

ARCHERY: The service endpoint registry of ARC6



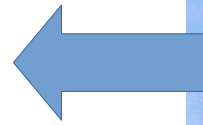
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Advanced Resource Connector
www.nordugrid.org/arc



Original vision of utility computing

service
discovery

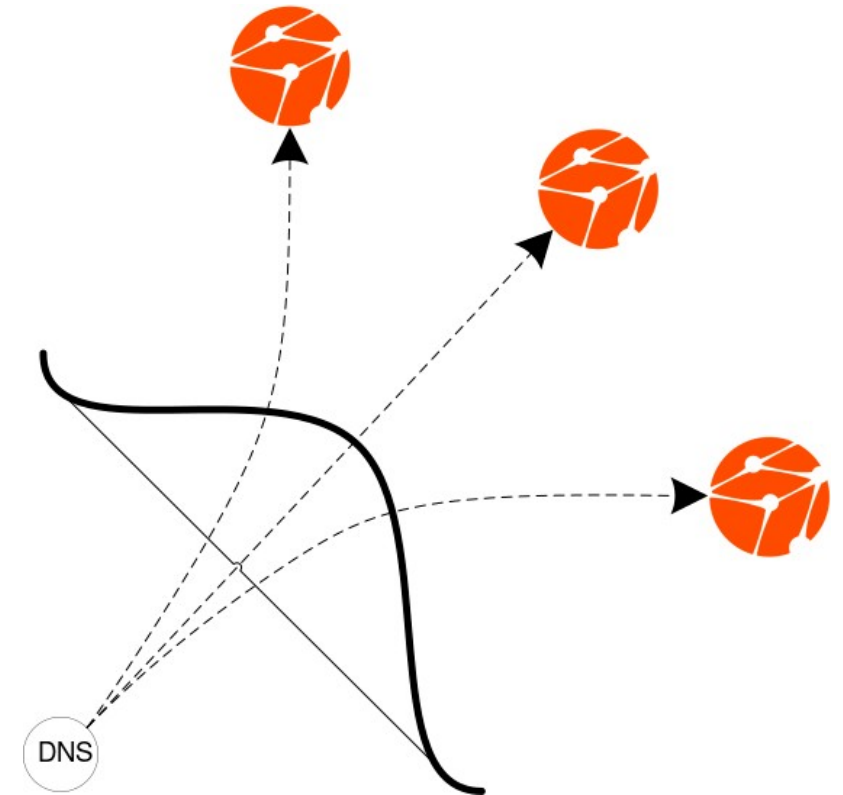


service
registry



ARCHERY: What is it?

- **ARC Hierarchical Endpoints Registry**
- The new general-purpose information index system by ARC
- **DNS-embedded** catalogue of service endpoints
- General system for e-Infrastructures, not restricted to ARC



Why yet another info service?

- There were many attempts:
 - Globus GIIS, BDII, EGIIS, EMIR, GOCDB, CRIC, EGI Service Catalogues
- Difficult to find the balance:
 - top-to-bottom vs bottom-to-top
 - central vs peer-to-peer
 - static and dynamic info
 - level of details



The Idea

- Understand what is really needed for **service discovery**
- Define the **minimalistic data model** of e-Infrastructure services
- Store the whole thing **embedded** in **DNS records!**



Why DNS?

- Reliable infrastructure **already established**
 - **Software layer** (both server and consumer side) is already in place
 - well-known to every infrastructure operator
- Robust technology to **distribute and access** content
- **Caching** on many network layers
- **Delegated administration**

“The costs of implementing such a facility dictate that it be **generally useful, and not restricted to a single application**. We should be able to **use names to retrieve** host addresses, mailbox data, and other as **yet undetermined information**.” © RFC 1034 - DOMAIN NAMES - CONCEPTS AND FACILITIES



How to embed data into DNS?

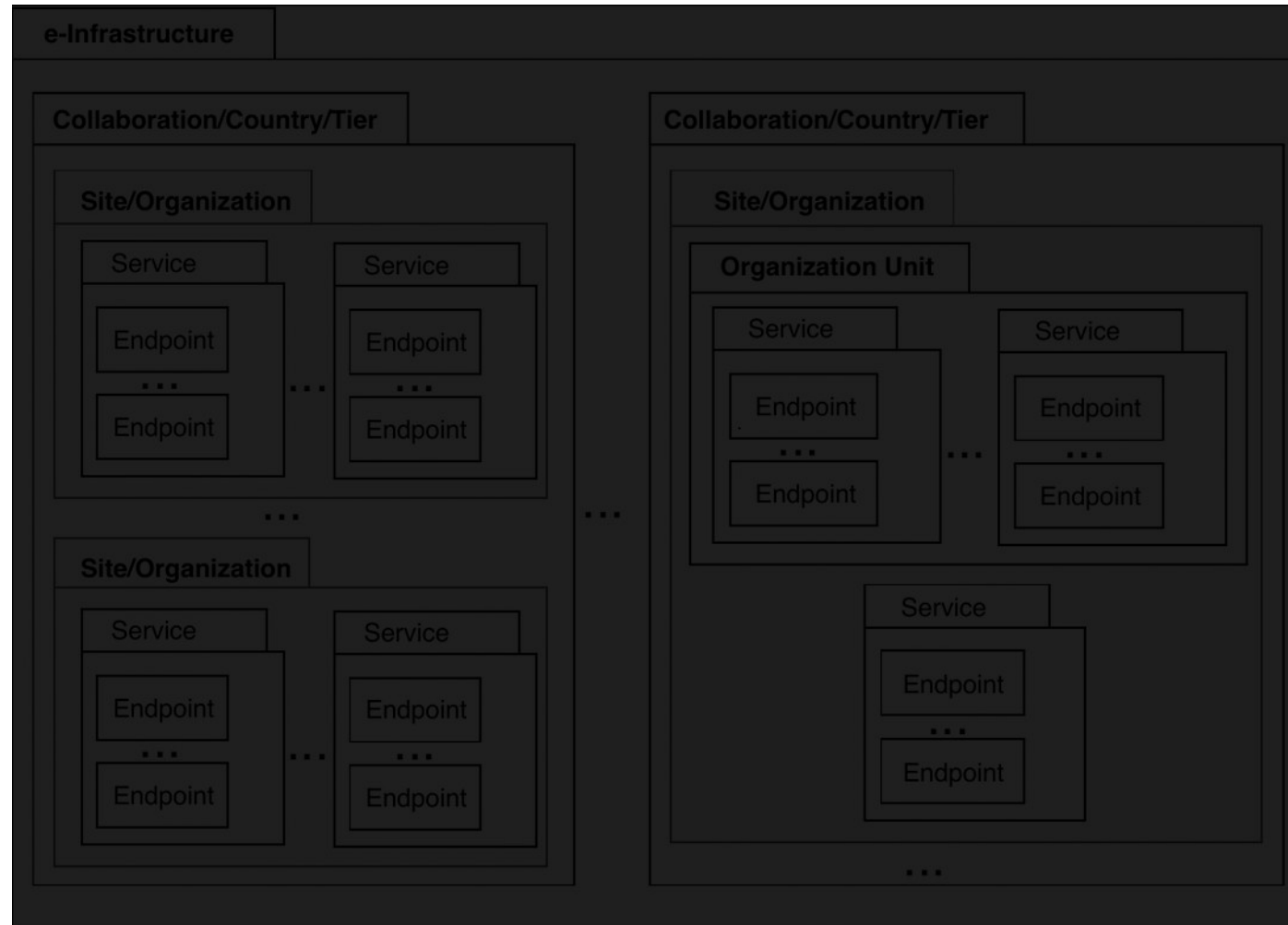
- Worldwide DNS infrastructure was designed to be scalable and open for many types of information
 - **TXT records** allows to store arbitrary ASCII string in the DNS database (up to 65kB of data per request)
- Heavily used in e.g. e-mail security

```
[user@host ~]$ host -t TXT grid.org.ua
grid.org.ua descriptive text "v=spf1 mx ip4:91.202.128.126 ~all"

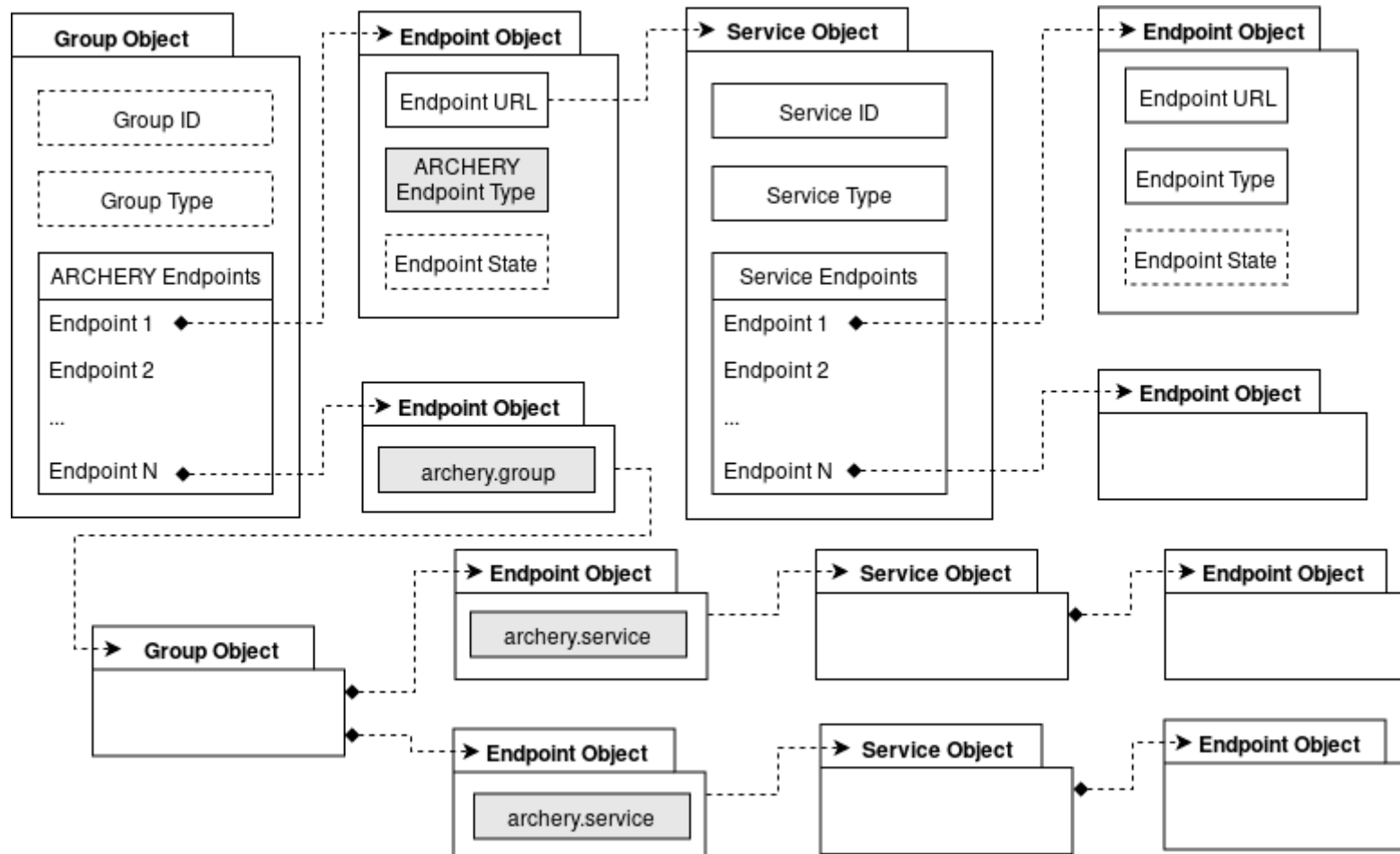
[user@host ~]$ host -t TXT mx._domainkey.grid.org.ua
mx._domainkey.grid.org.ua descriptive text "v=DKIM1\; k=rsa\;
p=MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDAYfGZLtaPtMcFSAn1gApiG
JaB8vEP8vLn08j5ZAieoaInEiJ0b8Pe0zDPOXRUQ4wIpGNB9q8jY9wNY3ga0K0x
R0vxpKr1uy56bJ3dVXwd1Bcz8DNt1L0y52M6i01meU45BV78ho6eZMnhCs+BfMR
TYkws1o7kH+bK0skgkI9rgQIDAQAB"
```



Lets go back to the beginning: e-Infrastructure model



ARCHERY data model



- **Endpoint object**
 - network location
- **Service object**
 - e-Infrastructure service (compute, storage, etc)
- **Group object**
 - Organize other objects



DNS Rendering

Service Object

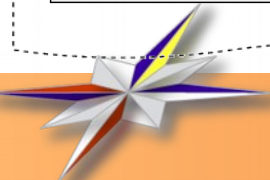
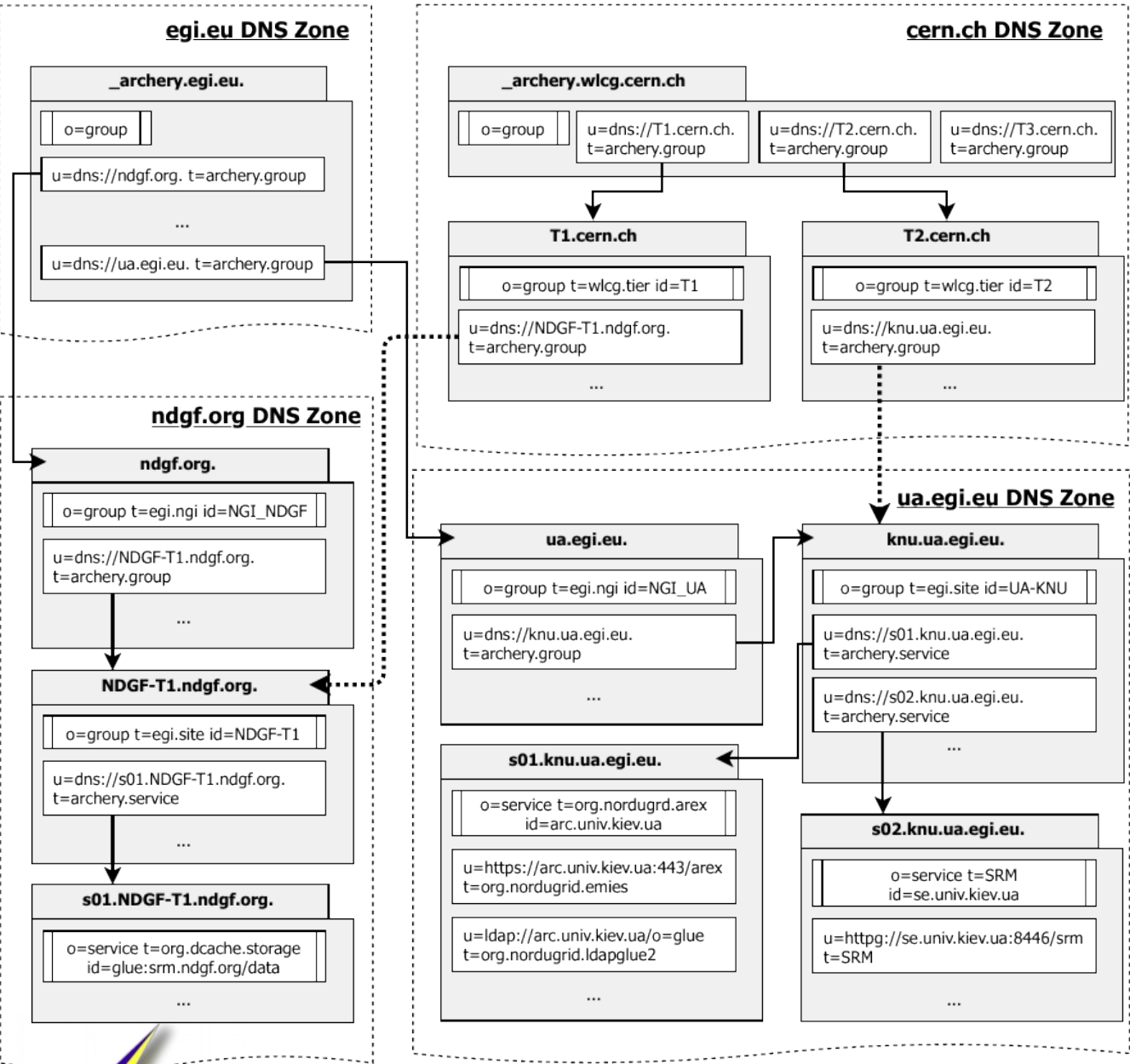
```

<DNS name> TXT "o=service t=<Service Type> id=<Service ID>"
<DNS name> TXT "u=<Endpoint URL> t=<Endpoint Type> [s={0|1}]"
<DNS name> TXT
...
<DNS name> TXT "u=<Endpoint URL> t=<Endpoint Type> [s={0|1}]"
    
```

Group Object

```

<DNS name> TXT "o=group [t=<Group Type>] [id=<Group ID>]"
<DNS name> TXT "u=<DNS URL> t=archery.{group|service} [s={0|1}]"
<DNS name> TXT
...
<DNS name> TXT "u=<DNS URL> t=archery.{group|service} [s={0|1}]"
    
```



How to create a populated ARCHERY instance?

- Create a DNS zone
- Generate access key and configure dynamic updates
- Use **archery-manage** to remotely insert service endpoint data in the proper format into DNS zone
 - get list of services from plain text file
 - get available services from site-bdiis or nordugrid egiis
 - filter endpoints (e.g. based on availability, type, other attributes)
- Run this periodically to keep ARCHERY up to date

See the Demo!



How to find service endpoints in ARCHERY?

- Any DNS client for manual data retrieval

```
[manf@X303 ~]# host -t TXT _archery.dk.archery.nordugrid.org
_archery.dk.archery.nordugrid.org descriptive text "u=dns://e06b294c0d._archery.dk.archery.nordugrid.org. t=archery.service"
[manf@X303 ~]# host -t TXT e06b294c0d._archery.dk.archery.nordugrid.org.
e06b294c0d._archery.dk.archery.nordugrid.org descriptive text "u=ldap://deckard.dcsc.ku.dk:2135/Mds-Vo-Name=local,o=grid t=org.nordugrid.ldapng"
e06b294c0d._archery.dk.archery.nordugrid.org descriptive text "o=service t=org.nordugrid.ares id=deckard.dcsc.ku.dk"
e06b294c0d._archery.dk.archery.nordugrid.org descriptive text "u=gsiftp://deckard.dcsc.ku.dk:2811/jobs t=org.nordugrid.gridftpjob"
e06b294c0d._archery.dk.archery.nordugrid.org descriptive text "u=ldap://deckard.dcsc.ku.dk:2135/o=glue t=org.nordugrid.ldapglue2"
```

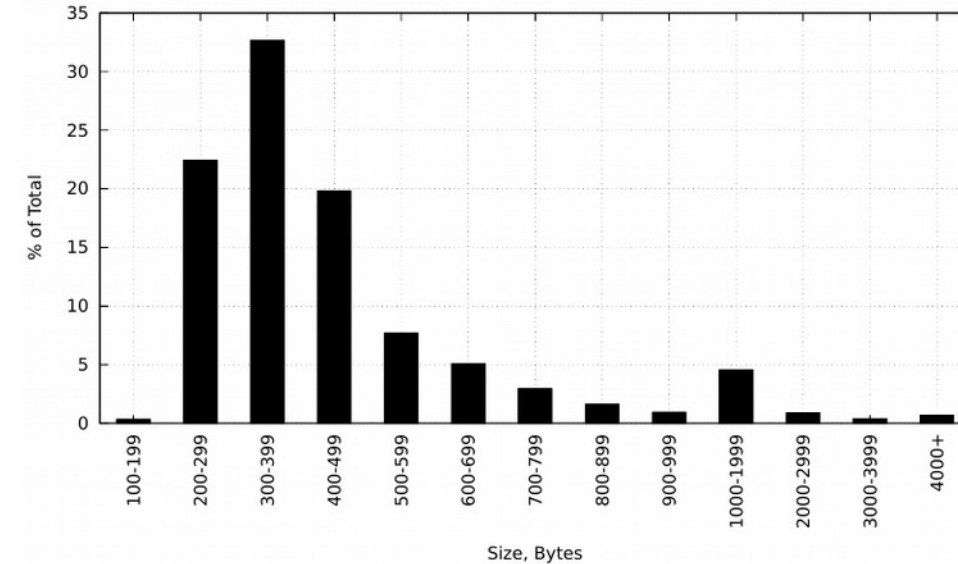
- ARC6 tools already supporting ARCHERY: **See the Demo!**
 - The archery-manage tool as registry client
 - ARC Client/SDK endpoint retrieval plugin
 - NorduGrid monitor is fetching ARCHERY data



Rolling out ARCHERY

- Service indexing of the NorduGrid infrastructure is already moved to ARCHERY (appx. 150 objects)
- We also played with test BDII->ARCHERY migration scenario
 - all services were fetched from Site-BDIIIs
 - NGI, Site, Service hierarchy was preserved in the DNS grouping
 - all endpoints data were embedded into the DNS (appx. 2000 objects)

See the Demo!



Object size distribution for EGI

ARCHERY as a WLCG service endpoint registry?



ARCHERY Demo

- DNS zone config
- Querying the records of the test EGI deployment
- Updating the records
- Submitting the job using ARCHERY

