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Bihar Dar University

Software Engineering`

Individual Assignment

Of

Operating system

And

System programming

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This project provides an overview of most secure Qubes operating system.`

Qubes os mainly aims to achieve a secure way which enables us to use our computer properly.

- ***Qubes OS was developed with a strong focus on security.***

This is done through compartmentalization and minimizing the impact of threats.

It focuses on creating isolated environment using virtual technology.

The main purpose of Qubes os is to assign a virtual machine for each Tasks. So, ensures that

a security breach in one qubes(virtual machine) dosen`t affect other

History of Qubes OS

- ✓ ***Qubes OS was first Introduced on semptember 3, 2012.***
- ✓ ***Since then, it has involved through multiple versions, enhancing its security and virtualization capabilities.***
- ✓ ***Founded by Joanna Rutkowaska.***
- ✓ ***Compartmentalized approach for security.***
- ✓ ***The latest supported release is Qubes OS 4.2.4, which is launched on December 18, 2023.***

Motivation of Qubes OS

- ✓ **Qubes OS is motivated by the need for a more secure and private computing experience.**
- ✓ **Especially for individuals who might be targeted by sophisticated adversaries.**
- ✓ **It aims to isolate different activities and applications into distinct, secure compartments called "qubes".**
- ✓ **This compartmentalization helps to protect users from security threats by ensuring that a compromise in one qube doesn't affect the rest of the system.**

Qubes OS is unique for several reasons:

- ✓ **Security Architecture: If each Task runs on its own virtual machine, the attacker can not attack the system easily.**
- ✓ **Flexible Management: Users can create different qubes for different tasks.**
  - **User -Friendly Interface: Qubes OS offers a user-friendly interface.**
  - **This allows users to manage their qubes easily.**

Requirements

- Qubes OS has specific hardware and software requirements to ensure compatibility and security`

Hardware Requirements

Minimum Requirements

- **CPU:** 64-bit Intel or AMD processor
- **Memory:** 6 GB RAM
- **Storage:** 32 GB free space

Recommended Requirements

- **CPU:** 64-bit Intel processor

- **Memory:** 16 GB RAM
- **Storage:** 128 GB free space (SSD strongly recommended)
- **Peripherals:** Non-USB keyboard or multiple USB controllers
- **Security Features:** Trusted Platform Module (TPM) with proper BIOS support.

Software Requirements

- Qubes OS is built on **Xen hypervisor**, meaning it requires direct hardware access.
- It is **not recommended** to install Qubes OS inside a virtual machine.
- **BIOS/UEFI Settings:** IOMMU-based virtualization must be enabled in BIOS/UEFI for proper isolation.

Installation steps

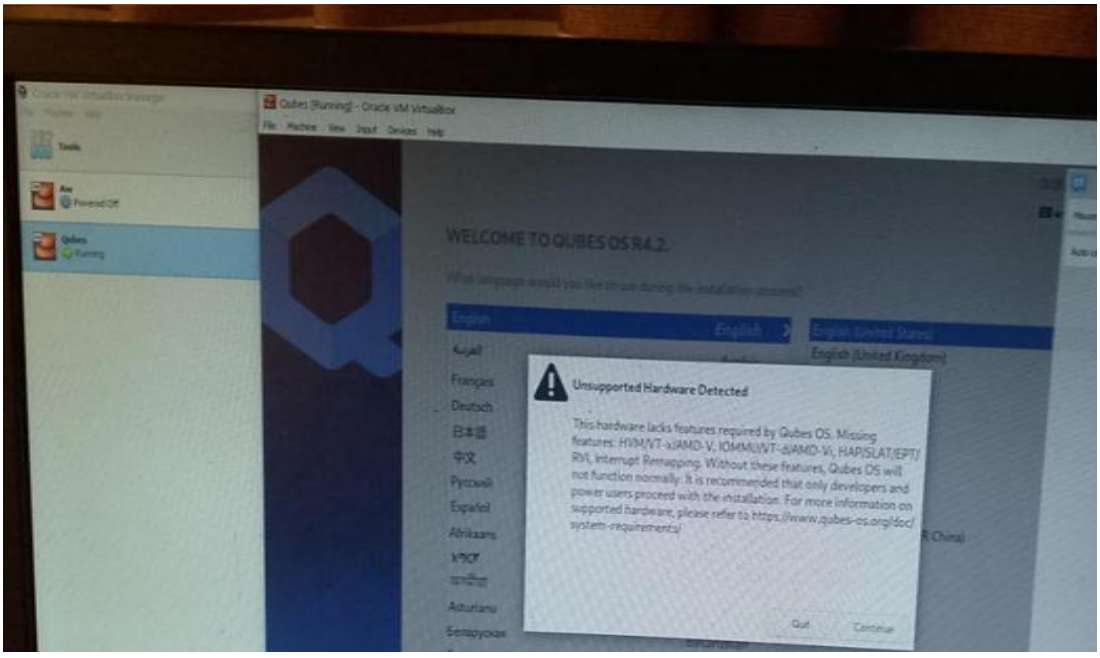
Qubes OS is mainly designed for security since it provides a virtual machine for each activity that are runs on the system. As mentioned above, even one program is attacked, couldn't affect the entire system. Thus, it focuses on creating a virtual machine for each running programmers.

Installing Qubes OS on virtual machine or VMware means creating a nested virtualization that affects

the performance of the operating system Not only this but also, such virtual machines does not support

all requirements of Qubes OS. Because it relays on hardware, just not on software. So, to install and use it efficiently at least we have to install it on Hardware devices like USB drive, DVD drive ….

Installing Qubes OS on VMware or other virtual machine is straight ward for some steps. When we try to do so, it is welcome up to language selection. Then, if we click on continue(install) bottom the system turned back the installation process to original position and shows the following image.



Therefore, we can conclude that installation of Qubes OS merely on virtual-box or VMware workstation 17 player might not be possible. So, to install and use it functionally external devices are necessary.

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- **If we're considering Qubes OS, it's ideal for users who prioritize security and privacy over convenience and performance.**

Conclusion

- ✓ **Qubes OS is a security-oriented operating system that designed for single-user desktop computing.**
- ✓ ***Founded by Joanna Rutkowaska.***
- ✓ ***Compartmentalized approach for security.***
- ✓ ***The latest supported release is Qubes OS 4.2.4, which is launched on December 18, 2023.***

- ✓ **` Qubes OS is motivated by the need for a more secure and private computing experience`.**
- ✓ ***Qubes OS is unique for several reasons:***

- **Security Architecture**
- **Flexible management**
- **User-friendly interface**

The following are the main goals of qubes OS:

- ***Compartmentalization***
- ***Secure GUI integration`***
- ***Disposable VMS***
- ***Advanced-networking security***

- **Qubes OS has specific hardware and software requirements to ensure compatibility and security.**
- **Specially it focus on hard-ware requirements, as it is security and compartmentalization oriented.**
  - **Ext4 and ptrfs are supported by Qubes OS due to their advanced features.**

- ✓ **`Qubes OS is a security-focused operating system that uses virtualization to isolate different tasks and applications.**

What future outlook I have?

Qubes OS is security oriented operating system. It provides a multiple of independently standalone domains.

This phenomenon is called compartmentalization.

So, the failure of one part doesn`t affect other part of the system.

Therefore we can conclude that , it plays an important role in the world of security.

However, it requires huge amount of hardware requirements, because relies on

External devices such as, USB drive, DVD drive rather than internal soft ware's .

Thus, it isn`t installed easily. Although it requires huge amount of external storage, I plan to master how it is installed and specialized on this type of operating system.