

Daemons: Printing

Printing

- **lpd** – the “standard” BSD print spooling daemon.
 - Accepts jobs, places them in a spool



Daemons: Printing

- ➡ If lpd is operating locally, then it does the interaction with printer (these days, almost always via a filter that does the actual communication)
- ➡ If not local, then (unsurprisingly) the daemon sends the job to another machine; the **lpd** protocol (RFC 1179, see <http://www.ietf.org/rfc/rfc1179.txt>) was not a great design success



Daemons: Printing

➤ **lpsched** – the “standard” ATT version of **lpd** ; it is more complex to administer (see Chapter 23 of USAH) and, while it was less likely to wander off the reservation once it is in operation, configuration can be much more interesting and problem-laden than **lpd**. **lpsched** uses the same RFC 1179 protocol, which it inherited from BSD.



Daemons: Printing

➤➤ **lprng** – an open source **lpd** replacement, includes a “Printing Cookbook” for people who like details. However, **lprng** doesn’t seem to be gaining popularity; **cups** instead seems to have overtaken it



Daemons: Printing

➤ **cups** – a very popular open source replacement which disposes of the problematic RFC 1179 protocol, replacing it with IPP (RFC2567 (good explanation of the overall view of the protocol's design), RFC2568, RFC2569, RFC2639, RFC2910, RFC2911, RFC3196, RFC3239, RFC3380, RFC3381, RFC3382, RFC3391, RFC3510, RFC3712, RFC3995, RFC3996, RFC3997, RFC3998)

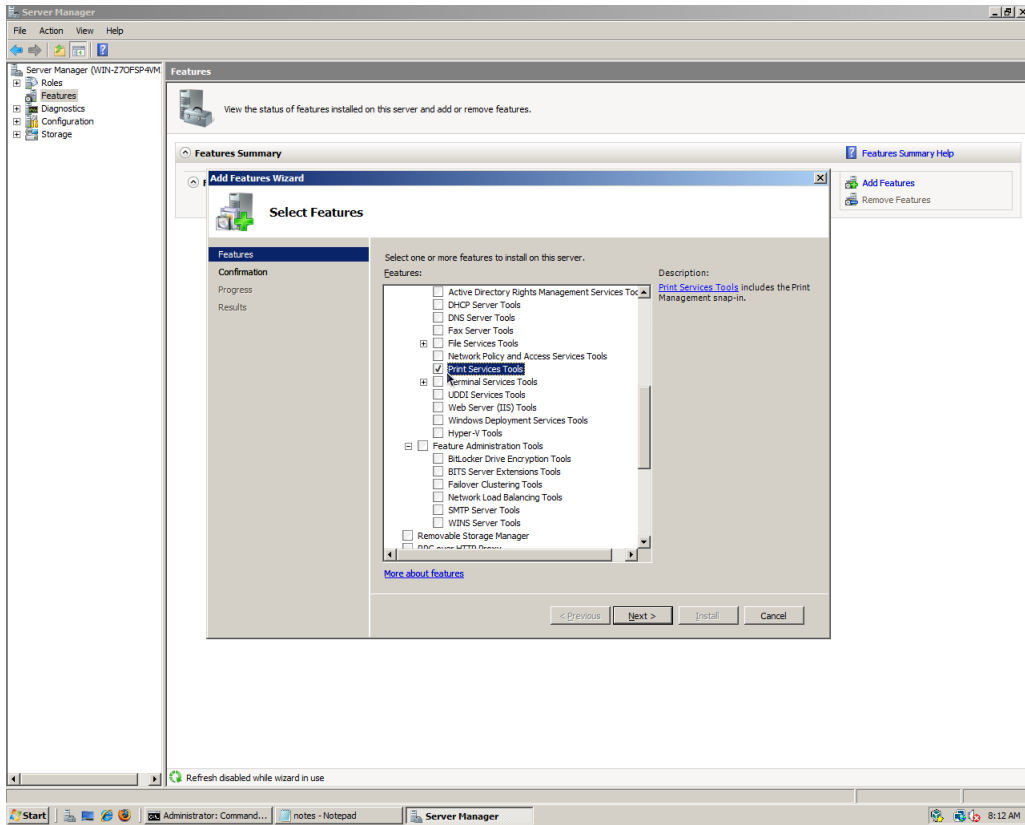


Daemons: Printing

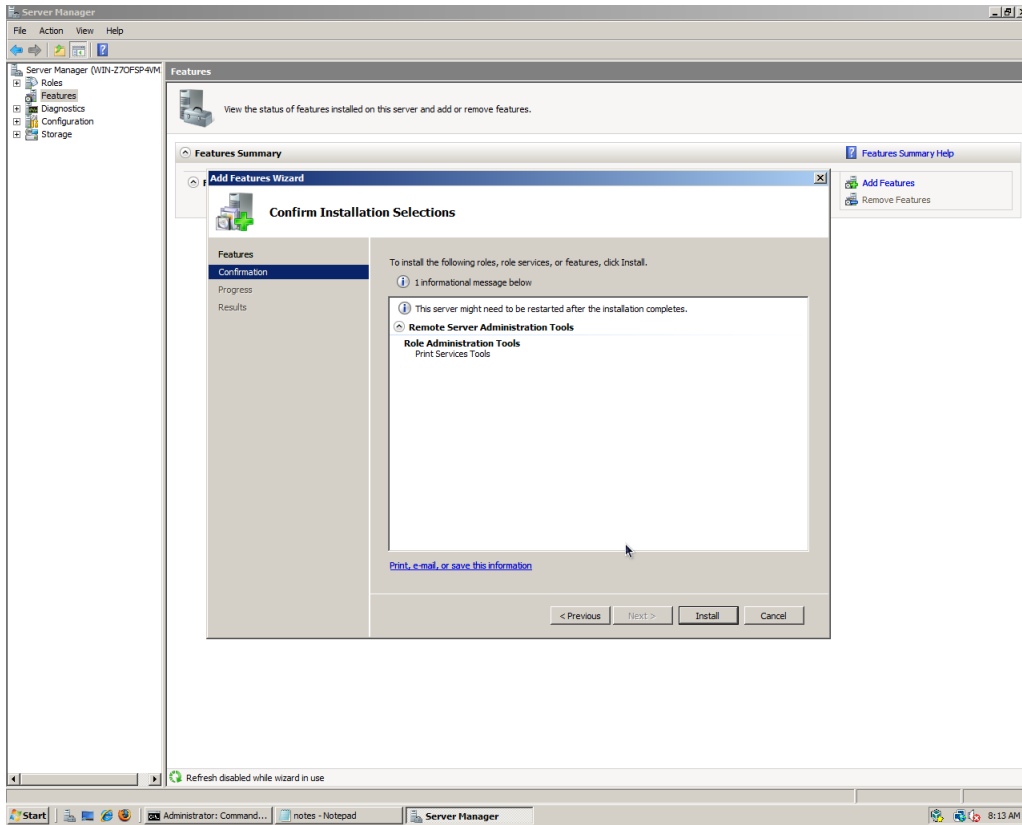
⇒ Windows 2008 – You can use the Server Manager application to turn on the printing “feature”.



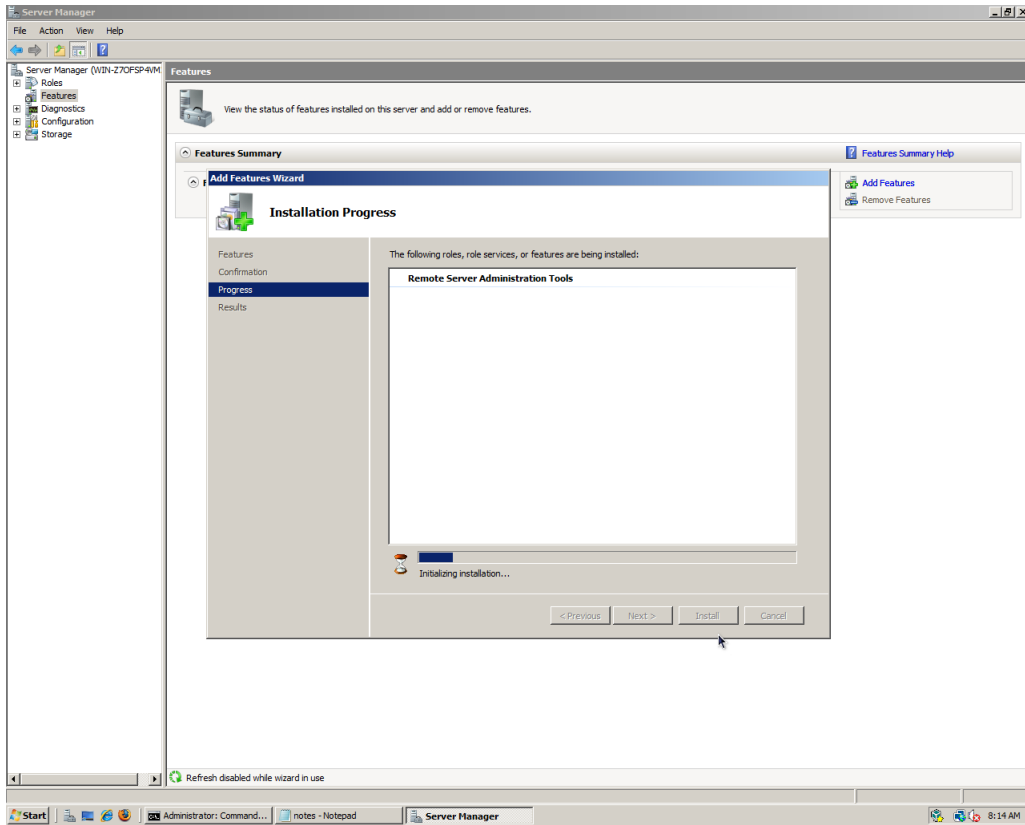
Windows 2008



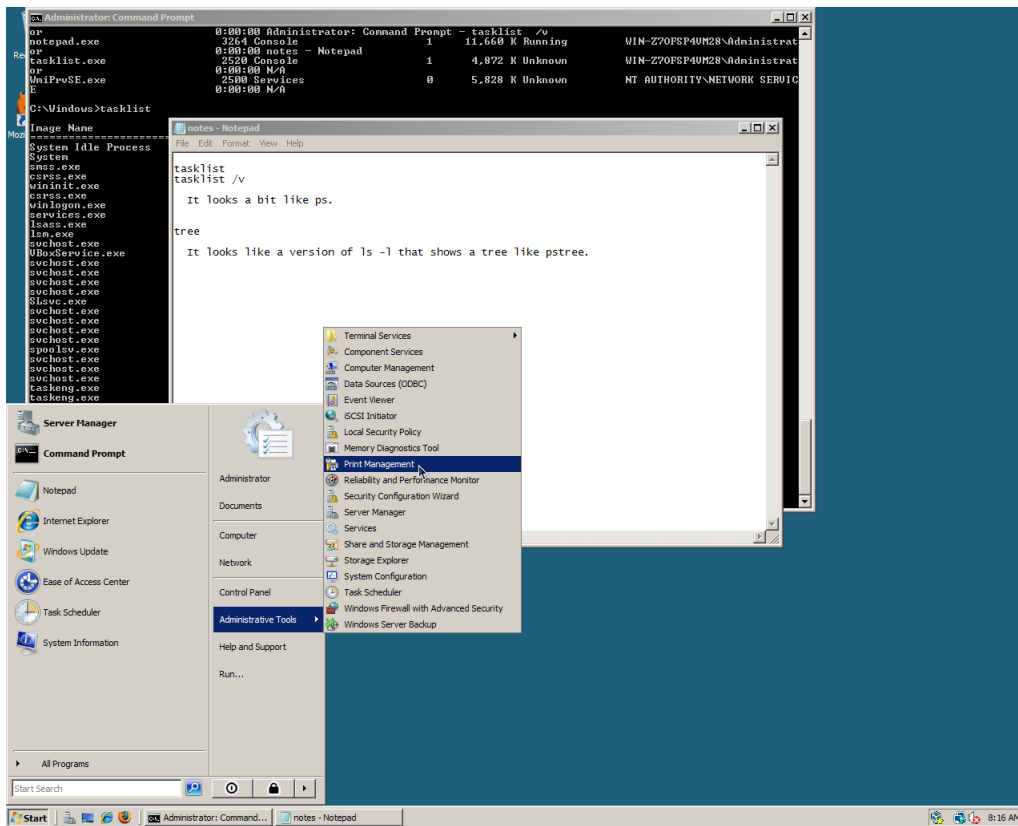
Windows 2008



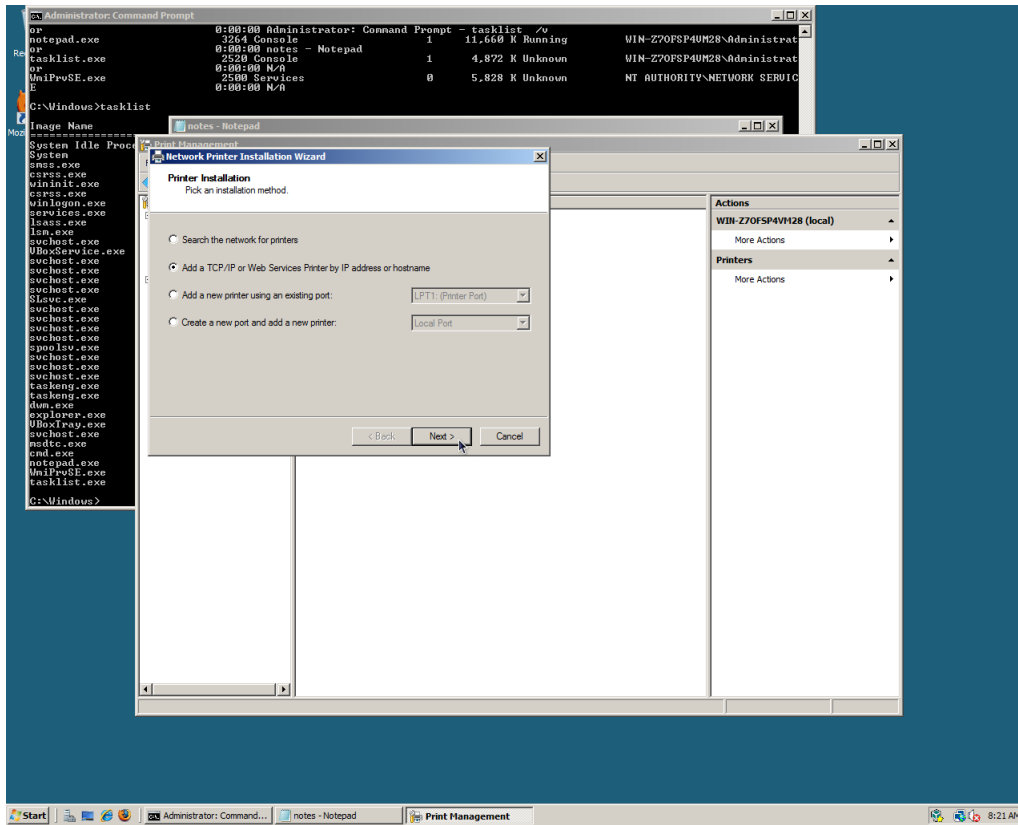
Windows 2008



Windows 2008



Windows 2008




Daemons: MTAs/MSAs

☞ Mail Transfer Agents (MTAs, see for instance RFC2821) and Mail Submission Agents (MSAs, RFC2476)



Daemons: MTAs/MSAs

sendmail

-  Routes local and network mail. Acts as MTA (and as an MSA listening on port 587), **sendmail** is one of the Internet email backbone workhorse programs.



Daemons: MTAs/MSAs

- ☞ One of the larger and certainly historically “buggiest” daemons, although the latest versions have security patches developed as needed (it is **always** a good idea to check <http://www.sendmail.org> for the latest on **sendmail** security.)
- ☞ Configuration information is kept these days in the subdirectory `/etc/mail`.



Daemons: MTAs/MSAs

- ☞ The file `/etc/mail/sendmail.cf` is a set of rewriting rules for modifying addresses; luckily tools exist to automate creation of this file (basically, you use a “makefile” that rewrites a “.mc” file into a “.cf” file. Check <http://www.sendmail.org/> for lots more information – the `op.ps` manual is the canonical reading material, although the O’Reilly book is easier. Unfortunately, some distributions have bizarrely taken



this makefile and turned into a simple invocation to a very complex shell script.)



Daemons: MTAs/MSAs

- ☞ **sendmail** is covered in LAH, plus there is an entire O'Reilly & Associates book is dedicated to **sendmail** .




Daemons: MTAs/MSAs


- ☞ Current, **sendmail** 8.14 is quite popular as an MTA. The ability to use a bolt-on “milter” (mail filter) was added (see <http://www.milter.org>), and now **sendmail** is probably the most flexible MTA when dealing with working at a message level; milters can detect and reject spam, they can check for legitimate users even for just forwarding MTAs, they can be implemented in C, C++, Perl, and Python.



Daemons: MTAs/MSAs

postfix

 **postfix** comes from IBM, and has become probably the second most popular MTA. (<http://www.postfix.org>)

 It is very powerful: and **postfix** now does handle milters. It does have a large set of configuration files that work very well together.



☞ The configuration is typically in `/etc/postfix`.



Daemons: Other MTAs/MSAs

- ☞ **qmail** - Dan Bernstein's MTA (<http://www.qmail.org>).
- ☞ **smail** - an older, less popular MTA from GNU; however, it has been very stable
- ☞ **exim** - an MTA from Cambridge, gaining in popularity, now found in many Linux distributions such as RedHat (CentOS) and Debian (where it is now the default MTA)



☞ **Exchange** - the enterprise Windows email server from
Microsoft



Daemons: MTAs/MSAs

- ☞ SA relevance:
- ☞ Mail service is the most popular and, arguably, most important service on your system (along with web service)
- ☞ Users get upset when mail does not work
- ☞ As with any other network service, you must keep up with the latest security patches



Daemons: MTAs/MSAs

- ☞ Configuring and tuning **sendmail** can take a lot of SA time, although generally using the m4 files allow deployment with just a little bit of effort — for a GUI approach, look at webmin at <http://www.webmin.com>, for instance



Daemons: MTAs/MSAs

- ☞ Very important these days in both server and client support is anti-spam and anti-virus protection. From a server perspective, the biggest tools are
- ☞ MailScanner (<http://www.mailscanner.info>) (server only)
- ☞ clamav (<http://www.clamav.net>) (runs on both client and server)



- ☞ razor (<http://razor.sourceforge.net>) (generally invoked within SpamAssassin)
- ☞ dcc (<http://www.dcc-servers.net/dcc>) (generally invoked within SpamAssassin)
- ☞ SpamAssassin (<http://spamassassin.apache.org/>) (general run on servers)
- ☞ Realtime Blackhole List (RBL) source, (for instance, <http://www.spamhaus.org>) (most powerful when used at the initial MTA contact, although SpamAssassin can



consult RBLs and we have used it both ways in the department)



NFS - Network File Service

- ☞ NFS was developed by Sun and is now used by many UNIX/Linux systems
- ☞ It allows file access across the network as if the files were local



NFS - Network File Service

- ➡ NFS exists as a number of daemons - nfsd, biod, etc., as well as in kernel file system code
- ➡ NFS is covered in Ch. 17 of USAH and we will cover it in more detail in a later lecture



Yellow pages (NIS and NIS+)

- ☞ Now deprecated even by Sun in favor of LDAP
- ☞ Allows key system files (“maps”) to be shared over the net using a UNIX/Linux dbm database and a client/server model running on top of RPC.
 1. ‘‘ypcat passwd | more’’ *vs*
 2. ‘‘more /etc/passwd’’
 3. /var/yp on the YP server and clients



4. YP == NIS (Network Information Service)



Yellow pages (NIS and NIS+)

☞ ypserv - server daemon

1. One master (see via “ypwhich”)
2. Serves a YP domain – “csdept” via “domainname”



Yellow pages (NIS and NIS+)

3. NOTE: YP domain name \neq DNS domain name \neq Windows domain (The term “domain” is, unfortunately, overloaded and overused in the computing field.)
- ☞ ypbind - client daemon: Locates a yp server and serves up the maps



Yellow pages (NIS and NIS+)

- 👉 SA RELEVANCE: You might come across the use of NIS or NIS+ in future jobs. The idea was a good one, but the implementation is now quite dated and insecure. Systems are moving away from NIS/NIS+ and into more versatile directory services, such as the Lightweight Directory Access Protocol (LDAP). More on generalized directory services and LDAP later.



ftpd

- 👉 **ftpd** is the File Transfer Protocol daemon, used by FTP client software to transfer files. As with sendmail, keeping up with security patches is critical in ftp implementations (the complex command set generally gives hackers plenty of places to look for flaws). On UNIX/Linux systems, a popular FTP implementation has been **wu-ftpd** (which has had many security flaws.)



ftpd

☞ **ftpd** is now being widely replaced by programs running over SSH/SSL, which gives a ftp-like capability over SSH (we will talk later more about **sshd**). While the client commands for **ftp** and **sftp** are similar, the underlying protocol is quite different (see <http://tools.ietf.org/html/draft-ietf-secsh-filexfer-10.txt> for more details.) Security is much better since plaintext passwords are not sent over IP as they were



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for the old protocol.



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ftpd

- ☞ The old ftp protocol is specified in RFC959.
- ☞ However, old ftp is not going away. There is still a useful place in Internet space for anonymous ftp, where the old version is better than more secure versions. If you don't care about security (and you don't with anonymous ftp), then why pay the overhead costs of using secure protocols?



Remote execution daemons

- ☞ A number of commands exist that permit a closer coupling between servers that support them. First there was **telnet** and **ftp**, then came the “r” command. Examples include: **rsh** (remote shell) and **rlogin** (remote login). A number of inetd-managed daemons exist to handle these services; strongly advised to disable all the “r” daemons since they are insecure.



Remote execution daemons (the “r” commands)

- ☞ In these security-conscious days you must move away from the “r” commands and into more secure equivalents, such as **ssh** (secure shell) and **scp/sftp** (secure copy)
- ☞ Ironically, the older programs **telnet** and **ftp** are still quite useful!



named (and djbdns)

☞ **named** is a common name for the popular Domain Name Server daemon and it comes as part of the BIND package, originally from UC Berkeley. We will discuss DNS later, but in short **named** provides:

- Mapping of host names to IP addresses
- Mapping of IP addresses to host names



named (and djbdns)

- Other mappings
- A distributed, reasonably robust protocol (RFC1034)
- The standard BIND distribution has had some severe criticism; Dan Bernstein has an alternative package called



named (and djbdns)

djbdns which is more secure (and you still can receive \$500 if you find a security lapse; see the offer at <http://cr.yp.to/djbdns/guarantee.html>) We will talk more about **djbdns**, but it lacks some features that many system administrators regard as critical. However, Dr. Bernstein has recently revised his licensing and very active development has picked up, especially in light of the recent spotlight cast on BIND's woes.



named (and djbdns)

- 👉 SA RELEVANCE: DNS is a major SA task, if you control your own domain. Both UNIX/Linux and 2003/2008 can act as a DNS server (as well as other operating systems).



fingerd

The finger protocol is an older method for getting information about users. As with the “r” commands, most consider **fingerd** (and the **finger** command) to be too problematic and remote finger should be disabled.



HyperText Transport

- ☞ Many web servers exist, both in the public domain and commercially. One of the most popular, Apache, uses the daemon name of **httpd**. It offers a great variety of services and enhancements; the relatively recent rewrite from 1.x to 2.x has finally gaining widespread acceptance (a few operating system distributions had been lingering on 1.3, which is still available as 1.3.41). See <http://httpd.apache.org>



httpd

- ☞ The management of web service is usually a fundamental service provided by the system administrator.
- ☞ The popular Windows 2008 web server equivalent from Microsoft is IIS. Historically, it was ridden with serious security lapses, but more recent versions are improved. (However, just last week, as we remarked in class, another serious security problem was found in IIS.)



httpd

☞ There are lightweight servers also, such as **thttpd** (<http://www.acme.com/software/thttpd>) and specialized ones such that allow development in SOAP-like manner (see Perl <http://www.cpan.org> (JOAP, HTTP-Server-Simple, etc.))



Databases: LDAP servers

- 👉 The main open source choice for UNIX/Linux-based LDAP service is OpenLDAP (<http://www.openldap.org>). The daemon process is called **slapd**, and it supports replication (via **slurpd** or more recently, **syncrepl**), a wide variety of backends (including relational databases such as **MySQL** and **PostgreSQL**.)



Databases: LDAP servers

- ☞ However, Netscape has partnered with Red Hat (December 2005) to provide its Directory Server (http://www.redhat.com/directory_server/) as an open source LDAP server. It's technically somewhat interesting; its ability to handle very arbitrary backends (such as MySQL and Postgres) is more flexible than the **openldap** approach of “metadata”.



Databases: relational

- 👉 **MySQL** – fast, becoming more featureful in version 5; the company itself was recently bought out by Sun. Expect to find the daemon **mysqld** in the process table. The client is **mysql**. Only a small amount of text file configuration in the poorly named file `/etc/my.cnf`; the rest is resident in the database. (Also, see Drizzle, an important fork from MySQL.)



Databases: relational

👉 **PostgreSQL** – very featureful, (ironically, it was supported by Sun well before Sun’s acquisition of **MySQL**). Grep for “post” when you are looking for its daemons, which typically have “postmaster” and other keywords with “post” in them. The client is **psql**. Surprising amount of text configuration files, such as `hba.conf`. Generally not as fast as MySQL.



Time: ntpd

- ☞ Since the 1990s, we have had a Network Time Protocol (NTP) and a structure of servers to propagate it. (Work goes back to the 1980s, but the first popular daemon implementation popped up in the 1990s.) It keeps our machines with a few milliseconds with a simple network of servers. (Also note that older versions of NTP actually suffer from a “year 2036” problem, like Unix suffers from a “year 2038” problem.)



Miscellaneous UNIX/Linux daemons

- ☞ A number of other UNIX/Linux daemons have been around for years to provide more specialized services. Examples include such daemons as **dhcpcd**, **bootpd**, **bootparamd**, **tftpd**, **rarpd** and others.

