How OSS help UTS:FEIT to build a virtualized networking lab

By

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About us

• UTS:FEIT <http://feit.uts.edu.au>
• The networking labs in UTS:FEIT
Requirement of networking labs

- Multiple OS 🌐 💻
- Student need full access to the OS
- OS need to be reset to pristine mode frequently
- Need to setup a wireless network environment
The limitation of previous setup

- Extra/non-standard hardware need
- Not easy to change/add new image
- Frequent swapping of external hard drive / inserting LiveCD are error-prone
What virtualization can do?

- Provide a clean/immutable lab environment in which users have full privilege on their running VM
- Provide an easy way to switch from different OSs on demand
- Better management over networking labs
- However, no usable emulated wireless device available atm
PCI-Passthrough via IOMMU

- I/O virtualization technology to provide exclusive & secure access to the passthroughed PCI device to a specific VM
Xen hypervisor with GNU/Linux

• Widely used & proved open source virtualization technology, have a very active community

• Provide better PCI-passthrough support for shared IRQ device

• Combined with GNU/Linux and QEMU it provides a solid and versatile virtualization platform
How all of these been glued up

• We created a GUI application called `vmchooser` for user authentication & VM selection


• On host boot, an auto-login user will run `vmchooser` then pass user selection back to the host for VM handling

• QEMU COW snapshot is used to save/restore each user's session
User feedback and improvement

- Students are not happy with VNC Viewer
- VGA-Passthrough is good, but how do we authenticate user and let them choose a VM?
XEN + SPICE, another option

- SPICE protocol is supported since Xen 4.2
- Better GUI than VNC
- Remote access via HTML5 capable browser
Why Open source

• OSS has been widely used in UTS:FEIT
• Cost effective
• Flexible, highly customizable
• Unified package management and centralized configuration tool
• Meet the special need in our networking labs