Email, DNS, and P2P Protocols

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1 Administrivia

Announcements

Assignment

Written assignment.

Review examples, in notes and textbook, of using telnet to exchange protocol messages with application services.

See me if you don't remember your phoenix username/password.

From Last Time

Application layer, HTTP, and FTP.

Outline

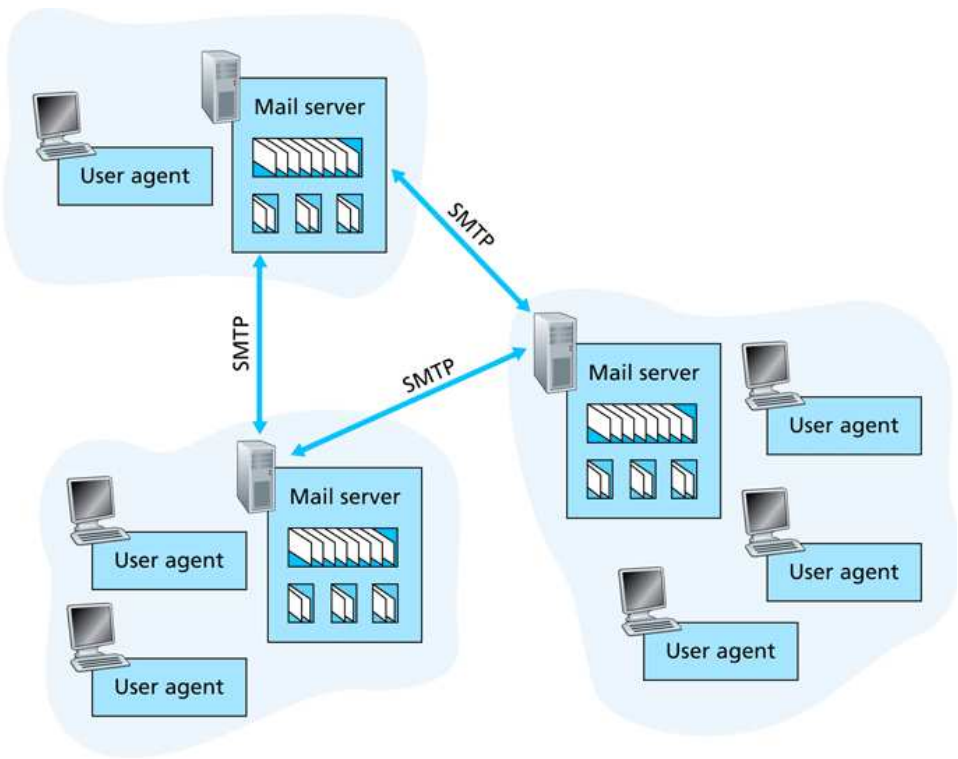
1. SMTP, POP, and IMAP protocols.
2. DNS.
3. P2P.

Coming Up

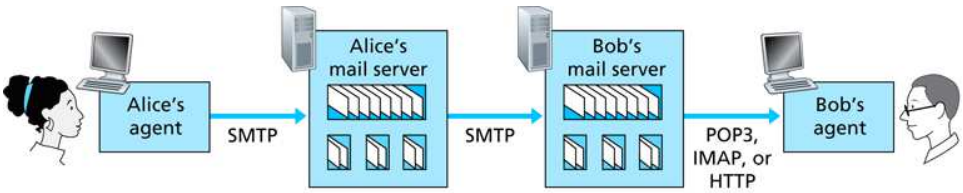
Protocols lab.

2 Email protocols

The overall model:



Sending email:



1. Email service in the traditional Unix model.

2. Email service with a standalone GUI client: POP and IMAP.
3. Email service with a web-based GUI client.
4. Email service with a Blackberry device.
   (a) Push vs. pull architectures.
   (b) What are the design models we could consider?
   (c) What model does RIM use?
5. Use of MX records.

3 DNS

Historical context:

1. How was name resolution initially performed?
2. What was wrong with that?

Features of today's DNS:

1. A FQDN and its components: `bluebird.goucher.edu.`
2. Hierarchy.
3. Delegation of authority.
4. Redundancies: multiple root servers; primary and secondaries.
5. Two components: the resolver and DNS service. Finding a DNS server.

   How the hosts file is used.

6. Caching servers. Priming the cache.

   TTL field.

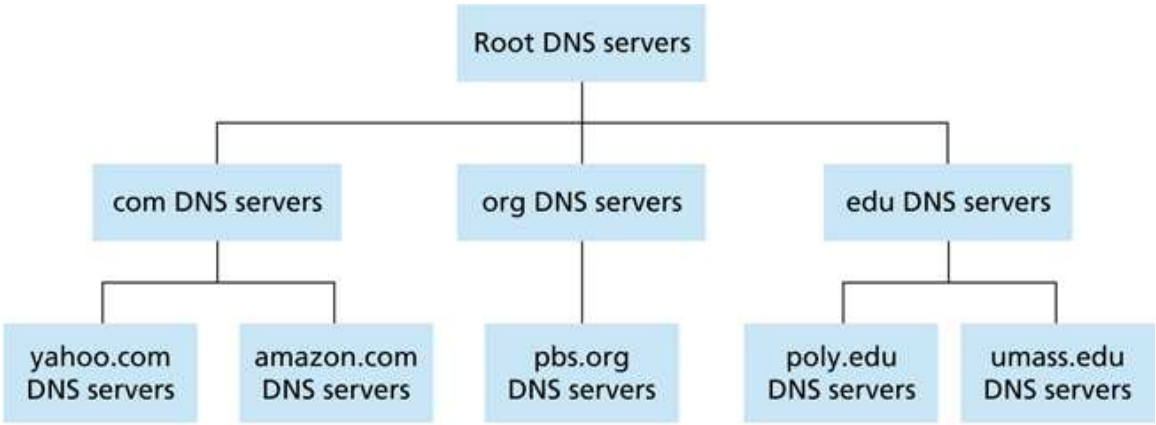
   Stale entries and flushing the cache.

7. A and PTR records. Some other records types: SOA, NS, MX,

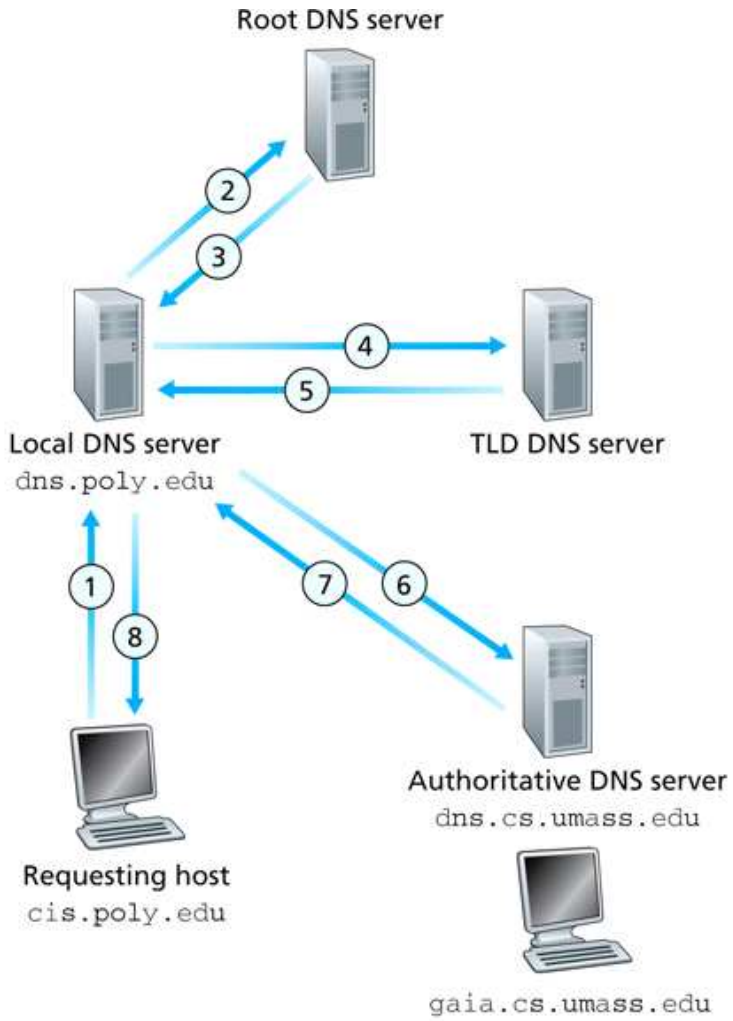
   TXT records and Sender Policy Framework (SPF) information for reducing SPAM.

8. Vulnerabilities: DDOS, cache poisoning, hosts file attacks.

A view of the hierarchy:



Anatomy of a DNS query:



Format of a DNS server response:

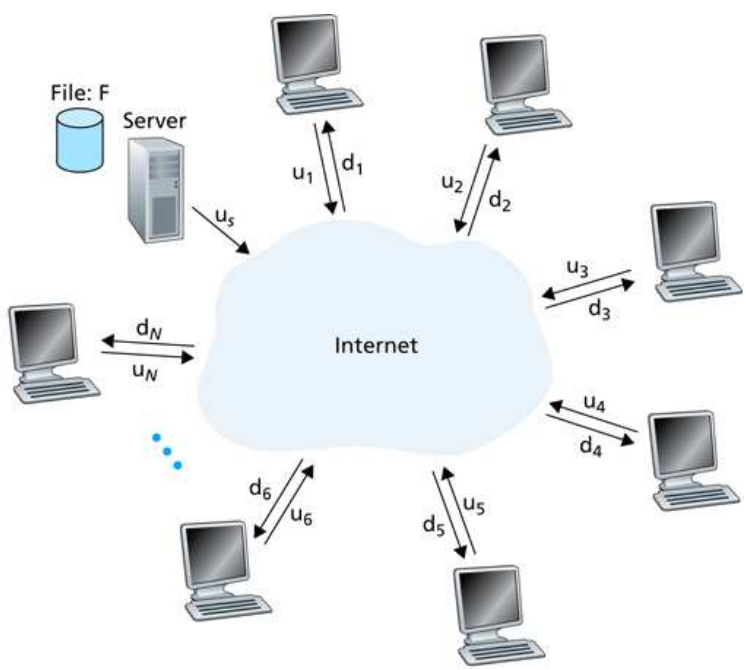
Identification	Flags	12 bytes
Number of questions	Number of answer RRs	
Number of authority RRs	Number of additional RRs	
Questions (variable number of questions)		Name, type fields for a query
Answers (variable number of resource records)		RRs in response to query
Authority (variable number of resource records)		Records for authoritative servers
Additional information (variable number of resource records)		Additional "helpful" info that may be used

1. Why does phoenix have two IP addresses?

2. DNS implications under this scenario.

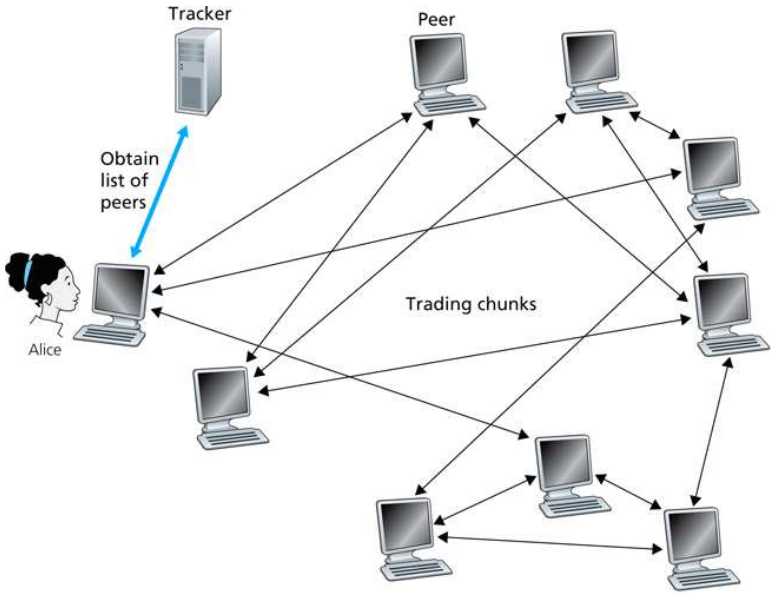
4 P2P

The file distribution problem:

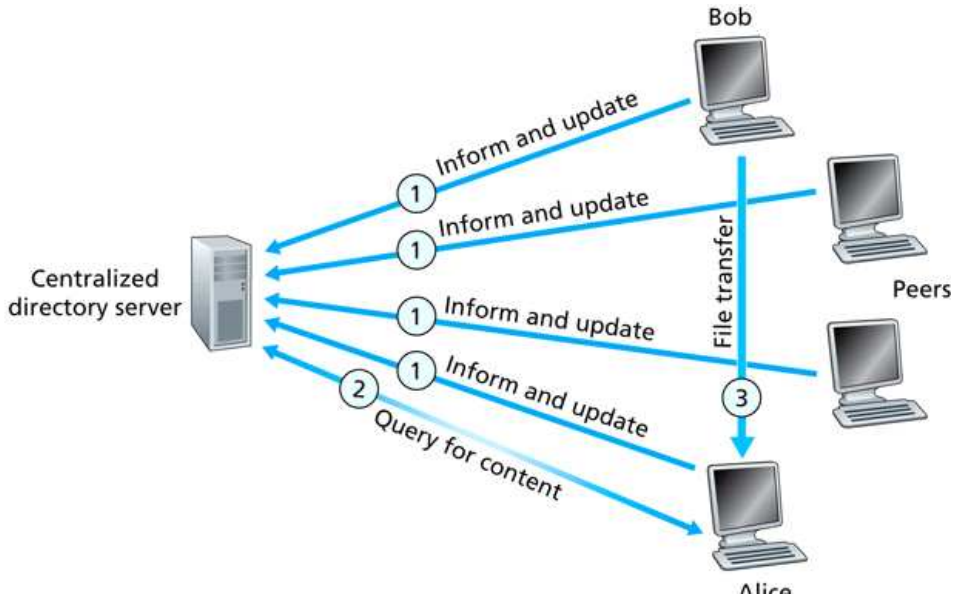


Scalable vs. unscalable architectures:

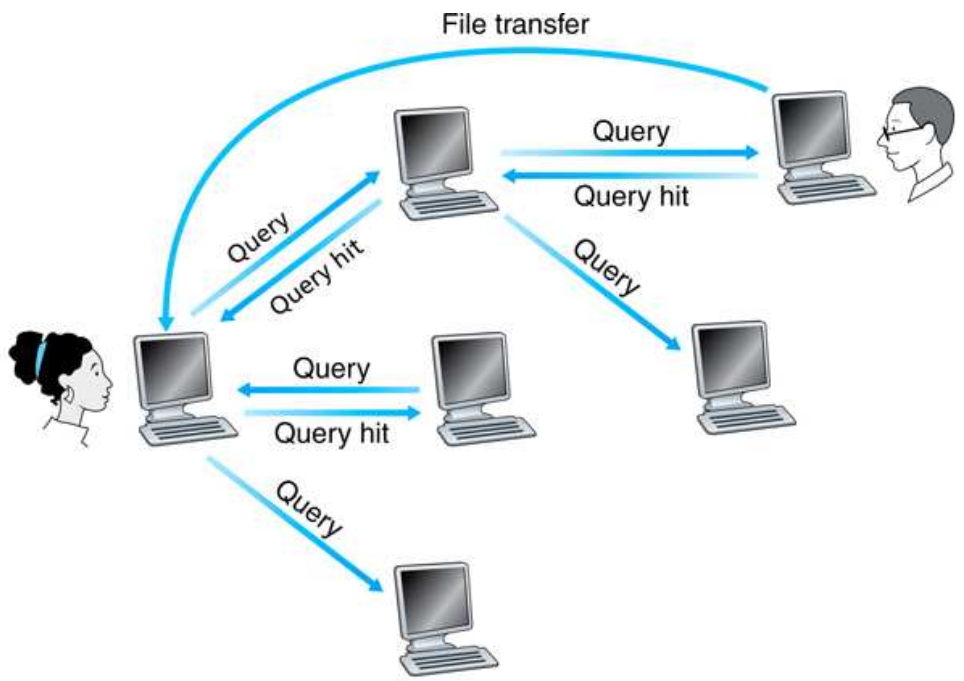
BitTorrent chunking:



Centralized indexing service:

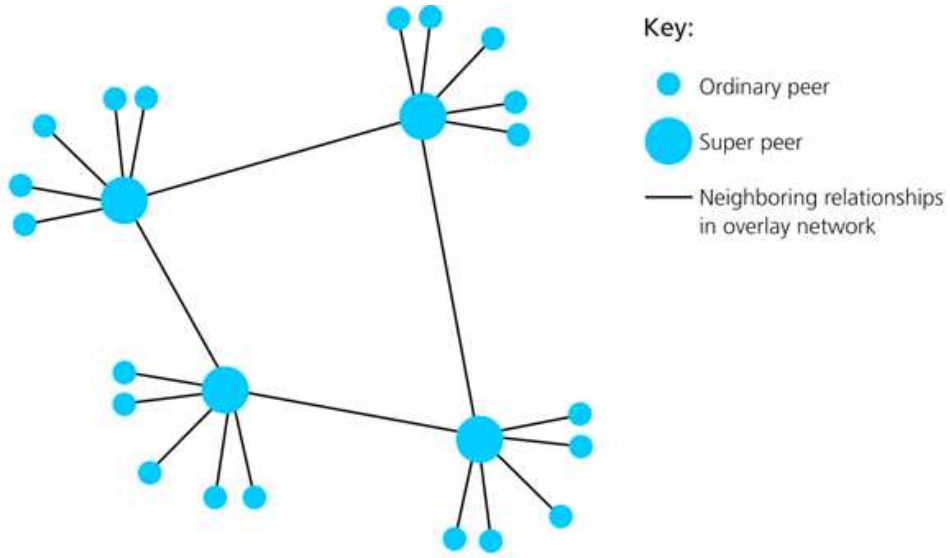


Distributed indexing service; query flooding:



Limiting scope with a hop count field.

A hybrid approach:


Key:
Ordinary peer
Super peer
Neighboring relationships in overlay network