

Fast switching between operating systems using a pass-through hypervisor

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Nowadays, a single OS is seldom sufficient for a computer user. For example, Linux' development tools make the OS attractive for developers while some video conference software like GoToMeeting¹ can only be run on Microsoft Windows or macOS. Using different computers for the different OSes allows for fast context switching, however, it is not always possible due to monetary or spatial limitations. Moreover, using multiple computers offers a poor user experience when it comes to data sharing between them. Installing the required OSes in parallel on a single computer does not have the problems mentioned, but it can be tedious and pesky to save the current work and reboot the computer just for a short conference call. Another approach of running different OSes on a single computer is using virtual machine solutions like VirtualBox or KVM, though they often come with performance loss or may even be impossible to use because they can not pass through special hardware. This work presents a way of switching between OSes without rebooting the computer using a lightweight pass-through virtualization layer.

The central problem is device state management, since devices are not designed to be handed from one OS to another during runtime. One way to deal with the device state management is to move the responsibility to recover devices into the OS. This can be achieved using the S3 sleeping state. When an OS enters S3, it directs all drivers to put their managed devices into a sleep state and signals the platform to enter low-power state. As soon as the platform is resumed, the OS is woken up and recovers all devices by itself. Thus, to move the responsibility to recover and configure the devices into the OS, this work leverages the S3 sleeping state as defined in the ACPI specification. The resulting OS switching mechanism is capable of reliable switching between Linux and Windows in under 10 seconds without any customizations to the guest OSes.

¹<https://www.gotomeeting.com/>