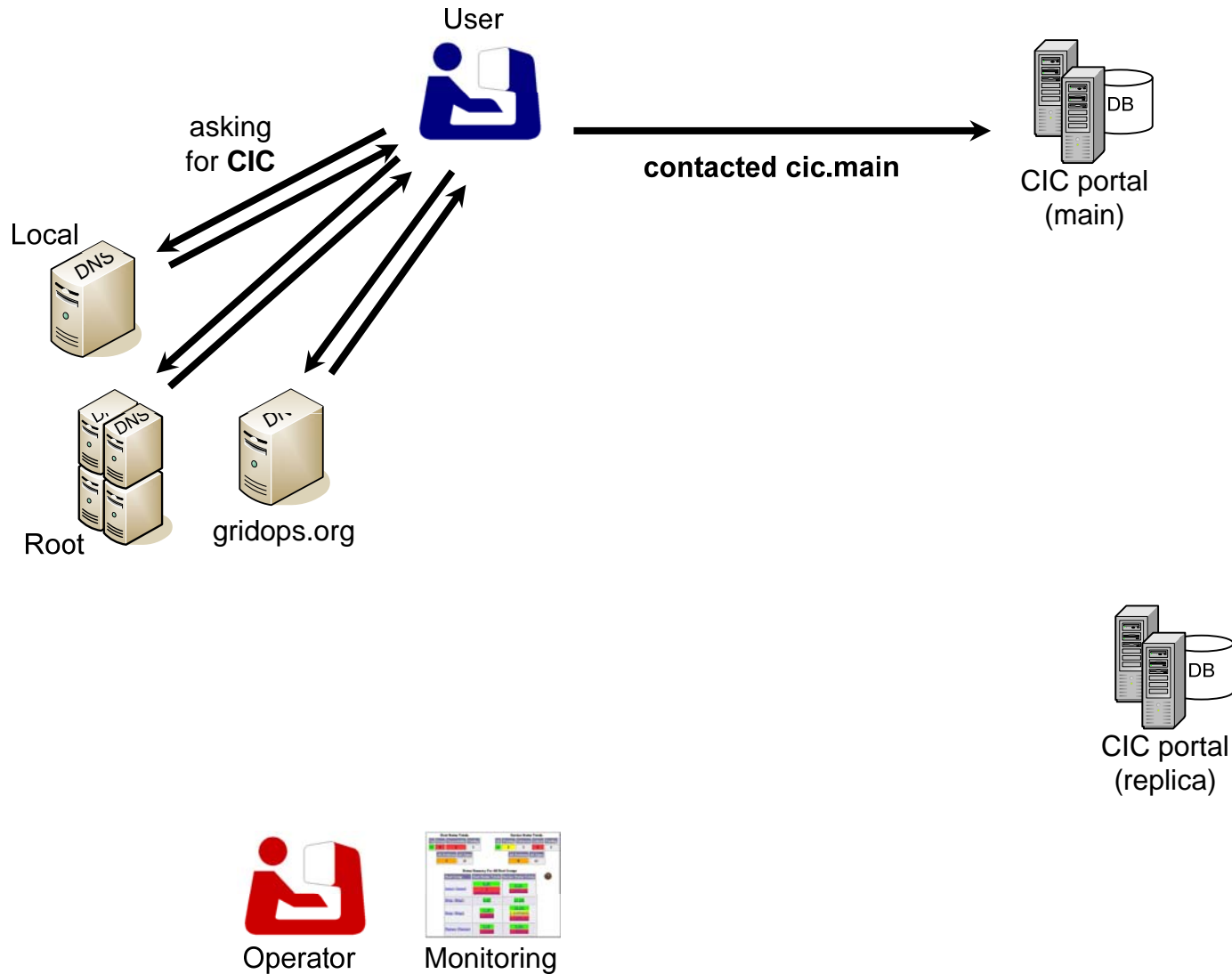
- A new **gridops.org** domain has been registered by CNAF
- Redundant master & slave DNS provided by CNAF & GRNET
- All the replicated services' names inserted as **CNAMEs**:
 - cic.gridops.org, cic2.gridops.org;
 - goc.gridops.org, goc2.gridops.org;
 - etc...
- Default “**\$TTL 60**” imposed to the gridops zone
- Names in gridops securely updated via `nsupdate` using `dnssec-keygen` generated keys

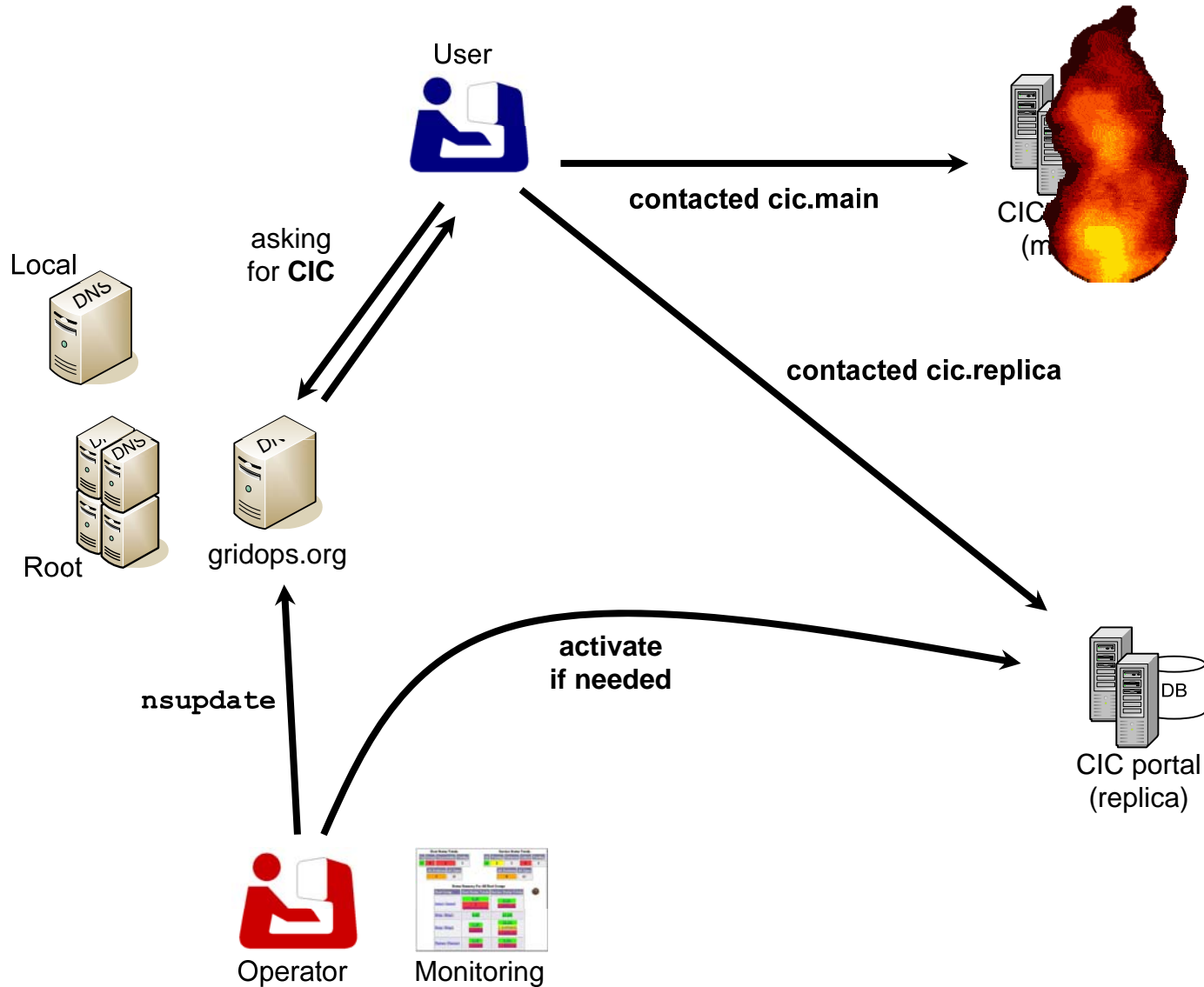
- CIC Portal
- GOCDB
- GRIDICE
- GSTAT
- SAM
- SAMAP

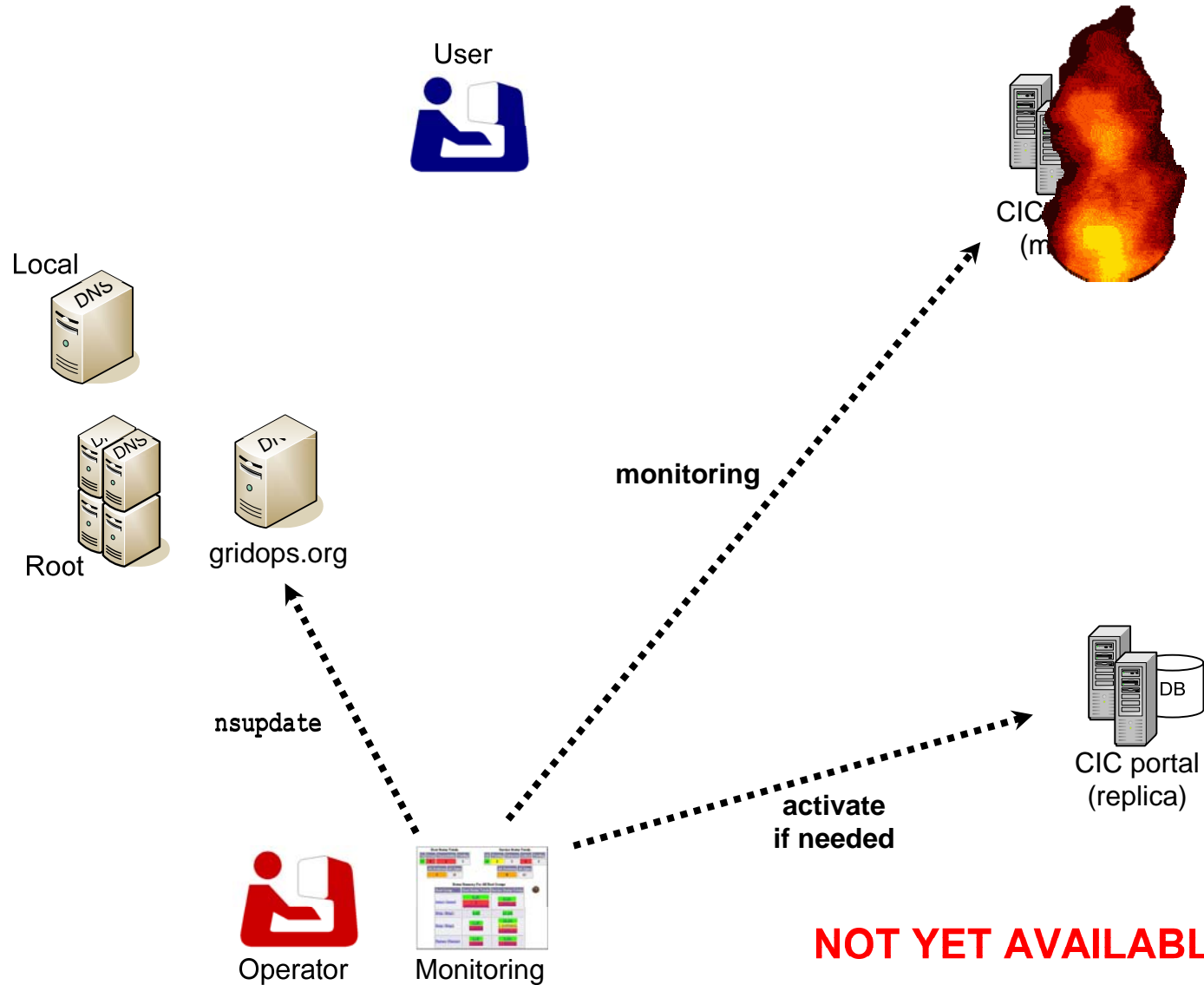


- Available operations tools are listed on www.gridops.org failover page. The portal is at present the collector of the proper links to the main and replica operations tools.

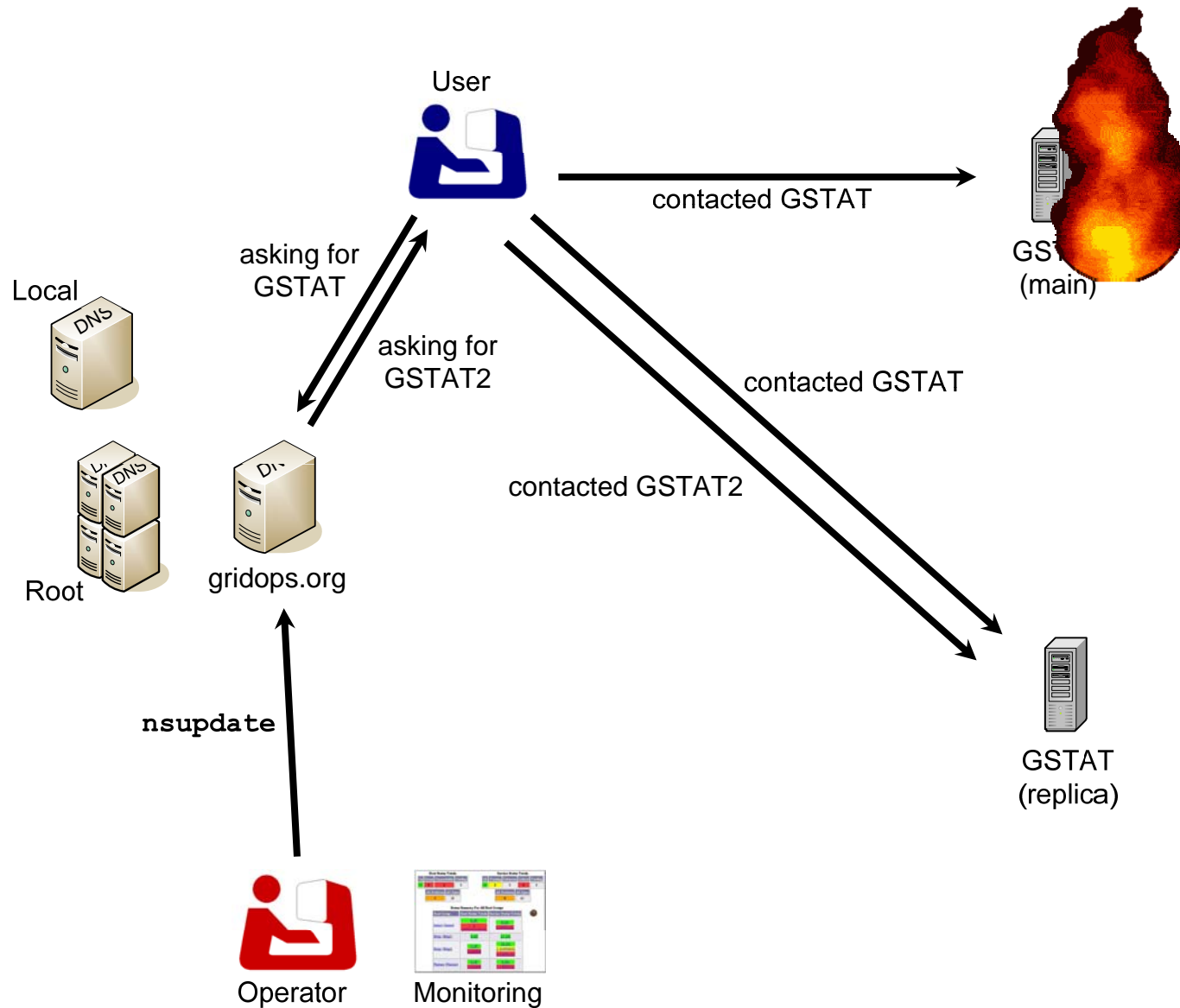








NOT YET AVAILABLE



- **Replication added early on the list**
 - Highly critical tool
 - Planned or unexpected service outages could break the continuity of daily activity

- **First switch successfully done**
 - Replica instance used in production during one whole week
 - Normal use of the portal during this time
 - No problem reported

CNAF - BOLOGNA



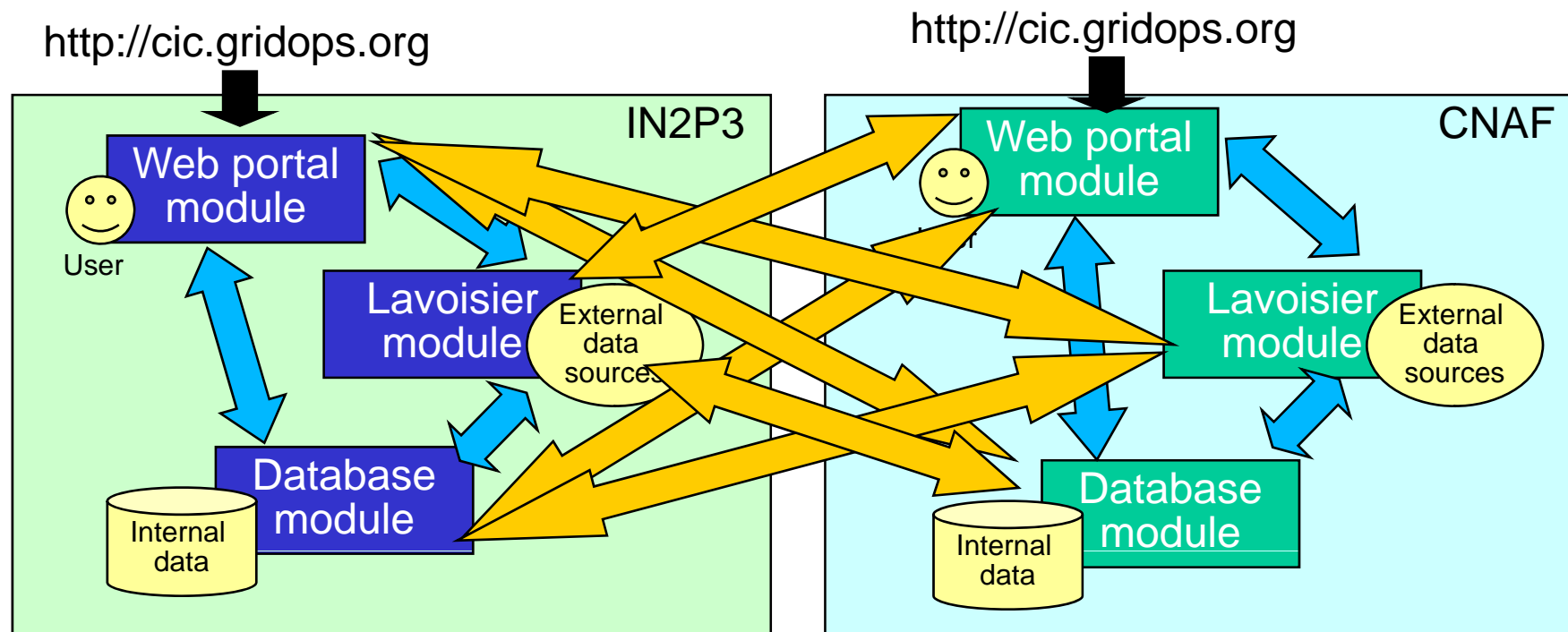
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CIC PORTAL Failover



- The CIC portal is based on three distinct components :
 - A web portal module (php and html, css files)
 - A database module (Oracle)
 - A data processing system (named Lavoisier)
- Each component can work with any of the other, master or replica: 8 possible scenarios !



- **Web module replication**
 - Portable code
 - Environment & configuration on replica (Apache, PHP, libs)
 - Host certificate for the replica
- **Data processing system (Lavoisier) replication**
 - Environment and configuration on replica (Apache ANT, Globus toolkit, java web services)
 - Deployment of a second instance of Lavoisier
 - Settings on replica (e-mail address for local error reporting...)
- **Database replication**
 - Dump of master DB exported to replica
 - Well established procedure, involving 2 persons and an interruption of service
 - We are working on better solutions

- **GOCDB**

- From the GOCDB3 release, introduced Oracle backend: more complex to replicate
- GOCDB3 web frontend promptly replicated in ITWM German site
 - Release synchronized via RPM and apt-get
- Oracle DB failover plans:
 - Short term: weekly DB dump to CNAF (**in progress**)
 - Medium term: 2 separate sites with Oracle Streams in UK (**in progress**)
 - Medium-long term: another replica in TW, when instructions are ready

- **SAM**

- Complex framework:
 - Web, WS, Oracle, UI(2), RB(2), WMS(2), BDII(2)
- DB size:
 - 100.000.000 rows, 100 GB TOTAL
 - 100.000 – 1.000.000 rows, 100 MB – 1 GB DAY
- Call for volunteers:
 - Implies Oracle licences
 - Good results from the tests done by CYFRONET (Poland), where SAM is already known, installed and used. It is likely that replica will be there

- **General considerations:**

- GRIDICE and GSTAT are very different, but similar in one aspect: they collect a lot of information mainly from the Grid Information System. The source in both cases is mainly one.
- Therefore for their replication:
 - we basically installed another instance
 - we waited for the historical data to be long enough to be usable
 - we accept some small inconsistencies between the instances, because this has the positive aspect to give another view of the monitored resources

- **GRIDICE**

- Main instance installed and administered by CNAF and GridICE teams
- Secondary instance recently installed at FORTH-ICS Greek site and administered with the support of GridICE experts

- **GSTAT**

- Main instance in ASGC-Taiwan
- Secondary instance running at CNAF for more than one year

- SAMAP(**SAM Admin's Page**) - web-based monitoring tool for submitting SAM Framework test jobs on demand
- based on SAM-client (Site Availability Monitoring Framework in EGEE)
- additional functionality implemented in response to the site administrator's needs
- provided functionality:
 - SAM job submission on demand
 - check status of the running test jobs
 - cancel submitted SAM jobs
 - publish SAM job results
 - show logging info of the running test jobs
 - schedule regular SAM job submission (cron task management)

- **SAMAP architecture divided into two independent parts: Portal part and UI (grid User Interface) part**
- **Portal part integrated with the CIC Portal**
- **UI part installed on dedicated UI machine**
- **SAMAP installed in two independent instances and linked to proper DNS domain entries**
- **synchronization of instances via CVS repository**
- **separate WMS servers available for both instances**
- **easy switch from main to backup instance by DNS entry modification**
- **full transparency for end users**

- **TODO**