SYNACKTIV

The Good, the Bad, and the Secure

A pentester's journey daily driving Qubes OS

Pierre Milioni at Pass the SALT

2023/07/03

Whoami?

SYNACKTIV

- **Pierre Milioni (*@b1two_*)**
  - Pentester at Synacktiv
- **Working at Synacktiv**
  - Offensive security
  - 140+ ninjas: pentest, reverse engineering, development, CSIRT
  - 6 locations: Paris, Rennes, Lyon, Toulouse, Lille (very soon) & remote
  - We are hiring! → *apply@synacktiv.com*

Introduction

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- **Pentesting**
  - Audit systems & report vulnerabilities
  - Never ending flow of new missions
    - New environments
  - Large community
    - Lots of tools, lots of *poc* → lots of dependencies

Introduction

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- **Unsafe environment**
  - Unthinkable to audit everything
  - Exposed to multiple vulnerabilities

Introduction

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- **Need of a confined environment**
  - Containers & namespaces
    - Partial isolation
    - Docker, LXC/LXD, Podman, ...
  - Physically separated workstation
    - Full isolation
    - Not practical
  - Virtual machines
    - Strong isolation
    - VirtualBox, VMware, qemu/kvm, Qubes OS

Introduction

SYNACKTIV

- **In the end…**
  - Virtual machines w/ Qubes OS
    - Decent security
    - Implements handy features
    - Good community

Introduction

SYNACKTIV

- **In the end…**
  - Virtual machines w/ Qubes OS
    - ~~Decent security~~
    - ~~Implements handy features~~
    - ~~Good community~~
    - Looked fun

Exploring Qubes OS

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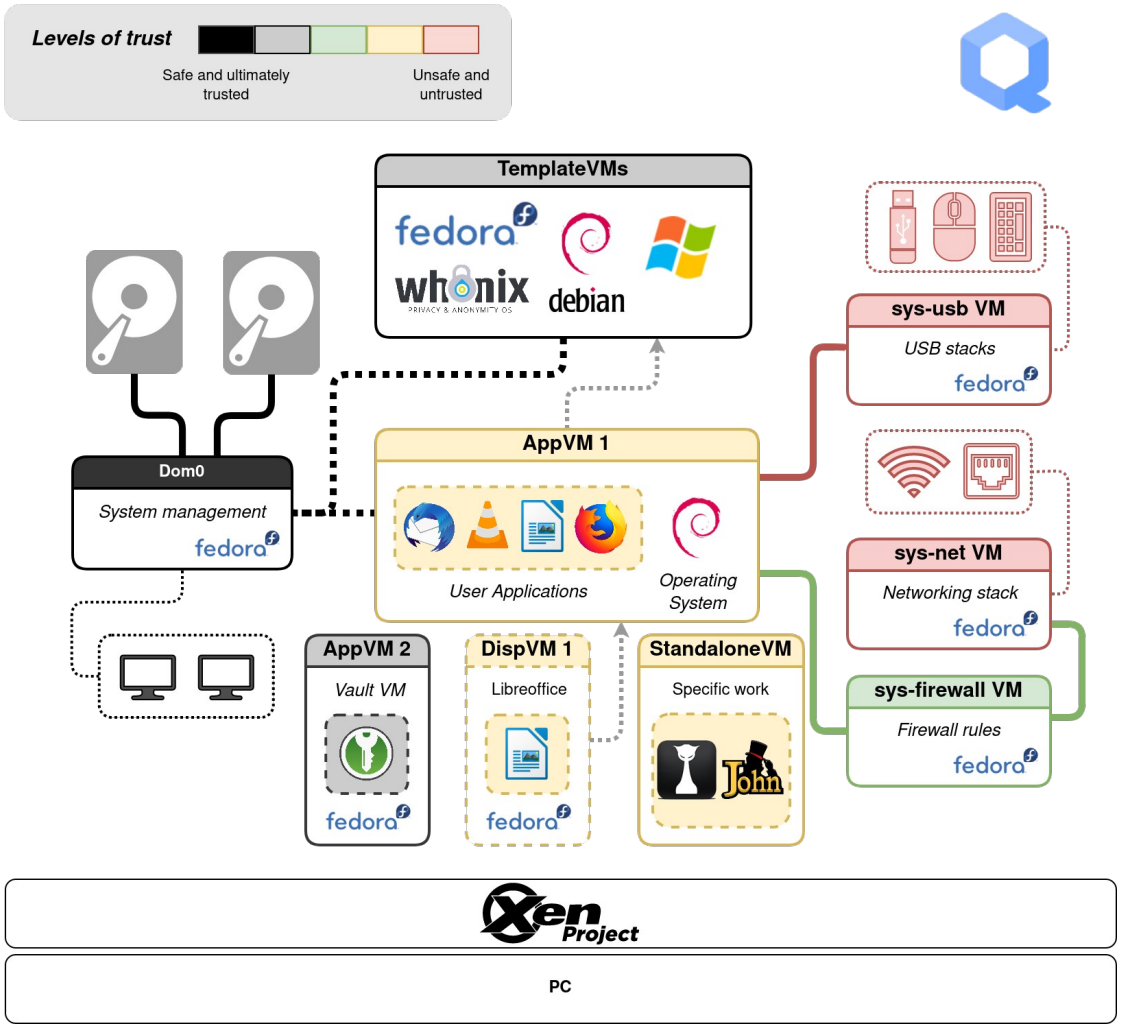

Exploring Qubes OS

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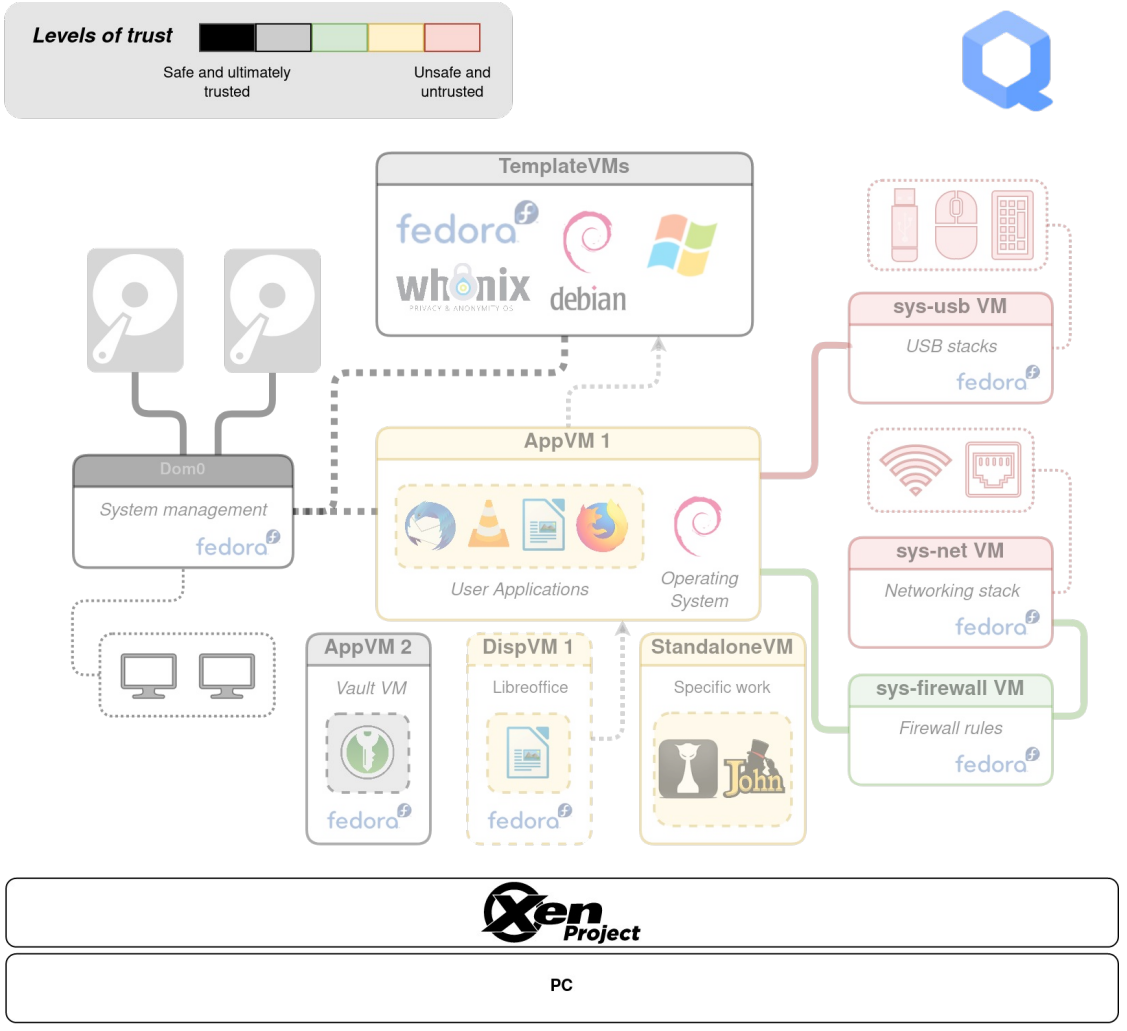

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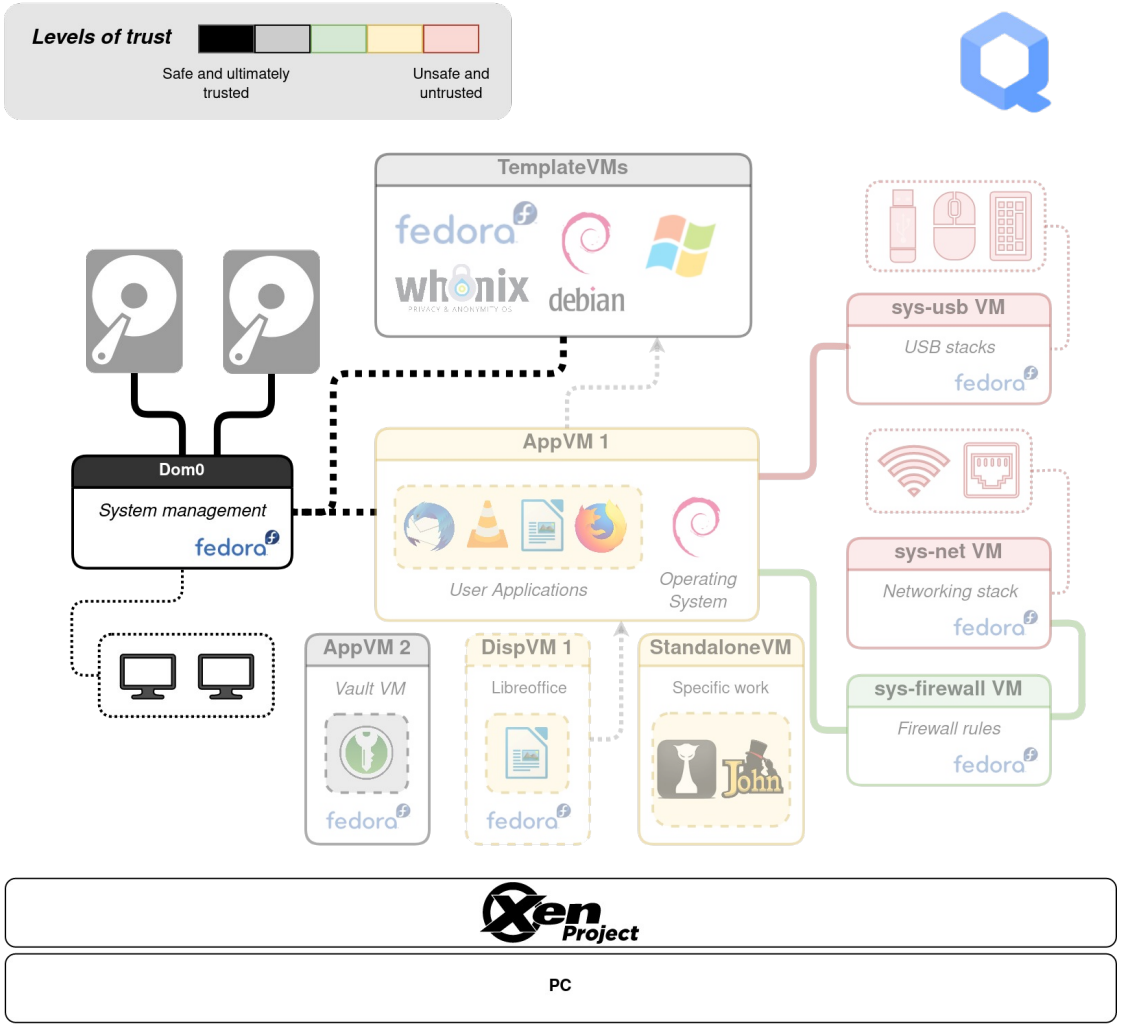

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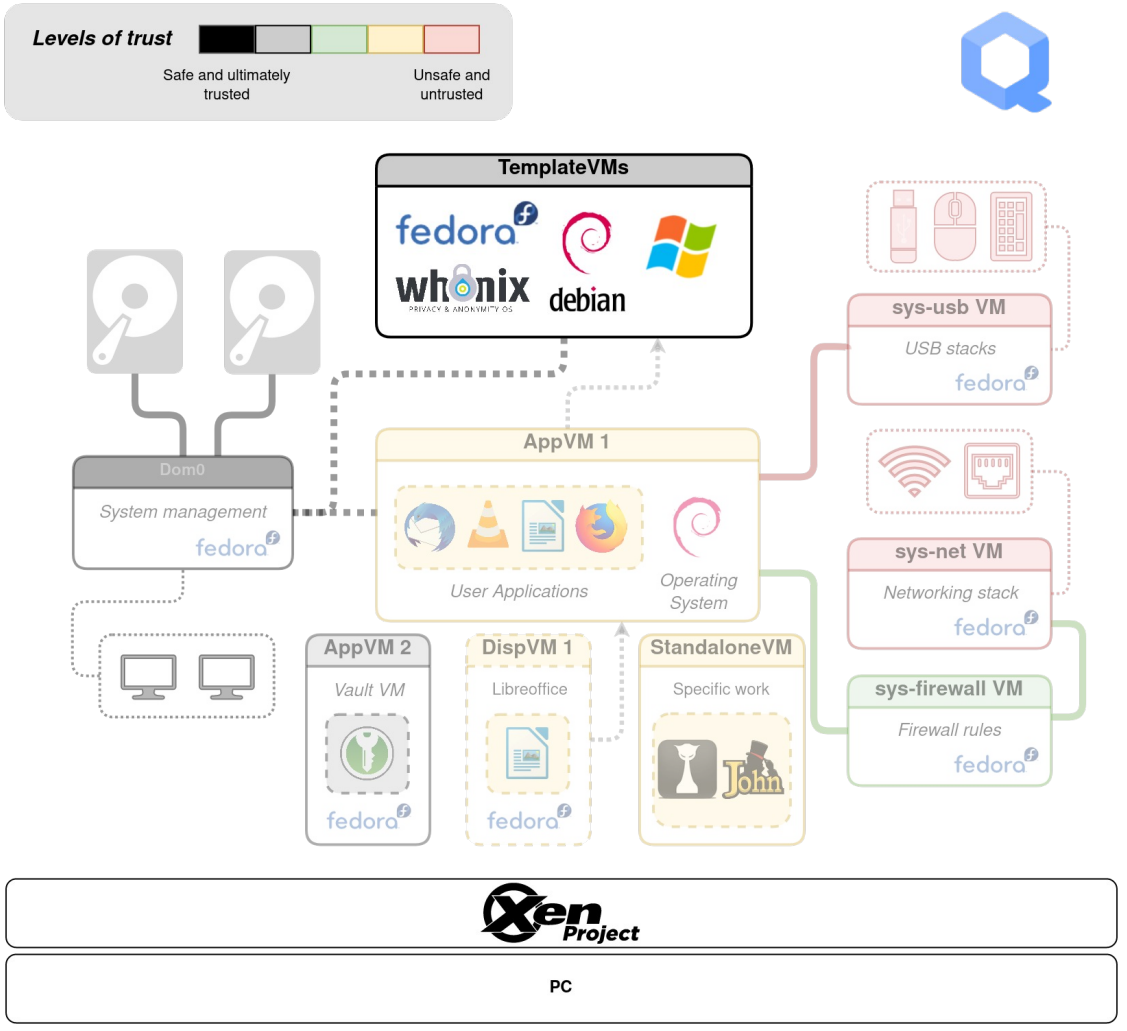

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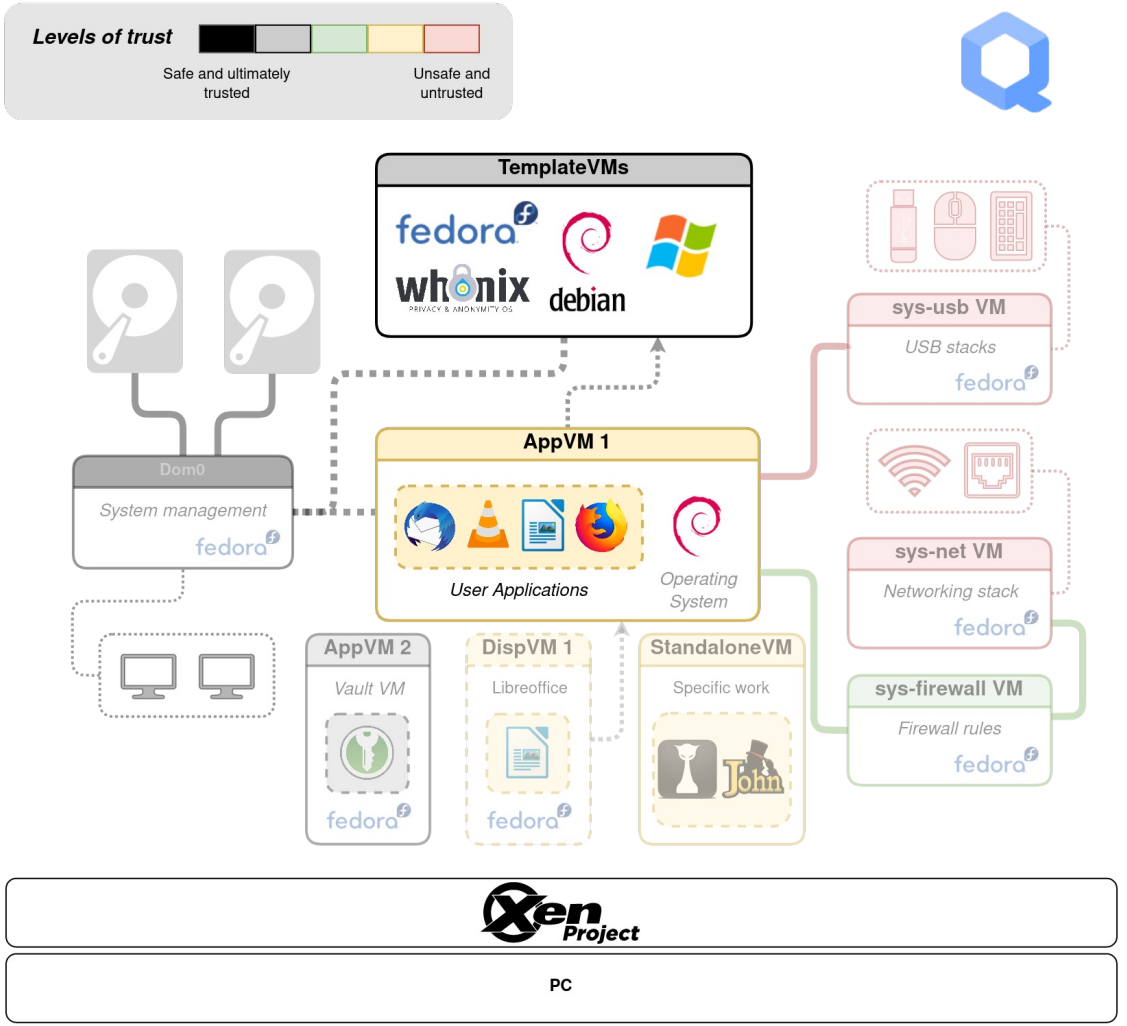

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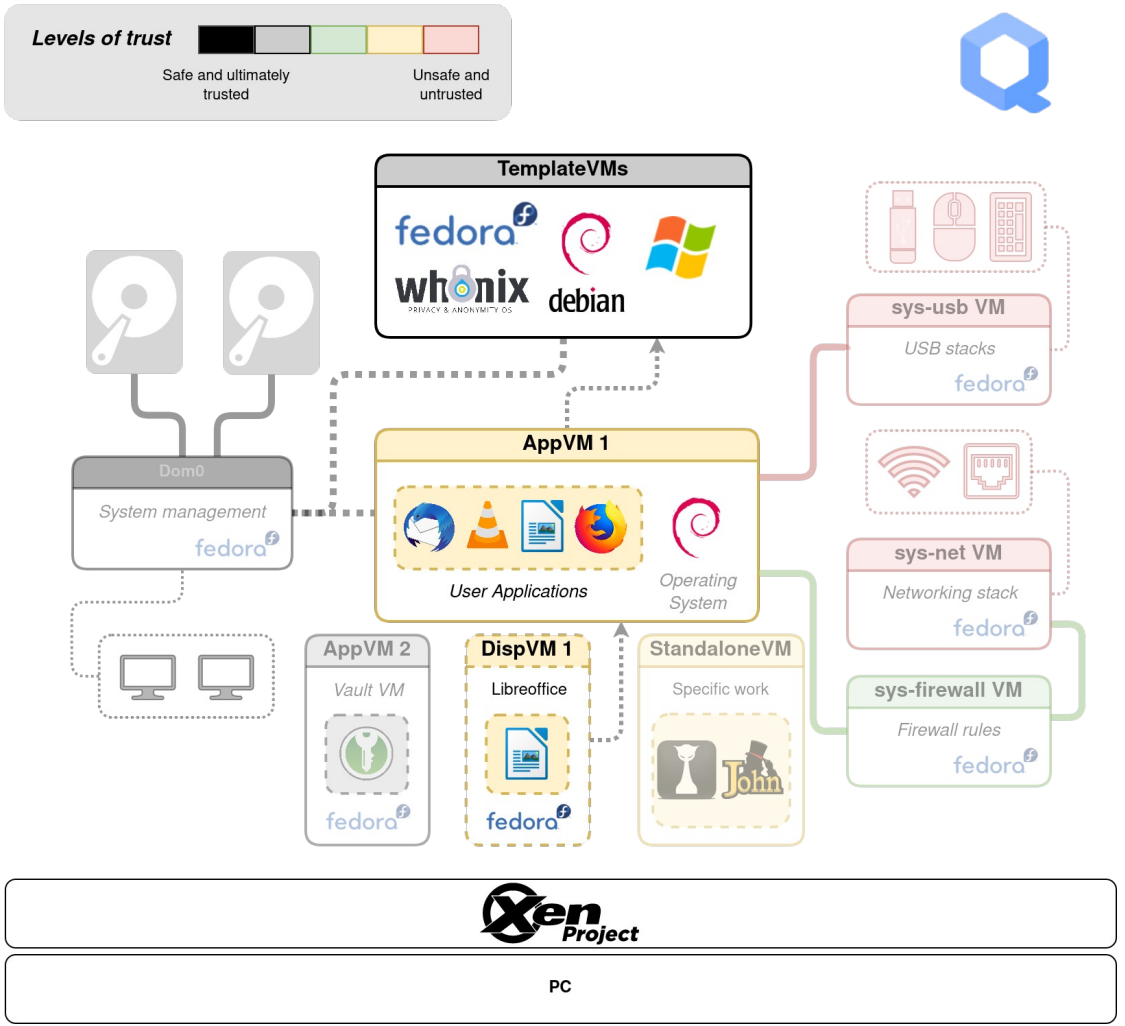

Exploring Qubes OS

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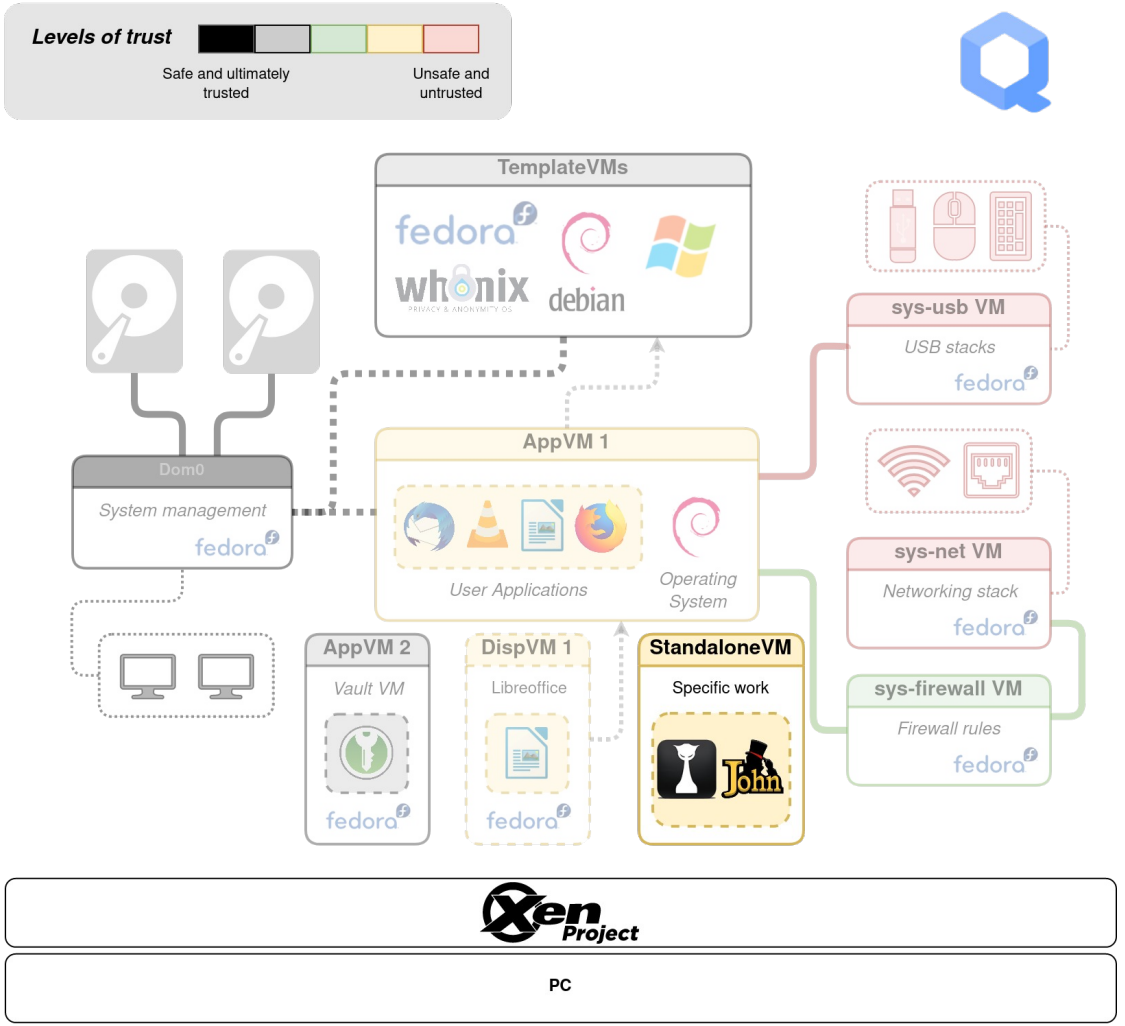

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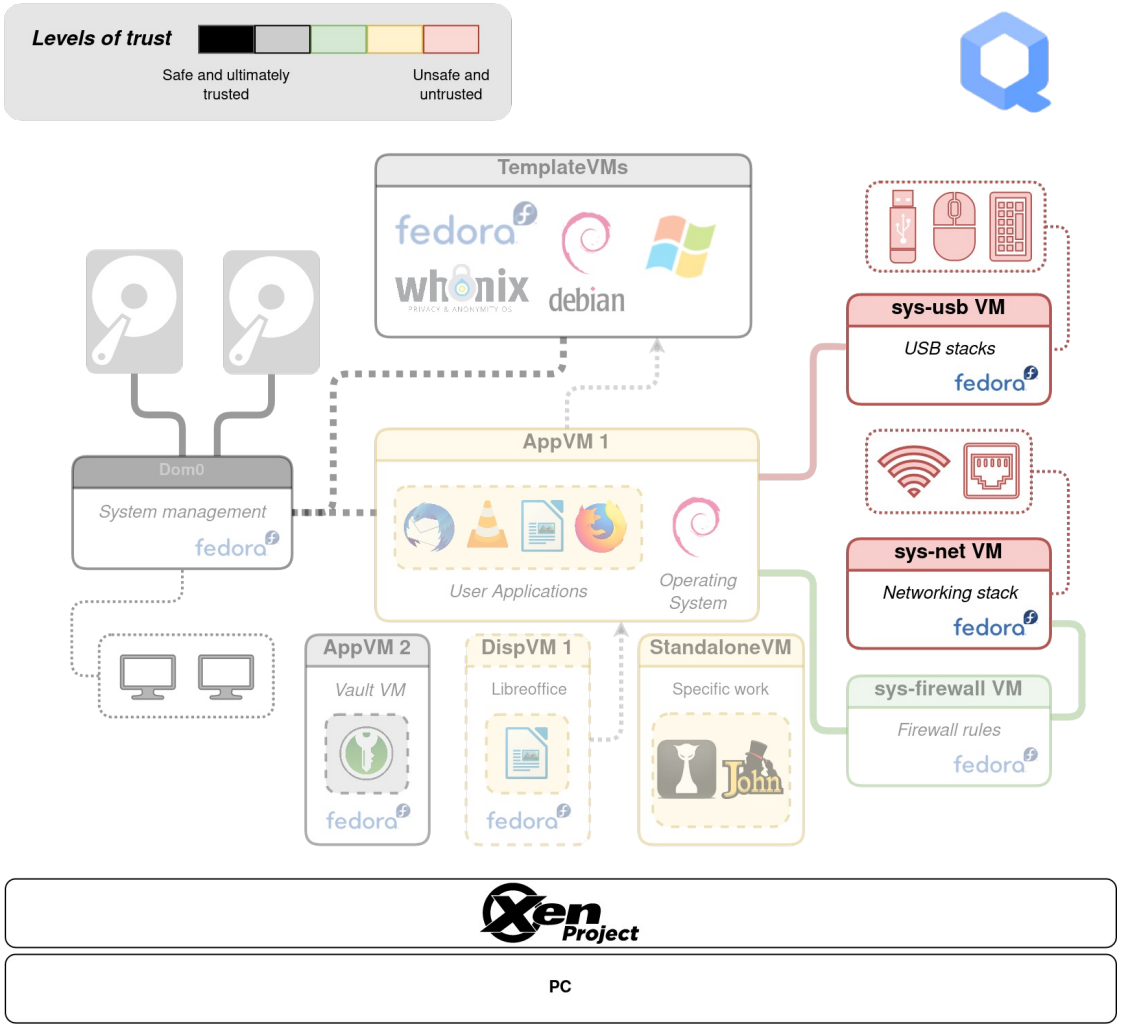

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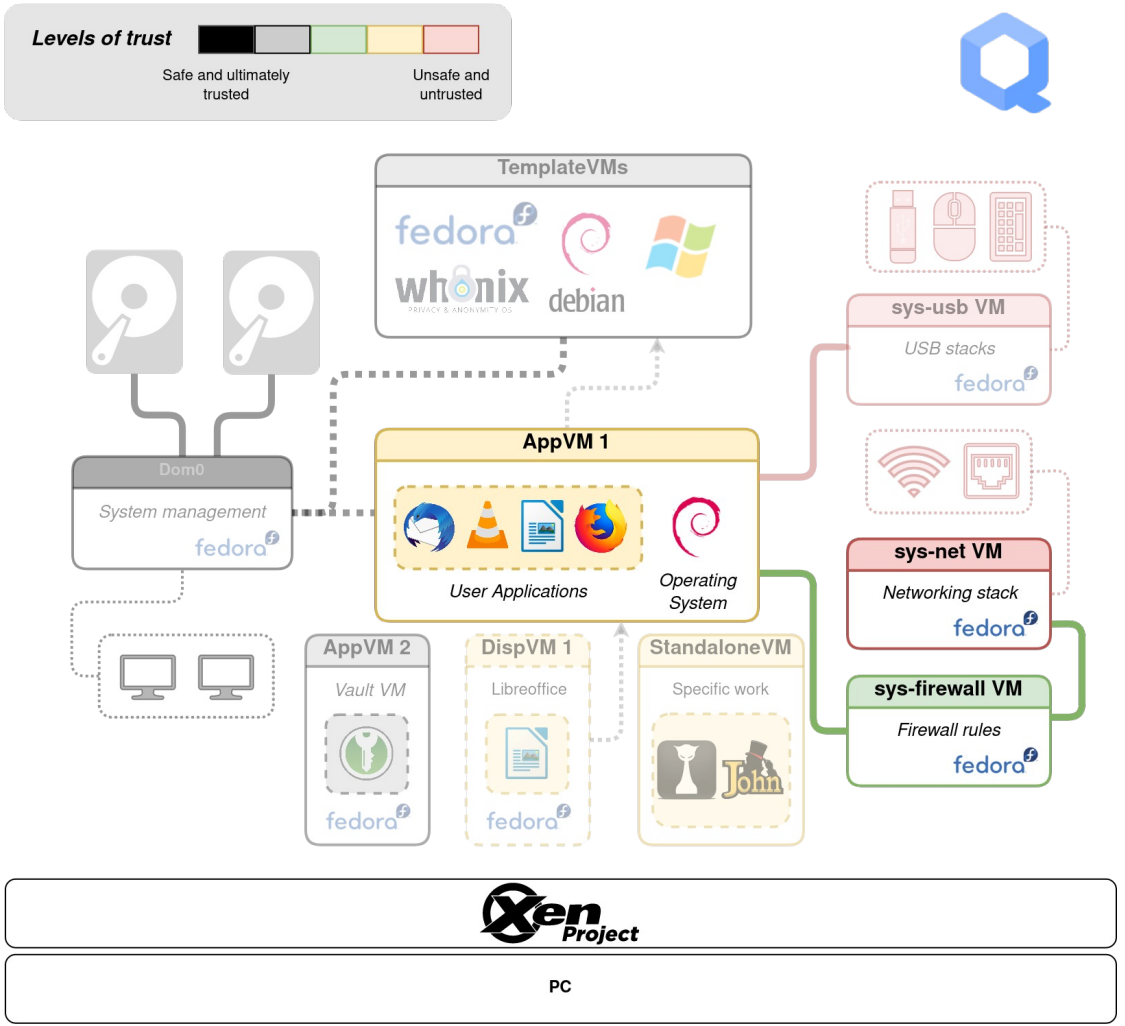

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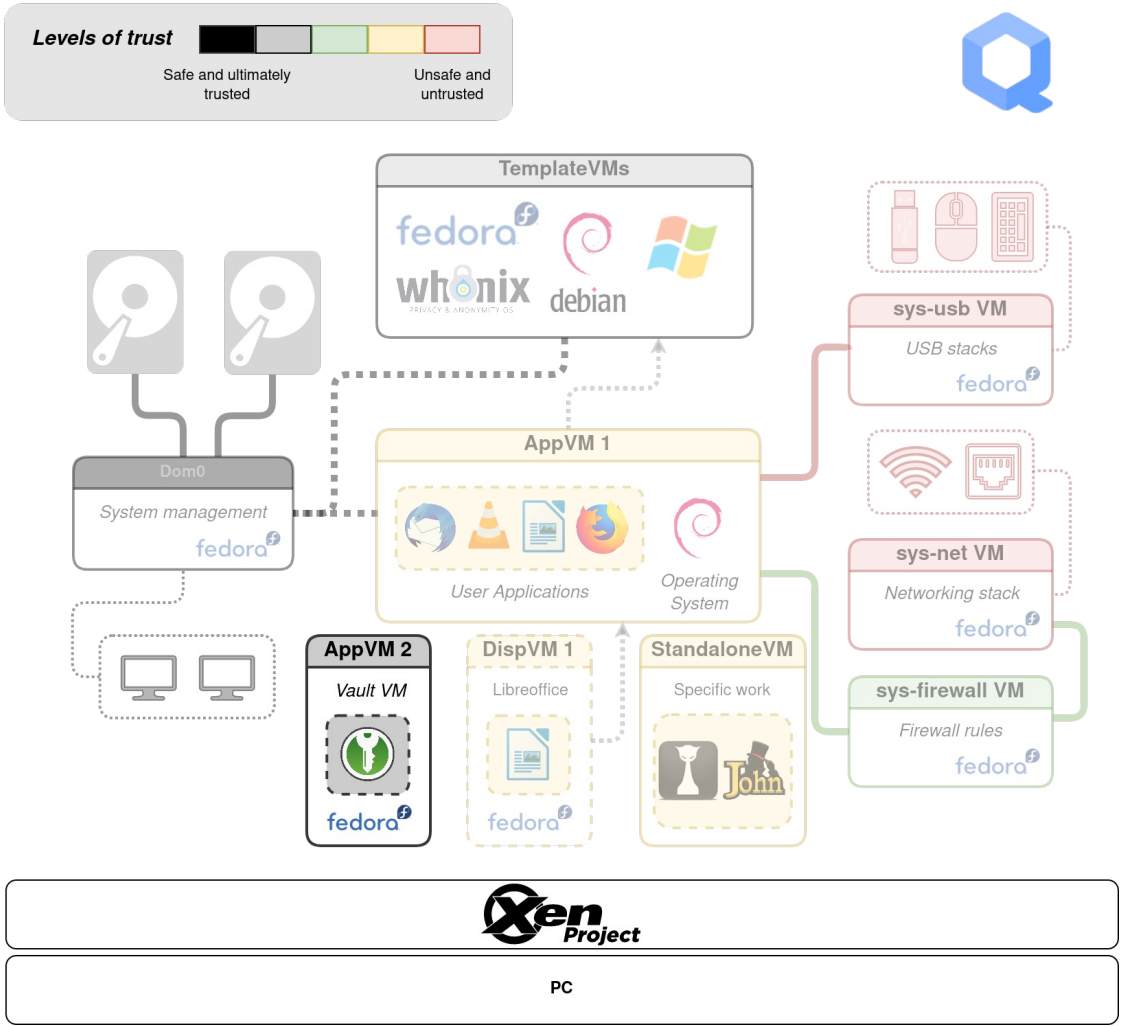

Exploring Qubes OS

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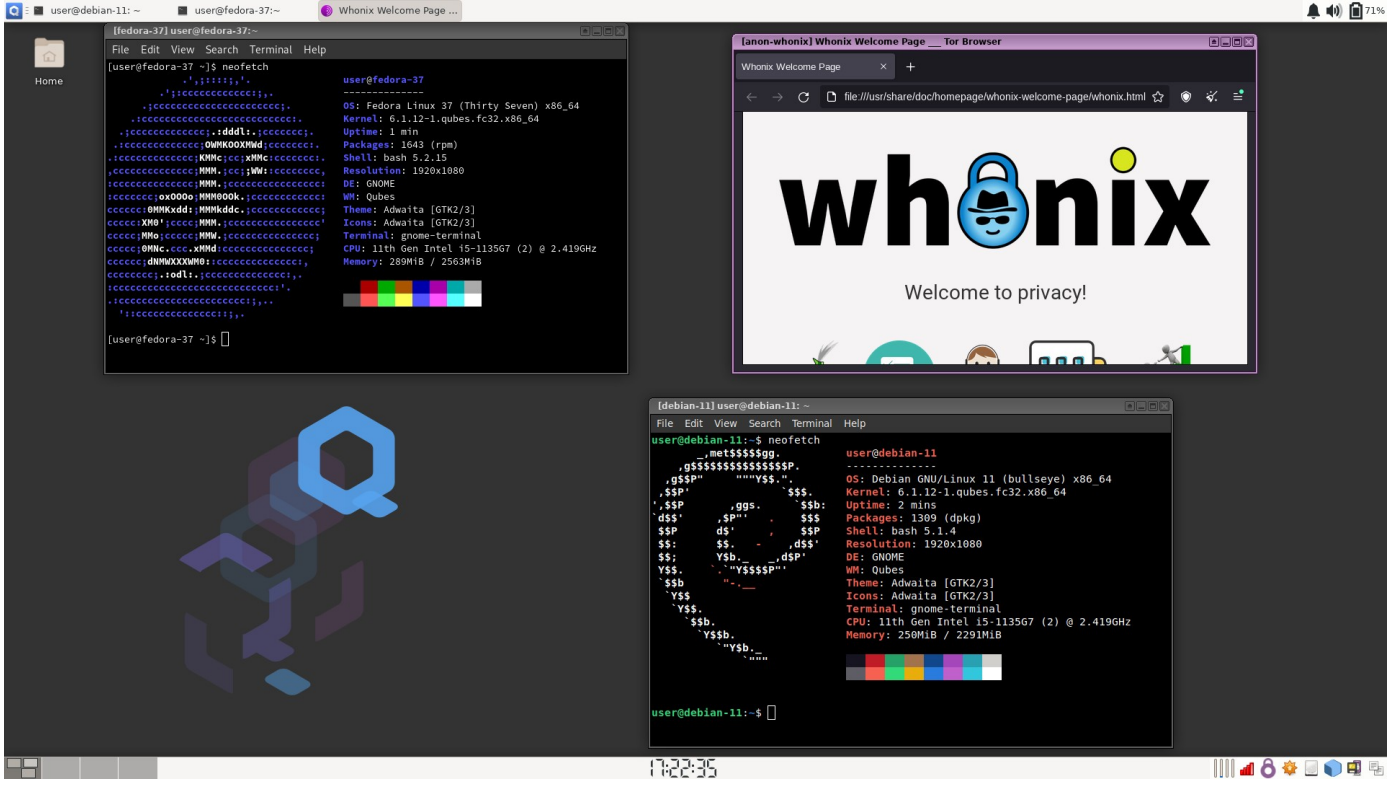
- **Icing on the cake**
  - Seamless integration



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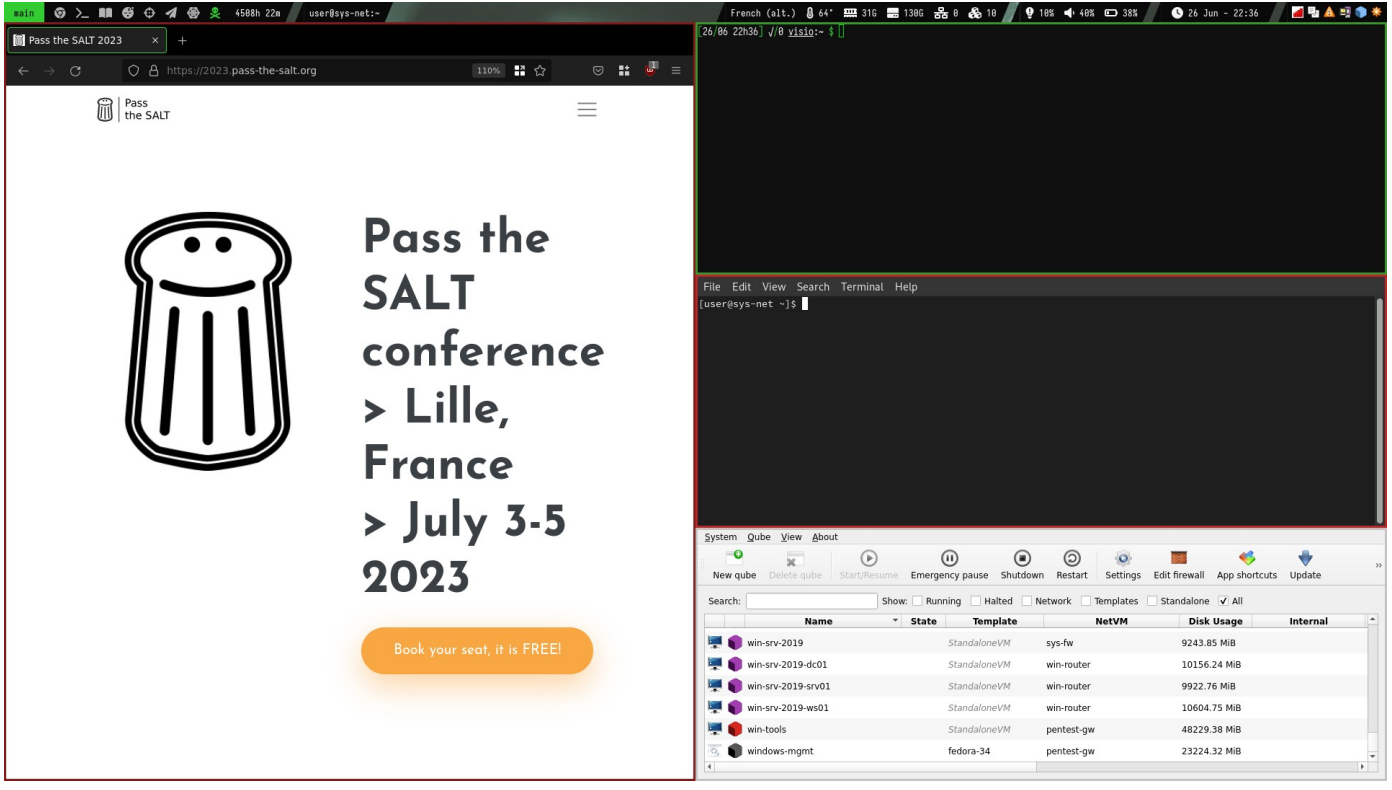

Exploring Qubes OS

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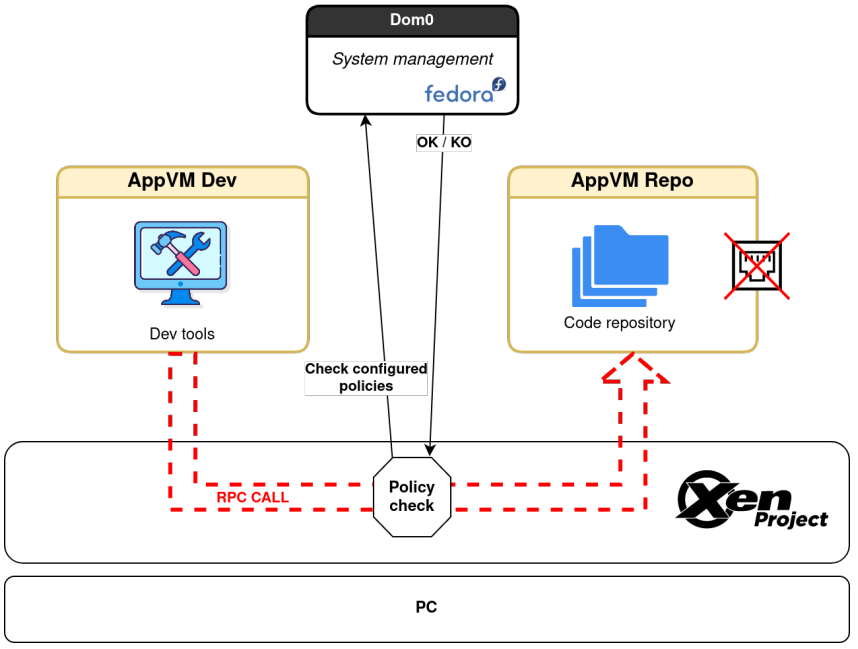
- **Icing on the cake**
  - RPC mechanism
    - Your handyman
    - Can do pretty much everything
    - Connect stdin/stdout between qubes
      - No need for network connection
    - Security enforced by policies in dom0
      - Allowed or asked
    - Use to expose services from a isolated qube



Exploring Qubes OS

- **Icing on the cake**
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    - Connect stdin/stdout between qubes
      - No need for network connection
    - Security enforced by policies in dom0
      - Allowed or asked
    - Use to expose services from a isolated qube
    - Everything and anything
      - Careful not to reduce the overall security

Exploring Qubes OS

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- **And much more...**
  - Automation (Saltstack, ansible)
  - Backup system
  - Automatic desktop file distribution
  - Whonix integration
  - Graphical firewall configuration (for nothing too fancy)

Exploring Qubes OS

SYNACKTIV

- **Security benefits**
  - Segmentation is key
    - Rubber ducky
    - Supply chain attacks
    - Browser 0 days
    - Infected documents
    - Malicious POC
    - Stack TCP/IP exploits

Exploring Qubes OS

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Exploring Qubes OS

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Exploring Qubes OS

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      → dedicated qube / dispVMs
    - ~~Stack TCP/IP exploits~~
      → sys-net / sys-fw

Exploring Qubes OS

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- ~~**Security benefits**~~
  - Xen 0 day vulnerabilities

Unveiling the user experience

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- **Enough with the commercial talk**
- **My experience**
  - 1 year part-time
    - Played with Qubes OS 4.0
    - Then switched to 4.1 release candidates
  - 1.5 years full-time
    - Started with Qubes OS 4.1-rc4
    - Both personal and professional computers

Unveiling the user experience

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- **Some statistics about my usage**
  - 103 qubes
  - 8 qubes started at boot (dom0, networking, USB, email, chat, internal browser, vault)
  - 13 qubes in normal usage (+ pentest, browsing, notes)

- **The computer**
  - Intel i7 (8th gen)
  - 48Go of RAM
  - 1To of SSD storage

  - Intel i7 (12th gen)
  - 32 → 64Go of RAM
  - 1+1To of SSD storage
  - Nvidia GPU

Unveiling the user experience

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- **Go over some usages and discuss**
  - Overall utilization
  - Browsing
  - Doing your job
    - Pentesting
    - Developing
    - Reporting
  - Visio conferencing
  - General organization
    - Multiple activities
    - Networking

Unveiling the user experience

SYNACKTIV

- **Overall utilization – the bad**
  - Need a powerful computer
    - The more RAM, the better
      - At the very least 16GB for Qubes OS as a main workstation
      - 32GB to be able to work without really worrying about RAM
      - 48GB to be really comfortable
      - 64GB for people like me who start a million things at once
    - Not so many monitoring tools
      - *Xentop*

Unveiling the user experience

SYNACKTIV

- **Overall utilization – the bad**
  - No hibernation (= S4 sleep) (= Suspend to disk)
    - S3 sleep (suspend to RAM)
      - Your computer has to support it
        → recent Dells do not

Unveiling the user experience

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- **Overall utilization – the bad**
  - No hibernation (= S4 sleep) (= Suspend to disk)
    - S3 sleep (suspend to RAM)
      - Your computer has to support it
        → recent Dells do not
    - Get used to power off your system
      - Really annoying at first
      - Forces you to keep your working environment clean
      - Forces you to write scripts to automate your setup

Unveiling the user experience

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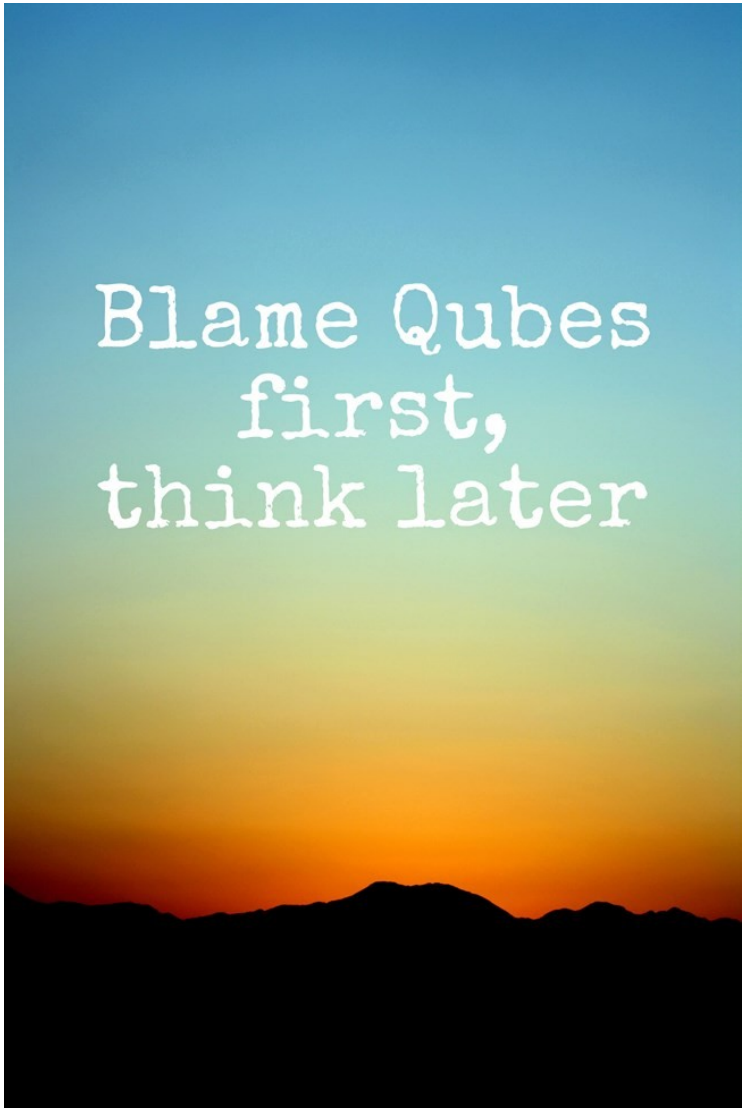
- **Overall utilization – the bad**
  - Bad autonomy
    - Depends on the laptop
      - 1st laptop: 2h30 (vs 4h)
      - 2nd laptop: <2h (vs ?)

Unveiling the user experience

- **Overall utilization – the bad**
  - Bad autonomy
    - Depends on the laptop
      - 1st laptop: 2h30 (vs 4h)
      - 2nd laptop: <2h (vs ?)
  - The Qubes effect

    “Blame Qubes OS first, think later”



Unveiling the user experience

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- **Overall utilization – the good**
  - Good for unorganized people
  - Stable system
    - No full reinstall since the switch
      - Swapped disk during laptop change
      - Reinstall regularly some qubes to keep them clean
    - Never booted again on my previous distro since the switch
  - Migration between systems simplified

Unveiling the user experience

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- **Browsing**
  - Works just fine
  - Struggles with heavy websites
    - No hardware acceleration
    - No 200+ tabs browsers anymore
  - Just like classical browsing
    - Doing things with Qubes is quite like doing them with a classical distro

Unveiling the user experience

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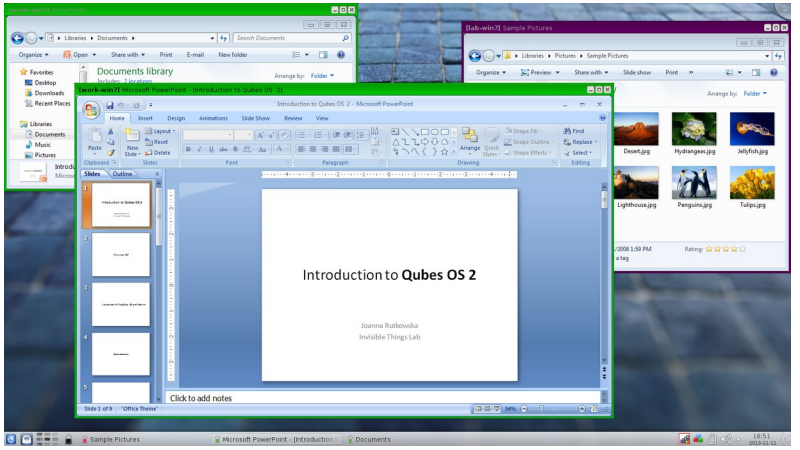
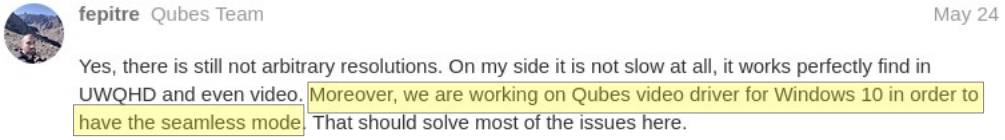
- **Pentesting – the good**
  - Fresh environment
    - Templating
    - Create new environments with ease
  - Simplifies complex network setup
    - Ex: internal pentests, automatic VPN
    - No risks using the wrong IP address
  - Peace of mind
    - Security
    - No mixing different missions

Unveiling the user experience

SYNACKTIV

- **Pentesting – the good**
  - Windows environments
    - Well integrated w/ QWT
      - Copy/paste
      - File exchange
      - RPC system
      - Seamless on Win7, maybe Win10 someday?





Unveiling the user experience

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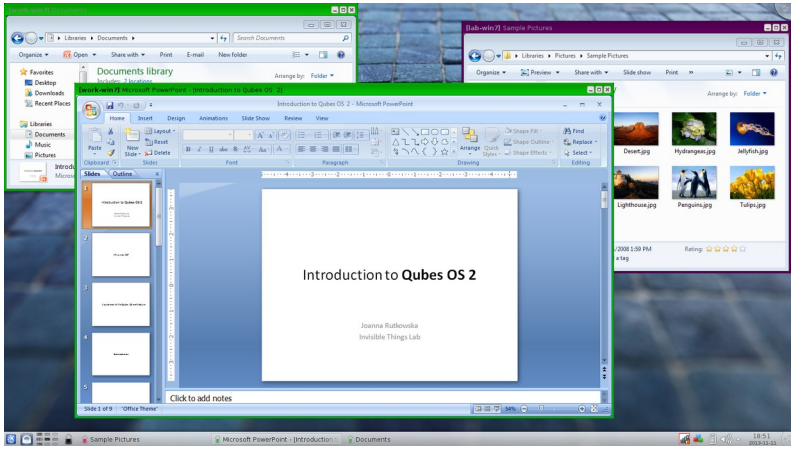
  - Windows environments
    - Well integrated w/ QWT
      - Copy/paste
      - File exchange
      - RPC system
      - Seamless on Win7, maybe Win10 someday?
    - Templating system too
      - Low size Windows virtual machines



Unveiling the user experience

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- **Pentesting**
  - Qubes OS is not a reason to drop hardening
    - Qubes really exposed to vulnerabilities/exploitation
    - No need to automatically give up a qube to attackers

Unveiling the user experience

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- **Pentesting – the bad**
  - Templates are annoying with “one-qube” packages
    - Standalones
    - OverlayFS
  - Mobile application audit are painful
    - No nested virtualization
      - At least I did not manage to do it (yet)
    - x86 Android qubes

Unveiling the user experience

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- **Developing**
  - Development template
  - One qube per project
  - Synchronization could be cumbersome
    - No shared folder between qubes
    - Custom solution using RPC

Unveiling the user experience

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- **Reporting**
  - Disposable VMs to open untrusted documents
  - Copy/Paste only raw data between qubes
    - No image copy-pasting
    - No custom type copy-pasting
    - Custom RPC script: *xclip -target image/png*

Unveiling the user experience

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- **Visio conferencing**
  - No builtin functionality to screen share another qube
    - Manual solution: *ffmpeg* + RPC call
  - Lack of performances
  - GPU passthrough

Unveiling the user experience

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- **General organization**
  - Own private infrastructure
    - Easy to setup
    - Very powerful
  - Routed network
  - Easy to isolate environments

Closing notes

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- **Do not take security for granted**
  - Qubes OS gives good foundations
  - There is still a lot of room for human error
  - Hardening is still relevant

Closing notes

SYNACKTIV

- **Should I switch to Qubes OS?**
  - Still thinking about switching after everything I said?
    It means you probably should
  - Will be usable as is, but…
    - You will spend time matching it to your company standards
      - Especially if you're alone to switch
      - Do not switch before knowing the environment
    - You will spend a crazy amount of time customizing it to be comfortable

Closing notes

SYNACKTIV

- **Should I switch to Qubes OS?**
  - Remember
    - Make sure your hardware is compatible
    - Make sure your company is OK with it
    - Be ready to commit (especially if you are switching solo)
    - Sometimes it will not always work as expected

Closing notes

SYNACKTIV

- **How to switch to Qubes OS?**
  - Install via USB first
    - Do not deploy *sys-usb* during that period!
  - Ensure a proper base
  - Make sure you have nothing too important the next week or so
  - Just do it

Closing notes

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- **Did I ever regret switching to Qubes OS?**
  - Sometimes you just want to throw your computer through the window
  - Never looked back
  - Too comfortable compared to “classical” distros

Closing notes

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- **Marek (lead dev) was here**

Why?
How?
Details
Status

Improving client systems security with Qubes OS

Marek Marczykowski-Górecki, Invisible Things Lab

4 Jul 2016

https://archives.pass-the-salt.org/RMLL%20Security%20Tracks/2016/slides/RMLL-Sec-2016-07-04-04-Marczykowski-QubesOS.pdf

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Questions?

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