Reasonably Secure Computing in the Decentralized World

(An Operating System Architect's Perspective)

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Invisible Things Lab & Qubes OS Project

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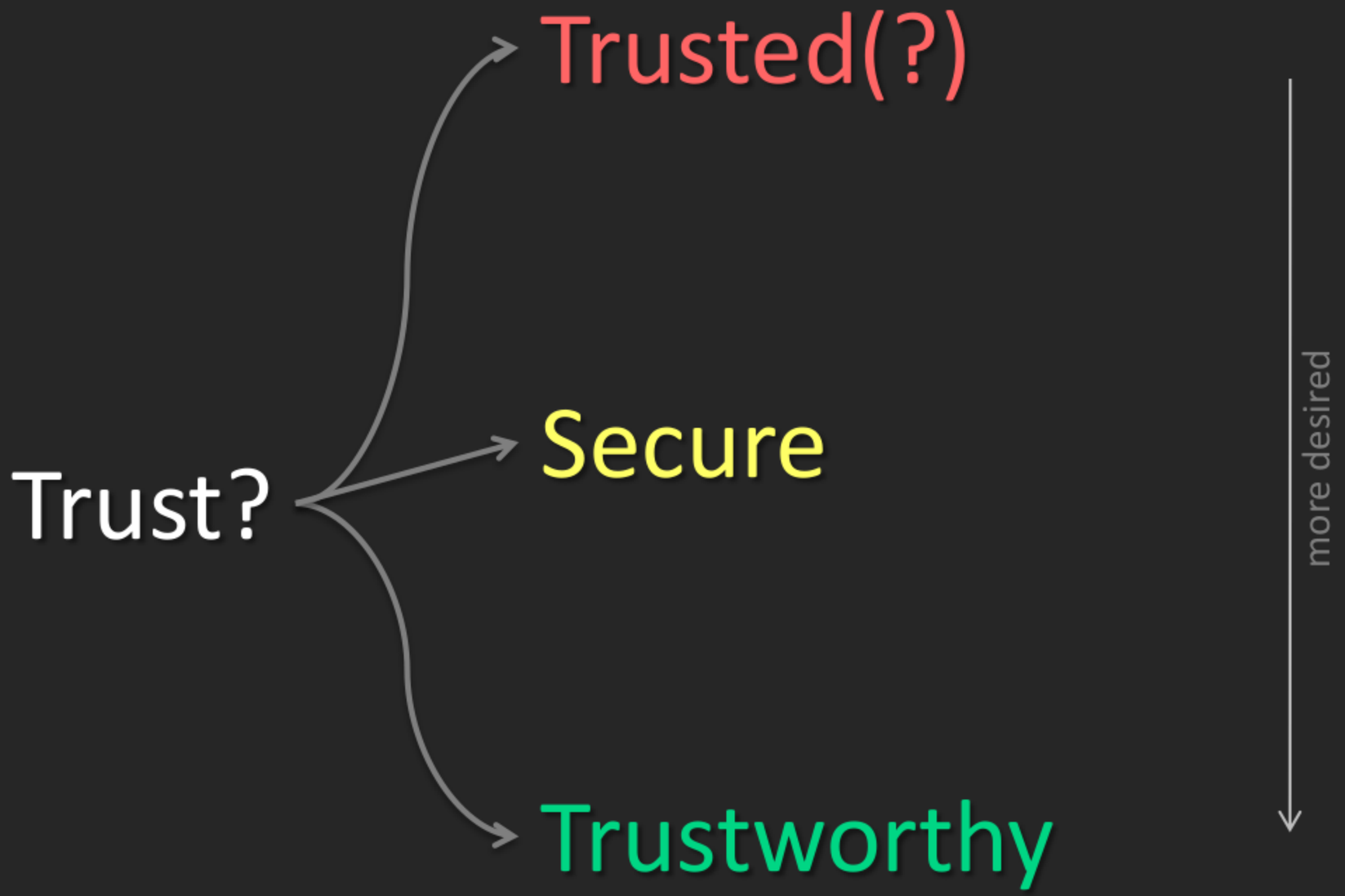
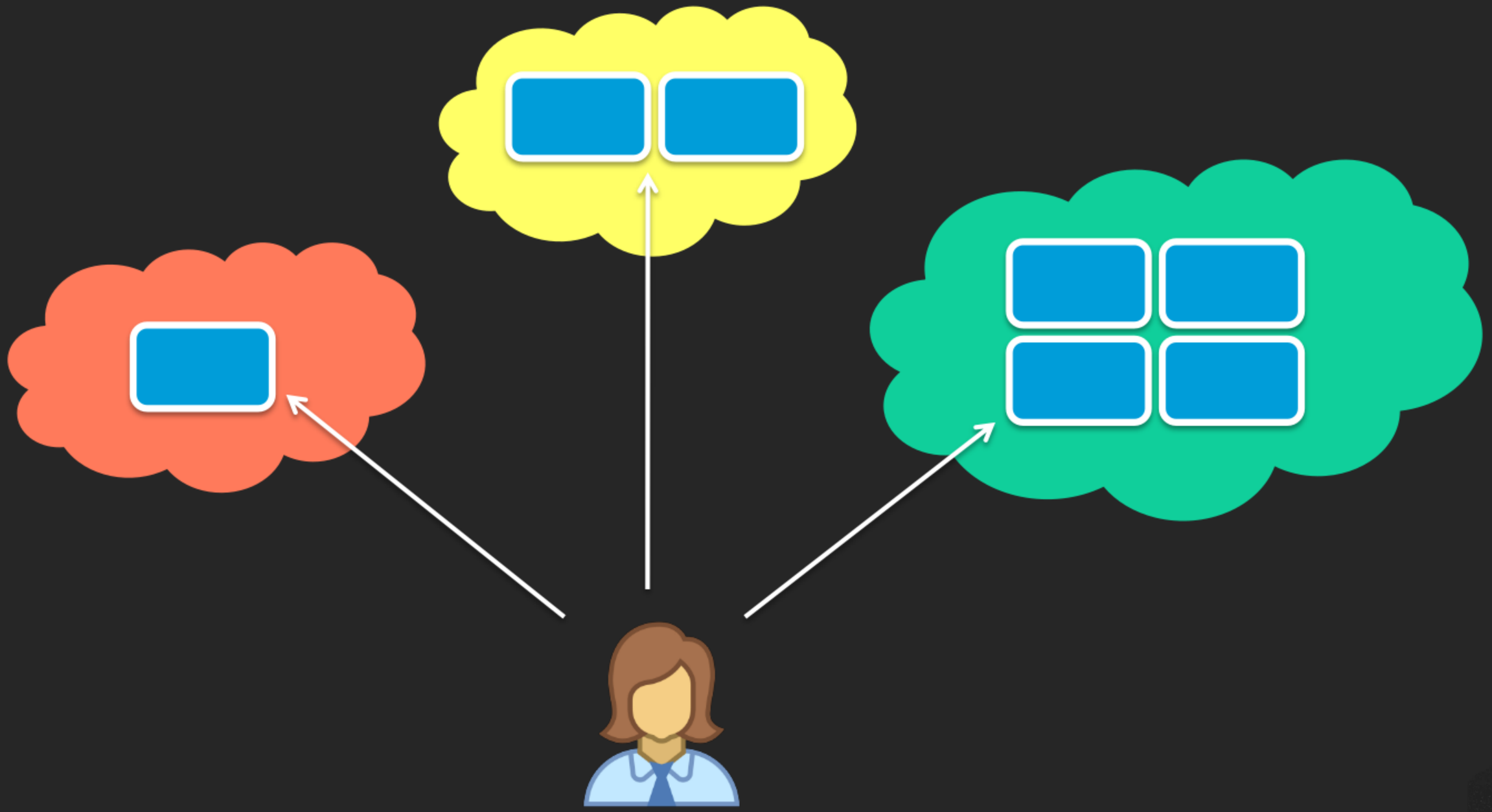
“The network is the computer.“

No, how to make this computer (reasonably) secure?

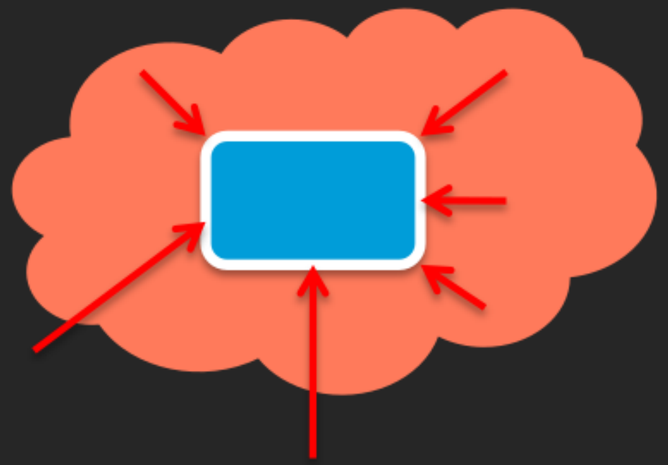




Challenge #1

Attacks from the host

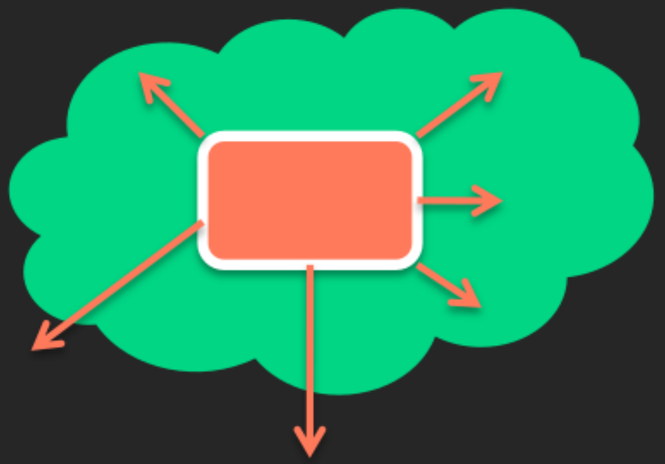
- Confidentiality
- Integrity (is it really *my* software?)



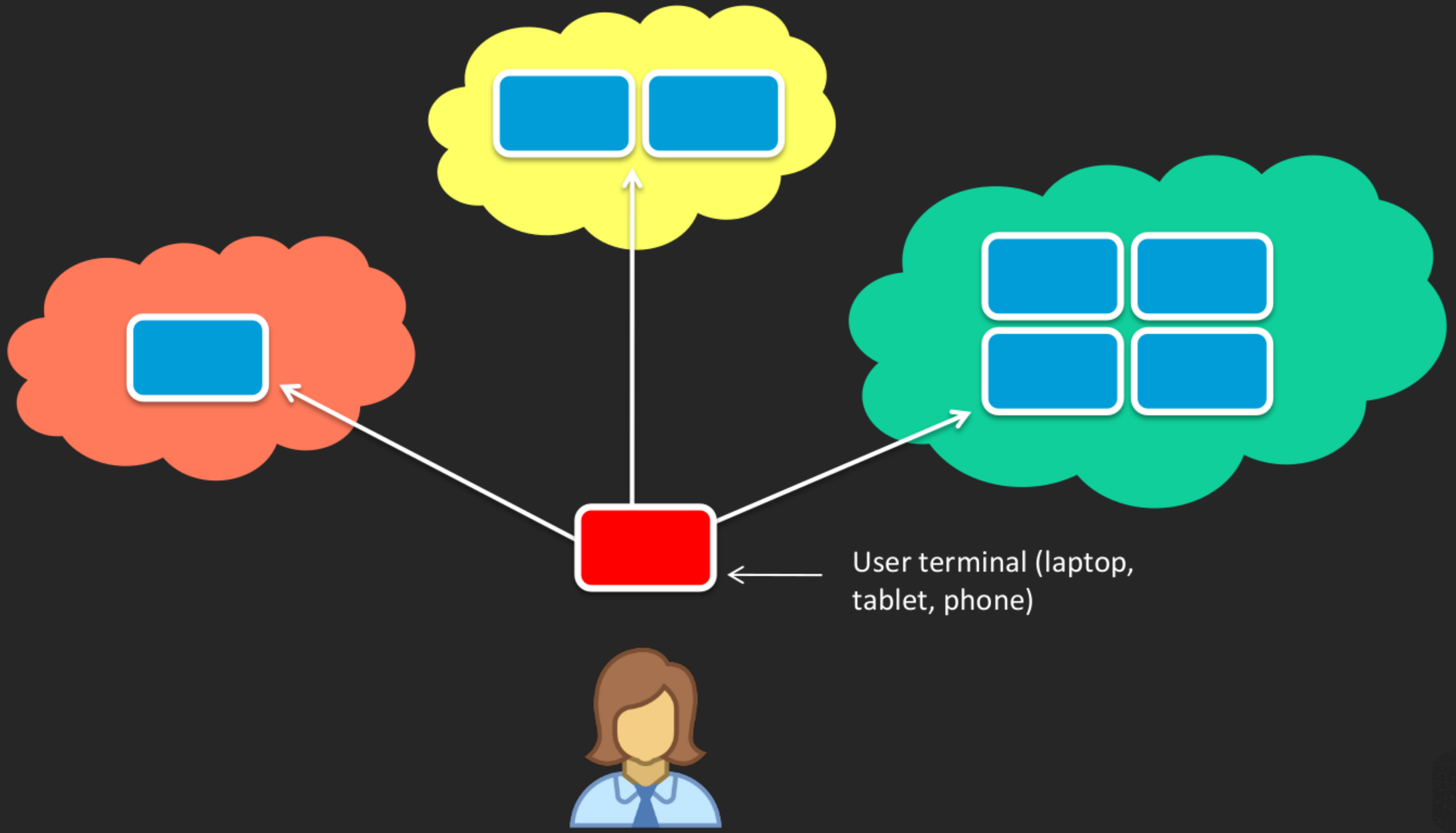
Not to be confused with…

Attacks on the host (complementary scenario)

- VM/container escapes
- Areas of active research for at least a decade!



Challenge #2

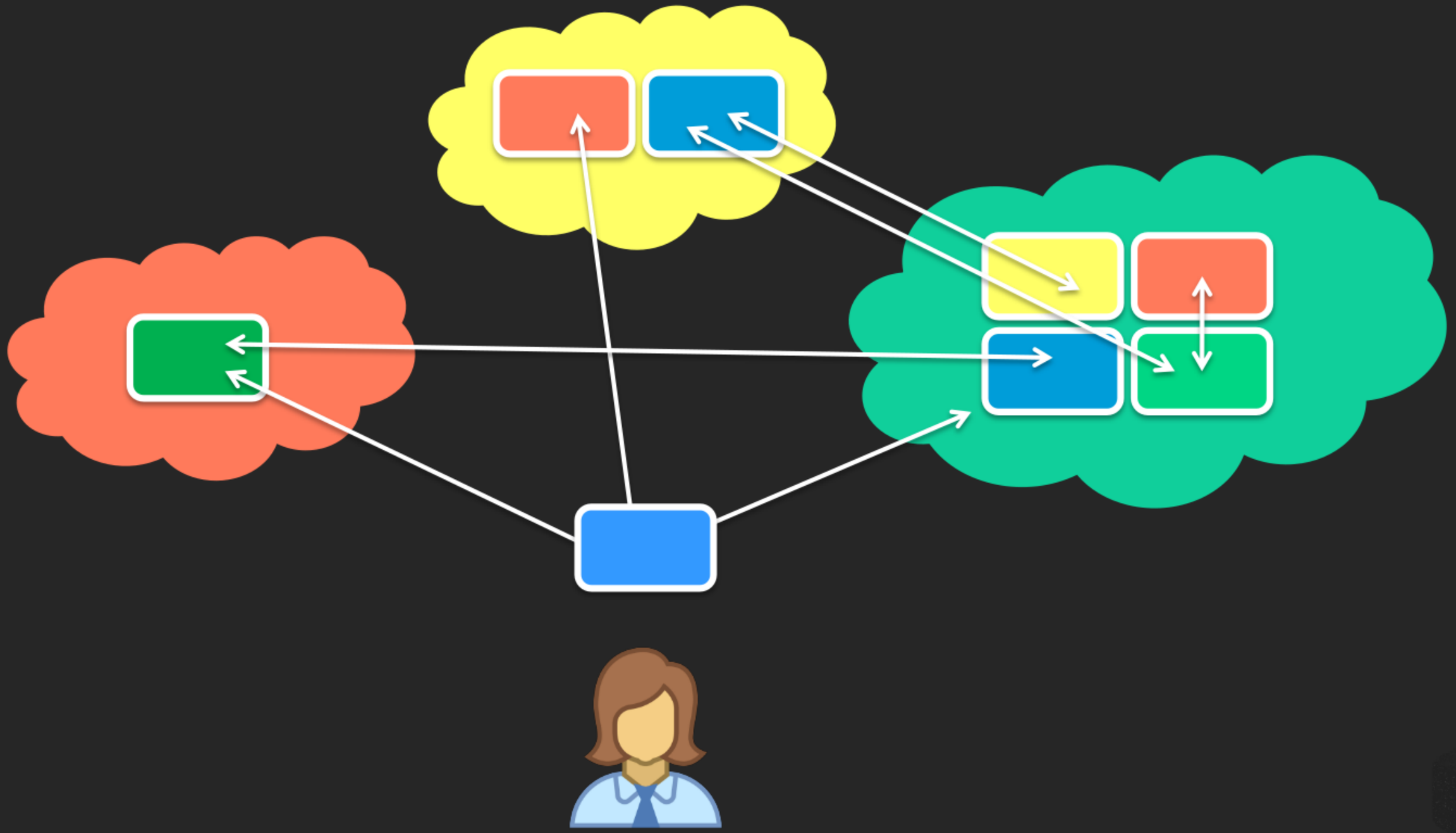


“But there are no apps on the (thin) terminal!”

Attacks on terminals

- WiFi/Bluetooth
- USB devices
- Networking services (NTP, DNS resolver, etc)
- Simple physical attacks (Evil Maid)

Challenge #3



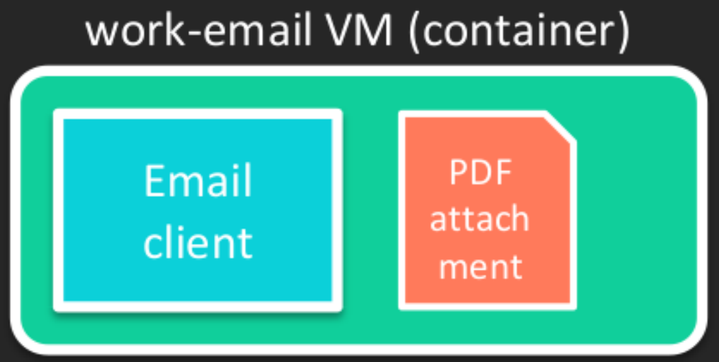
- Some apps are less trusted than others…
- How to prevent they don’t attack the others?

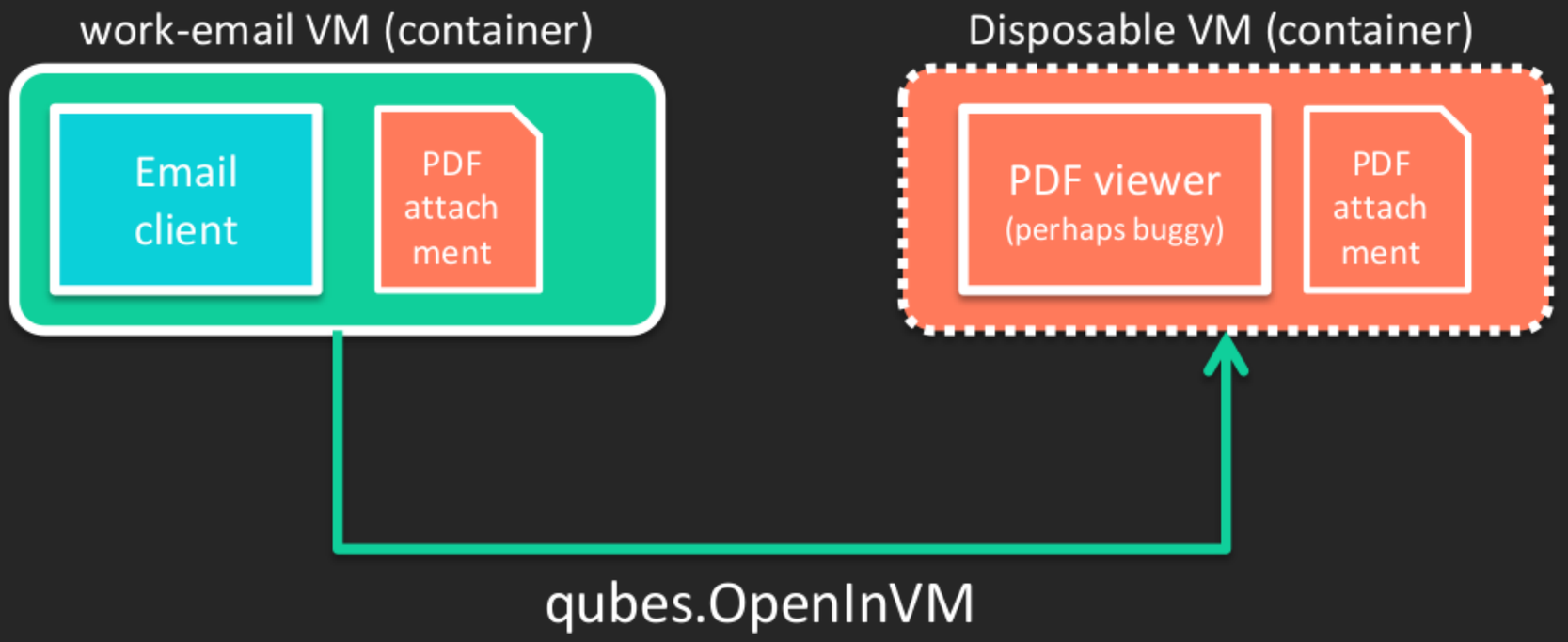
Qubes OS

Qubes OS

1. Compartmentalize
2. Carefully add integration on top of compartments

Example of Qubes integration on top isolation

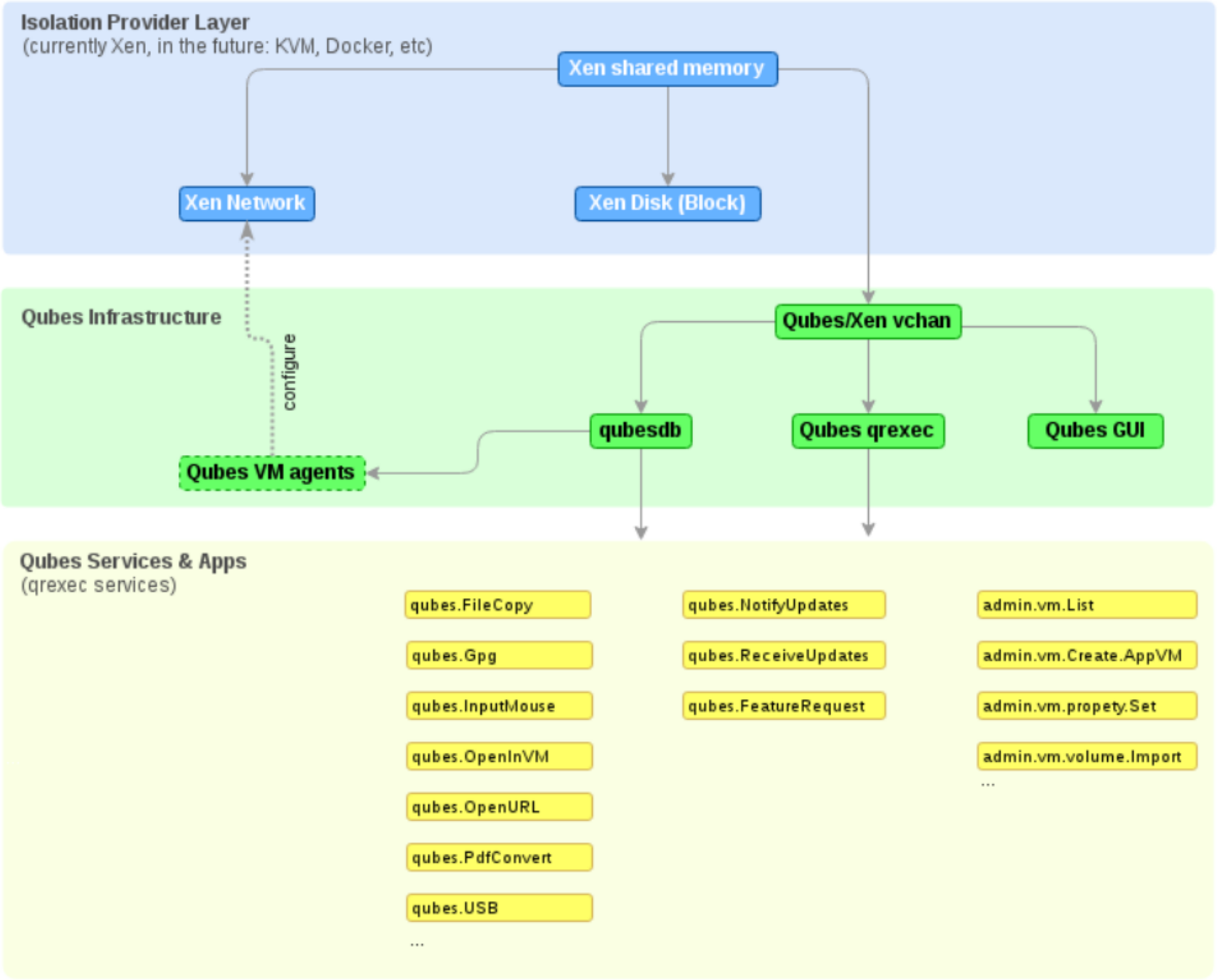




Looks simple, but…

- How to transfer files w/o increasing attack surface?
- How to virtualize GUI for the VMs w/o increasing the attack surface?
- Etc, etc.

Xen, or:
KVM?
Cloud VMs?
Golem?



Golem & Qubes

Golem & Qubes

- Both interested in solving similar challenges (#1-#3)
- Golem as a platform for Qubes?

Thanks!

https://qubes-os.org

This presentation made in MS Office on Qubes OS 3.2