

The Usual Suspects: The Kernel, udev, D-Bus, HAL, NetworkManager and Friends

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Kernel, udev, D-Bus, HAL, NetworkManager and Friends

1 Overview

- Rationale: It's All About Events
- Event Flow

2 Analyze and Solve Problems Within the Stack

- Investigating a Use-Case
- Solving the Issue
- The Event Monitor

3 Demo



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Events and Signals

- We're *not* going to talk about interfaces like `sysfs` and `procfs`
- We're talking about events and signals
- Loading a module, pressing a hotkey or closing the lid of the laptop trigger events in several components



The Components

- The Linux Kernel
- udev - Device Manager, reports uevents
- HAL - Hardware Abstraction Layer, sends signals using D-Bus
- Daemons (e.g. NetworkManager), send signals using D-Bus
- Desktop applications, receive signals using D-Bus



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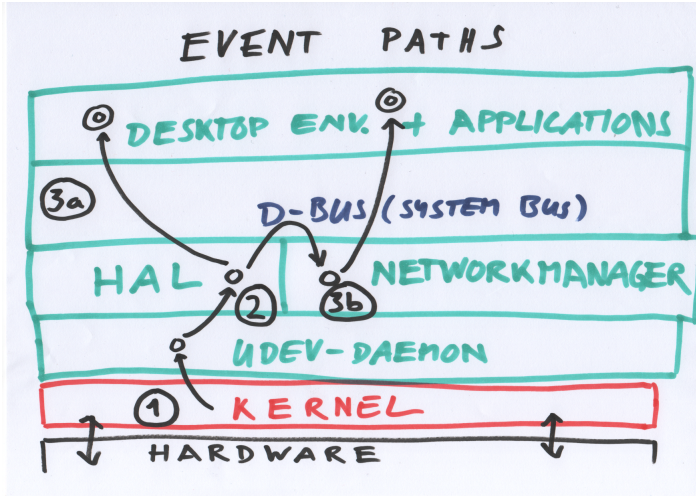


Typical Example: Loading a Kernel Module

- Kernel module gets loaded
- Driver calls `kobject_uevent()` or `kobject_uevent_env()`
- Events gets transmitted to `udev`
- HAL reads events from the abstract socket `/org/freedesktop/hal/udev_event`
- HAL creates device object and emits the signal `DeviceAdded`
- Applications receive the signals from HAL via D-Bus



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Use-Case: Brightness Hotkeys Don't Work

- Hotkeys for brightness up/down don't work
- Check one: Is there any driver support?
- Check two: Does it work when directly talking to the driver's interface?
- Check three: Which events are being reported, which events are missing?



Analysis

- Check one: The system is supported by the driver `sony-laptop`.
- Check two: Manually using the driver's interface works fine.
- Check three: Input events are being reported.
- Conclusion: The input events seem to get lost somewhere in the stack



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Identify Event Sources and Capture Events

- Identify all relevant event sources
- Monitor all events from the identified sources
 - Receive events from udev
 - Watch messages on the D-Bus system bus
 - Check for events on device interfaces
- Track down the defective component



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Quick Hack

- Ingredients: Python, `python-dbus` and GTK2
- The Monitor consists of several modules which receive events
- Example modules:
 - `udev`
 - HAL
 - NetworkManager
 - Input Layer (`/dev/input/eventn`)



Modules

- Extremely simple and small
 - udev module is 10 LoC
 - HAL module is 15 LoC
- Easily extensible
- No strings attached: Just show the events



Cover 'em all!

- One tool, showing all events
- Easy to use
- No drop-in replacement for `showkey(1)`, `lshal(1)`, `udevmonitor(8)`



The Event Monitor

Input (/dev/input/event7) (10)
Sony Vaio Keys: KEY_BRIGHTNESSDOWN

udev (102)
add: /devices/system/cpu/cpu1/cpuidle/state0, cpu,

HAL (15)
ButtonPressed: brightness-down

udev (103)
add: /devices/system/cpu/cpu1/cpuidle/state1, cpu,

udev (104)
add: /devices/system/cpu/cpu1/cpuidle/state2, cpu,

Listeners:
udev Listener
HAL Listener
NetworkManager Listener
Input Listener
Quit

Thu Feb 21, 17:29



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Thanks for coming!

Event Monitor (Sources, GPLv2):

<http://nouse.net/monitor.tar.gz>

