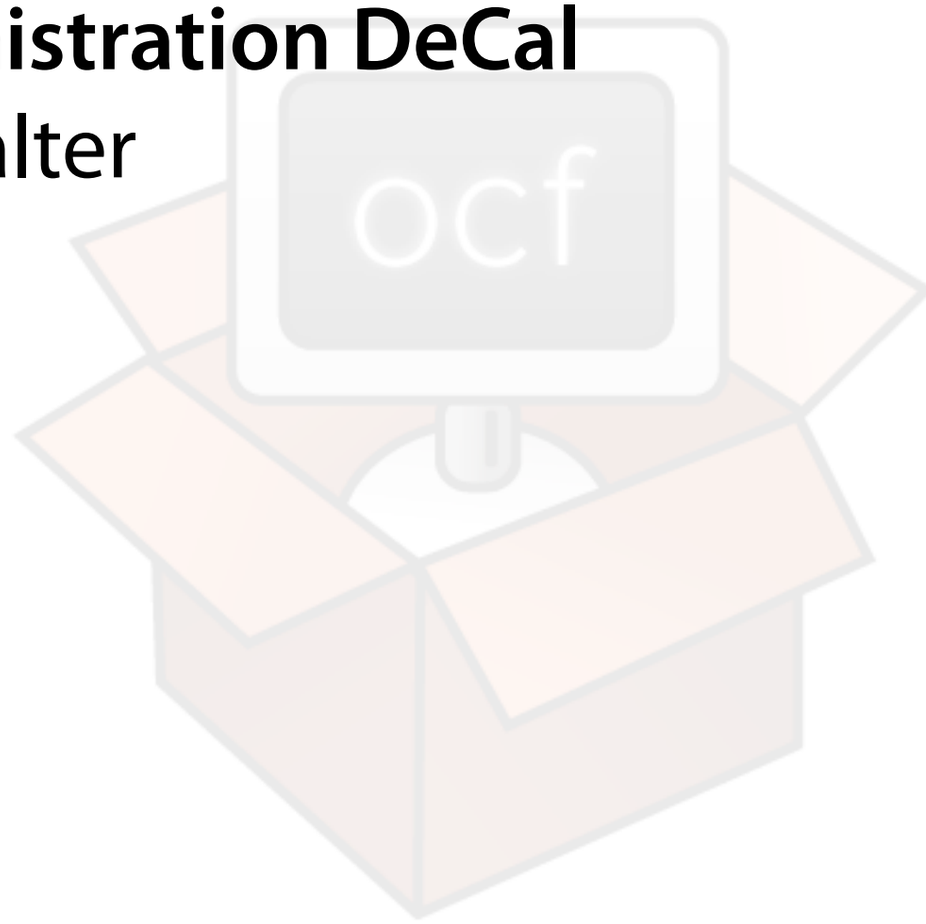
Network Services

Intermediate UNIX System Administration DeCal

Lecture 7 — Jordan Salter



Administrivia

- **Final projects!** They're due on **26 April**, when you'll present them to the class. Your project proposals are due (in hard copy) at the beginning of today's lecture.
- **Same site, new name…** The DeCal website is now accessible at decal.OCF *(the old www.OCF/decal URL still works too)*.

Today…

- **What is all that gobbledygook** (DHCP, DNS, and so on) in your network settings actually used for?
- **What happens under the hood** when you connect to AirBears, surf the web, send an e-mail, or IM a friend?

DHCP

- **Dynamic Host Configuration Protocol.** It provides an alternative to manually entering network settings. A DHCP *lease* typically includes an IP address, routing information, and a DNS server.
- Not just dynamic! A DHCP server can assign predetermined IP addresses to specific machines (e.g., by MAC address).

DNS

- DNS — the **Domain Name System** — is part of core internet functionality. In a nutshell: it's the Internet's phonebook.
- You can ask your DNS server for *records* (do this with `nslookup`, `host`, or `dig`).
- This is done automatically by client software (e.g., Mozilla Firefox) when you attempt to connect to a remote server.

DNS Records

There are dozens of kinds of DNS records, and a domain can have more than one record. Some of the most common ones:

- **A** record: an IPv4 address.
- **AAAA** record: an IPv6 address.
- **CNAME** (Canonical Name) record: an alias for another domain (think "symlink"). CNAMEs and all other types of records are mutually exclusive.

DNS Records

- **PTR** record: points to a canonical name (but doesn't continue processing as with a CNAME record). Usually used for reverse DNS lookups.
- **MX** record: specifies mail servers for a domain. Domains can have multiple MX records, listing different mail servers by priority.
- **SRV** record: similar to MX records, but not specific to mail. Can be used by LDAP, Jabber, …

“Netcraft confirms it…”

- The **Hyper-Text Transfer Protocol** is a simple, text-based protocol. A basic web server can be implemented in a 25-line bash script — you’ll be writing a basic HTTP client in today’s lab.
- Popular servers: Apache, IIS (“Internet Information Services”), lighttpd…
- You can see this in action with netcat (nc).

More Protocols

- There are dozens of other protocols you probably use on a day-to-day basis: SMTP and IMAP/POP for e-mail, XMPP/OSCAR/MSNP/YMSG for instant messaging, SSH and SCP on EECS Instructional machines…
- Others you may not know about: NFS (Network File System), LDAP (Lightweight Directory Access Protocol), Kerberos…

Server Daemons

- A program that runs in the background is called a *daemon*; many services run as daemons, including Apache and SSH.
- Services are frequently controlled by *init scripts* — e.g., `/etc/init.d/ssh restart` will restart your SSH server. Also, some daemons have their own management tools (e.g., `apache2ctl`).

One to rule them all

(and in the darkness bind them)

- A *super-server daemon* listens on multiple ports, spawning other server processes to handle incoming requests.
- `inetd` connects network sockets to server processes' stdin and stdout. This makes it really easy to write your own server!
- Other super-servers: `xinetd`, `launchd`…