Registry Architectures

What's a (ccTLD) registry ?

- Publishes one or more zones (think TLD and SLD)
- Manages delegations
- Publishes public (!) information (WHOIS)
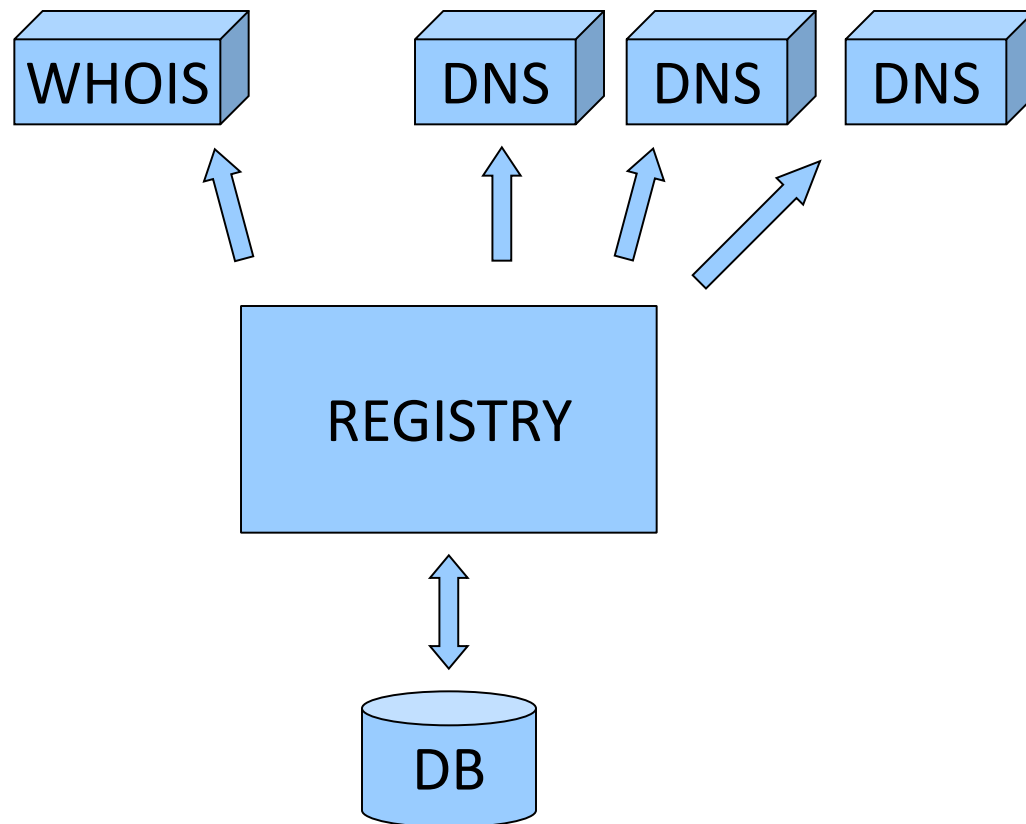- Possibly, receives payment for the service

Data flows

- Inputs
  - Domain Name System requests
  - Creation/deletion/modification requests of domain names
  - Add nameservers (name + IP)
  - Administrative information (registrant, tech contact, billing contact, ...)
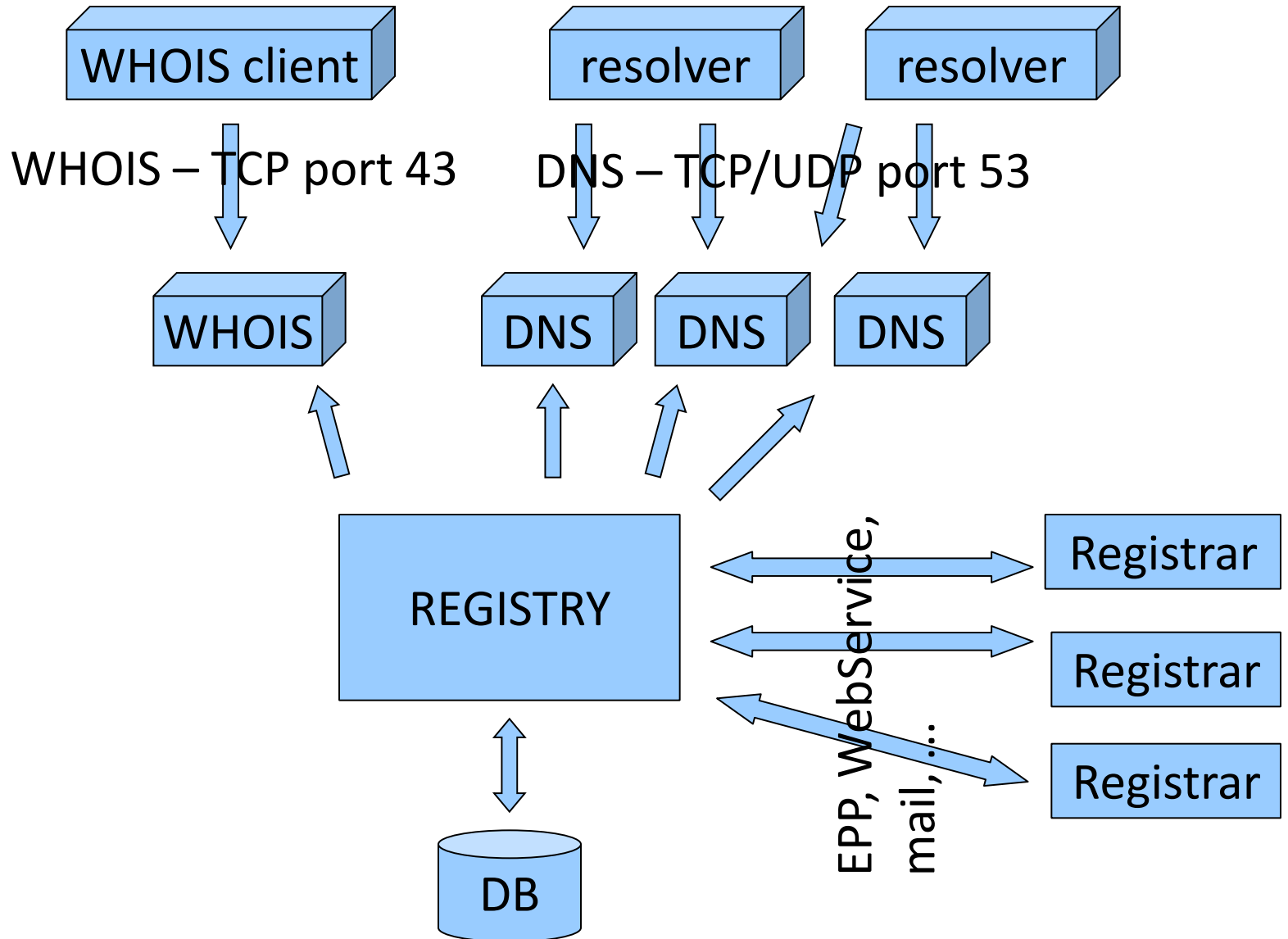
Data flows

- Output:
  - Answer DNS queries
  - Zones with delegations (publication)
  - Glue records (for nameservers which are within the zone being delegated)
  - Publication of WHOIS

Architecture

External interfaces

WHOIS client

resolver

resolver

WHOIS – TCP port 43

DNS – TCP/UDP port 53

WHOIS

DNS

DNS

DNS

REGISTRY

DB

EPP, WebService, mail,...

Registrar

Registrar

Registrar

What operations ?

- Add and remove records (redelegation)
- Add/modify/remove nameservers (modification is effectively a redelegation)
- Update of administrative data (whois info)

How complex can it get ?

- It can be as simple as a text zone file with comments in it
- Maintained with Ten Finger Interface

```
...
; SomeCompany
; contact John Dough, +1 123 123 4567, ; john@somecompany.mytld
somecompany        NS        ns1.othertld.org.
                   NS        ns.somecompany
ns.somecompany               A        1.2.3.4
...
```

Pretty simple operational model

- Add a delegation
  - Creation of domain
- Change a delegation
  - Domain dedelegation
- Remove a delegation
  - Domain destruction

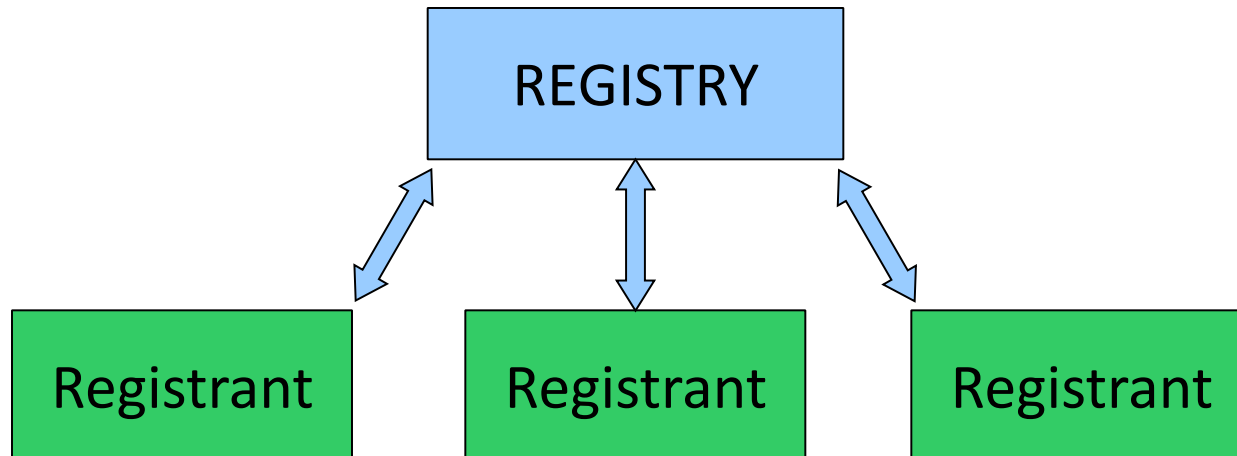- Every operation can impact delegation entries, glue records, whois data

Terminology

- "Registry" - Institution or organisation which maintains the zone and administrative data

- "Registrant" - Physical or moral person which is responsible for a domain name

- "Registrar" - Organisation managing domain registrations on behalf of registrants
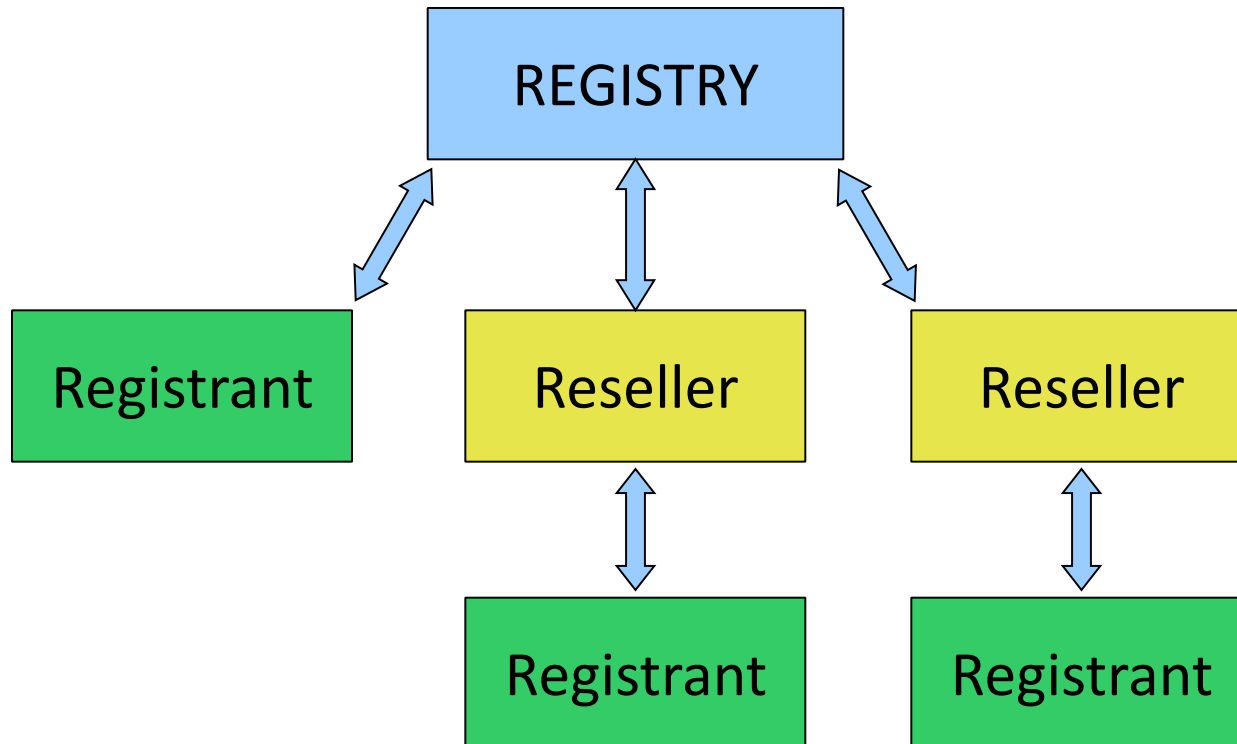
Different models: 2R

- Simple registry models – no registrars

The registrant is in direct contact with the registry. This is also called a "single access" registry.

```
                    ┌─────────────┐
                    │  REGISTRY   │
                    └─────────────┘
                   ↙       ↕       ↘
        ┌────────────┐ ┌────────────┐ ┌────────────┐
        │ Registrant │ │ Registrant │ │ Registrant │
        └────────────┘ └────────────┘ └────────────┘
```
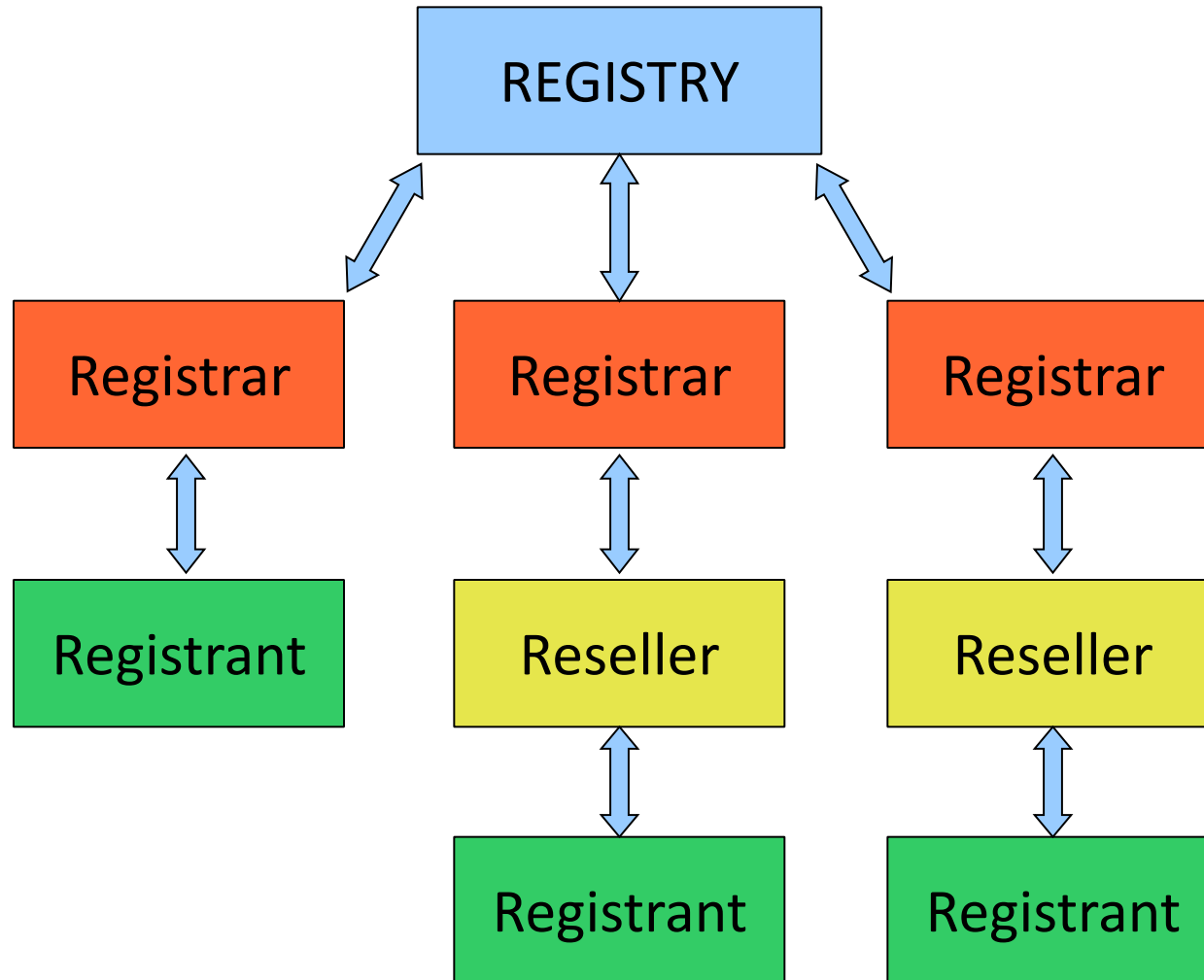
Different models: 2R

- It remains a single access registry, even though it may or may not allow resellers:

Different models: 3R

- Shared access registry

WHOIS

- Fetch meta-information about a domain, including administrative data (name, address, phone contact, ...)
- RFC 954
  - Not formally specified as a protocol
  - Output from different Registrars and Registries can look different (and often does)

Thick vs. Thin

- Indicates how the WHOIS is placed/ distributed

- Dependes on where the DB is located
  - Thin: .COM, .NET: administrative data are spread across the various registrars
  - Thick: .INFO – the administrative data are centralized at the Registry

Evolution of a registry

- From most simple
    - Text zone file with comments
    - Domain registration via email
    - No whois, or manually updated
    - No registrars or resellers, 2R
- To most complex
    - Relational database, Transaction, automated billing
    - WHOIS, EPP, Web interface
    - 3R with multiple registrars
    - Anycasting of DNS servers

EPP

- RFC3730

- Supercedes RRP (RFC2832)

- Extensible Provisioning Protocol

- Based on XML

- Used by an increasing number of registries and registrars

- Not all "modern" registries have adopted it yet!

Impact of policy on the registry

- This will be explained at a later stage, but it has to be taken into account that the policy will dictate many operational aspects of your registry:

    - Registration policy – conflict resolution – authorized names – 2R/3R – data privacy – automated renewal or expiration, etc...

- The evolution of the registry if often tied to technical as well as policy aspects