

ICANN 57 Tech Day

Nomulus

What is Nomulus

- The registry platform that powers Google's TLDs and takes advantage of the scalability and easy operation of Google Cloud Platform
- Runs on Google App Engine and backed by Google Cloud Datastore, a highly scalable NoSQL database
- Can manage any number of TLDs in a single shared instance
- Supports the full range of TLD functionality required by ICANN
 - Extensible Provisioning Protocol (EPP)
 - WHOIS and RDAP
 - Reporting
 - Trademark protection
 - Data Escrow (RDE/BRDA) with automated crypto, signing, and transfer
- Written in Java and released under the Apache 2.0 license

Why Open Source?

- Registry goals
 - Provide an open source implementation of core registry functions
 - Develop enterprise class software that runs in the cloud for ease of operation
 - Build a shared registry system that scales to meet high demand
 - Support all ICANN gTLD requirements
 - Support Google's gTLDs
 - Give back to the community
- Other platform goals
 - Create an open source reference for idiomatic Google code on Google App Engine
 - Demonstrate Google Cloud Platform's advanced features
 - Support customization to accommodate special needs
 - Evolve the platform over time through community contribution
 - Encourage interoperability and open standards (including Gavin Brown's fee extension)

Why Now?

- Core registry functionality fully open source-able
- Code base is fully dependency injected
 - Using Dagger 2 compile time dependency injection

Still needed:

- EPP/WHOIS protocol level endpoints
- Administration UI (though there is a fully functioning command line utility)
- Remaining gaps are relatively easy to fill
 - DNS integration
 - Secure key locker
 - Full Spec 3 compliant reporting (though we have reporting support)

Simplified Administration and Operations

- App Engine project configuration through XML
- Nomulus configuration done in Java
- No machines or networks to configure or maintain
- Built in automatic scaling, load balancing, and security
- Built in administration tools and dashboards as part of Google App Engine
- Can “kick the tires” with the GAE free daily quota

Distributed EPP with Transactional Consistency

- Standard EPP protocol support (RFCs 5730-5733)
- Backed by Google Cloud Datastore - distributed, auto-scalable, NoSQL
- High write QPS, extremely high read QPS
- Maximum concurrency unit is the EPP resource (domain/host/contact)
 - Writes must touch two sharded indexes (one for any mutation, two for resource creates), but still parallelizable up to the shard count - defaults to 100 and can be adjusted upwards
- Maintains required transactional consistency across entire SRS
 - Commit log system guarantees consistency for backups and escrow deposits
- Costs
 - Read-only operations (e.g. domain check) may be momentarily stale
 - Some infrequent operations must be asynchronous (contact/host deletes, host renames)
 - Transactional consistency on NoSQL database is complex

Pluggable DNS Provider Support

Default support for:

- BIND (via dynamic updates, a.k.a. RFC 2136)
- Google Cloud DNS

Includes example code to make adding new DNS backend support for any provider with an API easy.

WHOIS and RDAP (gTLD compliant)

- WHOIS
 - Can be modified to accommodate different WHOIS requirements
 - Future support for searchable WHOIS
- RDAP
 - Basic functionality available now
 - Development will continue as the standard evolves, including support for authentication

We note that not everyone is interested in gTLD compliance.

Powerful and Flexible Reporting

Automatic export of raw data to BigQuery (Google Cloud Platform's "big data" analytics data warehouse), including:

- Daily datastore dumps with EPP resources and transaction history
- App Engine request logs containing EPP and WHOIS logs

Nomulus includes limited example SQL queries for converting this data into activity reports and billable transaction reports (as input to an invoicing system).

New gTLD operators can leverage this data easily as part of the reporting requirements in Spec 3.

Demonstration

[Nomulus Demonstration Screencast](#)

Further information on Nomulus

- Main site: <https://nomulus.foo> (currently redirects to GitHub)
- Javadoc: <https://nomulus.foo/javadoc/latest/>
- Other docs: <https://github.com/google/nomulus/tree/master/docs>
- Discussion group: <https://groups.google.com/forum/#!forum/nomulus-discuss>

Q&A