User mode and kernel mode

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In this article

A processor in a computer running Windows has two different modes: *user mode* and *kernel mode*.

The processor switches between the two modes depending on what type of code is running on the processor. Applications run in user mode, and core operating system components run in kernel mode. While many drivers run in kernel mode, some drivers may run in user mode.

User mode

When you start a user-mode application, Windows creates a *process* for the application. The process provides the application with a private *virtual address space* and a private *handle table*. Because an application's virtual address space is private, one application cannot alter data that belongs to another application. Each application runs in isolation, and if an application crashes, the crash is limited to that one application. Other applications and the operating system are not affected by the crash.

In addition to being private, the virtual address space of a user-mode application is limited. A processor running in user mode cannot access virtual addresses that are reserved for the operating system. Limiting the virtual address space of a user-mode application prevents the application from altering, and possibly damaging, critical operating system data.

Kernel mode

All code that runs in kernel mode shares a single virtual address space. This means that a kernel-mode driver is not isolated from other drivers and the operating system itself. If a kernel-mode driver accidentally writes to the wrong virtual address, data that belongs to the operating system or another driver could be compromised. If a kernel-mode driver crashes, the entire operating system crashes.

This diagram illustrates communication between user-mode and kernel-mode components.
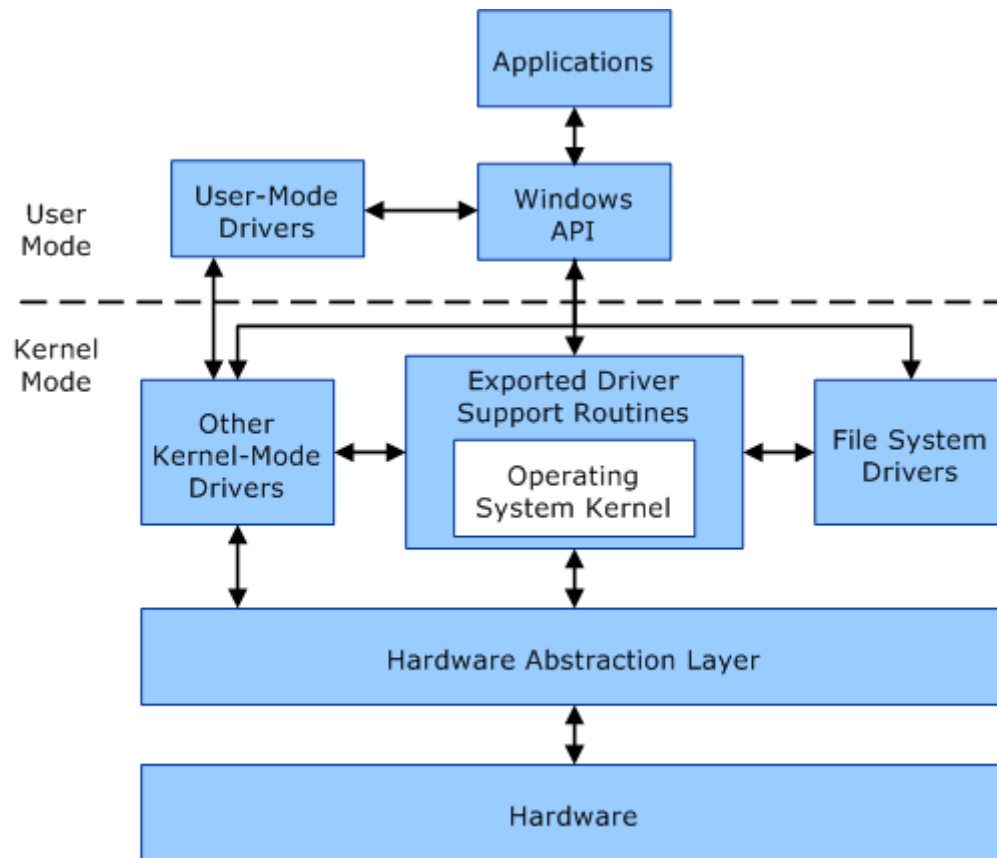
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