NETWORK DOCUMENTATION AND NETDOT

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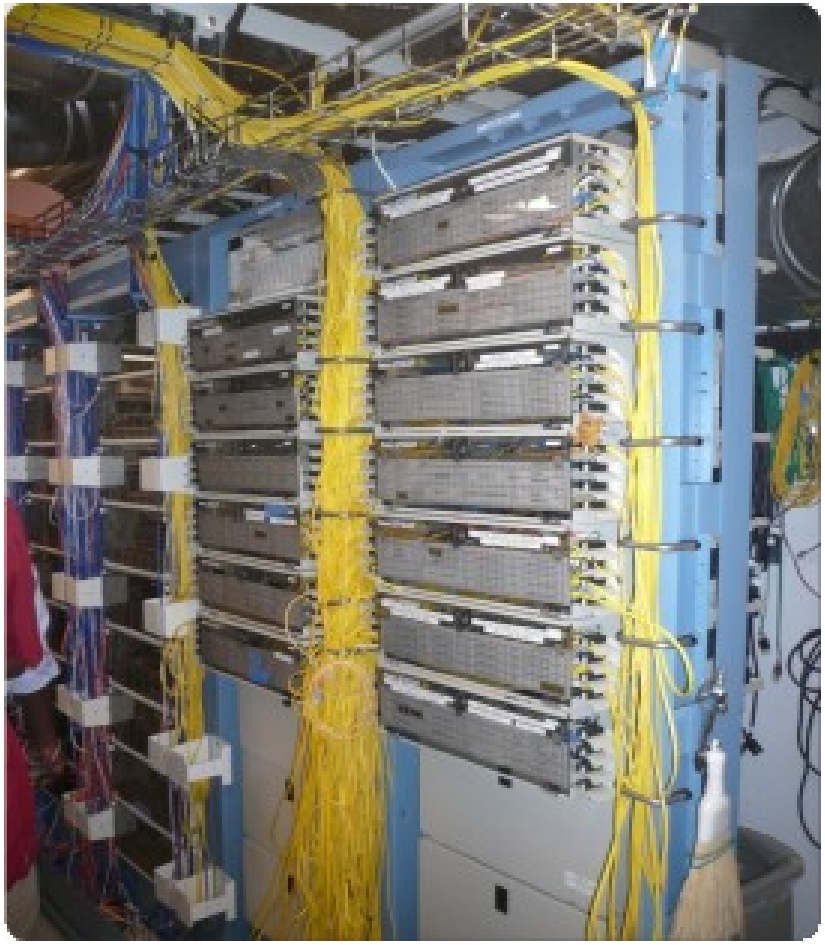
Introduction

The answer to keeping track of it all is



Document,

Document,

Document.

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Introduction

- Basics, such as documenting your switches...
  - What is each port connected to?
  - Can be simple text file with one line for every port in a switch:
    - health-switch1, port 1, Room 29 – Director’s office
    - health-switch1, port 2, Room 43 – Receptionist
    - health-switch1, port 3, Room 100 – Classroom
    - health-switch1, port 4, Room 105 – Professors Office
    - .....
    - health-switch1, port 25, uplink to health-backbone
  - This information might be available to your network staff, help desk staff, via a wiki, software interface, etc.
  - Remember to label your ports!

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Introduction

- Maybe this process should be automatic.
- Tools to help automate network documentation are something to consider.
  - You can write local scripts (programs) to do this.
  - Consider among several automated documentation systems for networks.
  - You'll probably end up using and doing both.

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Labelling

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Problems with documentation

- In most cases:
  - Lack of clear procedures and methods
  - Dispersion
  - Lack of structure
  - Lack of correlation
  - Lack of tools... or, too many tools
  - Lack of time and human resources

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Requirements for a tool

- Open standards based
- Generic and flexible
- That uses a relational database
- Automates tasks
- Exports configurations
- Web and command-line interfaces (CLI)
- Authentication and authorization
- Reports
- Open source code
- Application programming interface (API)

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Netdot:

- Started in 2002. Required by the University of Oregon Network Services and NERO (http://www.nero.net).
- Nothing equivalent available as Open Source.
- Started as something much simpler.
- Quickly it became apparent that centralizing and correlating information was critical:
    - Topology.
    - Cable plant.
    - IP and Mac addresses.
    - DNS, DHCP, etc.

Netdot: Design goals

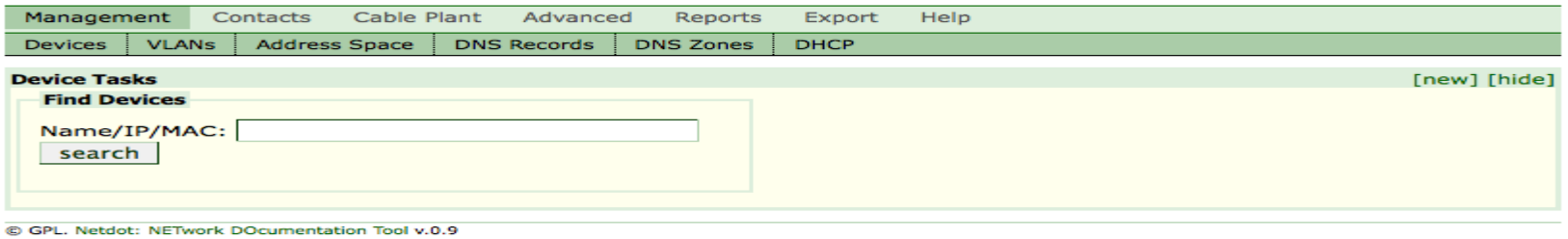
- Utilize components (don’t reinvent the wheel)
  - There are Open Source packages that help to resolve many Network Management problems.
- Independent of the RDBMS using abstraction (http://www.masonhq.com)
  - MySQL, Postgres, etc.
- Use of Object Relations Mapper tools (ORM)
- Minimize the number of programming languages.
  - Perl and Javascript
- Low impact graphical interface.

Functionality

- Include functionality of other network documentation tools such as IPplan and Netdisco.
- Core functionality includes:
  - Discovery of network interfaces via SNMP
  - Layer 2 topology discovery and graphics using:
    - CDP/LLDP
    - Spanning Tree protocol
    - Switches forwarding tables
    - Router point-to-point subnets
  - IPv4 and IPv6 address management (IPAM)
    - Address space visualization
    - DNS and DHCP configuration management
    - IP and Mac address correlation

Functionality Cont'd

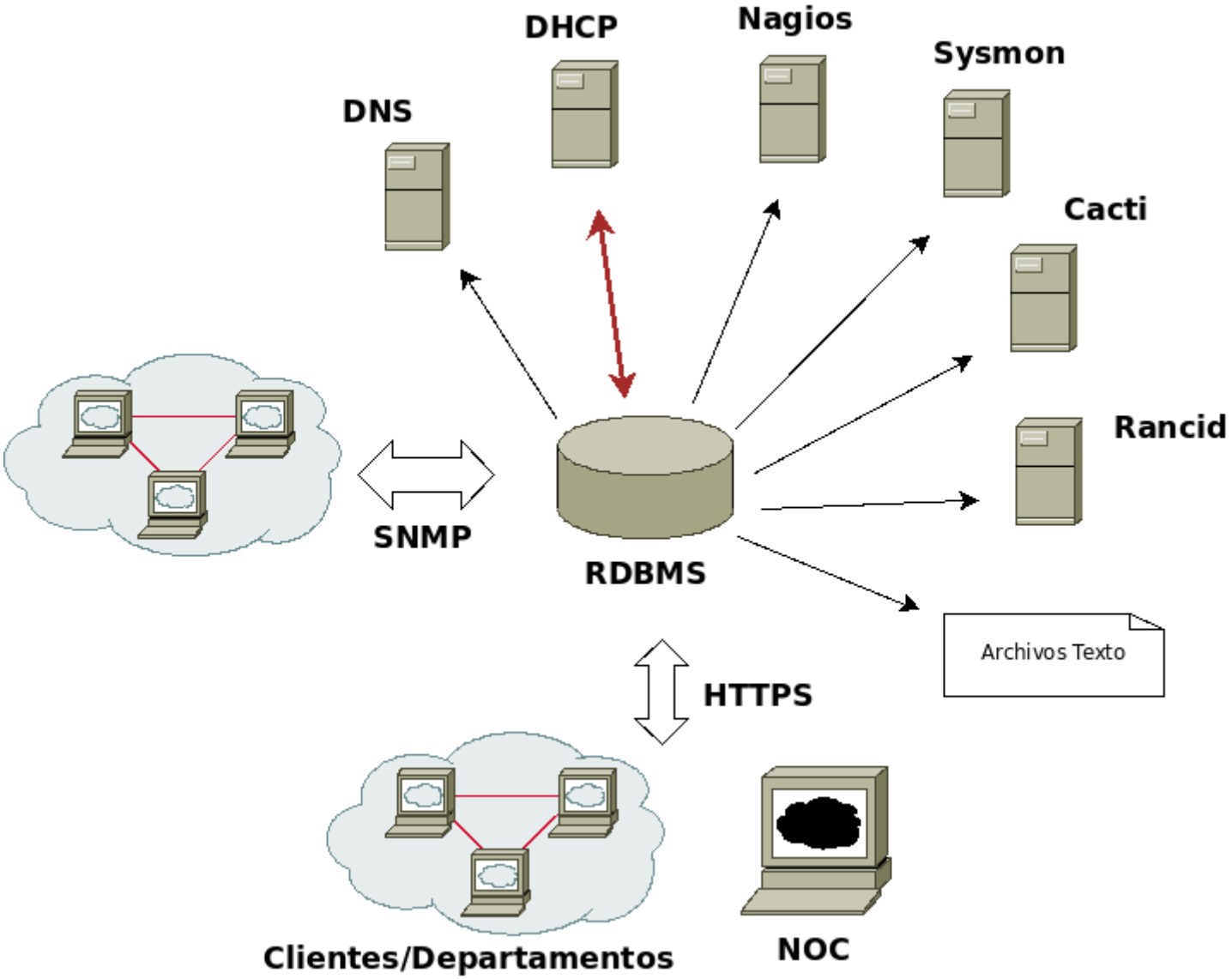
- Cable plants (sites, fibre, copper, closes, circuits)
- Contacts (departments, providers, vendors, etc.)
- Export of data for various tools (Nagios, Sysmon, RANCID, Cacti, etc.)
    - For example, automate Cacti configuration
    - I.E., how to automate node creation in Cacti
- User access-level: admin, operator, user
- Ability to draw pretty pictures of your network.



Netdot components

- SNMP::Info
  - http://snmp-info.sourceforge.net/
- HTML::Mason
  - http://www.masonhq.com/
- Class::DBI
  - http://search.cpan.org/~tmtm/Class-DBI/lib/Class/DBI.pm
- Apache2::SiteControl
  - http://search.cpan.org/~awkay/Apache2-SiteControl-1.03/lib/Apache2/SiteControl.pm
- NetAddr::IP
  - http://search.cpan.org/dist/NetAddr-IP/IP.pm
- DBI
  - http://dbi.perl.org/
  - http://search.cpan.org/~timb/DBI/DBI.pm
- MySQL
  - http://dev.mysql.com/doc/refman/5.1/en/

Netdot: NETwork DOcumentation Tool



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Network devices

- Can be added via SNMP (preferred) or manually
- Automatic updates via SNMP
- Manufacturer, model, software version, name and domain, dates
- Maintenance contracts, out of band access, SNMP version and community
- Interfaces, VLANs, IP addresses, BGP peers
    - ARP tables (routers), redirection tables (switches)
- Topology
- Images, comments, change history

Topology

- Netdot uses all possible sources of topological information:
- CDP and LLDP protocols
- Analyze redirection tables
- Spanning Tree protocol
- Point-to-point networks

IP Space: Addresses and Blocks

- Hierarchical (drill-down) and graphical representation
- Support for IPv4 and IPv6
- Classification in:
  - Block
    - Container
    - Subnet
    - Reserved
  - Address
    - Static
    - Dynamic
    - Reserved

IP Space: Blocks and Addresses

- Subnets are discovered from router interfaces
- From ARP tables we can know:
  - Addresses in use in each subnet
  - Mapping of IP to MAC
- Information added for blocks (or subnets)
  - Group that uses the block
  - Group that administers the block
  - Percent utilization of addresses (subnet)
  - Percent utilization of sub-divisions (containers)
- Information added for addresses
  - First and and last time seen
  - interface and device
  - Services to monitor with Nagios (HTTP, DNS, SSH, DHCP, Radius, LDAP, etc.)

Cabling

- Inter-building cabling (backbone)
  - Buildings and closets where cabling starts and stops.
  - Type of fiber, length, quantity of fibers
- Fibers
  - Interconnections (splicing) and sequences
  - Measurements, tests, interfaces, circuits
  - Status

Cabling

- Intra-building cabling (interior cabling)
  - Closet where it begins
    - Level
      - Building
- Interface (port) where it is connected
- Outlet where it terminates (id)
  - Office number or room
    - Level
      - Building

Cabling: Closets

- Physical data
  - Dimensions, number and types of panels, type of ventilation, number of copper pairs, number of racks, etc.
- Cabling that terminates in the closet
  - Fiber and twisted pair
- Photos

Entities

- Branch
- Customer
- Department
- Manufacturer
- Peer (BGP)
- Provider
- Vendor

Contacts

- Based in individuals and roles (Person & Contact)
  - Information by individual
    - Contact data
      - Locations, position, telephone, e-mail, beeper
    - Roles
      - Administrative contact, technical, etc.
      - Notification schedule and levels
    - Contact lists
      - Assigned to different resources
      - Devices, subnets, cabling, etc.

Reports

- Devices
  - By category and by product
  - Out-of-date firmware
  - Duplex mismatches
- Most used MAC codes (Manufacturers)
- From the database
  - SQL table utilization reports

Configuration exports

- The information contained within Netdot enables the automatic generation of configurations for software packages.
  - Monitoring devices and services
    - Nagios, Sysmon
  - Monitoring configurations
    - RANCID
  - Traffic analysis
    - Cacti
  - Services
    - DNS (Bind)
    - DHCP

Exporting configurations

- Recommendation:
  - Netdot updates Subversion or CVS
  - Puppet (replaces Cfengine) distributes configurations, restarts services, etc.

Other automated systems

- There are several. Each one does something different:
  - <u>Open Source</u>
    - IPplan:
      - http://iptrack.sourceforge.net/
    - Netdisco
      - http://netdisco.org/
    - RackTables
      - http://racktables.org/
  - <u>Commercial</u>
    - HP OpenView
    - IBM Tivoli and Netcool
    - SolarWindows

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Q&A.

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THANK YOU!