2 Device Drivers

Device driver

programmers can build device drivers as parts of the kernel, separately as loadable modules, or as user-mode drivers (for certain types of devices where kernel

In the context of an operating system, a device driver is a computer program that operates or controls a particular type of device that is attached to a computer. A driver provides a software interface to hardware devices, enabling operating systems and other computer programs to access hardware functions without needing to know precise details about the hardware.

A driver communicates with the device through the computer bus or communications subsystem to which the hardware connects. When a calling program invokes a routine in the driver, the driver issues commands to the device (drives it). Once the device sends data back to the driver, the driver may invoke routines in the original calling program.

Drivers are hardware dependent and operating-system-specific. They usually provide the interrupt handling required for any necessary asynchronous time-dependent hardware interface.

Device file

In Unix-like operating systems, a device file, device node, or special file is an interface to a device driver that appears in a file system as if it were

In Unix-like operating systems, a device file, device node, or special file is an interface to a device driver that appears in a file system as if it were an ordinary file. There are also special files in DOS, OS/2, and Windows. These special files allow an application program to interact with a device by using its device driver via standard input/output system calls. Using standard system calls simplifies many programming tasks, and leads to consistent user-space I/O mechanisms regardless of device features and functions.

USB mass storage device class

storage device. Third-party, freeware drivers became available for Windows 98 and Windows 98SE, and third-party drivers are also available for Windows NT

The USB mass storage device class (also known as USB MSC or UMS) is a set of computing communications protocols, specifically a USB Device Class, defined by the USB Implementers Forum that makes a USB device accessible to a host computing device and enables file transfers between the host and the USB device. To a host, the USB device acts as an external hard drive; the protocol sets interfaces with a number of storage devices.

PS/2 port

conventionally assigned to that device. (That is, keyboard drivers are written to use the first port, and mouse drivers are written to use the second port

The PS/2 port is a 6-pin mini-DIN connector used for connecting keyboards and mice to a PC compatible computer system. Its name comes from the IBM Personal System/2 series of personal computers, with which it was introduced in 1987. The PS/2 mouse connector generally replaced the older DE-9 RS-232 "serial mouse" connector, while the PS/2 keyboard connector replaced the larger 5-pin/180° DIN connector used in the IBM PC/AT design. The PS/2 keyboard port is electrically and logically identical to the IBM AT

keyboard port, differing only in the type of electrical connector used. The PS/2 platform introduced a second port with the same design as the keyboard port for use to connect a mouse; thus the PS/2-style keyboard and mouse interfaces are electrically similar and employ the same communication protocol. However, unlike the otherwise similar Apple Desktop Bus connector used by Apple, a given system's keyboard and mouse port may not be interchangeable since the two devices use different sets of commands and the device drivers generally are hard-coded to communicate with each device at the address of the port that is conventionally assigned to that device. (That is, keyboard drivers are written to use the first port, and mouse drivers are written to use the second port.)

HANS device

Australian V8 Supercar Series made the device compulsory for drivers in the 2005 season. Acceptance by drivers was helped by the addition of quick-release

A HANS device (head and neck support device) is a type of head restraint and a safety device in motorsports. Head restraints are mandatory when competing with most major motorsports sanctioning bodies. They reduce the likelihood of head or neck injuries, including the often fatal basilar skull fracture, in the event of a crash. There are many such devices on the market today, but the HANS is the original and the most common.

Hutchens device

A Hutchens device is used for protecting race car drivers in the event of an accident by controlling head movement, reducing head and neck injuries due

A Hutchens device is used for protecting race car drivers in the event of an accident by controlling head movement, reducing head and neck injuries due to whiplash. It consists of a series of straps, attached to the helmet and connected across the chest and at the waist, depending on the lap belt for anchoring. The device was developed beginning in 2000.

From 2001 until 2004 NASCAR mandated that drivers use either a Hutchens device or the HANS device. NASCAR banned the use of the Hutchens device in January 2005, due to it failing SFI Foundation safety tests, and required all drivers to use the HANS device instead.

Windows Driver Model

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In computing, the Windows Driver Model (WDM) – also known at one point as the Win32 Driver Model – is a framework for device drivers that was introduced with Windows 98 and Windows 2000 to replace VxD, which was used on older versions of Windows such as Windows 95 and Windows 3.1, as well as the Windows NT Driver Model.

Device driver synthesis and verification

Device drivers are programs which allow software or higher-level computer programs to interact with a hardware device. These software components act as

Device drivers are programs which allow software or higher-level computer programs to interact with a hardware device. These software components act as a link between the devices and the operating systems, communicating with each of these systems and executing commands. They provide an abstraction layer for the software above and also mediate the communication between the operating system kernel and the devices below.

Usually the operating systems comes with a support for the common device drivers and usually the hardware vendors provide the device driver for their hardware devices for most platforms. The aggressive scaling of the hardware devices and the complex software components has made the device driver development process cumbersome and complex. When the size and functionality of the drivers started increasing the device drivers became a key factor in defining the reliability of the system. This has created an incentive towards automatic synthesis and verification of device drivers. This article sheds some light into some approaches in synthesis and verification of device drivers.

Advanced Linux Sound Architecture

provides an application programming interface (API) for sound card device drivers. Some of the goals of the ALSA project at its inception were automatic

Advanced Linux Sound Architecture (ALSA) is a software framework and part of the Linux kernel that provides an application programming interface (API) for sound card device drivers.

Some of the goals of the ALSA project at its inception were automatic configuration of sound-card hardware and graceful handling of multiple sound devices in a system. ALSA is released under GPL-2.0-or-later and LGPL-2.1-or-later.

On Linux, sound servers, like sndio, PulseAudio, JACK (low-latency professional-grade audio editing and mixing) and PipeWire, and higher-level APIs (e.g OpenAL, SDL audio, etc.) work on top of ALSA and its sound card device drivers. ALSA succeeded the older Linux port of the Open Sound System (OSS).

Ignition interlock device

the drivers re-offended instead of 30% without the program. As of 2020, there were about 1,000 drivers participating in the Ignition Interlock Device program

An ignition interlock device or breath alcohol ignition interlock device (IID or BAIID) is a breathalyzer for an individual's vehicle. It requires the driver to blow into a mouthpiece on the device before starting or continuing to operate the vehicle. If the resultant breath-alcohol concentration analyzed result is greater than the programmed blood alcohol concentration (which varies between countries), the device prevents the engine from being started. The interlock device is located inside the vehicle, near the driver’s seat, and is directly connected to the engine’s ignition system. It is a form of electronic monitoring.

An ignition interlock interrupts the signal from the ignition to the starter until a valid breath sample is provided that meets maximal alcohol guidelines in that jurisdiction. At that point, the vehicle can be started as normal. A breath sample is not required to start the vehicle if the engine has been running within a time-out period, to allow quick re-starts in case the vehicle stalls. At random times after the engine has been started, the IID will require another breath sample, referred to as a rolling retest. The purpose of the rolling retest is to prevent someone other than the driver from providing a breath sample. If the breath sample isn't provided, or the sample exceeds the ignition interlock's preset blood alcohol level, the device will log the event, warn the driver, and then start up an alarm in accordance to state regulations (e.g., lights flashing, horn honking) until the ignition is turned off, or a clean breath sample has been provided. A common misconception is that interlock devices will simply turn off the engine if alcohol is detected; this would, however, create an unsafe driving situation.

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