Distributed Systems

COMP90015 2018 Semester 2
Tutorial 11

Things to cover today

- Name Services questions

Name Services questions

1. Define and discuss the concepts of Uniform Resource Identifiers.

2. What are Name Services and why do we need them?

3. What is the process of name resolution?

4. What is navigation and what are the approaches to navigation.

5. What is Domain Name System and in what aspects does it improve on a file-based implementation?

Define and discuss the concepts of Uniform Resource Identifiers

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- *Uniform Resource Identifiers* (URIs) are concerned with identifying resources on the Web, and other Internet resources such as electronic mailboxes.
- URIs are intended to allow a generic way of specifying the identifier so as to make it easy for common software to process the identifier. This allows new types of identifiers to be readily introduced and for existing identifiers to be used by a wide variety of different software and services.
- URLs provide ways to locate the resource being named. They clearly suffer if the resource has since changed its name (e.g. broken links in the Web).

What are Name Services and why do we need them?

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- The major operation of a name service is to resolve a name, i.e to lookup the attributes that are bound to the name.
- Name management is separated from other services largely because of the openness of distributed systems, which brings the following motivations:
    - Unification: Resources managed by different services use the same naming scheme, as in the case of URIs.
    - Integration: To share resources that were created in different administrative domains requires naming those resources. Without a common naming service, the administrative domains may use entirely different name formats.

What is the process of name resolution?

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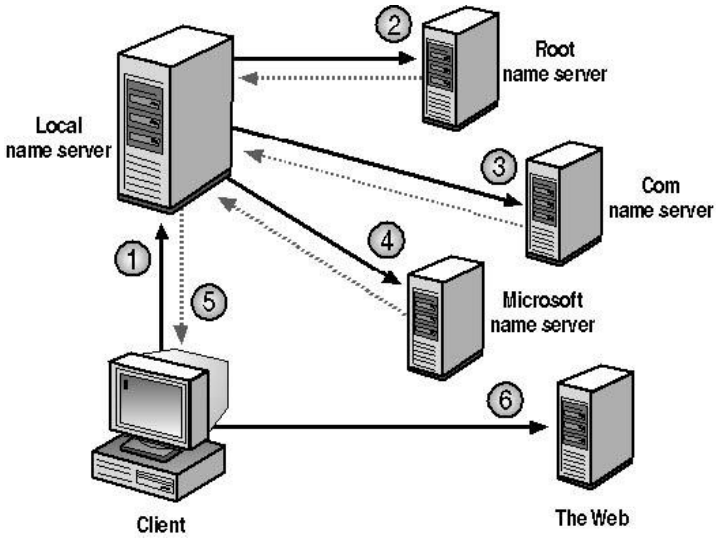
- Name resolution is in general an iterative process. A name either resolves to a set of primitive attributes or it resolves to another name.
- The use of aliases make it possible for resolution cycles to occur and the potential for the resolution process to never terminate. Two solutions to overcome this include:
  - Abandon the resolution process after some number of iterations.
  - Require administrators to ensure that no cycles occur



What is navigation and what are the approaches to navigation?

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- When the name service is distributed then a single server may not be able to resolve the name. The resolve request may need to propagate from one server to another, referred to as *navigation*.
- Classification of different navigation approaches.
  - *iterative navigation* -- The client makes the request at different servers one at a time. The order of servers visited is usually in terms of domain hierarchy. Always starting at the root server would put excessive load on the root.
  - *multicast navigation* -- The client multicasts the request to the group (or a subset) of name servers. Only the server that holds the named request returns a result.
  - *non-recursive server-controlled navigation* -- The client sends the request to a server and the server continues on behalf of the client, as above.
  - *recursive server-controlled navigation* -- The client sends the request to a server and the server sends the request to another server (if needed) recursively.

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- The Domain Name System (DNS) is a name service design whose main naming database is used across the Internet.
- Before DNS, all host names and addresses were held in a single central master file and downloaded by FTP to all computers that required them.
- The problems with the original name service included:
  - It did not scale to large numbers of computers.
  - Local organizations wished to administer their own naming systems.
  - A general name service was needed -- not one that serves only for looking up computer addresses.
- DNS is designed for use in multiple implementations, each of which may have its own name space, though in practice the Internet DNS name space is the one in widespread use.