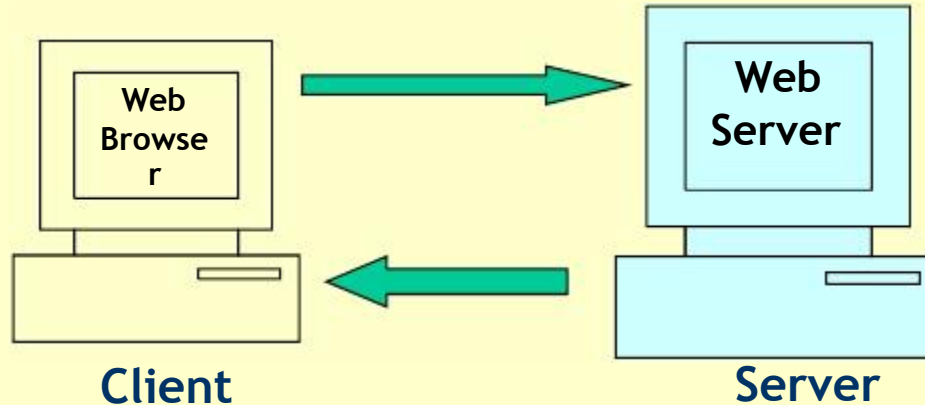


DT228/2 Web Development

Web Servers

Introduction



A web server is specialised software that responds to client (I.e. web browser) requests

Every web site requires a web server to process client requests and ‘serve up’ the pages

Web servers used to service Internet, intranets and extranets

Note that web server in this context is software. Server machine is also referred to as the web server.

System architecture

A web server is part of a multi-tier application (also called n-tier application)

Functionality is divided into separate tiers or groupings

Tiers can be on same computer or on separate computers

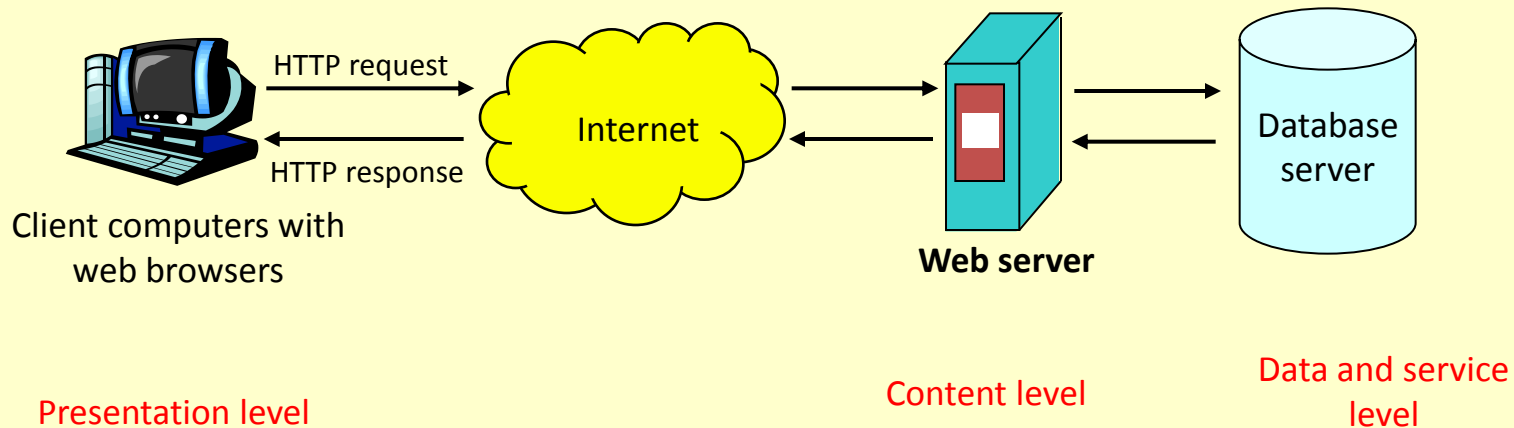
Web applications are often three tiered:

- Information tier (also called data tier)
- Middle tier
- Client tier (user interface tier)

Web Architecture

❑ Three-tier architecture:

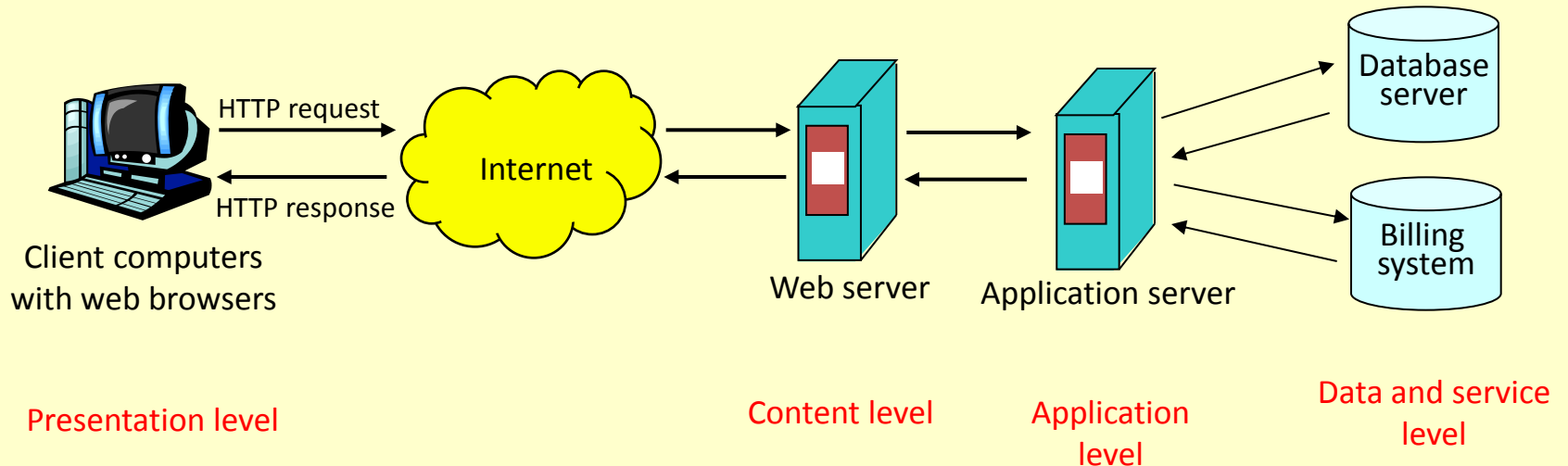
- Presentation: clients contains both the presentation and application logic components.
- Content: web server provides interactive view of information from a data store.
- Data and service level: provides data for the web server.



Web Architecture

❑ Multi-tier architecture:

- Application-level or middleware: has an application server, which is used to find requested data and services, makes them available for viewing, and carries out transactions.
- Data and service level: has a variety of data and services accessible by the application server.

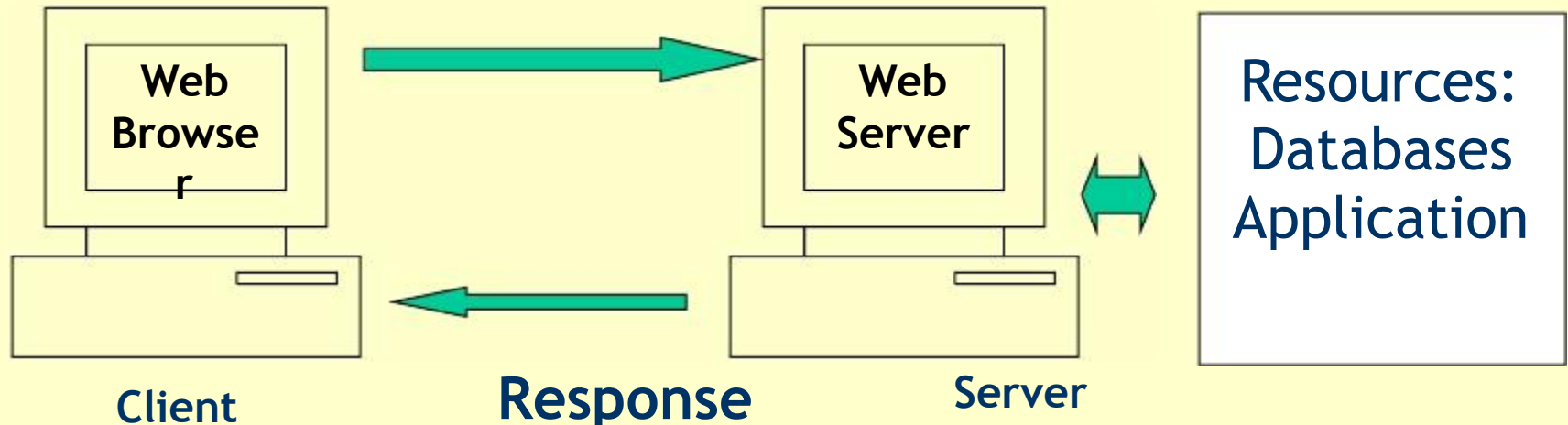


Hyper Text Transfer Protocol

Request

e.g. “Get me a webpage”

“Post this data to the server”



e.g. “here’s the web page”

Basic function of web server is to act as **HTTP server**

Web servers communicate with clients using a
Response-Request protocol: **HTTP**

Client-Server model and HTTP

- A request is generated by a client (by browser software)
 - Most common requests are “Get” and “Post”
- Request reaches the appropriate web-server
- Request is processed by the web-server
- A response is formulated by the web server and sent back to the client (e.g. web page contents)

Client-Server model and HTTP

- HTTP is the de facto standard for transferring World Wide Web documents
- Usually to port 80
- HTTP messages (requests and responses) between client and server are human readable

Http: Requests from client

- Request
 - Get resource
 - Type of browser
 - Name of host
 - etc
- First line is request-line. Contains the nature of the Request e.g.
 - GET: Get a file from the server
 - POST: Post data to the server
 - PUT: Store some resource

Http: Requests from client: HTML Examples

```
<body>
```

```
  <form method= "post" action ="process.jsp">
```

```
    Word to look up: <Input type = text Name =  
    "word">
```

```
  <input types = "submit">
```

```
</form>
```

```
</body>
```

*HTML code
for a form*

Indicates a **post** request
Data in form is posted to the server

Http: Requests from client: HTML Examples

```
<body>
```

```
<form method= "get" action ="process.jsp">
```

Word to look up: <Input type = text Name = "word">

```
<input types = "submit">
```

```
</form>
```

```
</body>
```

*HTML code
for a form*

Indicates a **get** request
Not usually used for forms
Sends any parameters in the query
string as www.hostname?name=word& etc

Http: Response from web server

- Response
 - 200 = Status code
 - All's well
 - Type of server
 - Other contents etc

```
HTTP/1.1 200 OK
Date: Thu, 25 July 2013 18:40:55 GMT
Server: Apache/1.3.5 (Unix) PHP/3.0.6
Last-Modified: Mon, 22 July 2013 16:03:22 GMT
Content-Type: text/html
Content-Length: 12987
...
```

HTTP Response Status Codes

- 1XX: Provide information to the client
- 2XX: Correct response has occurred.
- 3XX: Browser must carry out some further action in order for the request to be successful. For example, the code 301 indicates that the resource that was requested has been permanently moved to another location.
- 4XX: Something has gone wrong; for example, the most frequent status code that is returned is 404 which indicates that the resource that has been requested cannot be found.
- 5XX: Server has experienced a problem. For example, the status code 503 indicates that the service requested has not been able to be carried out.

Accessing web servers

- Must know host name on which web server resides

- Remote web servers accessed using
 - URL: **http://www.dit.com/default.asp**
 - Protocol
 - Domain name
 - Page name
 - OR IP address **http://207.60.134.230**
- Local web servers (on same machine) accessed using machine name or *localhost*

web server functionality

- HTTP Server (at a minimum)

But usually includes many other functions such as:

- File Transfer Protocol (FTP) server
- Simple Mail Transfer Protocol (SMTP) server (for Email)
- Web development and publishing functionality
- Support for specific server side technologies e.g. JSP, SSIs
- Security features
- And more

Leading web servers

| <i>Server</i> | <i>Vendor</i> | <i>Comment</i> |
|---|----------------------|---|
| IIS (Internet Information Server) | Microsoft | Bundled with Windows operating system. Supports Active Server Pages |
| Apache | Freeware | Free. Most used web server. |
| Apache Tomcat | | Free. High performance. Compatible with Unix or Windows OSs |

Leading web servers

| <i>Server</i> | <i>Vendor</i> | <i>Comment</i> |
|----------------------|----------------------|-----------------------------------|
| Nginx | Open Source | 7.5% of all domains worldwide |
| lighttpd | Free | FreeBSD, Windows, Mac OS X, Linux |
| Jigsaw | Open Source | Free, can run CGI and PHP |
| Abyss | | About \$60 |

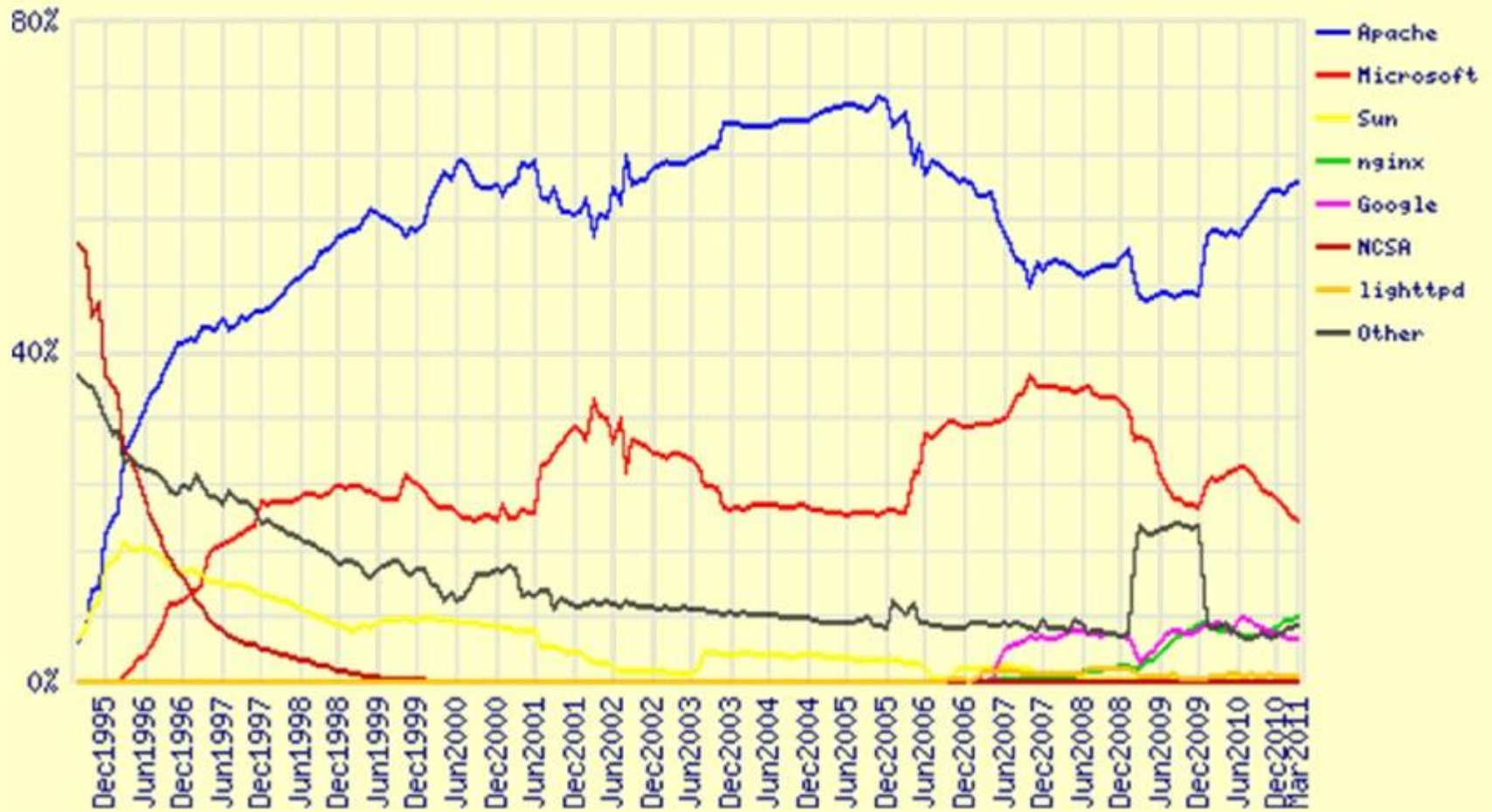
Plus hundreds more.... E.g. Blazix

See

http://en.wikipedia.org/wiki/Comparison_of_web_servers

<http://www.serverwatch.com/tutorials/article.php/1363221>

Market Share for Top Servers Across All Domains August 1995 - March 2011



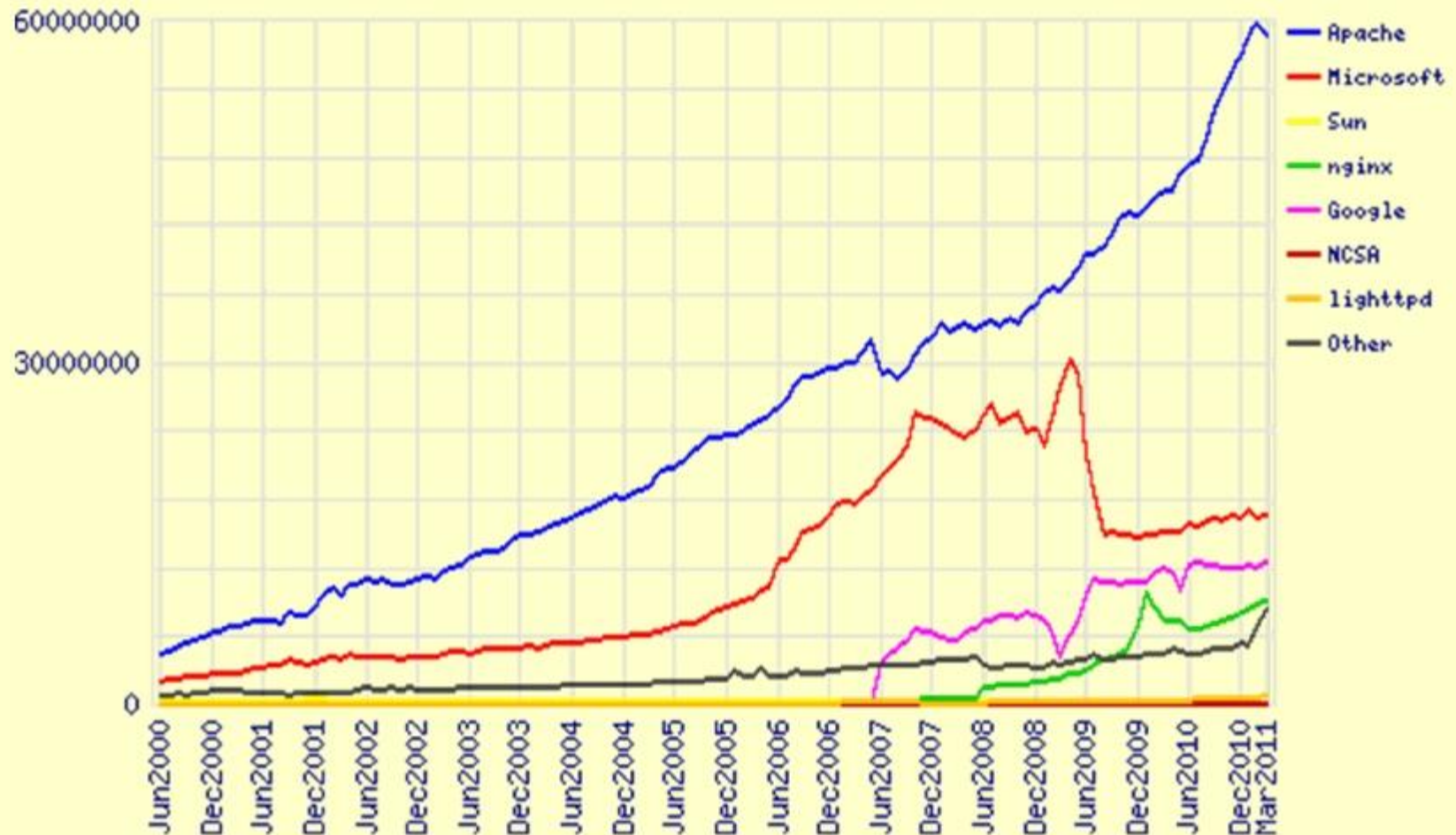
Source: <http://news.netcraft.com/archives/2011/03/09/march-2011-web-server-survey.html>

Market Share for Top Servers Across All Domains August 1995 - March 2011

| Developer | February 2011 | Percent | March 2011 | Percent | Change |
|-----------|------------------|---------|-------------|---------|--------|
| Apache | 171,195,554 | 60.10% | 179,720,332 | 60.31% | 0.21 |
| Microsoft | 57,084,126 | 20.04% | 57,644,692 | 19.34% | -0.70 |
| nginx | 21,570,463 | 7.57% | 22,806,060 | 7.65% | 0.08 |
| Google | 14,454,484 | 5.07% | 15,161,530 | 5.09% | 0.01 |
| lighttpd | 1,953,966 | 0.69% | 1,796,471 | 0.60% | -0.08 |

Source: <http://news.netcraft.com/archives/2011/03/09/march-2011-web-server-survey.html>

Totals for Active Servers Across All Domains June 2000 - March 2011



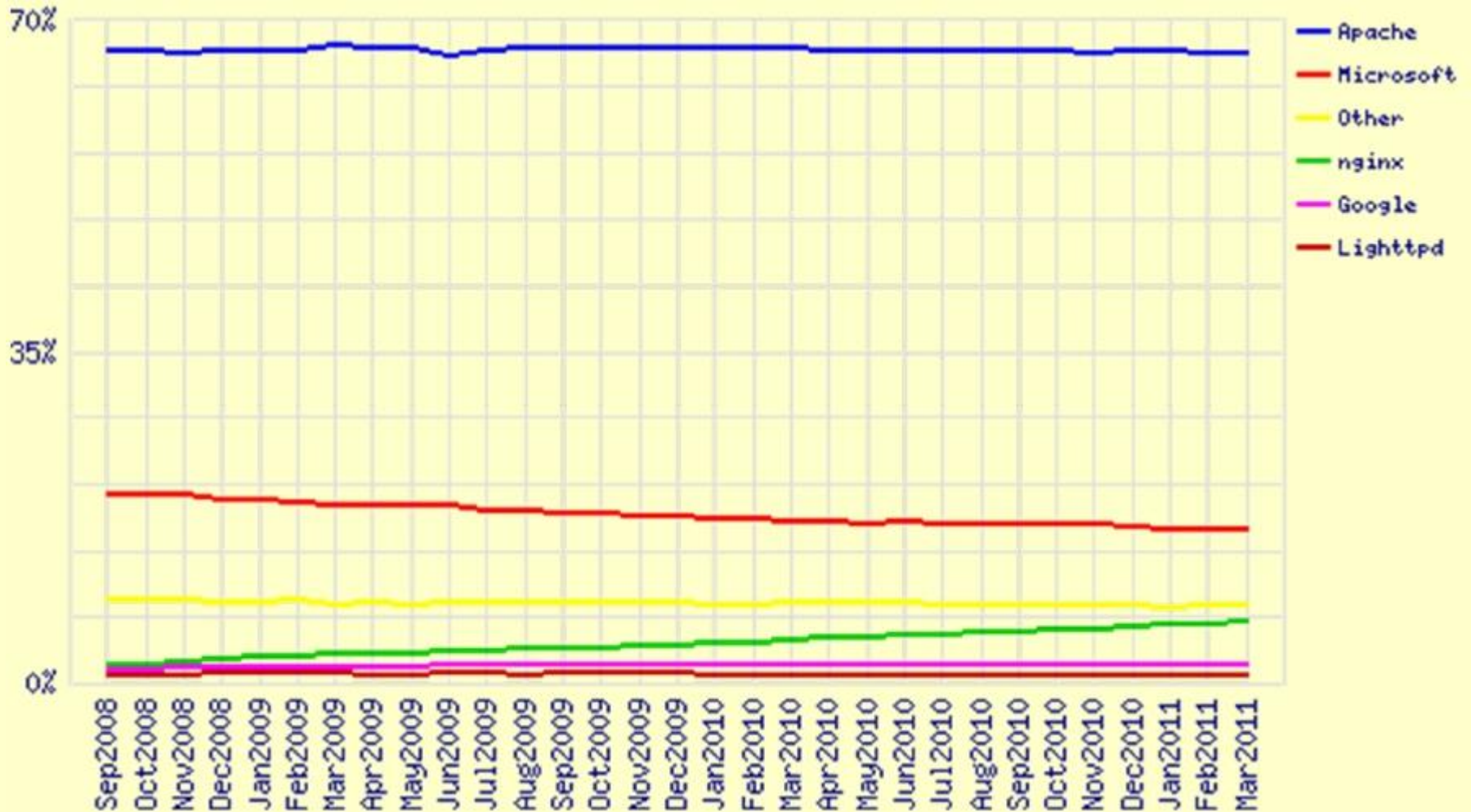
Source: http://news.netcraft.com/archives/2005/08/01/web_server_survey_turns_10_finds_70_million_sites.html

Totals for Active Servers Across All Domains June 2000 - March 2011

| Developer | February 2011 | Percent | March 2011 | Percent | Change |
|-----------|------------------|---------|---------------|---------|--------|
| Apache | 59,595,889 | 57.35% | 58,570,429 | 55.50% | -1.85 |
| Microsoft | 16,359,585 | 15.74% | 16,626,766 | 15.76% | 0.01 |
| Google | 11,946,570 | 11.50% | 12,390,167 | 11.74% | 0.24 |
| nginx | 8,688,338 | 8.36% | 8,946,787 | 8.48% | 0.12 |
| lighttpd | 598,339 | 0.58% | 624,988 | 0.59% | 0.02 |

Source: <http://news.netcraft.com/archives/2011/03/09/march-2011-web-server-survey.html>

Market Share for Top Servers Across the Million Busiest Sites September 2008 - March 2011



Source: <http://news.netcraft.com/archives/2011/03/09/march-2011-web-server-survey.html>

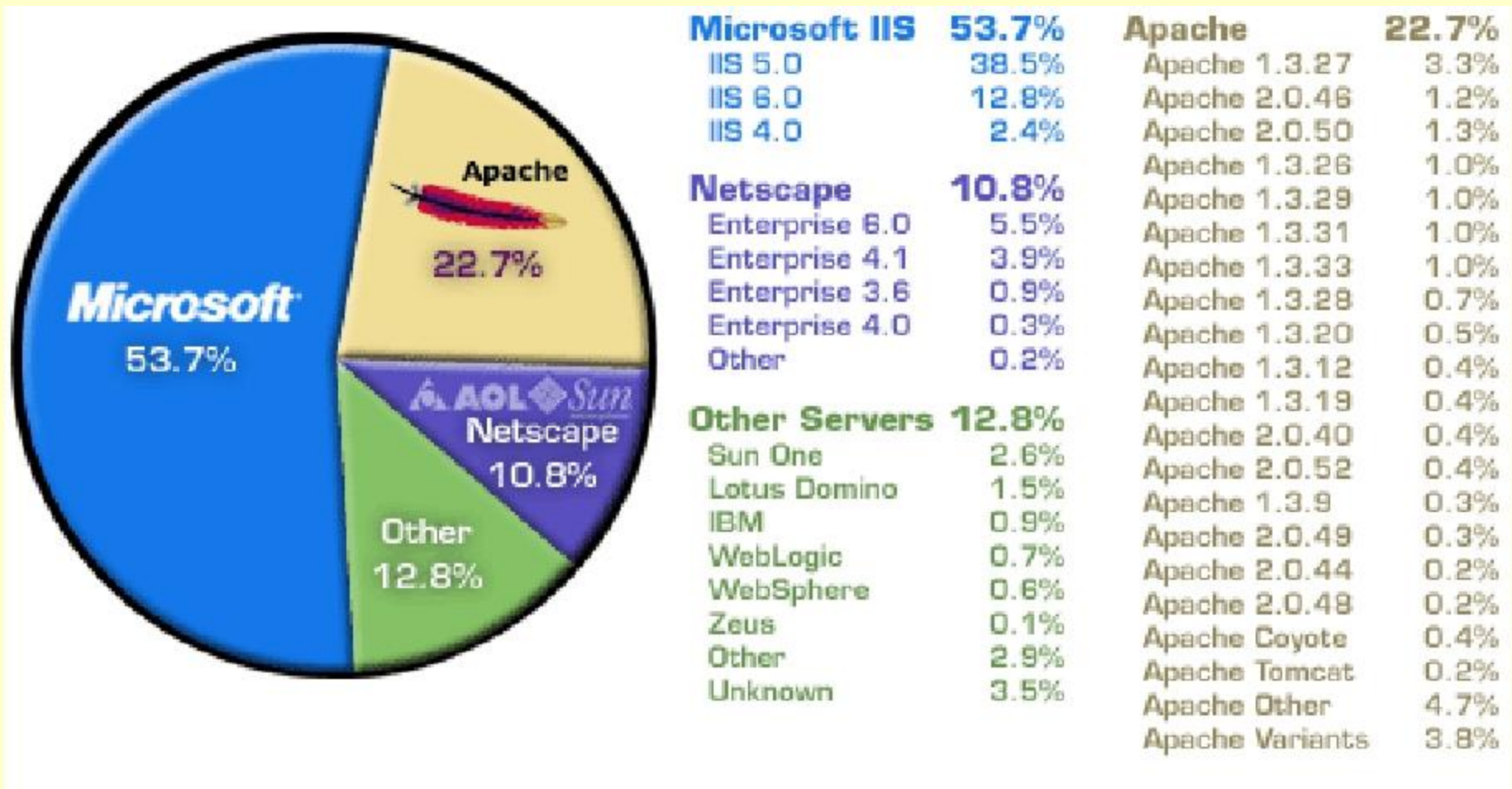
Market Share for Top Servers Across the Million Busiest Sites September 2008 - March 2011

| Developer | February 2011 | Percent | March 2011 | Percent | Change |
|-----------|------------------|---------|---------------|---------|--------|
| Apache | 660,238 | 66.42% | 659,369 | 66.32% | -0.09 |
| Microsoft | 161,189 | 16.21% | 160,069 | 16.10% | -0.11 |
| nginx | 62,762 | 6.31% | 64,221 | 6.46% | 0.15 |
| Google | 19,422 | 1.95% | 21,099 | 2.12% | 0.17 |

Source: <http://news.netcraft.com/archives/2011/03/09/march-2011-web-server-survey.html>

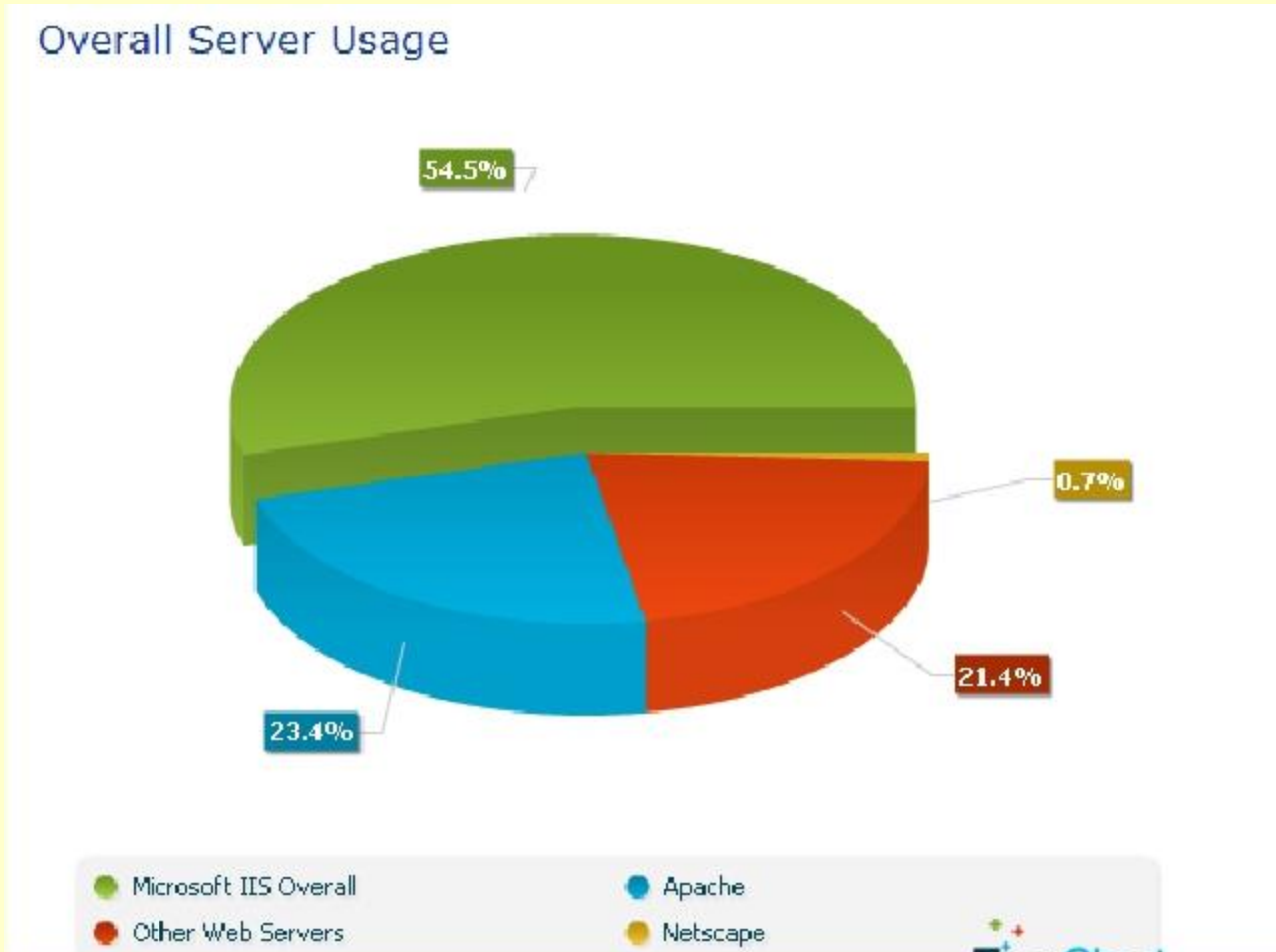
Web server market share top 1000 companies

Source: <http://www.port80software.com/surveys/top1000webservers/> May 2005



Web server market share top 1000 companies

Source: <http://www.port80software.com/surveys/top1000webservers/> 2010

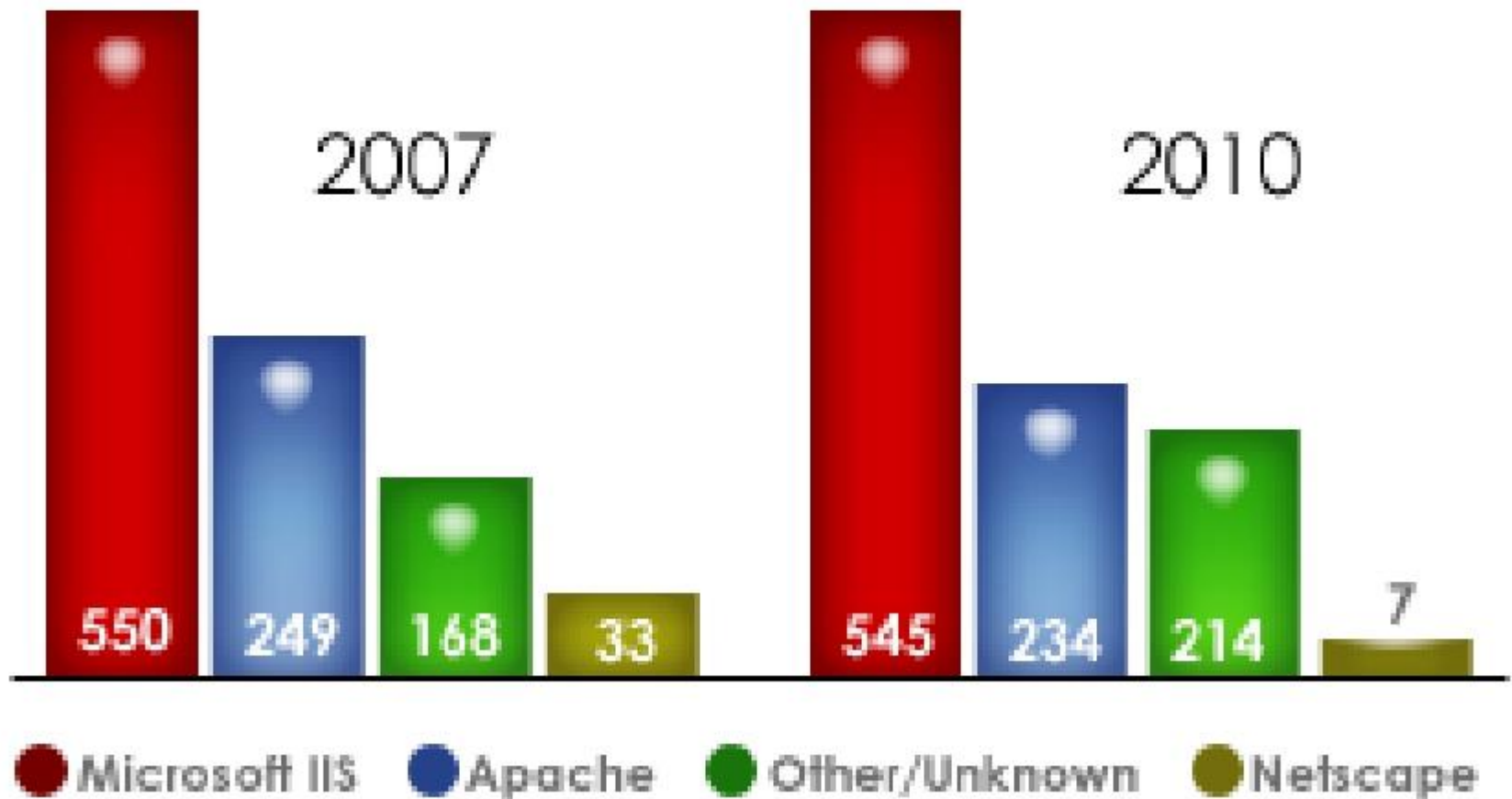


Survey of top 1000 companies
Conclusions?

Web server market share top 1000 companies

Source: <http://www.port80software.com/surveys/top1000webservers/> 2010

Web Server Stats



Selecting a web server

Various criteria

Performance

e.g. how many client requests per second can be processed? Load balancing?

Reliability

How robust is the web server?
How liable to crash? How easily recovered?

Ease of Use

How easy to set up ,
administer, learn?

Support

What support is
provided by the
vendor?

Selecting a web server (cont.)

Price

How much does it cost to buy and maintain?

Security

What security functionality is offered? e.g. SSL?

Functionality

- server side technologies supported?
(as add-ons? - e.g. TomCat for Apache)
e.g. ASP? JSP? CGI? etc
- Logging
- Proxy server

Operating system

What operating system(s) does the web server support?

See <http://www.serverwatch.com/tutorials/article.php/1363221>
for examples of assessments

Question

- Development selecting a new web server:
Currently using websites built in JSP, running on Blazix web server, running on Linux servers. The number of users is trebling every two months and they now want to upgrade to an industry standard web server. Their parent company uses Internet Information Server and would like them to use IIS
- Considerations? Issues?