Figure 9.1  Composed naming domains used to access a resource from a URL

URL


DNS lookup

Resource ID (IP number, port number, pathname)

55.55.55.55  8888  WebExamples/earth.html

Network address

2:60:8c:2:b0:5a

Web server

Socket

file
Figure 9.2  Iterative navigation

A client iteratively contacts name servers NS1–NS3 in order to resolve a name.
A name server NS1 communicates with other name servers on behalf of a client.
Figure 9.4  DNS name servers

Note: Name server names are in italics, and the corresponding domains are in parentheses. Arrows denote name server
**Figure 9.5** DNS resource records.

<table>
<thead>
<tr>
<th>Record type</th>
<th>Meaning</th>
<th>Main contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A computer address</td>
<td>IP number</td>
</tr>
<tr>
<td>NS</td>
<td>An authoritative name server</td>
<td>Domain name for server</td>
</tr>
<tr>
<td>CNAME</td>
<td>The canonical name for an alias</td>
<td>Domain name for alias</td>
</tr>
<tr>
<td>SOA</td>
<td>Marks the start of data for a zone</td>
<td>Parameters governing the zone</td>
</tr>
<tr>
<td>WKS</td>
<td>A well-known service description</td>
<td>List of service names and protocols</td>
</tr>
<tr>
<td>PTR</td>
<td>Domain name pointer (reverse lookups)</td>
<td>Domain name</td>
</tr>
<tr>
<td>HINFO</td>
<td>Host information</td>
<td>Machine architecture and operating system</td>
</tr>
<tr>
<td>MX</td>
<td>Mail exchange</td>
<td>List of <code>&lt;preference, host&gt;</code> pairs</td>
</tr>
<tr>
<td>TXT</td>
<td>Text string</td>
<td>Arbitrary text</td>
</tr>
</tbody>
</table>
Figure 9.6  Service discovery in Jini

1. 'finance' lookup service?
2. Here I am: ....
3. Request 'printing'
4. Use printing service

Client

admin

Lookup service

Corporate infoservice

Printing service

Network

admin, finance

Printing service

finance
Figure 9.7  GNS directory tree and value tree for user Peter.Smith
Figure 9.8  Merging trees under a new root

Well-known directories:

\[
\begin{align*}
#599 &= #633/\text{EC} \\
#642 &= #633/\text{NORTH AMERICA}
\end{align*}
\]

EC

DI: 633 (WORLD)

DI: 642

NORTH AMERICA

DI: 732

US

DI: 457

CANADA

DI: 574

UK

DI: 543

DI: 599

DI: 642

NORTH AMERICA

DI: 574

US

DI: 457

CANADA

DI: 732

US

DI: 642

NORTH AMERICA

DI: 574

US

DI: 457

CANADA

DI: 732

US

DI: 642

NORTH AMERICA

DI: 574

US

DI: 457

CANADA

DI: 732
Figure 9.9   Restructuring the directory

Well-known directories:

#599 = #633/EC
#642 = #633/NORTH AMERICA

DI: 633 (WORLD)

EC

DI: 599

DI: 543

UK

FR

DI: 574

US

DI: 732

DI: 642

NORTH AMERICA

US

DI: 457

CANADA

#633/EC/US
Figure 9.10  X.500 service architecture
Figure 9.11 Part of the X.500 Directory Information Tree

X.500 Service (root)

... France (country) Great Britain (country) Greece (country) ...

... BT Plc (organization) University of Gormenghast (organization)

... Computing Service (organizationalUnit)

Department of Computer Science (organizationalUnit)

Engineering Department (organizationalUnit).

... Departmental Staff (organizationalUnit)

ely (applicationProcess)

Research Students (organizationalUnit).

... Alice Rintstone (person) ... Pat King (person) James Healey (person) Janet Papworth (person) ...
Figure 9.12 An X.500 DIB Entry

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**info**

Alice Flintstone, Departmental Staff, Department of Computer Science, University of Gormenghast, GB

**commonName**
- Alice.L.Flintstone
- Alice.Flintstone
- Alice Flintstone
- A. Flintstone

**surname**
- Flintstone

**telephoneNumber**
- +44 986 33 4604

**uid**
- alf

**mail**
- alf@dcs.gormenghast.ac.uk
- Alice.Flintstone@dcs.gormenghast.ac.uk

**roomNumber**
- Z42

**userClass**
- Research Fellow