

**Chapter  
1**

**GETTING  
STARTED**

*Get on the  
Fast Track!*

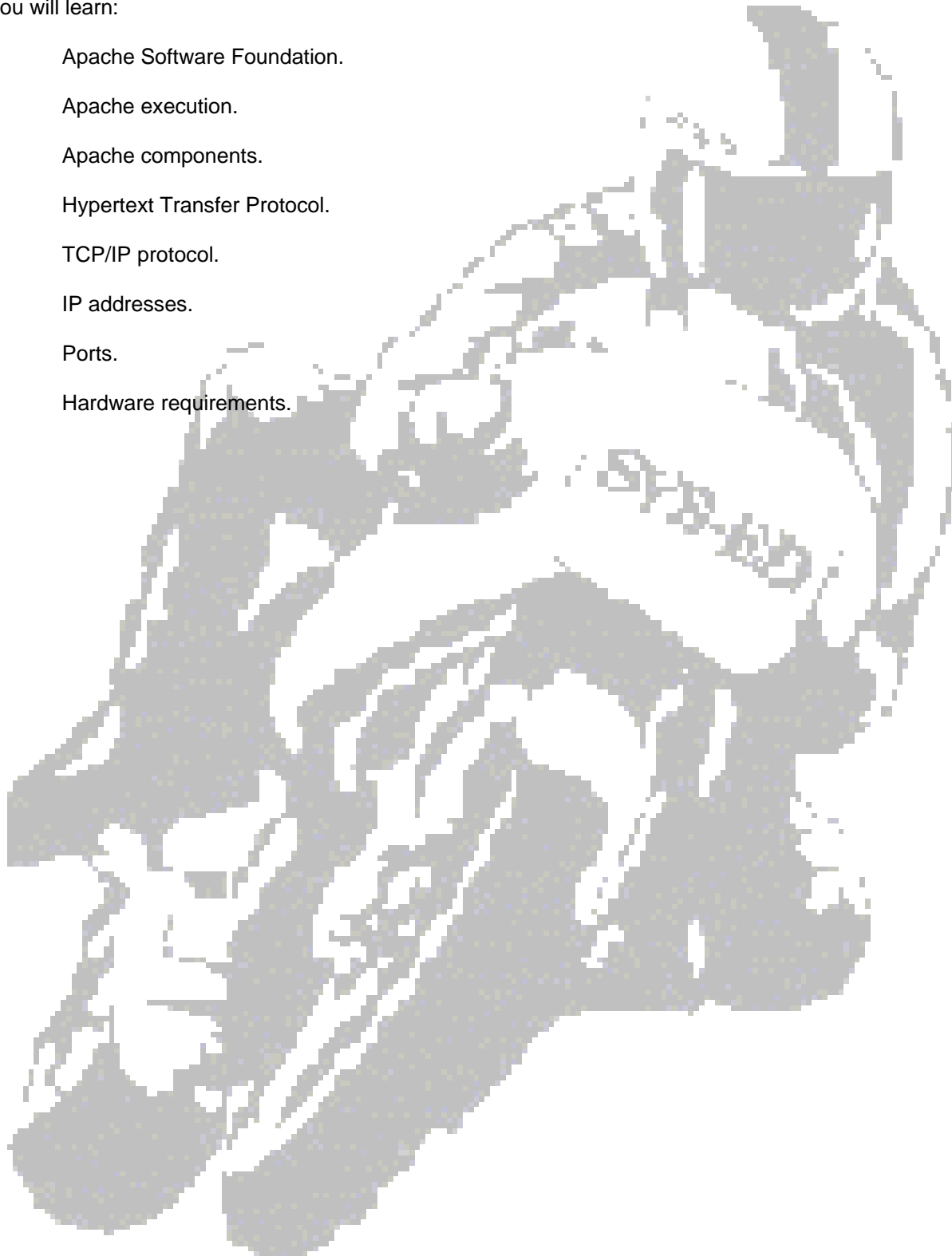


**SYS-ED/  
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**Objectives**

You will learn:

- C Apache Software Foundation.
- C Apache execution.
- C Apache components.
- C Hypertext Transfer Protocol.
- C TCP/IP protocol.
- C IP addresses.
- C Ports.
- C Hardware requirements.



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## **1 Purpose and Function**

Apache is the software which runs and manages a web server. Its principal function is to service requests from clients for the set of resources it manages.

Apache clients are mainly web browsers, but also include web robots and crawlers.

Apache resources include:

- C HTML pages.
- C Image files.
- C Results of scripts; usually it is HTML.
- C Java applets.

Apache is the most popular web server software on the Internet with over 50% of the installed base; it is a reliable product.

A great deal of Apache's attraction is that there is no cost associated with its use.

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## **2 Apache Software Foundation**

Apache was developed by the Apache Software Foundation. It still is responsible for approving new releases.

Apache is open source. The source can be downloaded and modifications can then be added. If a modification is innovative, it can then be included as a new Apache module. Some of the existing modules started as externally-developed projects.

When the binary distribution of Apache is downloaded, the source code is also downloaded. If any problems are encountered, a reading of the sourcecode may well serve to identify the cause of the bug.

Apache has a license which allows its distribution. It is not the same as the GNU Public License, and is less restrictive than the GPL.

If the primary objective is to use Apache for internal purposes, exclusive of commercial applications, no special actions will be required. However, if the ultimate objective is to create and market a product which includes Apache, it will need to be licensed.

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### 3 Support

The Apache Software Foundation does not directly support Apache Web Server. In most situations, when the recommended versions of Apache are used this should not be a problem.

Support from Apache Server can come from several sources:

- C IBM's WebSphere for AIX, Linux, NT, and Solaris includes Apache.  
IBM offers support for the Apis version (known as IBM HTTPD Server).
- C Apple has Apache integrated into MacOS X Server and MacOS X desktop operating systems.
- C Linux suppliers such as RedHat also provide support for their products, including some support for Apache.

Some ISPs also provide support.

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## 4 Apache Execution

### UNIX

In UNIX, Apache 1.3 runs as a 'forked' process.

A web server request is handled by a forked child process. Each child process is a copy of the original process.

With Apache 2.0, the platform-dependant code has been placed in a Multi Processing Module. Multi Processing Module is known as MPM.

Compatibility with Apache 1.3 is provided with the prefork Multi Processing Module.

### Microsoft Windows

Windows does not have a fork system, and utilizes threads with Apache 2.0.

Apache 1.3 used a less reliable POSIX emulation.

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## 5 Apache Components

Apache uses a configuration file to hold settings and options.

Apache utilizes the following modules:

- C core modules.
- C optional modules.
- C 3rd party modules.

Any platform specific coding is placed in Multi-Processing Module.

Modules can be dynamically added to a running Apache server; these modules are referred to as Dynamic Shared Object - DSO.

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## 6 Hypertext Transfer Protocol

Apache uses HTTP for governing how a client makes a request for information and how the server responds to that request. It is a request/response protocol.

### HTTP Versions

- C HTTP/0.9 (which is assumed if no protocol version is sent)
- C HTTP/1.0
- C HTTP/1.1

### HTTP Method

- C GET
- C HEAD
- C POST

### HTTP/1.1 Commands

- C OPTIONS
- C CONNECT
- C DELETE
- C PUT
- C TRACE

### HTTP Messages

HTTP may contain HTTP headers:

- C Request headers
- C Response headers
- C Entity headers

## 7 TCP/IP

Apache supports two protocols of IP:

Protocol	Addressing	Example
IPv4	32 bit	181.232.47.25
IPv6	128 bit	e9f0::723:b3ff:a625:8b5 e9f0:0000:0000:0000:0723:b3ff:a625:08b5

The IPv4 addressing scheme is used on the Internet.

It is divided into regions:

Class A	First number in range 1-126 (max 16,777,214 hosts)
Class B	First number in range 128 - 191 First and second numbers fixed. There can be a maximum of 16,382 Class B networks each with 65,534 hosts
Class C	First number in range 192-223 First three numbers fixed. There can be a maximum of 2,097,150 class C networks each with 254 hosts
Reserved by TCP/IP specification	First number in range 224 - 254

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## 8 Special Addresses

Host address values of all 0 indicate an anonymous address; the host does not know its own IP address.

Host address values of all 255 indicate a broadcast address for the network, and all hosts may receive a broadcast.

Class	Anonymous	Broadcast	Netmask
A	25.0.0.0	25.255.255.255	255.0.0.0
B	145.23.0.0	145.23.255.255	255.255.0.0
C	208.179.13.0	208.179.13.255	255.255.255.0

Some IP address ranges have special meanings for networking hardware such as routers. They are treated as private addresses and do not cause data to be transmitted outside the local routers.

They can be used for testing purposes or for intranets which will not have an Internet connection.

Class A	10.0.0.0
Class B	172.16.0.0 to 172.31.0.0
Class C	192.168.0.0 to 192.168.255.0
Loop back address	127.0.0.1 (local host)

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## 9 Netmask

The netmask is ANDed with the IP address to produce the network address.

208.179.13.7

208.179.13.8

208.179.12.0

For Class C networks, the netmask is 255.255.255.0. When this is ANDed with the first two IP addresses, the value returned by each is 208.179.13.0. This serves to have them placing on the same network.

This means that when a data packet is sent among the IP addresses, TCP/IP will attempt to send it directly without routing.

However, the third IP address will return 208.179.12.0 when ANDed with its netmask. This means that it is on a different network from the other two, therefore TCP/IP will send data packets to the gateway.

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## 10 Ports

Apache uses port 80 by default, and needs to be started by root or at system start-up by UNIX.

Non-privileged users can run an Apache server provided they use a port number of at least 1024.

There is an Internet daemon (inetd) which provides a server with the capability for listening to many ports and then starting up the relevant program for accepting/managing the incoming requests. Some of the services which inetd implements are not secure (eg. telnet FTP runs on port 21).

Since inetd is not required by Apache, some sites elect to disable it.

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## 11 Hardware

Apache can run on a:

- C dedicated PC (486 upwards) running UNIX.
- C multi-processor
- C cluster providing the image of a single virtual server

### Guidelines

- C Utilize as much memory as possible; this will result in less swapping.
- C 10Base2 or 10BaseT is too slow (90 hits/sec, 6-8 Mbits/sec max).
- C Network cards should be at the 10/100 base speed; gigabit Ethernet cards would be a better choice and are now a reasonable cost effective alternative.
- C Utilize two network interfaces: one external to the Internet and another for the local network.
- C Place a firewall between the server and LAN.
- C Use SCSI rather than IDE.
- C RAID is better, but at a price.
- C Have a DAT backup or backup on another server on the LAN.
- C Utilize multiple dated backups.