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# Module 4

# Application Protocol

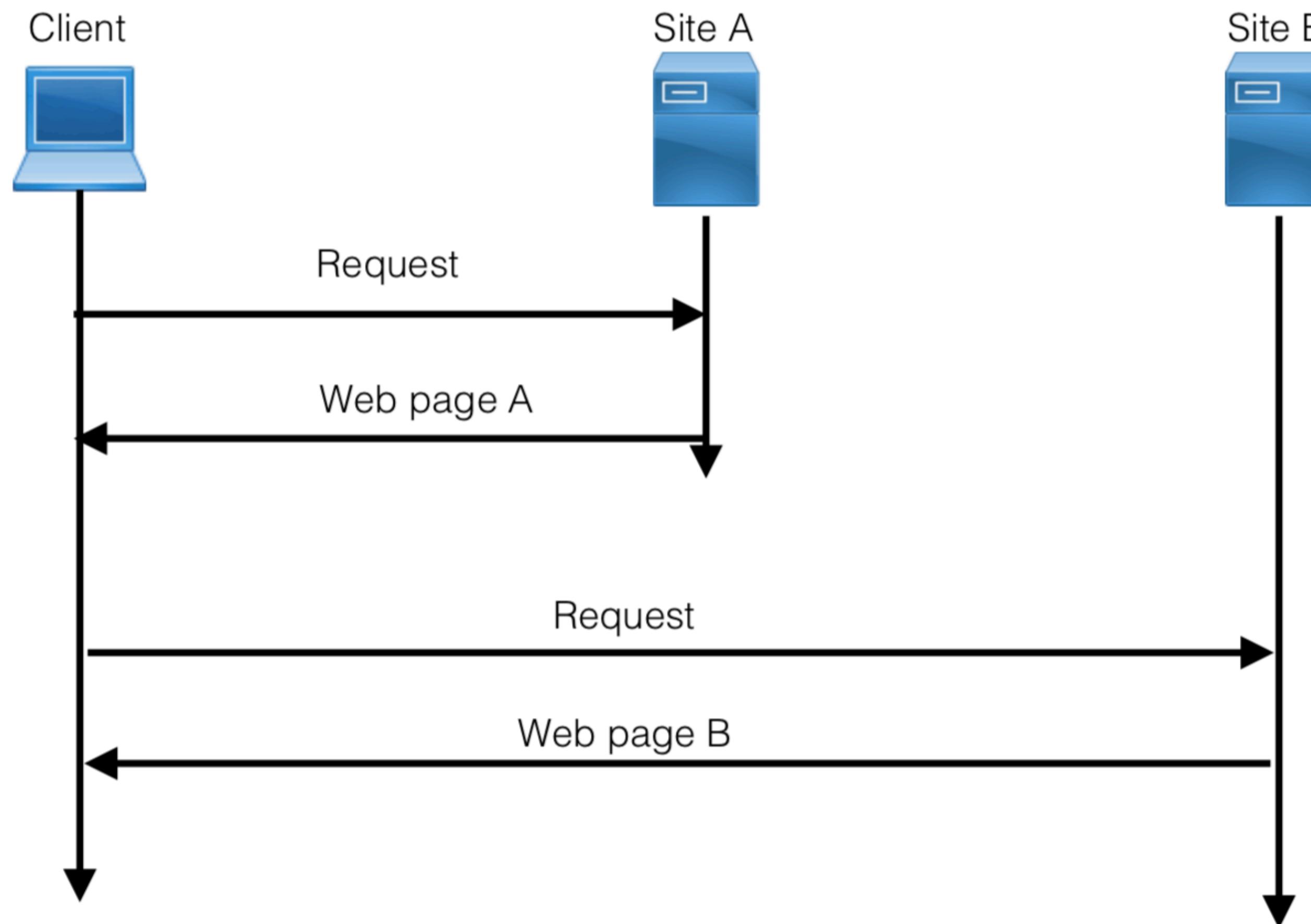
# Contents

- Web Technology
  - Browser
  - Web Document
  - Web Architecture
  - HTTP Protocol
- File Sharing
  - File Transfer Protocol
  - Network File System
- Domain Name System

# Web Technology

UbIn3\$  
Ubiquitous Networked Embedded System

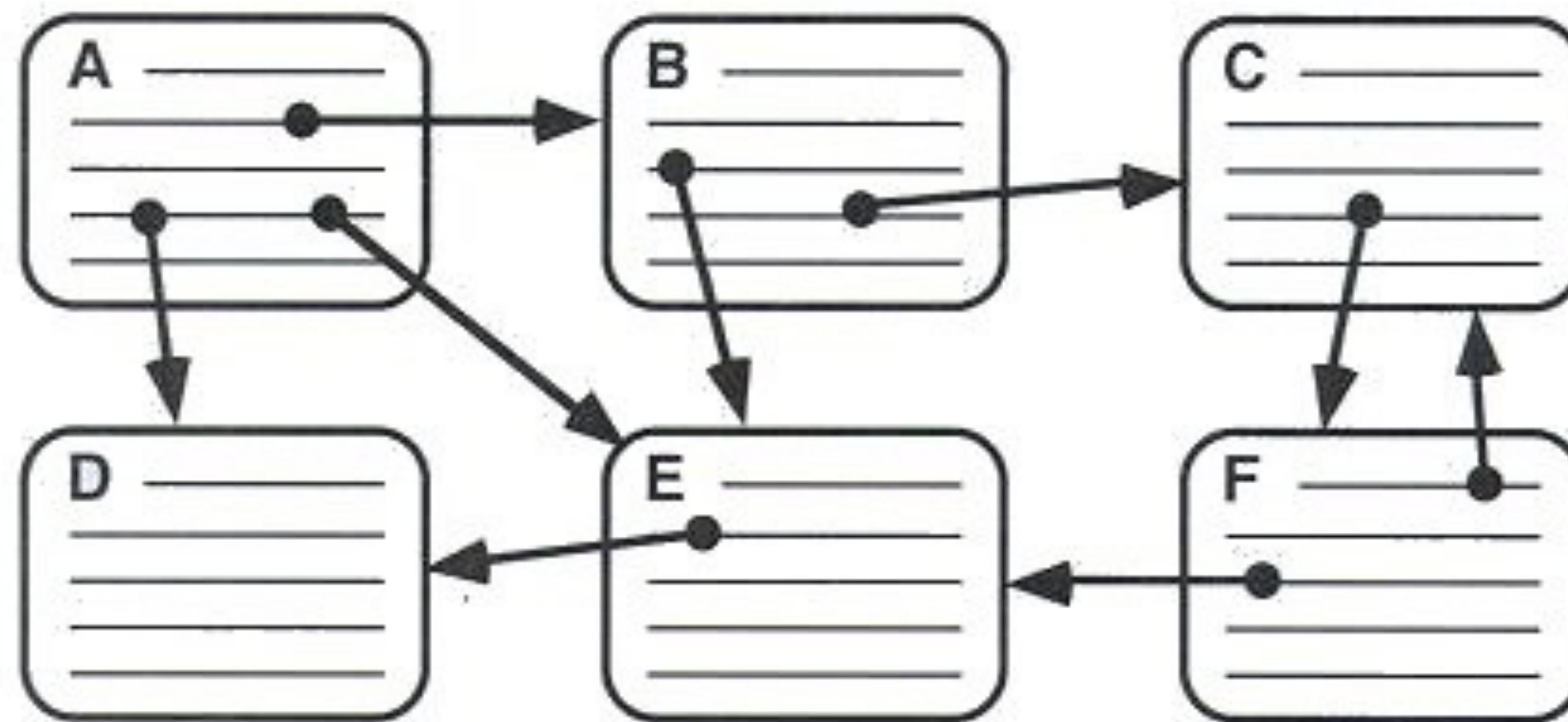
## HTTP



# Web Technology

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Ubiquitous Networked Embedded System

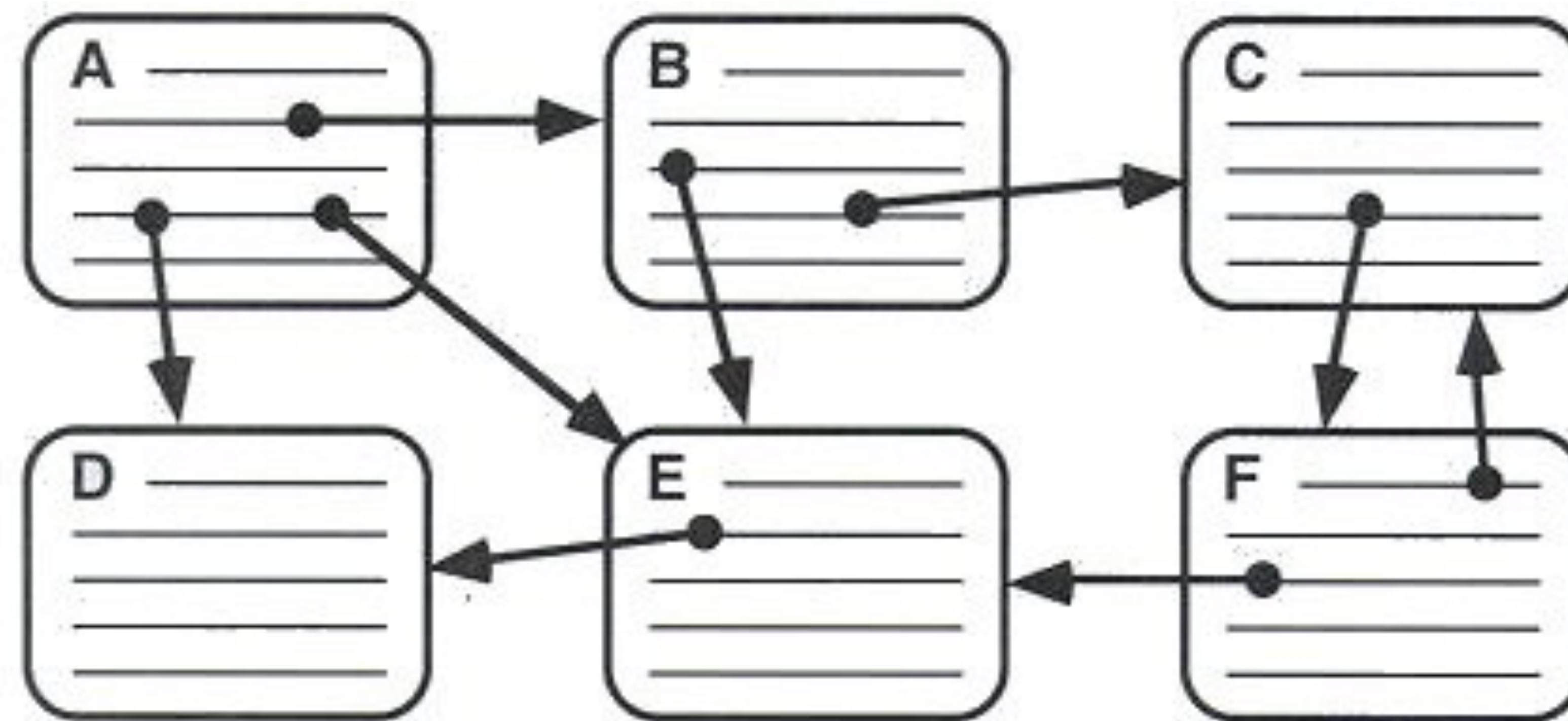
## Hypertext



# Web Technology

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## Hypertext



## Hypermedia

**jacaranda.in.th** Chatchanan Jandaeng, Lecturer at School of Informatics, WU

**2010**

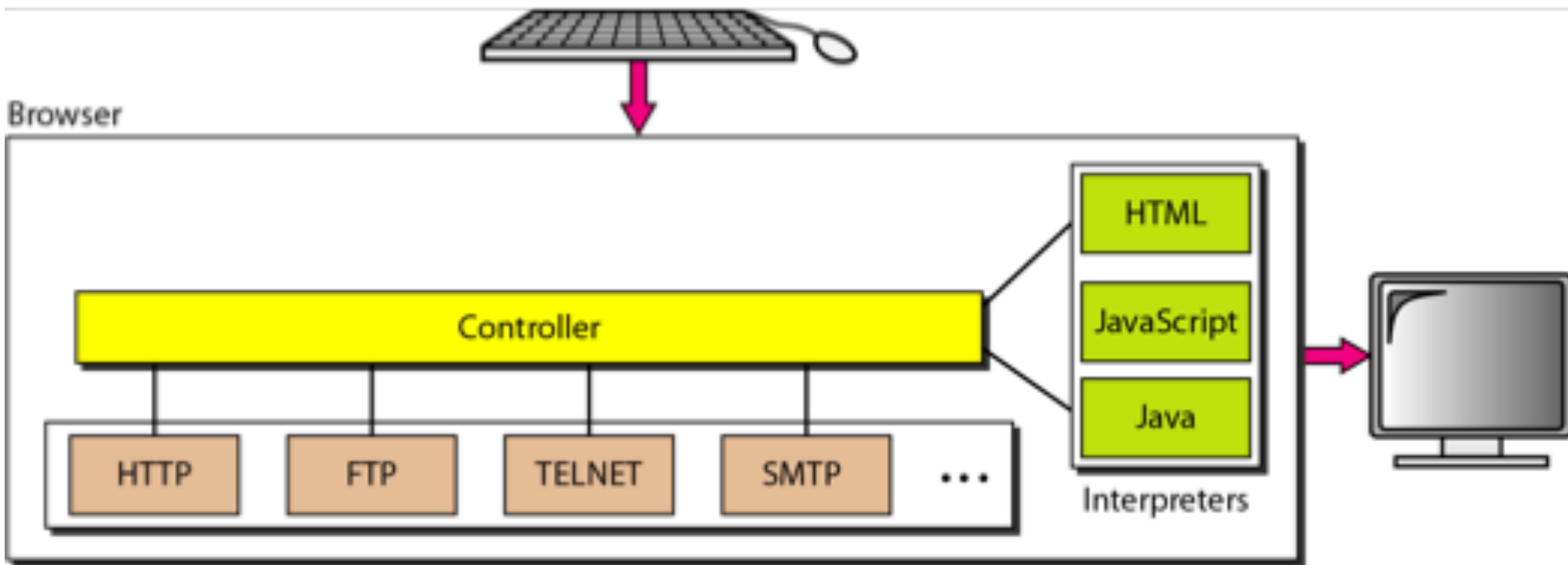
[\[Show as slideshow\]](#)



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# Web Technology

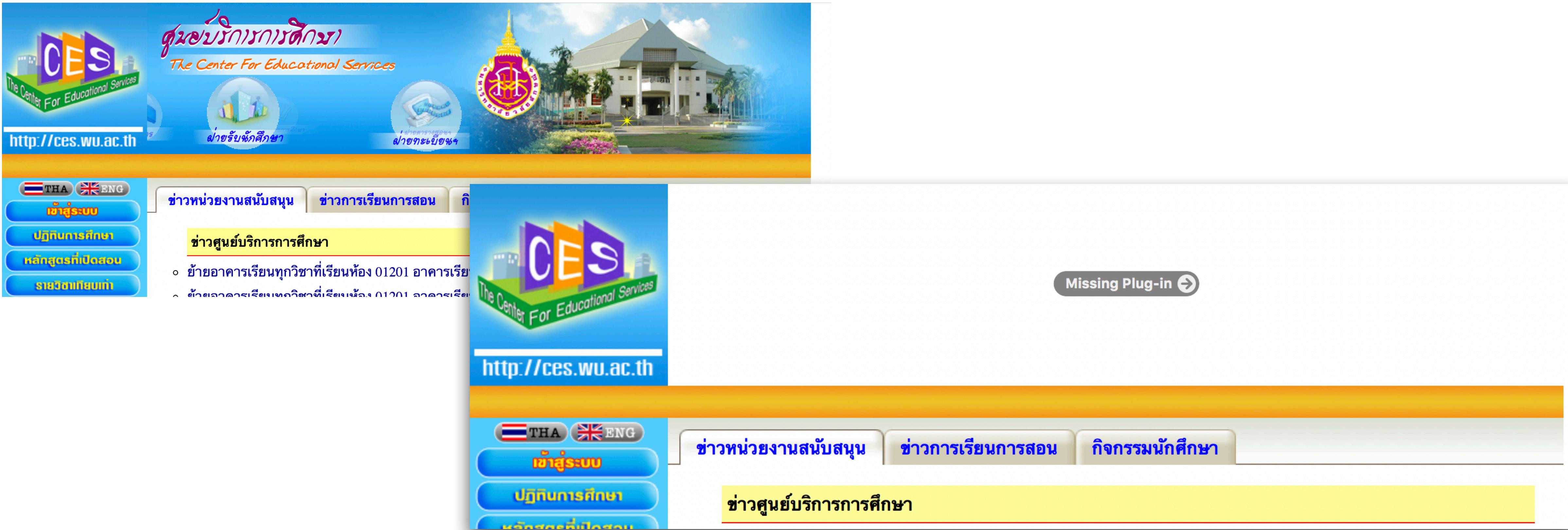
## Browser



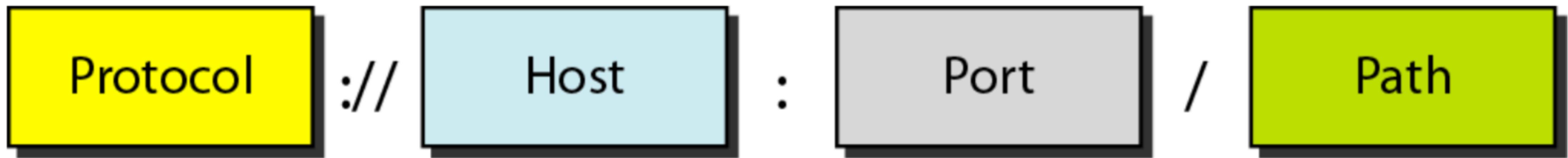
# Web Technology

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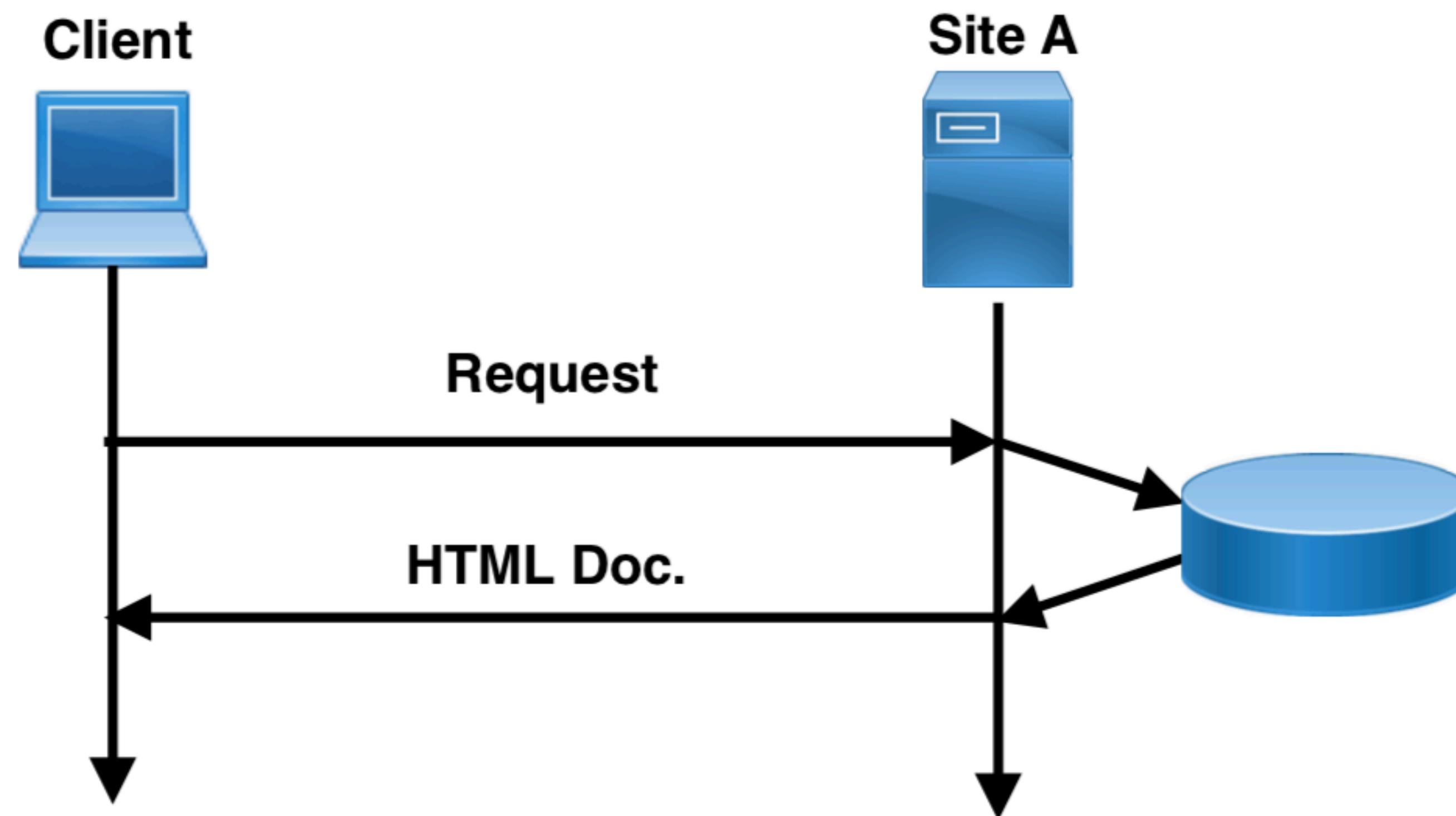
## Plugin



## Uniform Resource Locator (URL)



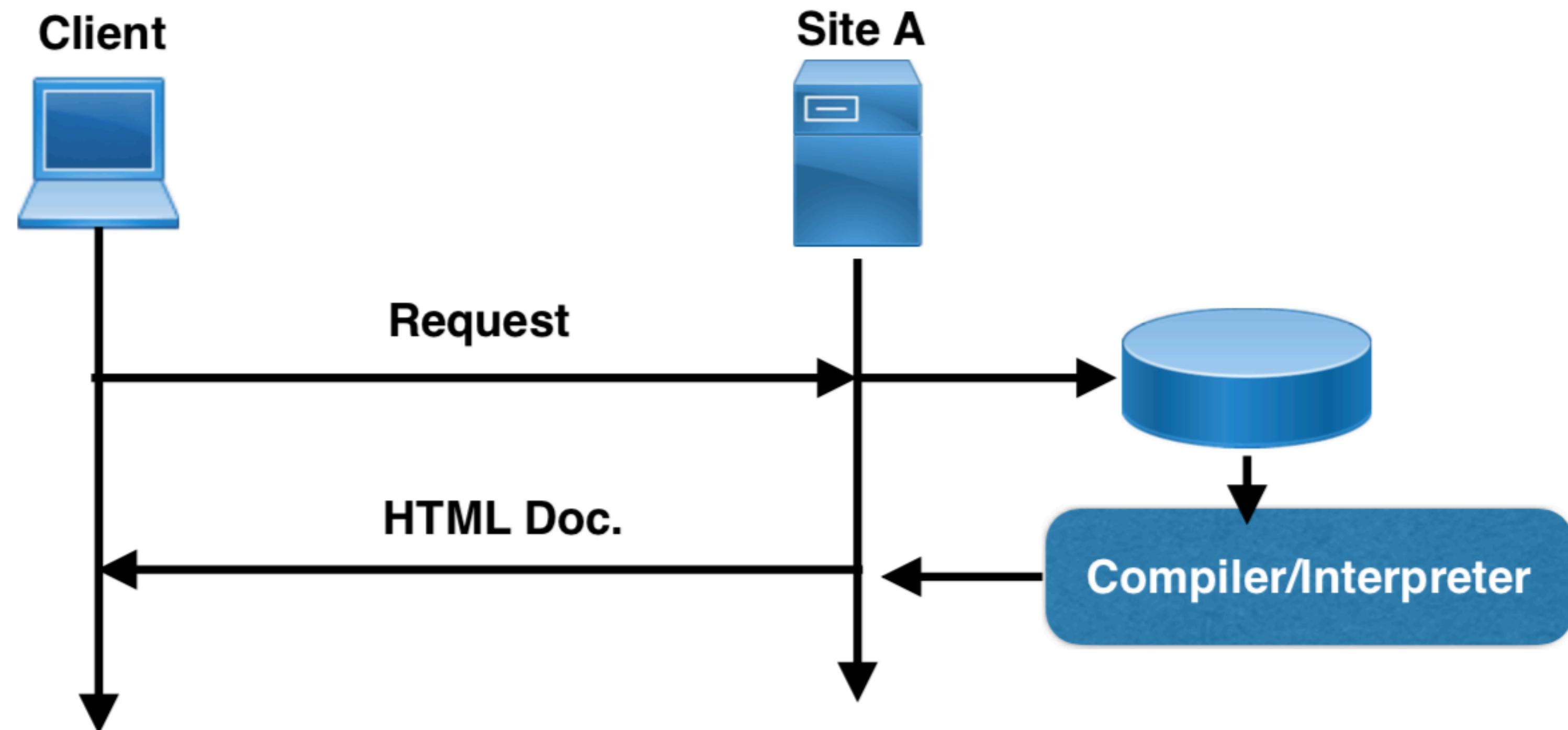
## Web Document - Static Document / Passive Document



## Web Document - Static / Passive Document

```
<!DOCTYPE html>
<html>
  <head>
  </head>
  <body>
    <p>A code element is displayed like this:</p>
    <code>A piece of computer code</code>
    <p>Change the default CSS settings to see the effect.</p>
  </body>
</html>
```

## Web Document - Dynamic Document / Server Site



## Web Document - Dynamic Document / Server Site

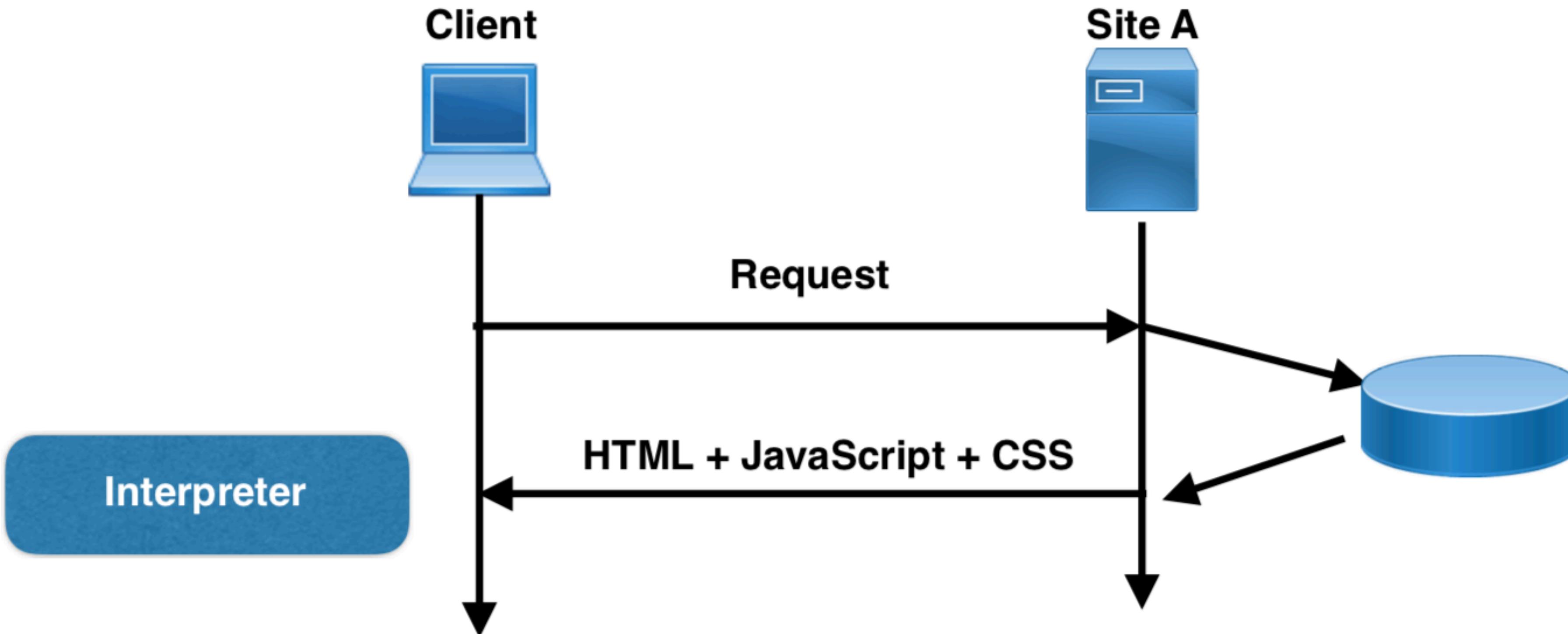
```
#include <stdio.h>
void main(){
    printf("content-type: text/html\n\n");
    printf("<h1>Hello</h1>");
}
```

```
<?php
$x = 1;

while($x <= 5) {
    echo "The number is: $x <br>";
    $x++;
}
?>
```

# Web Technology

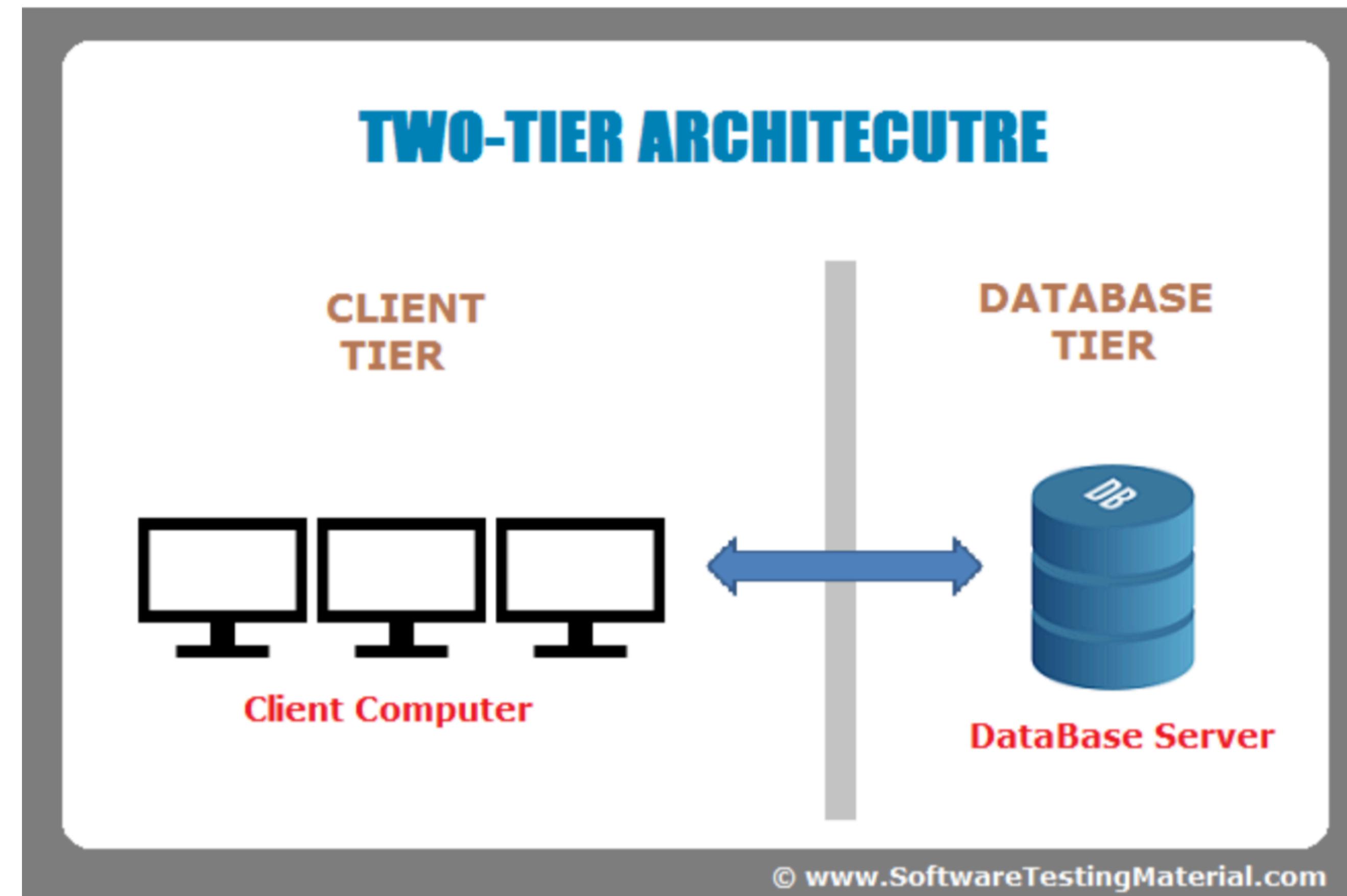
## Web Document - Active Document / Client Site



## Web Document - Active Document / Client Site

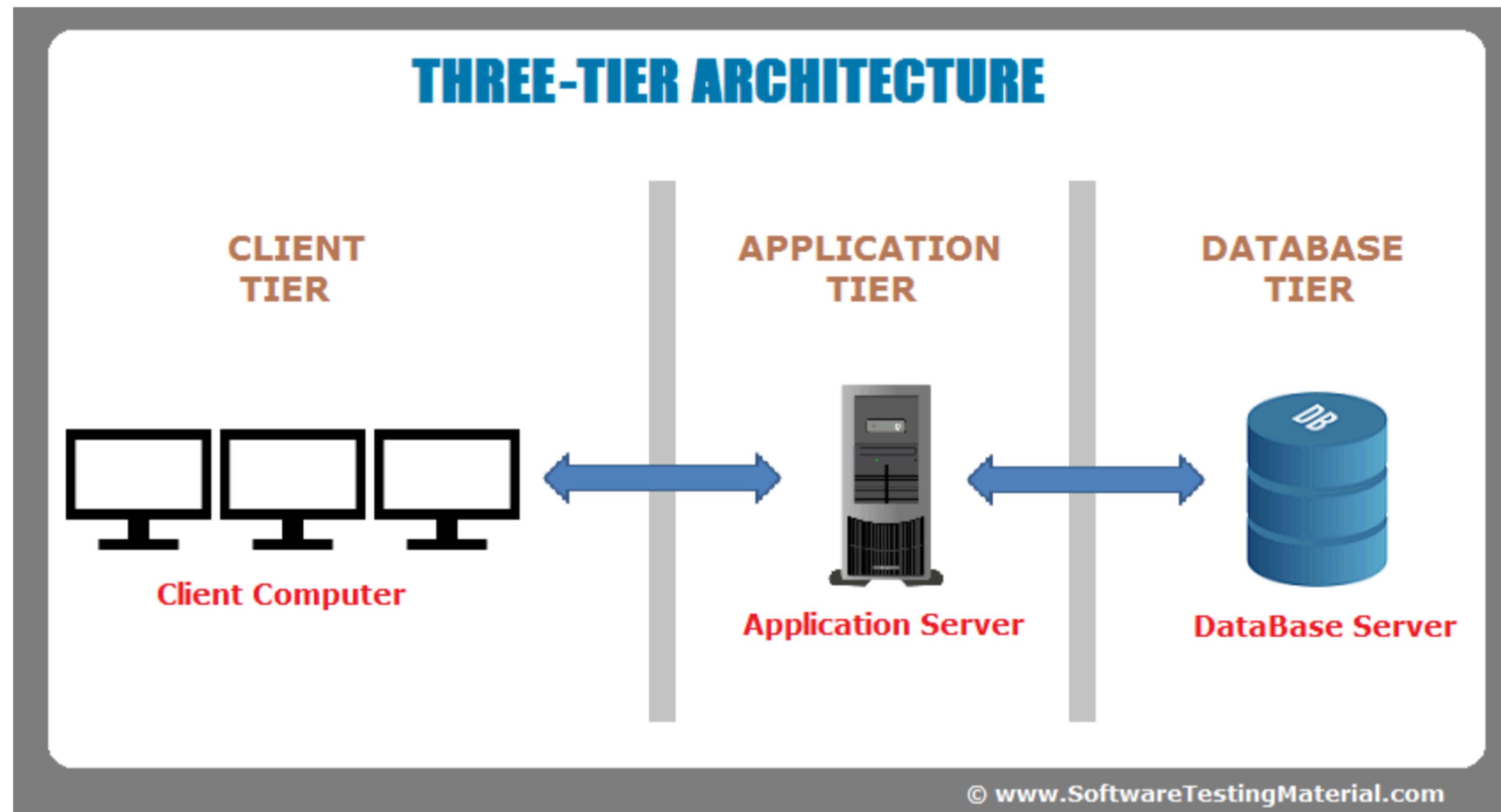
```
<!DOCTYPE html>
<html>
  <head>
    <style>
      H1{
        color:green;
      }
    </style>
    <script>
      document.write("Hello");
    </script>
  </head>
  <body>
    <p>A code element is displayed like this:</p>
    <code>A piece of computer code</code>
    <p>Change the default CSS settings to see the effect.</p>
  </body>
</html>
```

## 2-Tier Web Architecture



# Web Technology

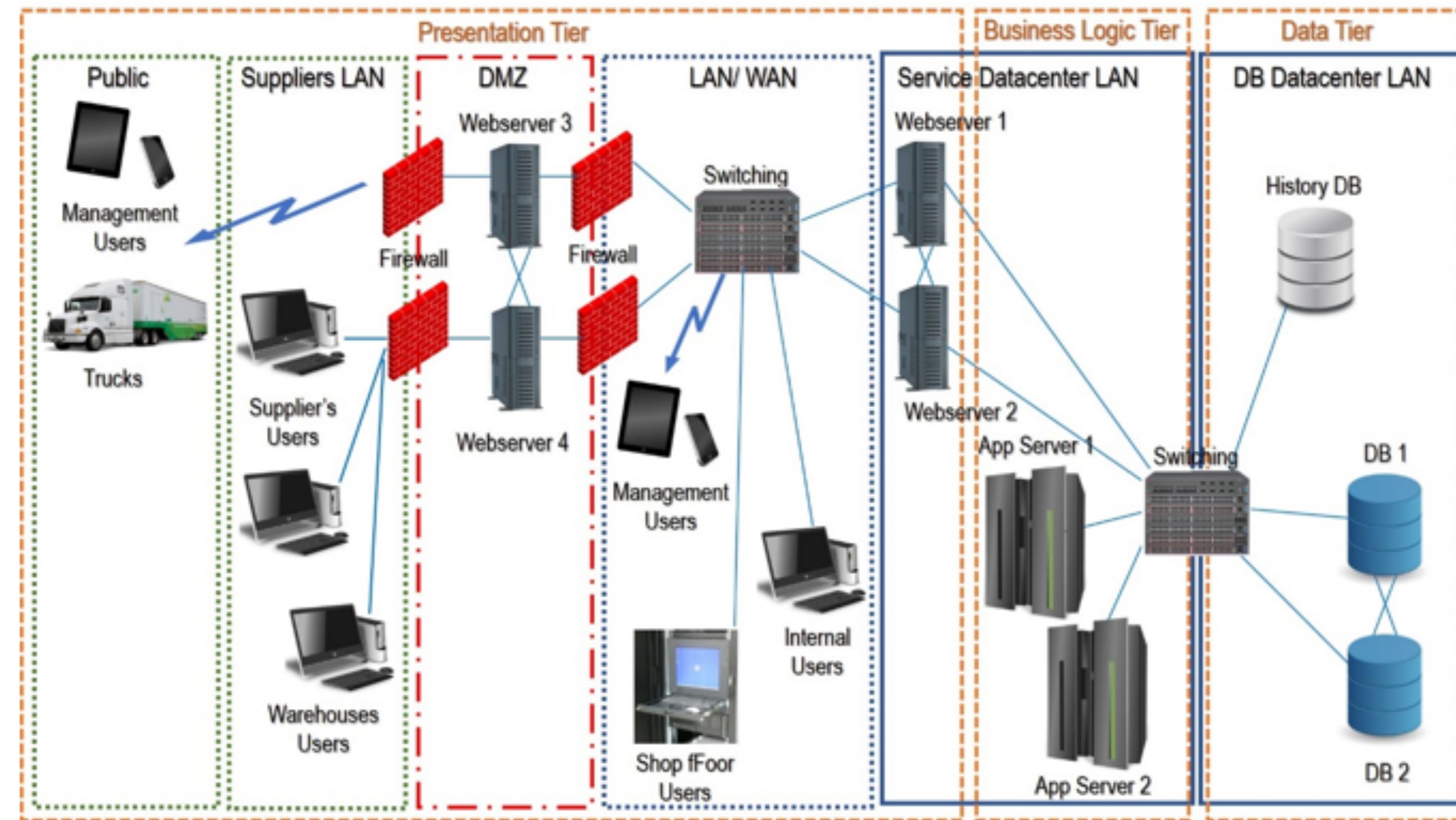
## 3-Tier Web Architecture



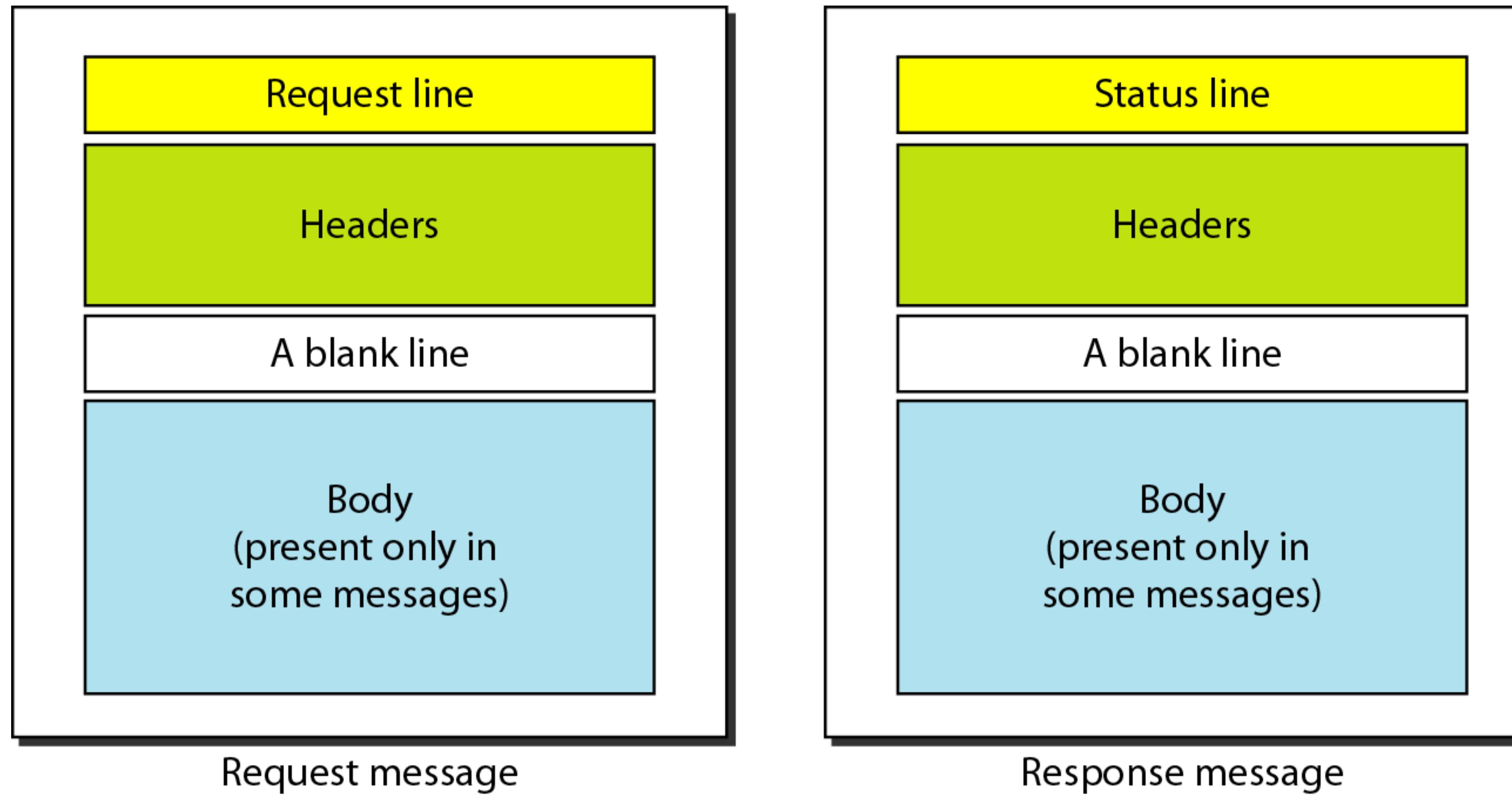
# Web Technology

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## n-Tier Web Architecture

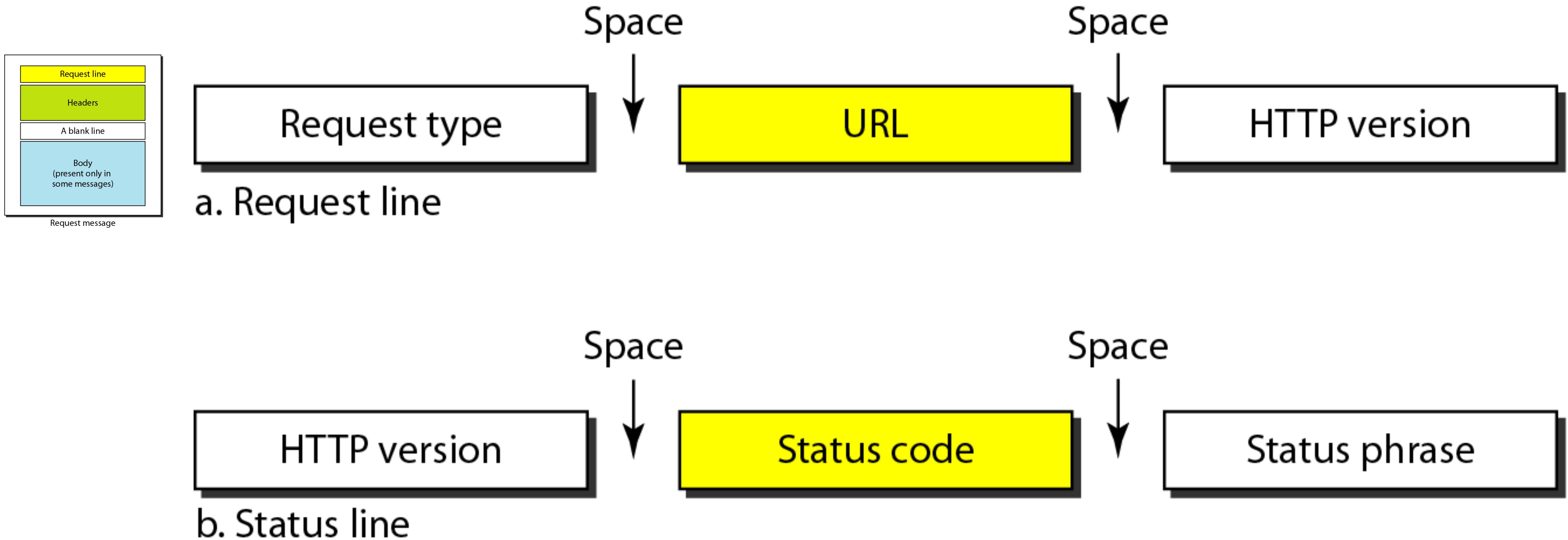


## HTTP Protocol



# Web Technology

## HTTP Message



# Web Technology

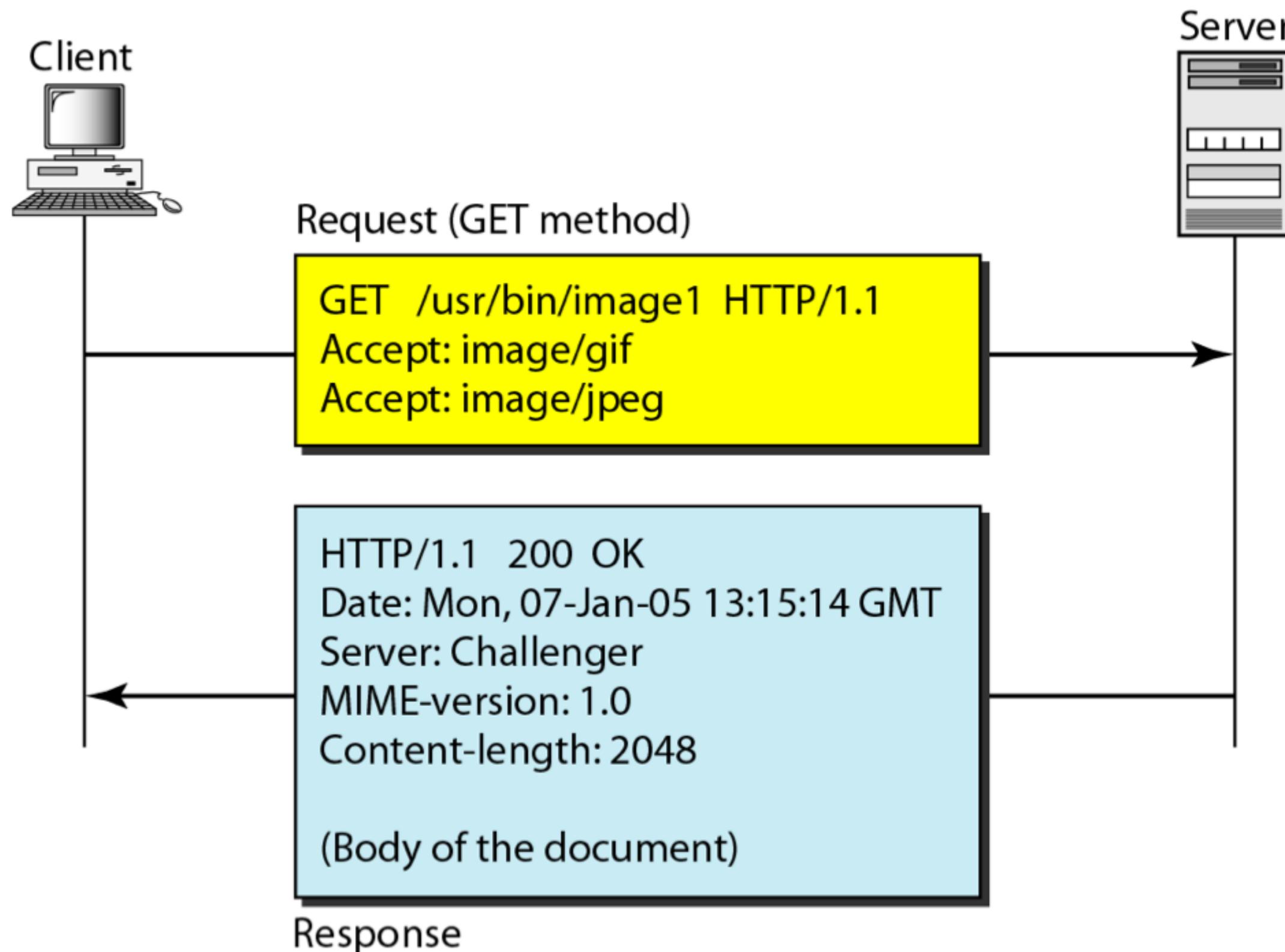
## HTTP Code & Phase

Method	Action
GET	Requests a document from the server
HEAD	Requests information about a document but not the document itself
POST	Sends some information from the client to the server
PUT	Sends a document from the server to the client
TRACE	Echoes the incoming request
CONNECT	Reserved
OPTION	Inquires about available options

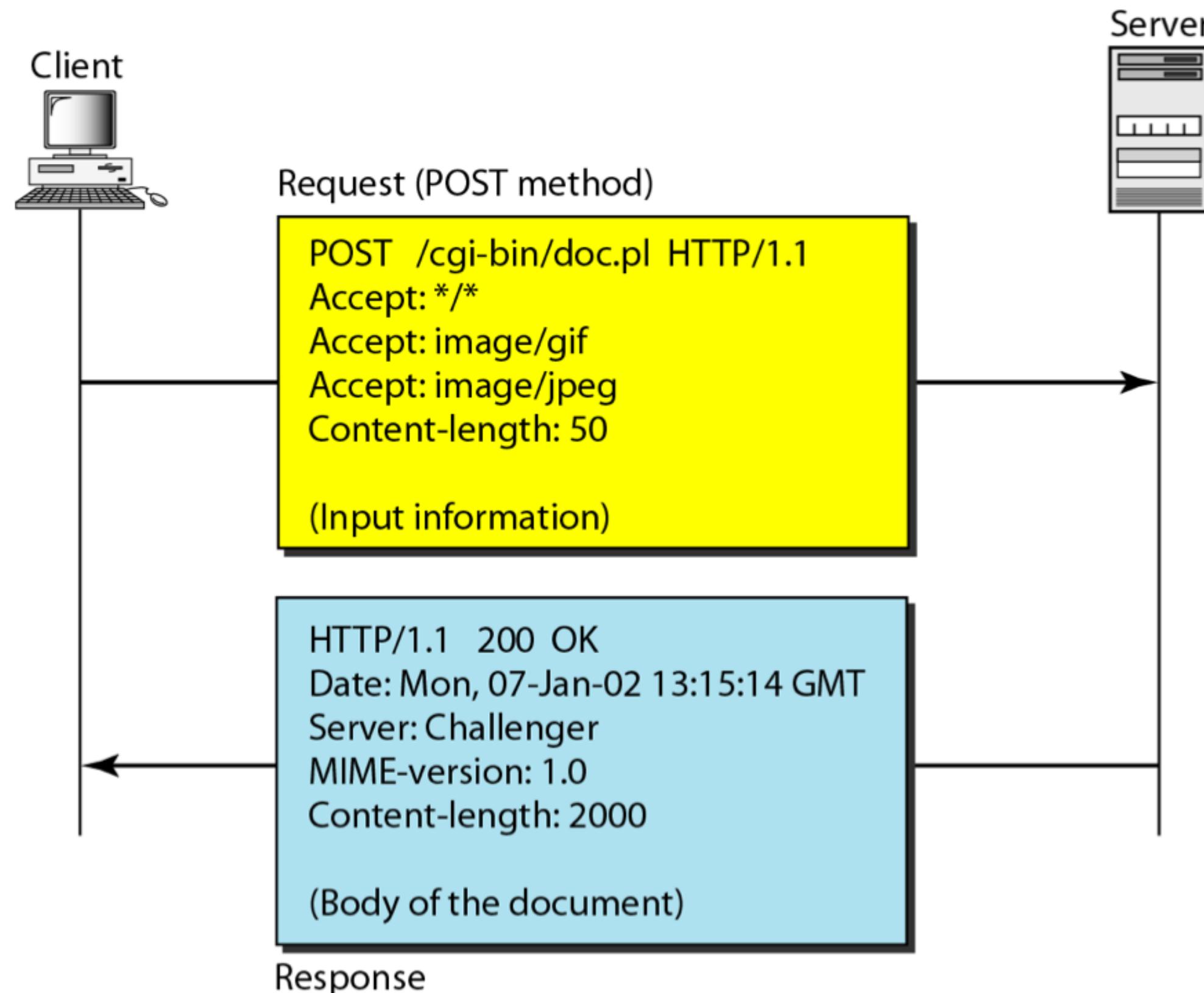
Code	Phrase	Description
<b>Informational</b>		
100	Continue	The initial part of the request has been received, and the client may continue with its request.
101	Switching	The server is complying with a client request to switch protocols defined in the upgrade header.
<b>Success</b>		
200	OK	The request is successful.
201	Created	A new URL is created.
202	Accepted	The request is accepted, but it is not immediately acted upon.
204	No content	There is no content in the body.

Code	Phrase	Description
<b>Redirection</b>		
301	Moved permanently	The requested URL is no longer used by the server.
302	Moved temporarily	The requested URL has moved temporarily.
304	Not modified	The document has not been modified.
<b>Client Error</b>		
400	Bad request	There is a syntax error in the request.
401	Unauthorized	The request lacks proper authorization.
403	Forbidden	Service is denied.
404	Not found	The document is not found.
405	Method not allowed	The method is not supported in this URL.
406	Not acceptable	The format requested is not acceptable.
<b>Server Error</b>		
500	Internal server error	There is an error, such as a crash, at the server site.
501	Not implemented	The action requested cannot be performed.
503	Service unavailable	The service is temporarily unavailable, but may be requested in the future.

## HTTP Get Method



## HTTP Post Method



## Access HTTP via Telnet

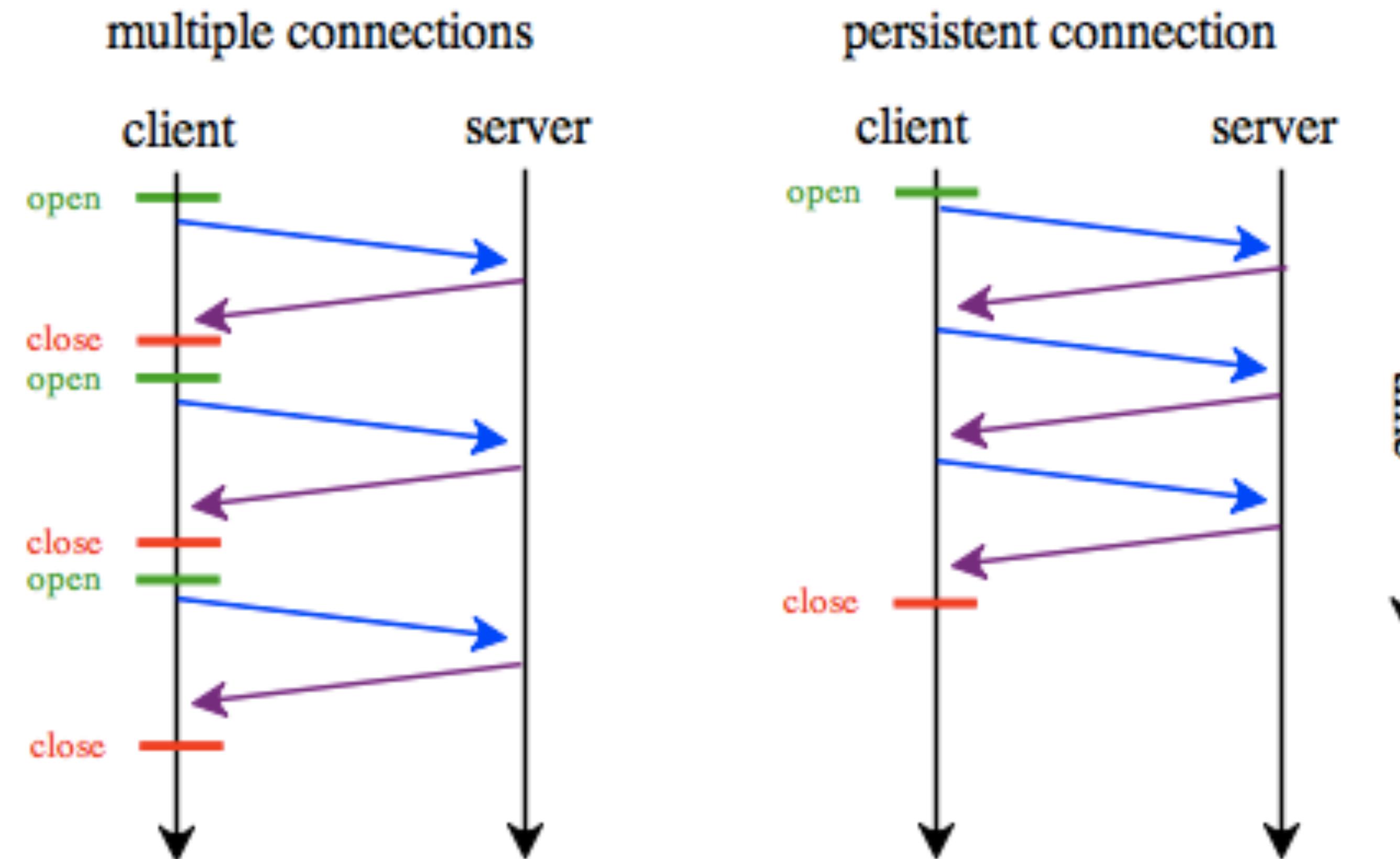
```
cjundang:~ jacaran$ telnet 127.0.0.1 80
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
GET /~jacaran/2011/index.php HTTP/1.0
```

```
HTTP/1.1 200 OK
Date: Sat, 14 Jan 2012 05:34:33 GMT
Server: Apache/2.2.20 (Unix) mod_ssl/2.2.20 OpenSSL/0.9.8r DAV/2 PHP/5.3.6
X-Powered-By: PHP/5.3.6
Content-Length: 1733
Connection: close
Content-Type: text/html

<!DOCTYPE html
PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html lang="en">
<head>

<link rel="stylesheet" type="text/css" href="style.css" />
```

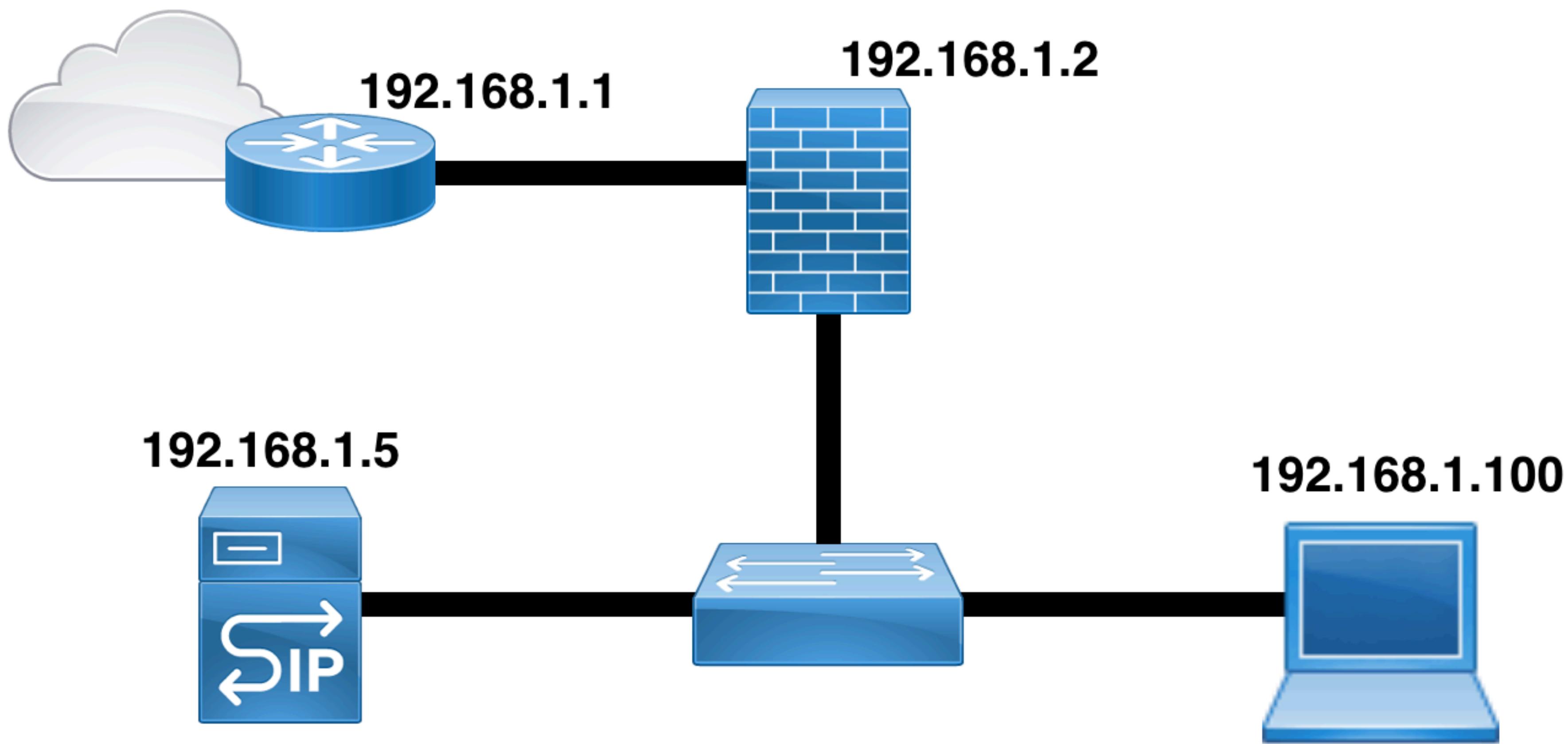
## Persistent/None Persistent Connection



# Web Technology

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## Web Proxy



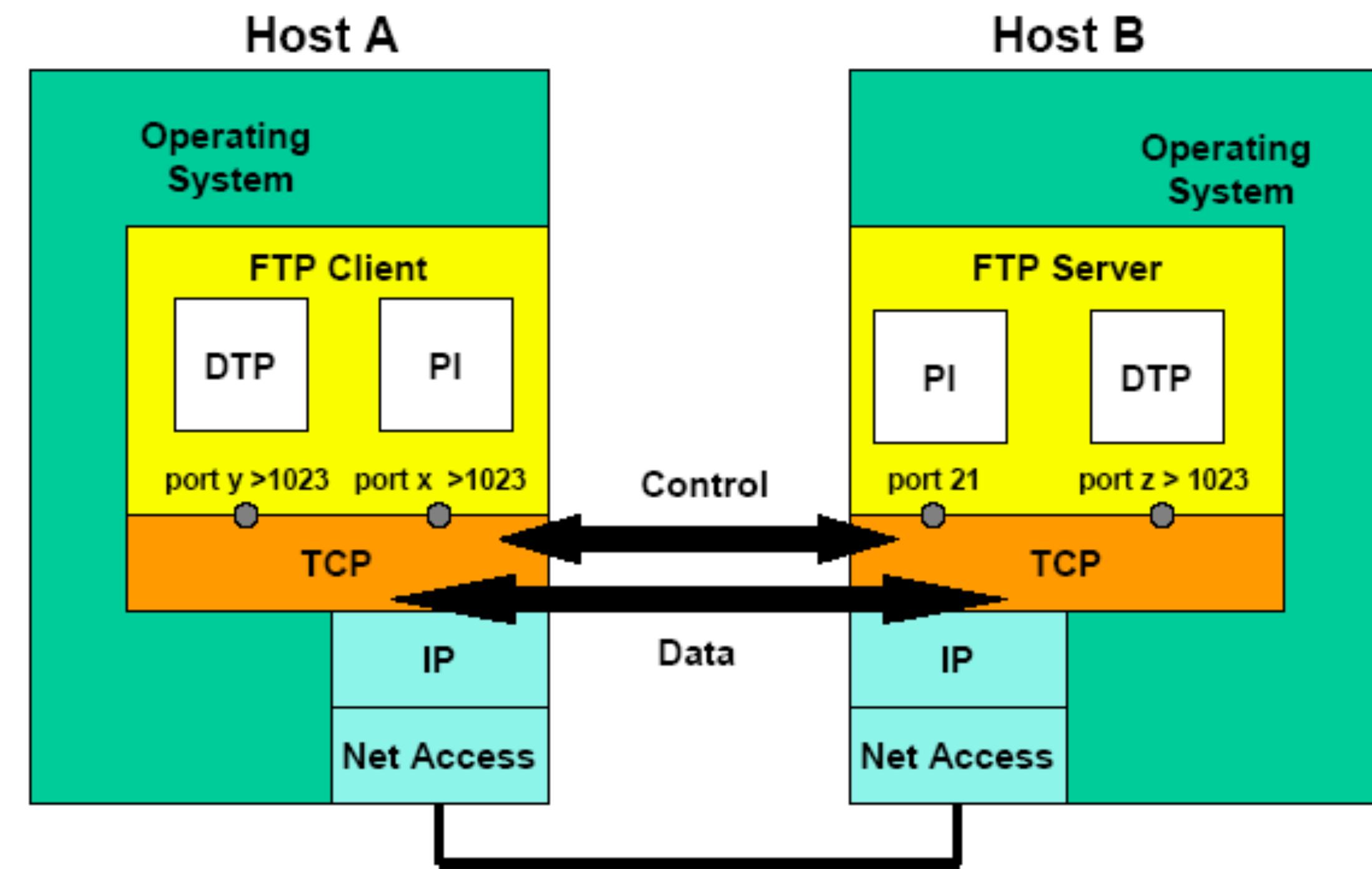
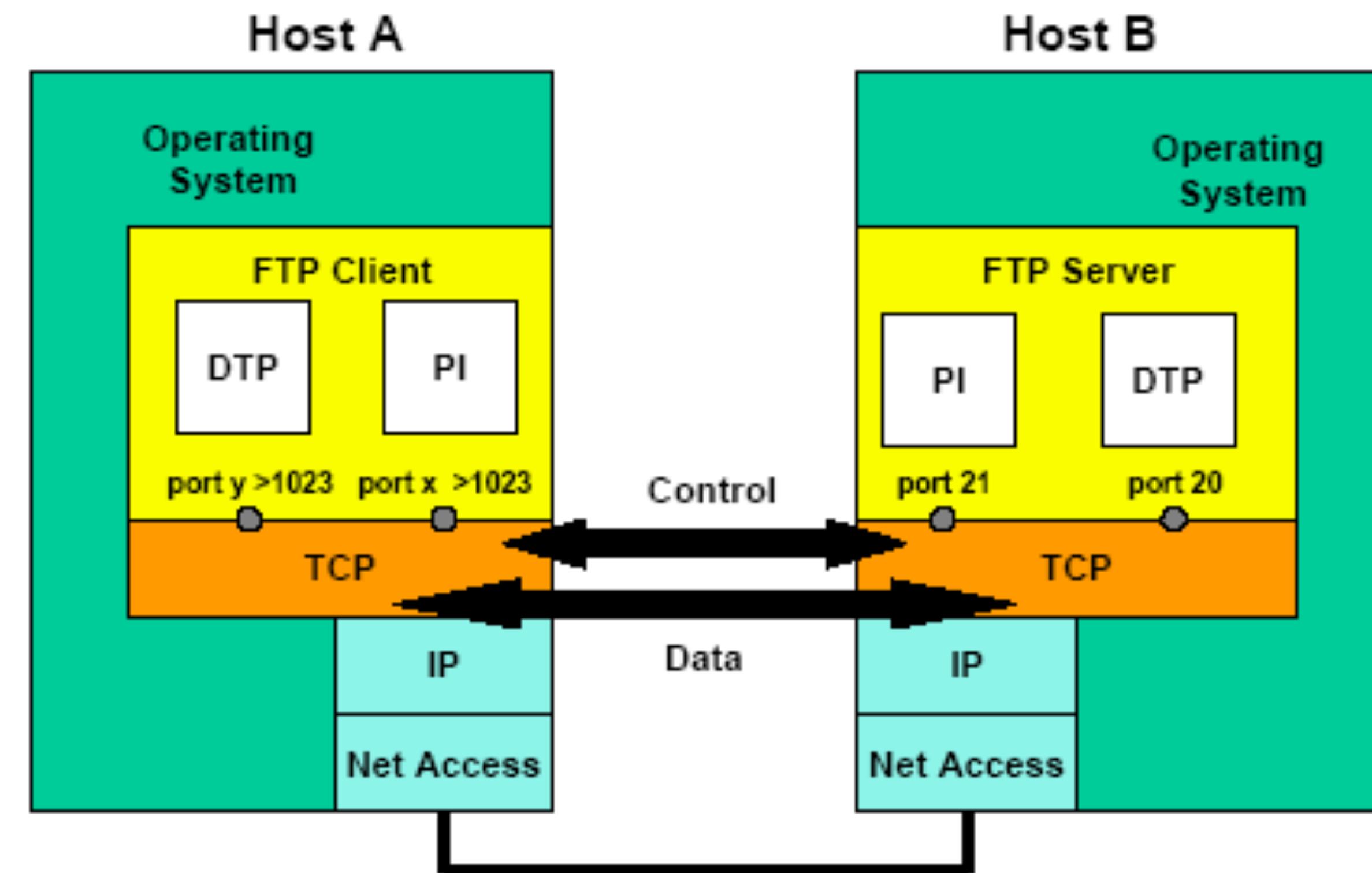
# File Sharing

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## File Transfer Protocol

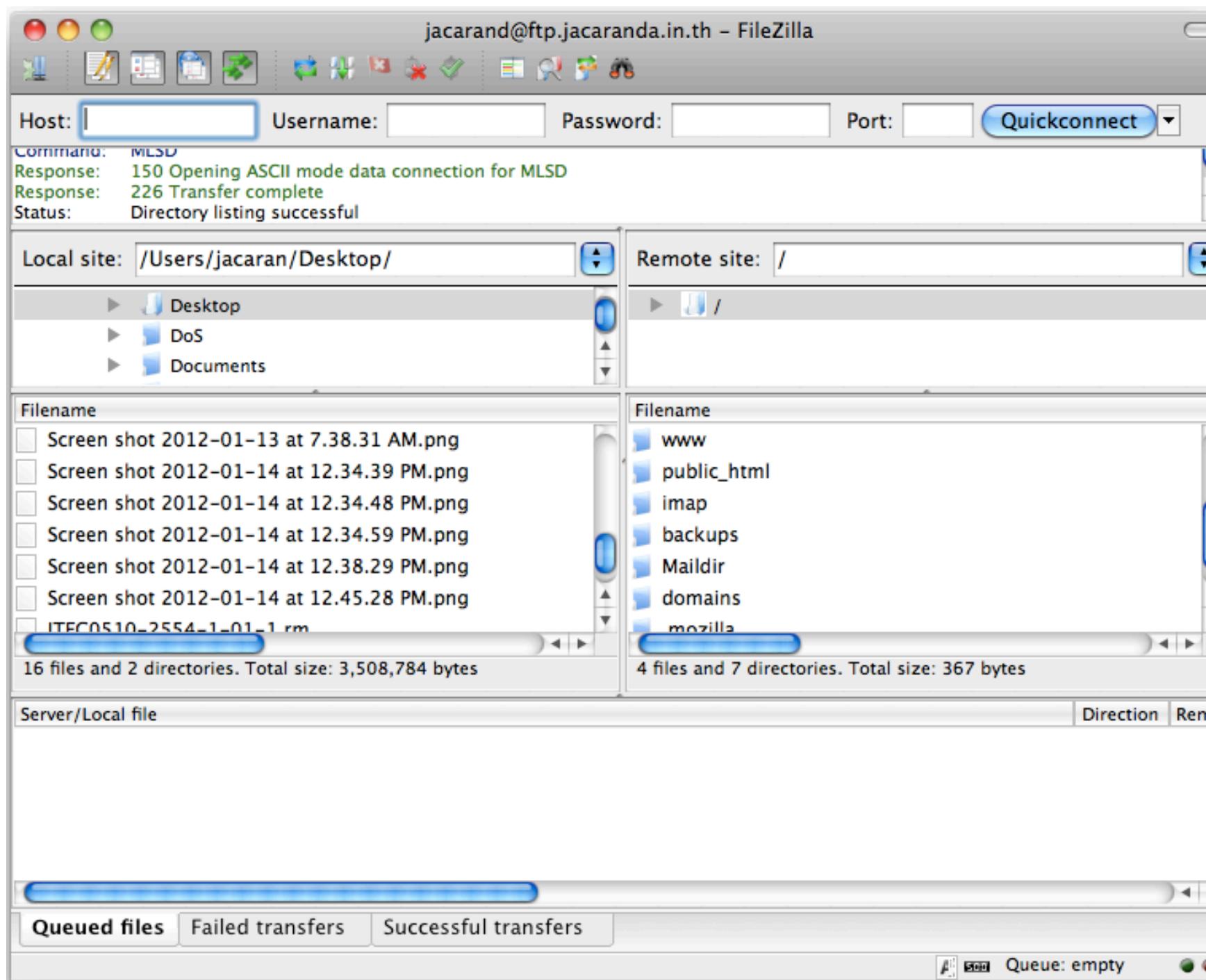
# File Sharing

## FTP Protocol



# File Sharing

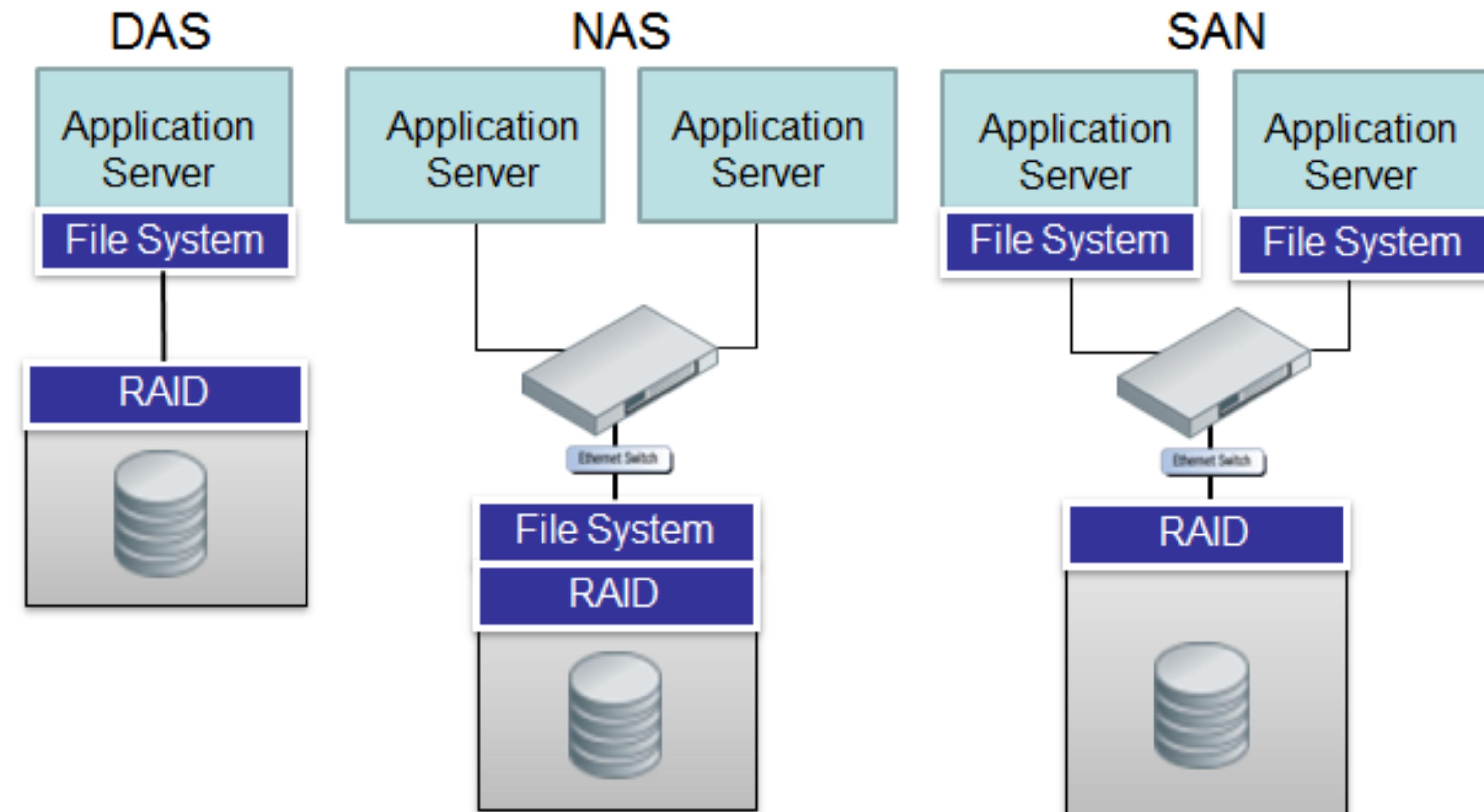
## FTP Application



```
cjundang:Desktop jacaran$ ftp ftp.jacaranda.in.th
Connected to ftp.jacaranda.in.th.
220 ProFTPD 1.3.3e Server ready.
Name (ftp.jacaranda.in.th:jacaran): jacaran
331 Password required for jacaran
Password:
530 Login incorrect.
ftp: Login failed
ftp> quit
221 Goodbye.
cjundang:Desktop jacaran$
```

# File Sharing

## Network File System

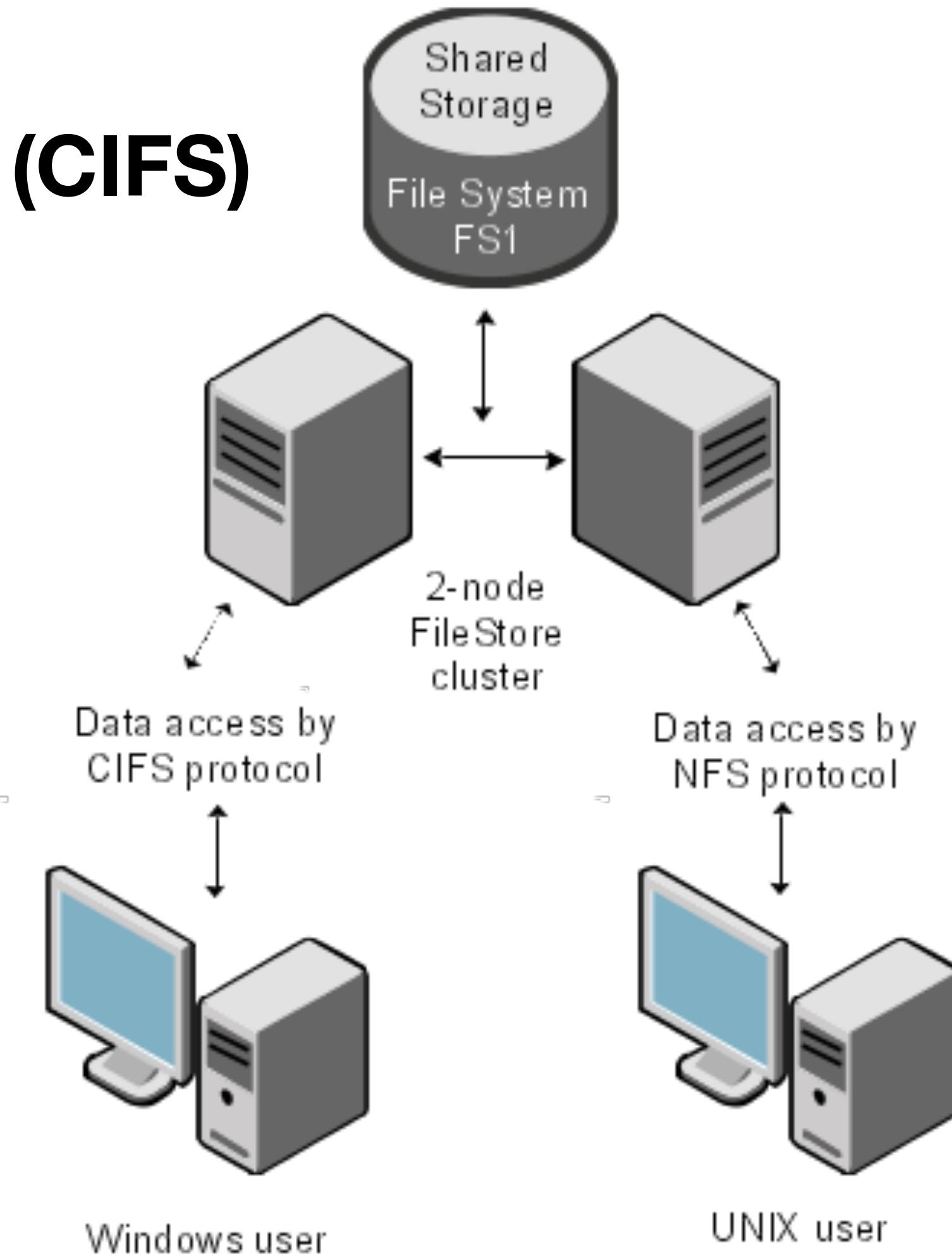


12

# File Sharing

**Network File System (NFS)**

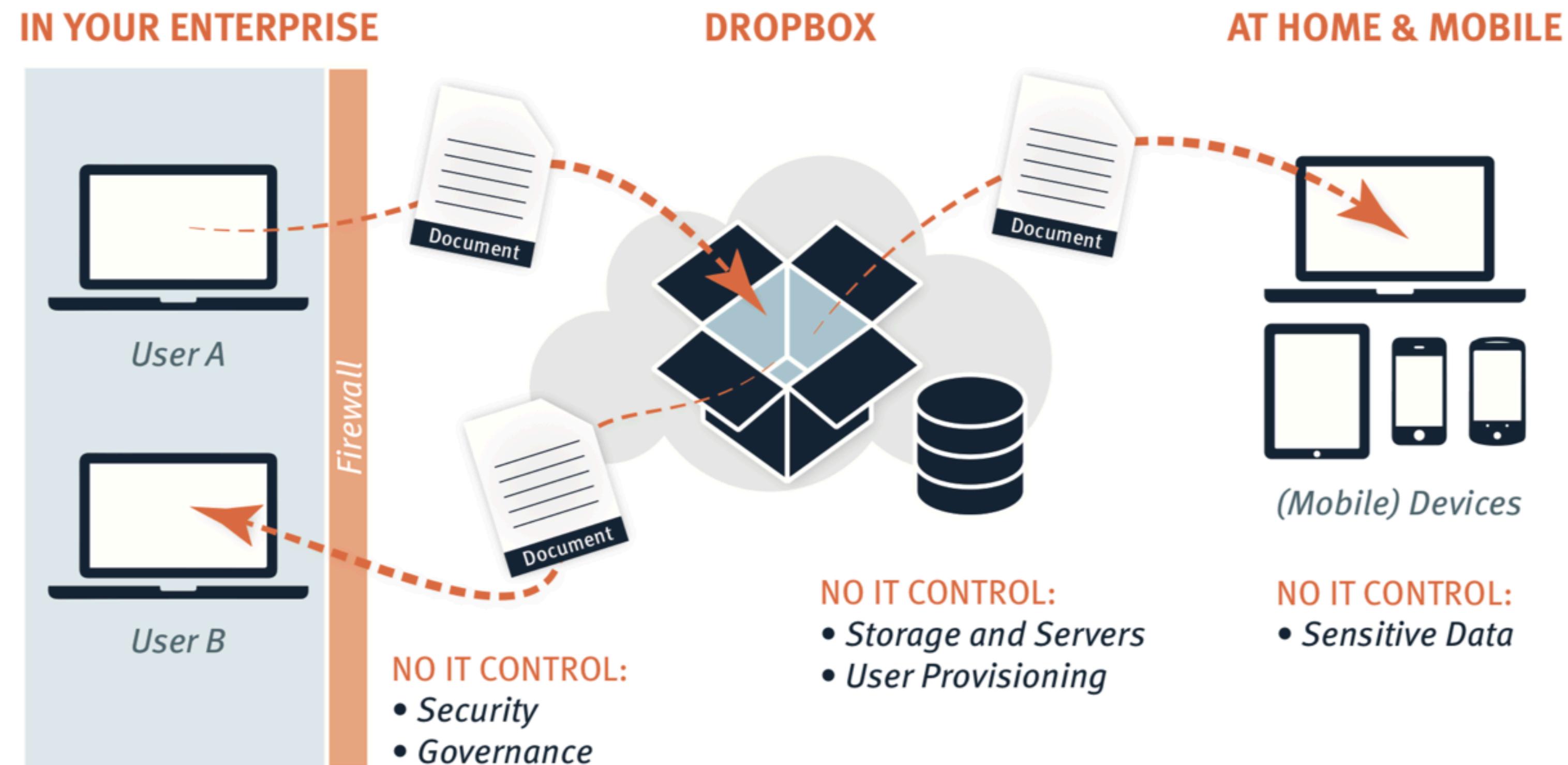
**Common Internet File System (CIFS)**



# File Sharing

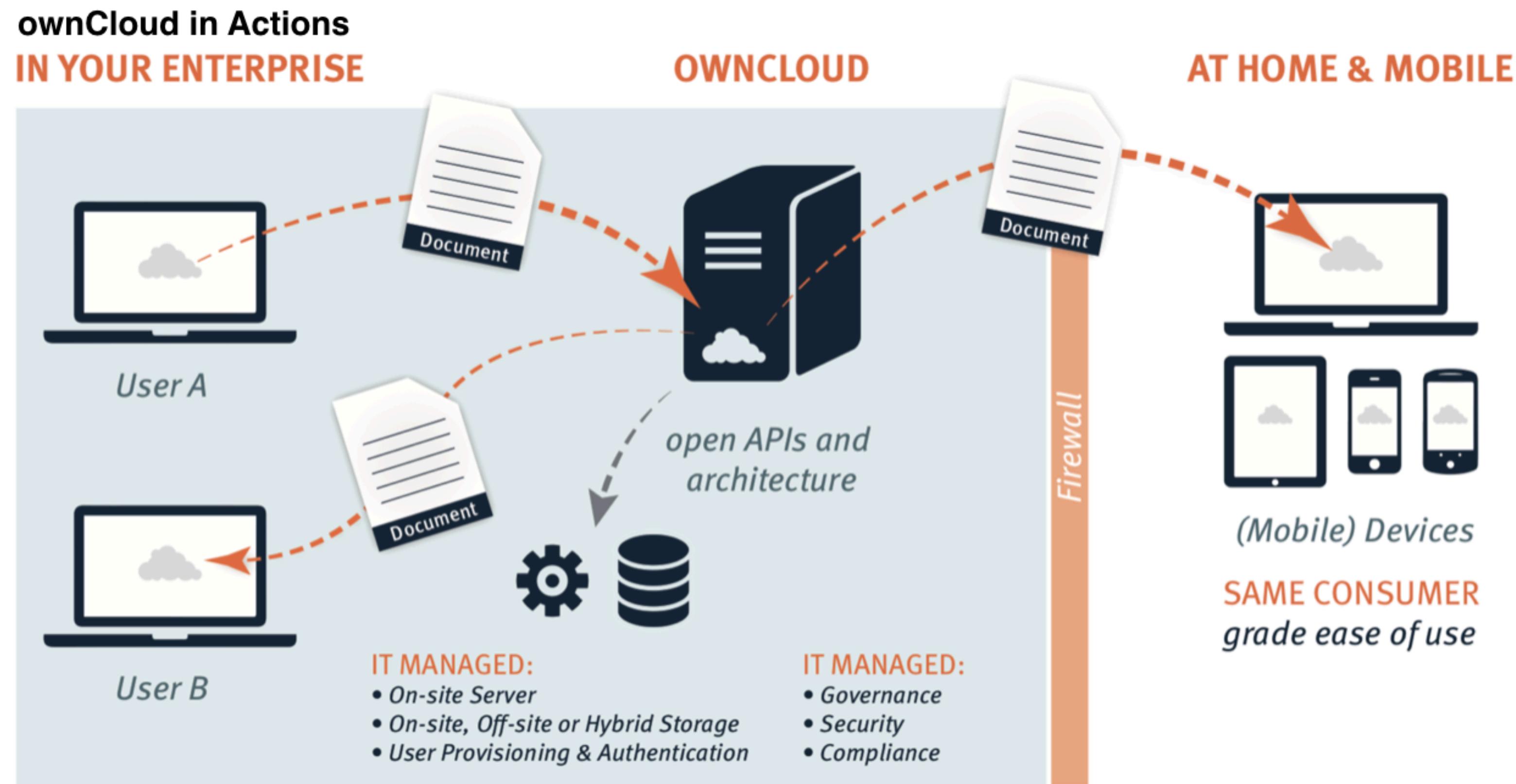
## OwnCloud

### Dropbox Problem in Actions



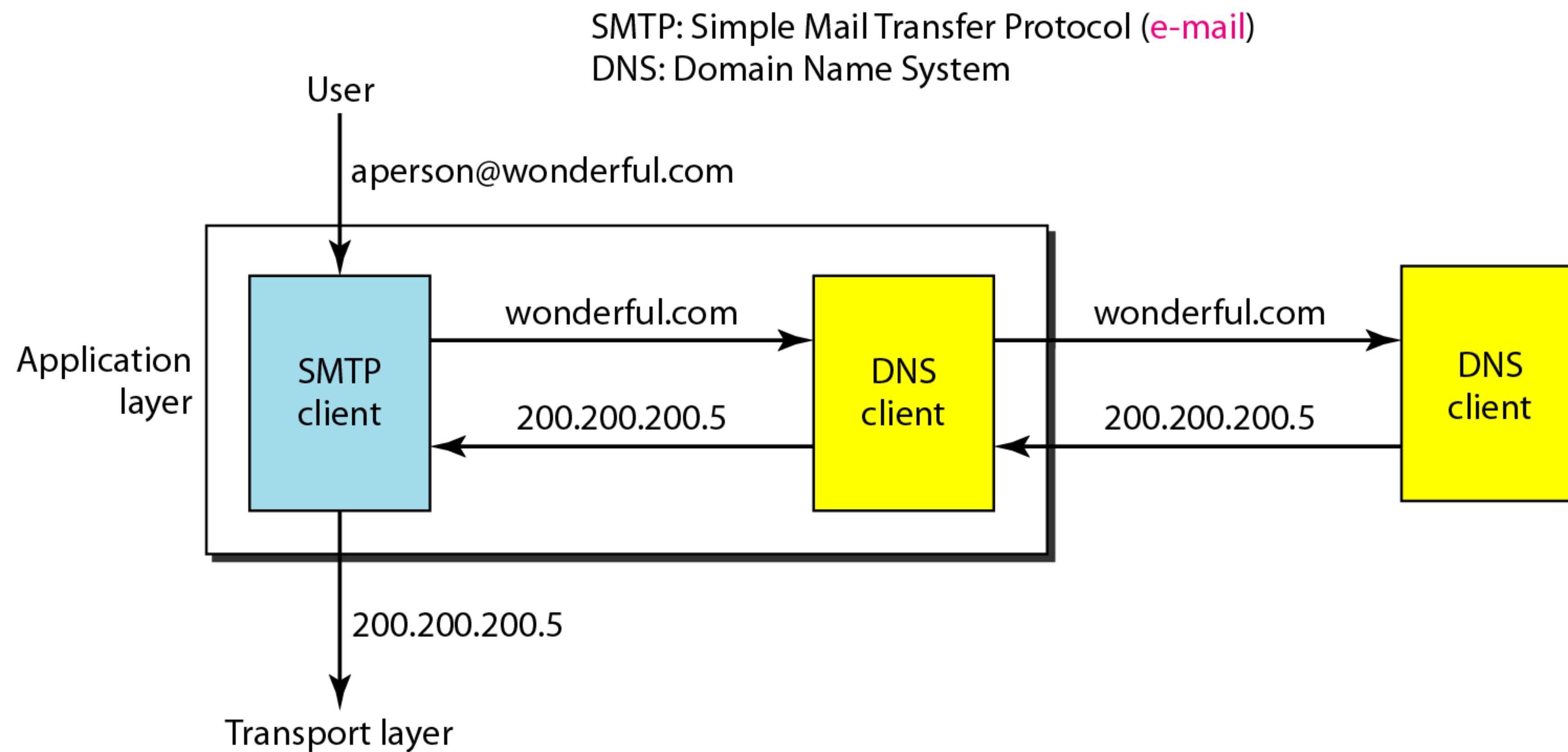
# File Sharing

## OwnCloud



# Domain Name System

## DNS Services



# Domain Name System

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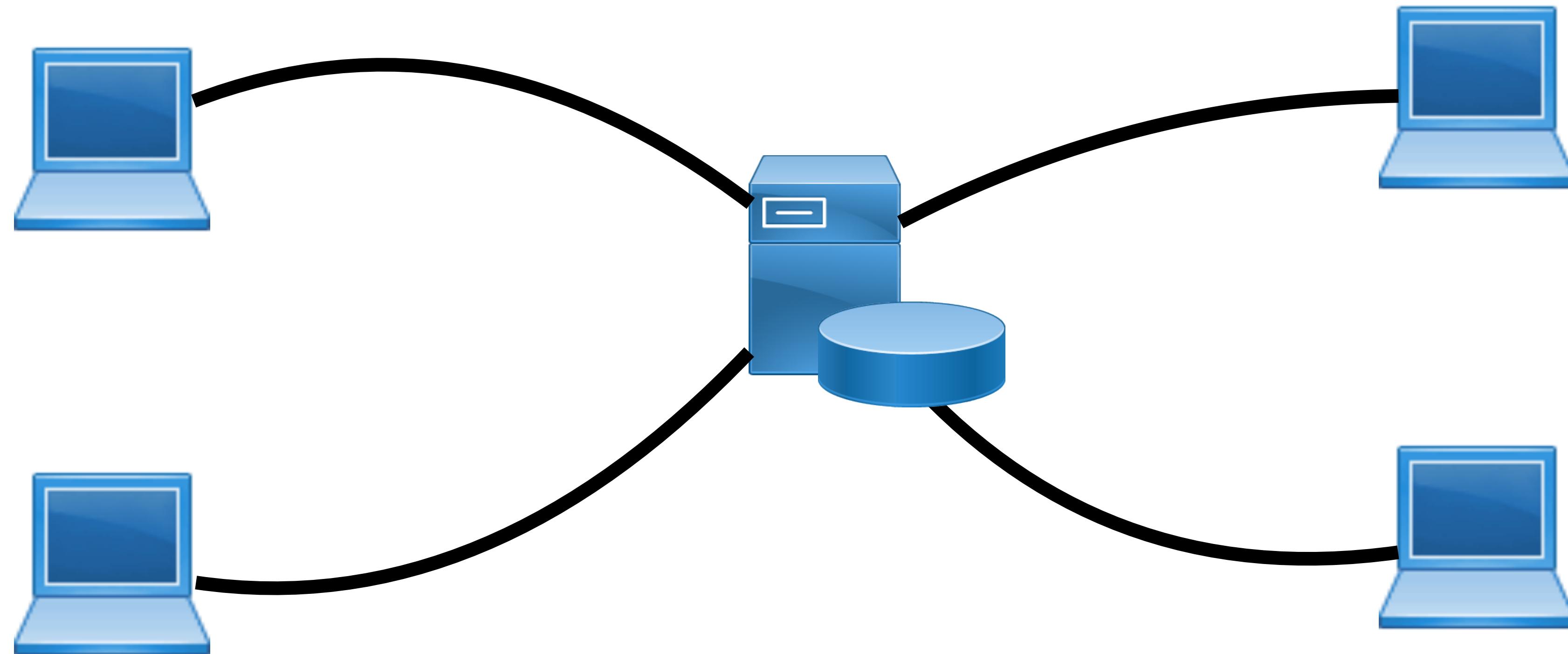
## Flat Namespaces

Name	IP address

# Domain Name System

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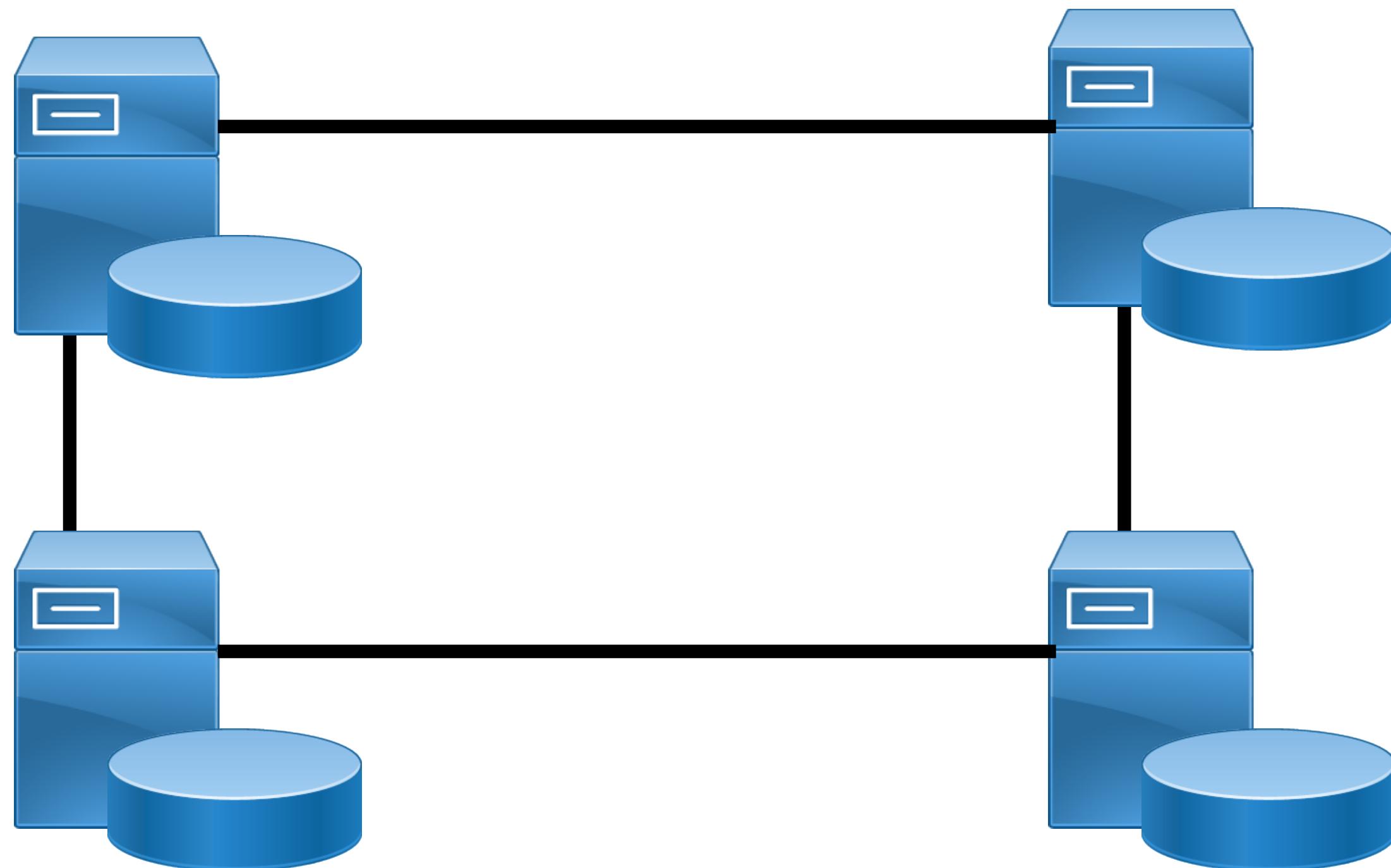
## Flat Namespaces - Problem



# Domain Name System

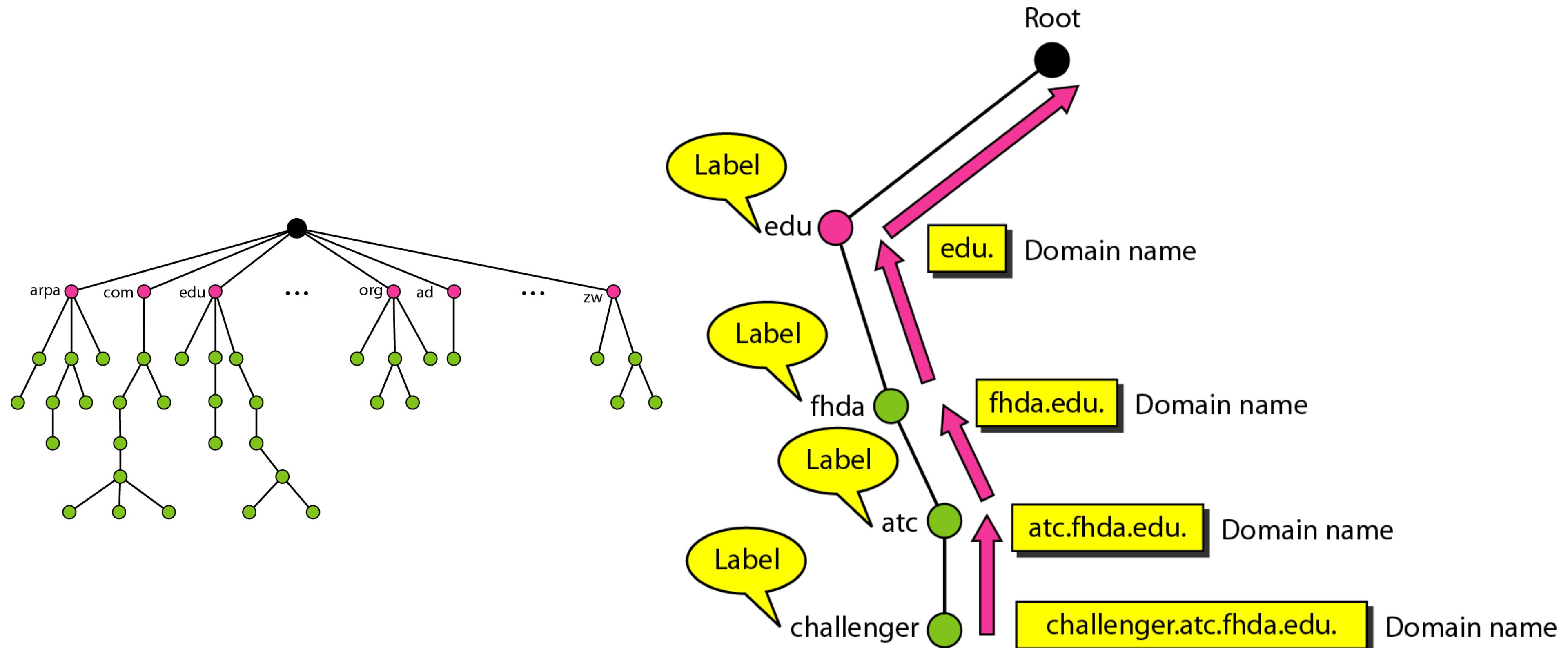
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Ubiquitous Networked Embedded System

## Flat Namespaces - Solution



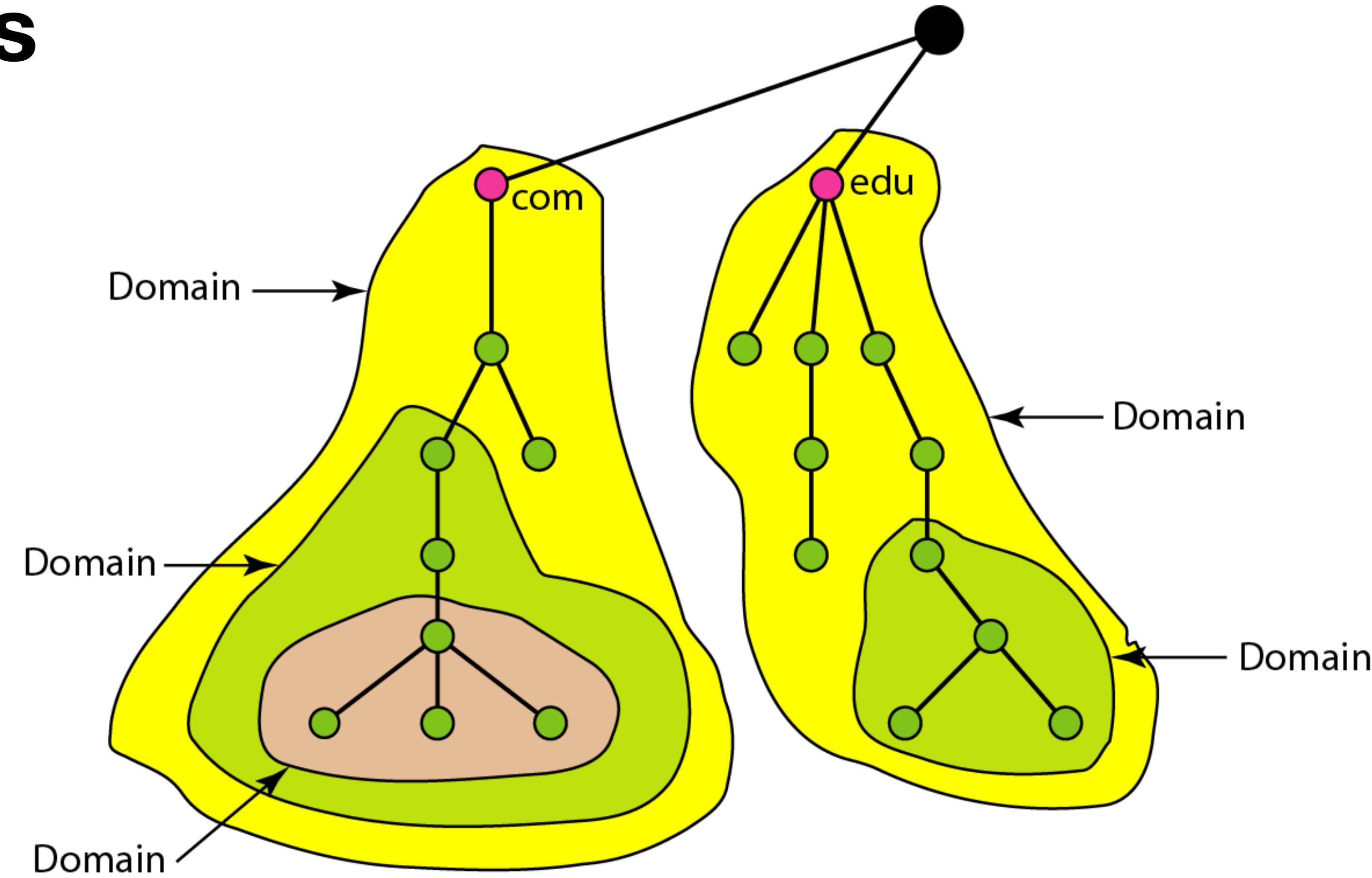
# Domain Name System

## Hierarchical Name Space



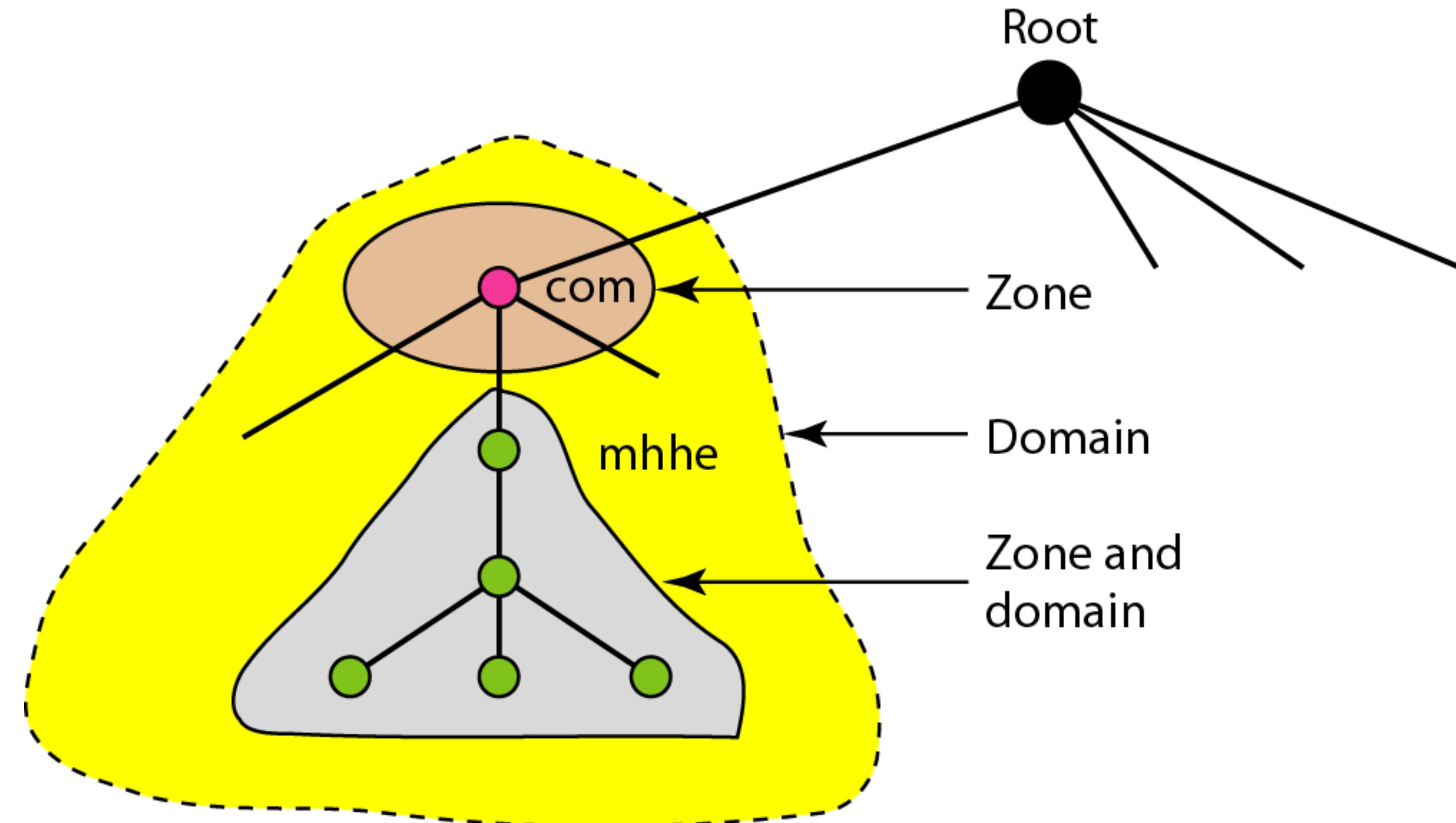
# Domain Name System

## Namespaces



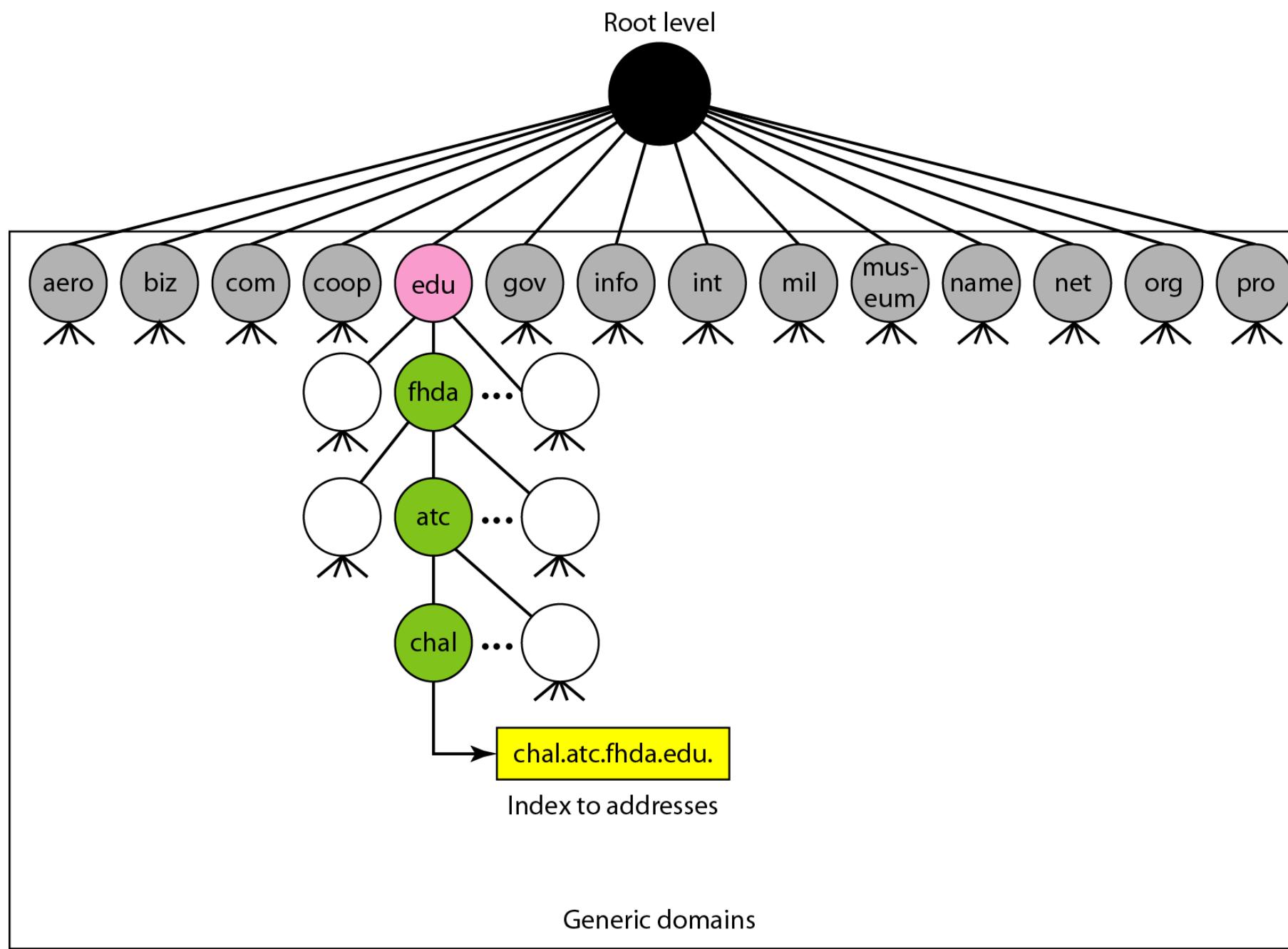
# Domain Name System

## Zone

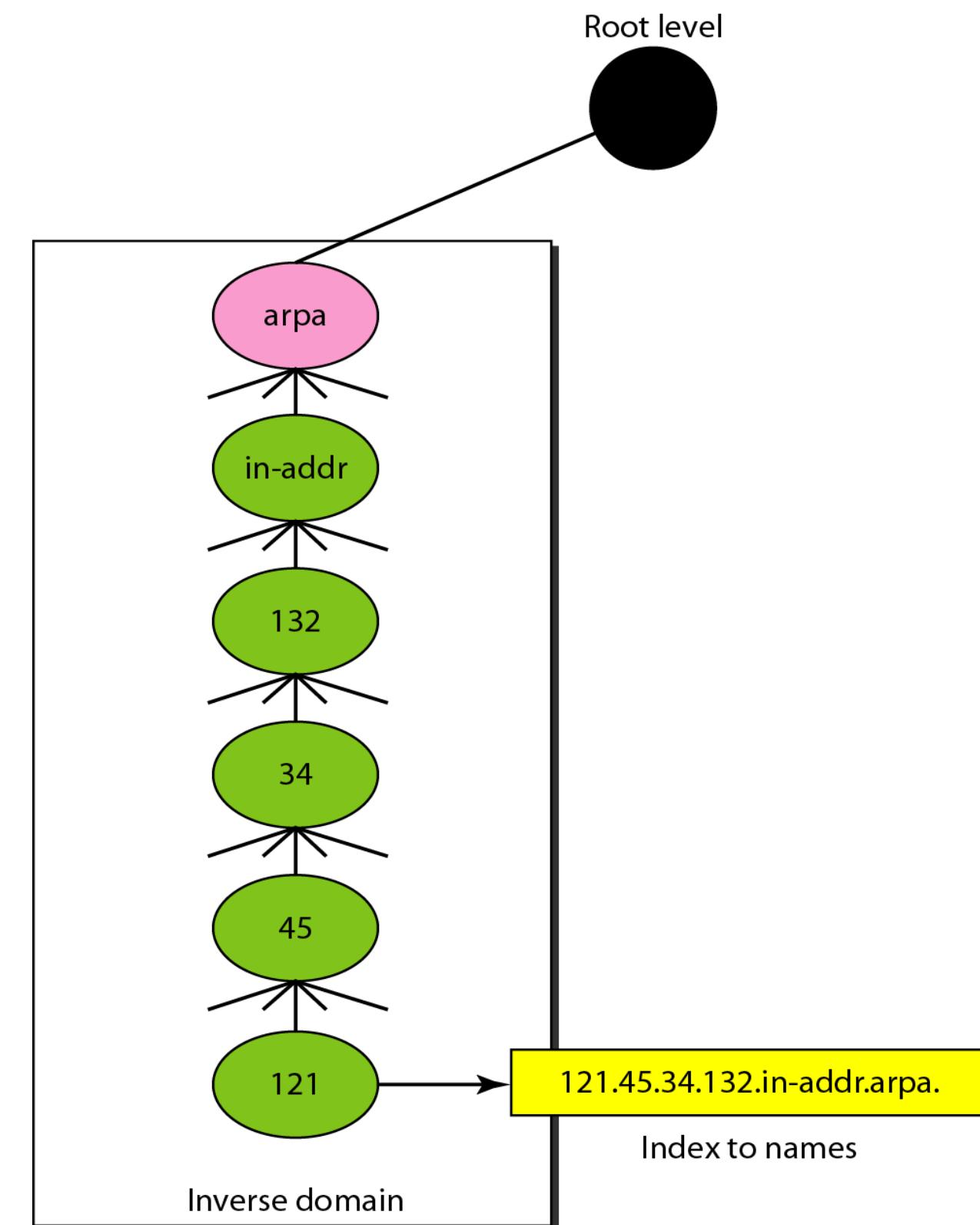


# Domain Name System

## Domain Name Spaces

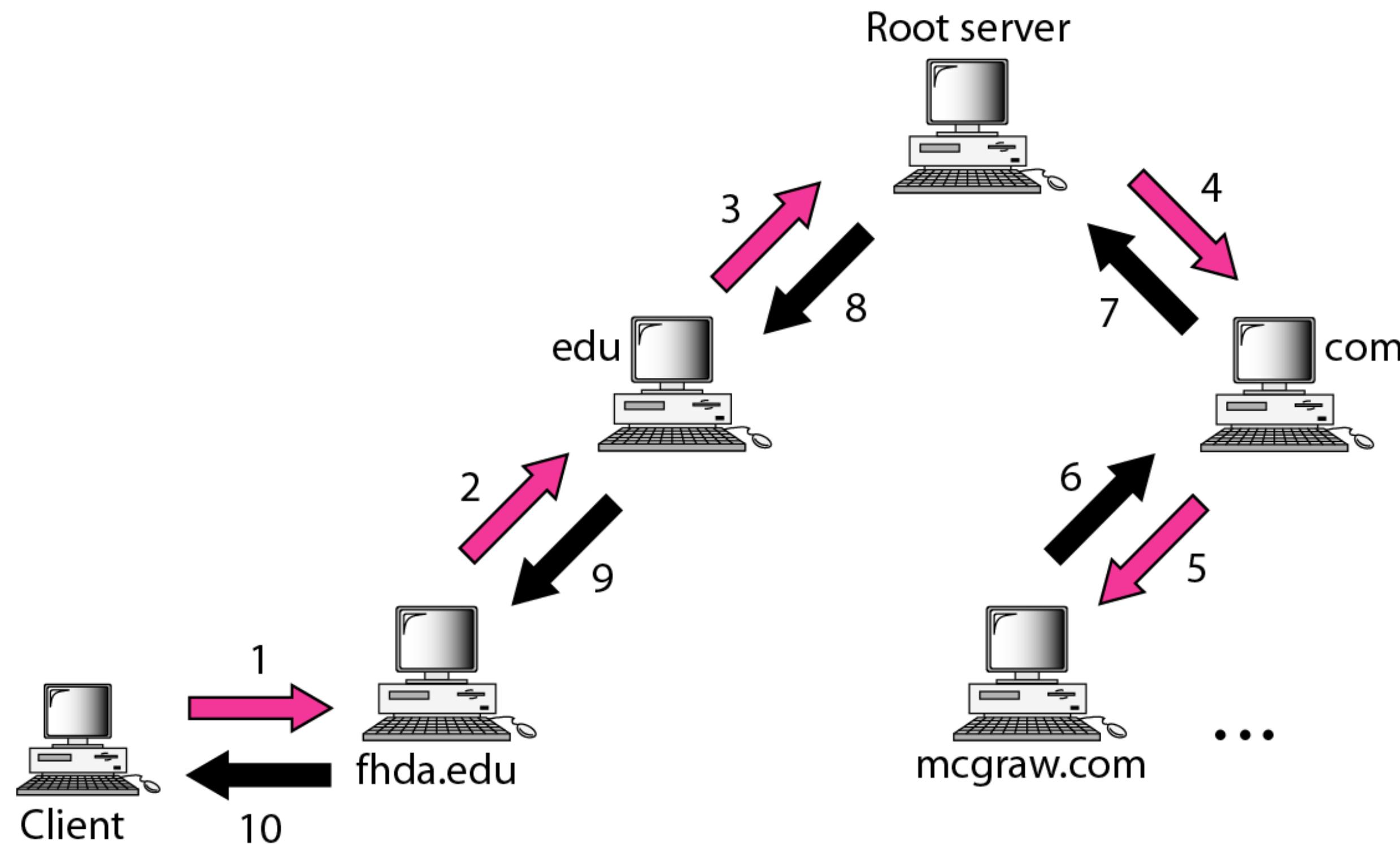


Label	Description
aero	Airlines and aerospace companies
biz	Businesses or firms (similar to "com")
com	Commercial organizations
coop	Cooperative business organizations
edu	Educational institutions
gov	Government institutions
info	Information service providers
int	International organizations
mil	Military groups
museum	Museums and other nonprofit organizations
name	Personal names (individuals)
net	Network support centers
org	Nonprofit organizations
pro	Professional individual organizations



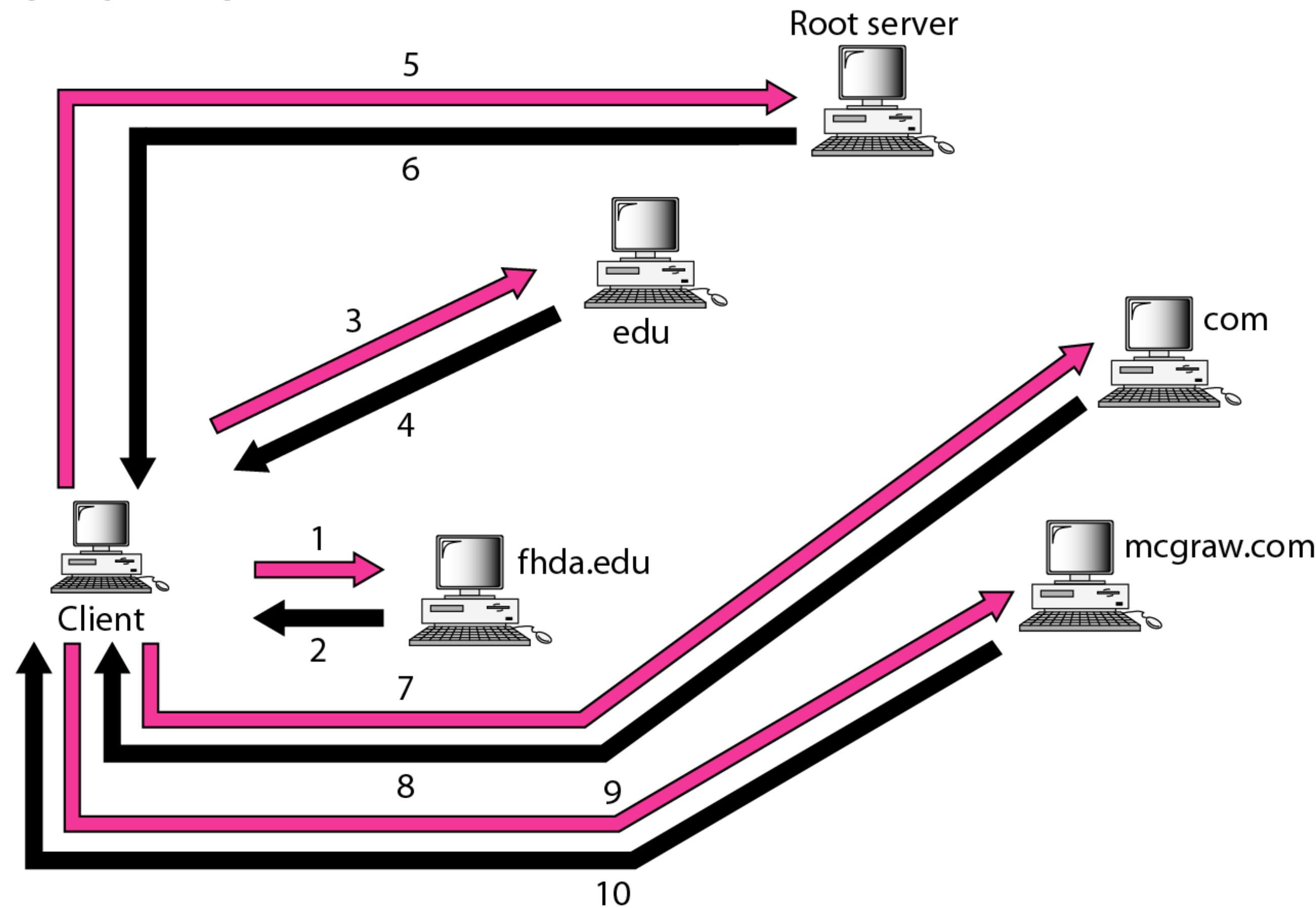
# Domain Name System

## Recursive Resolution



# Domain Name System

## Iterative resolution



# Domain Name System

## DNS in Practice

- 1) name & IP address are stored in file named /etc/hosts

```
[chanankorn:~ cjundang$ cat /etc/hosts
##
# Host Database
#
# localhost is used to configure the loopback interface
# when the system is booting.  Do not change this entry.
##
127.0.0.1      localhost
255.255.255.255 broadcasthost
::1            localhost
127.0.0.1      demo
```

# Domain Name System

## DNS in Practice

2) configuration file for DNS server (/etc/resolv.conf)

```
chanankorn:~ cjundang$ cat /etc/resolv.conf
#
# Mac OS X Notice
#
# This file is not used by the host name and address resolution
# or the DNS query routing mechanisms used by most processes on
# this Mac OS X system.
#
# This file is automatically generated.
#
domain wu.ac.th
nameserver 202.28.68.5
```

# Domain Name System

## DNS in Practice

```
[chanankorn:~ cjundang$ ping informatics
PING informatics.wu.ac.th (202.28.68.132): 56 data bytes
64 bytes from 202.28.68.132: icmp_seq=0 ttl=62 time=1.483 ms
64 bytes from 202.28.68.132: icmp_seq=1 ttl=62 time=2.579 ms
64 bytes from 202.28.68.132: icmp_seq=2 ttl=62 time=14.887 ms
^C
--- informatics.wu.ac.th ping statistics ---
3 packets transmitted, 3 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 1.483/6.316/14.887/6.077 ms
```

```
[chanankorn:~ cjundang$ ping informatics.wu.ac.th
PING informatics.wu.ac.th (202.28.68.132): 56 data bytes
64 bytes from 202.28.68.132: icmp_seq=0 ttl=62 time=5.814 ms
64 bytes from 202.28.68.132: icmp_seq=1 ttl=62 time=14.248 ms
64 bytes from 202.28.68.132: icmp_seq=2 ttl=62 time=3.416 ms
^C
```

# Domain Name System

## DNS in Practice

```
[chanankorn:~ cjundang$ nslookup www.wu.ac.th
```

```
Server: 202.28.68.5
```

```
Address: 202.28.68.5#53
```

```
Name: www.wu.ac.th
```

```
Address: 202.28.68.76
```

```
[chanankorn:~ cjundang$ nslookup www.facebook.com
```

```
Server: 202.28.68.5
```

```
Address: 202.28.68.5#53
```

```
Non-authoritative answer:
```

```
www.facebook.com canonical name = star-mini.c10r.facebook.com.
```

```
Name: star-mini.c10r.facebook.com
```

```
Address: 31.13.78.35
```

