

Chapter 1. Fundamental IOS Software Architecture

This chapter covers the following key topics:

- Operating Systems Basics
- IOS Architecture Overview
- Memory Organization
- IOS Processes
- IOS Kernel
- Packet Buffer Management
- Device Drivers

If you were naming the most popular and widely used computer operating systems, which ones would you choose? Most likely, your list would contain names like UNIX, MS-DOS, Microsoft Windows, or even IBM's MVS for mainframes. These are all well-known operating systems—you might even be using one on a computer at home. Now, think for a minute; are there any others? Would your list contain Cisco IOS? No, it probably wouldn't, even though IOS is one of the most widely deployed operating systems in use today.

Unlike the general-purpose operating systems just mentioned, many people never encounter IOS directly. Most who use a computer to access the Internet aren't even aware IOS is behind the scenes. Even those who are aware of IOS, people who use it directly, often don't consider it to be an operating system but instead just the software that runs Cisco routers.

IOS might not run word processors or accounting applications like others on the list but it is still, in fact, an operating system—albeit, one specialized for switching data packets. As you will see, much of the IOS architecture is focused on switching packets as quickly and efficiently as possible.

Although IOS is constructed of many of the same fundamental components found in general-purpose operating systems, the components often contain key differences due to the design goals for IOS. This chapter covers these fundamental operating system components—the *software infrastructure* of IOS—and explores the rationale behind their design.

This chapter begins by introducing a few basic operating system concepts and terms that are useful in understanding the IOS architecture. If you already have a thorough understanding of operating systems, you might want to skip this first section and continue with the section, "IOS Architecture Overview." The remainder of this chapter deals with the major elements of the IOS architecture.

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