RIPE Database Inconsistencies

Carol Orange
RIPE NCC

Outline

- Credits (VU, NCC, RIPE)
- Taxonomy of inconsistencies
- Statistics
- Inconsistencies
  - Prevention
  - Cure
- Where to go from here?

VU Student Project

- Academic Staff:
  Jaap Gordijn
- Students:
  Lars Baede,Peter Paul Bakker
  Tania de Bruin, Wiebe Hordijk
  Jelena Knezevic, Jeroen Langeveld
  Wouter Wijngaards

And, ...

- Input from RIPE NCC
  Daniel Karrenberg
  Ambrose Magee
  Carol Orange
  Staff survey
- Input RIPE
  Wilfried Woeber
  DB Working Group survey

Taxonomy of Inconsistencies

- Garbage in admin-c,tech-c,zone-c
- Invalid InterNIC nic-hdl's (AUTO1)
- Nonexistent object references
- Multiple person objects
  - with different nic-hdls
  - with and without a nic-hdl
- Role references in admin-c

Person Objects

- What's in there?

Person Objects	99637
With nic-hdl	55479
Never referenced:	~16800
Names occuring 2X:	3398
Objects involved:	8596

References to Persons/Roles

Attribute	Name	CAPS	digits	NIC-hdl	ALL
admin-c	72688	782	145	51552	125177
tech-c	80145	891	146	58321	139503
zone-c	32243	1385	0	30287	63915
all	185076	3058	291	140150	328585

What's Found?

- Of 240231 objects:
  - 101499 person/role objects
  - 333103 references to person/role
- References found:
  - 134467 by **NAME**
  - 145341 by **NIC Handle**
- **53295 NOT FOUND (~15%)**

What's in the 53295 references?

- 29826 "see remarks"
- 7798 "not maintained"
- 7471 nonexistent person/role
- 7123 "-"
- 293 telephone numbers
- 280 email addresses
- ...

Preventing Inconsistencies

- Introduce constraints
- Enforce constraints
  - Perform checks on object:
    - creation
    - modification
    - deletion

Constraints

- Internal (object)
  - Syntactic
  - Semantic
- External (object)
  - Referential
  - Inter-object
  - Inter-database

Syntactic Constraints

- Presence of mandatory attributes
- Strong type checking on all attributes, e.g.
  - inetnum:
    - 193.0.0.0 - 193.0.0.255
  - telephone/fax:
    - "+" then digits (spaces, dashes)

Semantic Constraints

- Require NIC handle in every
  - Person object
  - Role object
  - all references to Person/Role objects
- NIC handle as primary key
  - Person object
  - Role object

Referential Constraints

- Only existing objects referenced
  - restricts database manipulations
  - tricky for referencing external data
    - Internic NIC handles, IRR
- Permission to reference, includes
  - Hierarchical authorization

Inter-Object Constraints

- Mutual exclusion
  - allocations
  - assignments
  - as numbers
  - domain names
- Other
  - assigment from allocation
  - RR specific

External Constraints

- Validity of external NIC Handles
- Domain object / DNS
- RR specific semantics

Enforcing Constraints on Input

- Internal input checks
  - mostly straightforward, but see case
- External checks
  - InterNIC (RIDE?)
  - DNS (validity of data?)
  - IRR
    - age of mirrors
    - validity of other databases

Case Study

- Suppose we decide:
  - nic handle is unique key for
    - person
    - role
  - all person/role references use
    - nic-hdl
  - no dangling references permitted

Enforcement

- Input
  - creation person/role
    - give unique RIPE nic-hdl **ALWAYS**
  - reference to person/role (creation)
    - check existence of person/role
    - non-RIPE handle ???

Case Study

- Deletion of referenced object
  1. Don't - send an error
  2. Add "to be deleted" attribute
  - If present:
    - maintainers referenced objects notified
    - no new references allowed
  - Deletion after all references removed
  - Add Replace function for person/role

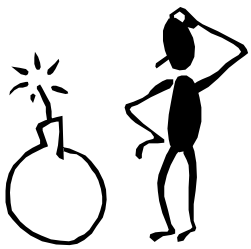
Cleanup - the data is yours!

- RIPE NCC cannot modify
- So who does?
- Of person objects
  - 70% have no maintainer
  - 41% no email
  - 84% no notify
- almost all have "changed"!

And what about references?

- 140150 of 328585 are NIC-hdls
- What about the

188435 others ?



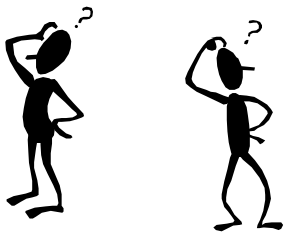
Local IR WG Says:

- Inetnum's should only reference

NIC-Handle

- That's means cleanup of

40K references alone!

RIPE NCC

RIPE Network Coordination Centre