Improving client systems security with Qubes OS

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We need secure client systems

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- Encryption
- 2-factor authentication
- "Secure cloud"

All the above can be manipulated by compromised client system.

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  - Web browser
  - Mail client
- Lack of GUI separation
- One bug to rule them all

Compartmentalization

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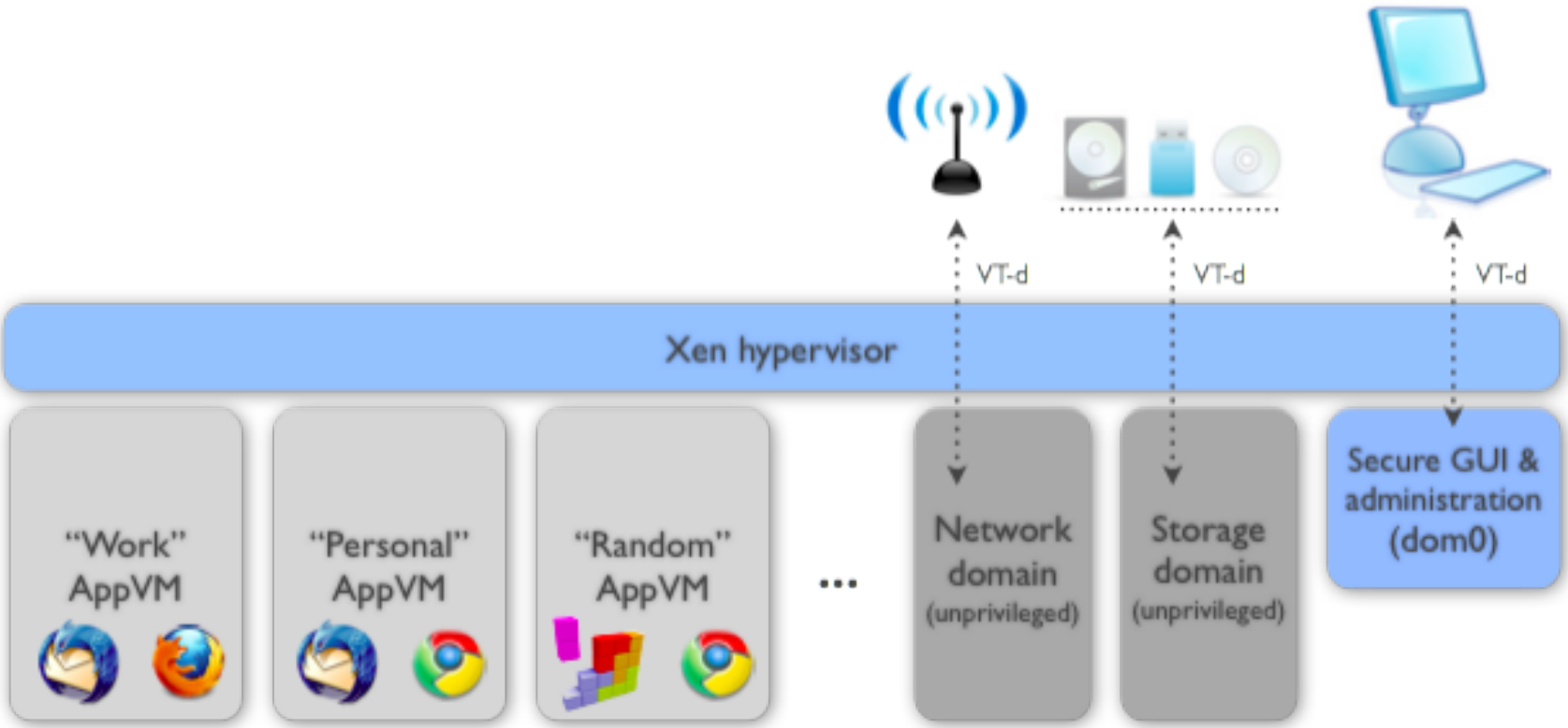
- Use virtualisation, have **minimal, simple** interfaces


VT-d
VT-d
VT-d
Xen hypervisor
"Work" AppVM
"Personal" AppVM
"Random" AppVM
...
Network domain (unprivileged)
Storage domain (unprivileged)
Secure GUI & administration (dom0)

Isolated devices

- Net VM

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- USB VM

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- USB VM
- GUI VM (planned)

Isolated data

- Different areas of digital life
- Different levels of trust

Not only about separating applications!

Isolated workflows

- Proxy VM (VPN, Tor, Whonix)
- Data converters (PDF, images)
- Data storage (offline vaults, gpg)
- Disposable VM

Framework for building secure workflows

- Socket-like inter-VM communication (qrexec)
- Each operation requires policy approval (not necessary user approval)
- VMs - building blocks

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- Input devices - strictly filtered (mouse only/mouse+keyboard)
- Generic USB passthrough

Split GPG

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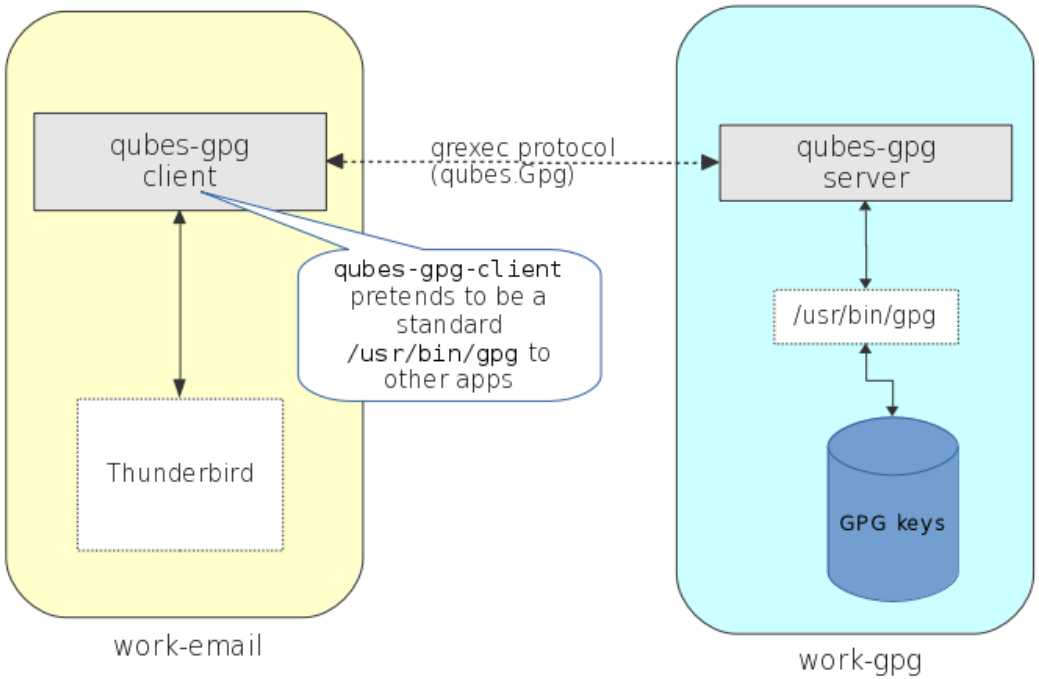
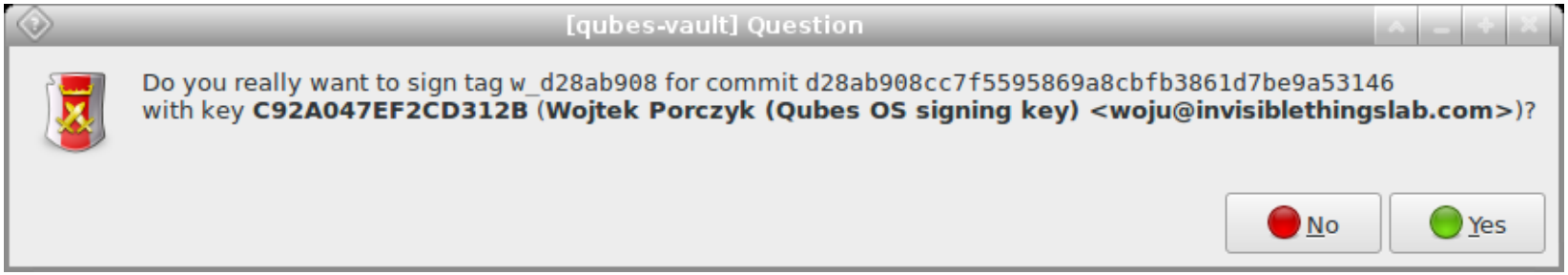
- /bin/gpg drop-in replacement


qubes-gpg
client
grexec protocol
(qubes.Gpg)
qubes-gpg
server
qubes-gpg-client
pretends to be a
standard
/usr/bin/gpg to
other apps
/usr/bin/gpg
Thunderbird
GPG keys
work-email
work-gpg


[qubes-vault] Question
Do you really want to sign tag w_d28ab908 for commit d28ab908cc7f5595869a8cbfb3861d7be9a53146
with key C92A047EF2CD312B (Wojtek Porczyk (Qubes OS signing key) <woju@invisiblethingslab.com>)?
No
Yes

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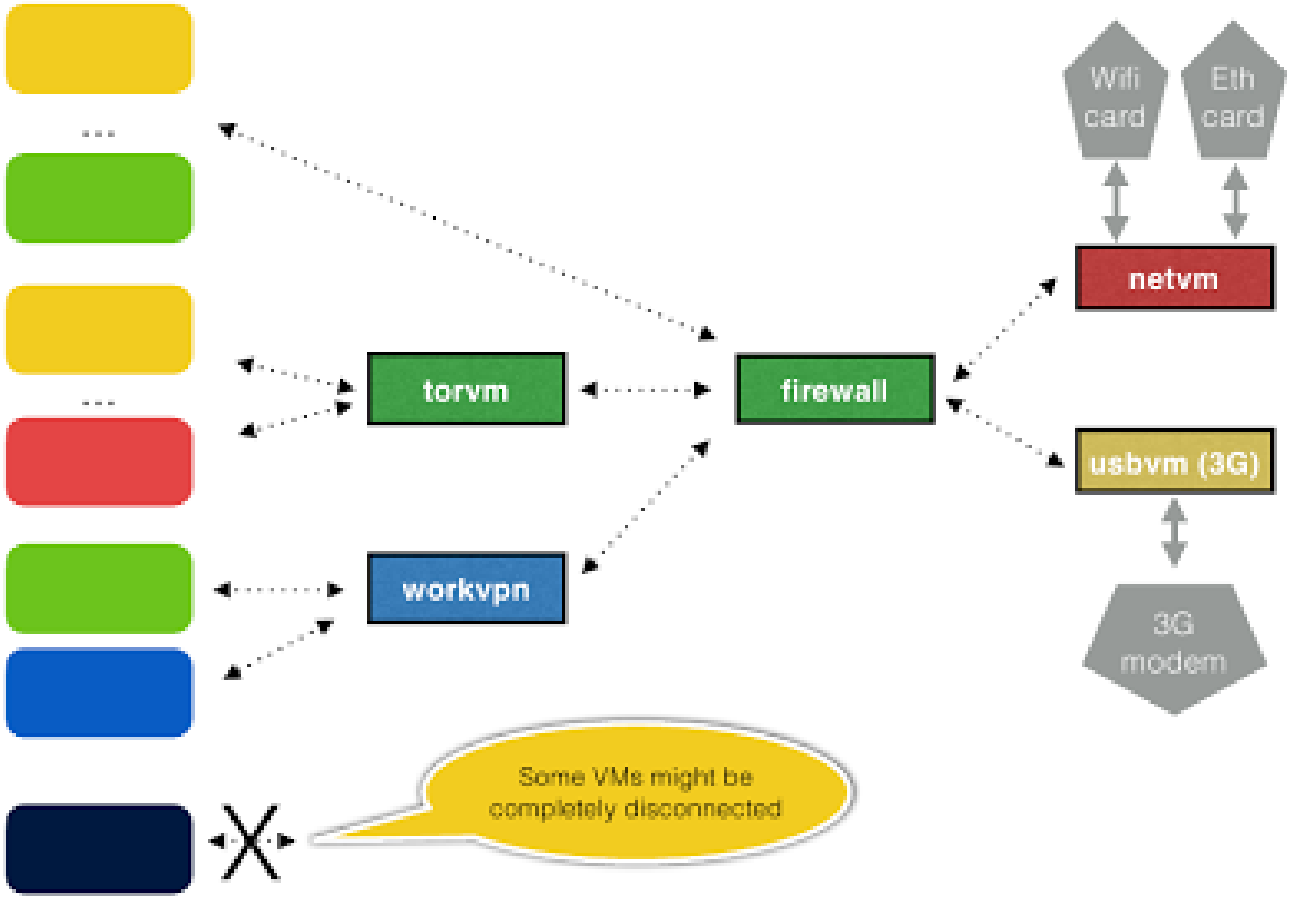
- Dom0 has no network at all!
- VMs can be chained (proxy)
- VPN, Tor, IDS, and many more


...
...
torvm
workvpn
firewall
Wifi card
Eth card
netvm
usbvm (3G)
3G modem
Some VMs might be completely disconnected

Qubes 3.x

- Qubes 3.1 released in March 2016
- Qubes 3.2-rc1 released last month

Supports everything mentioned here.

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Management stack

- Powerful framework for building secure client system.
- Sample recipes provided
- We need more!

Qubes Master Signing Key

427F 11FD 0FAA 4B08 0123 F01C DDFA 1A3E 3687 9494

Questions?

Thanks!