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Secure Boot: Getting To Know Your Frenemy

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About

- Over 25+ years in the technology industry
- Member of Rocky Enterprise Software Foundation and Rocky Linux project
- Part of Fedora Community
- Over the years, contributor to projects such as Asterisk, Rocky Linux, Warewulf
- Maintain DisplayLink driver RPM packages
  (github.com/displaylink-rpm/displaylink-rpm)
- Work for CIQ as a Principal Systems Engineer
  - CIQ is the leading corporate sponsor of the Rocky Linux project
  - Focus on providing next generation infrastructure for modern high performant workloads

Secure Boot: Frenemy?

- Becoming a requirement in many environments
- Cloud VMs
- Differing opinions around if it solves a problem

What is Secure Boot?

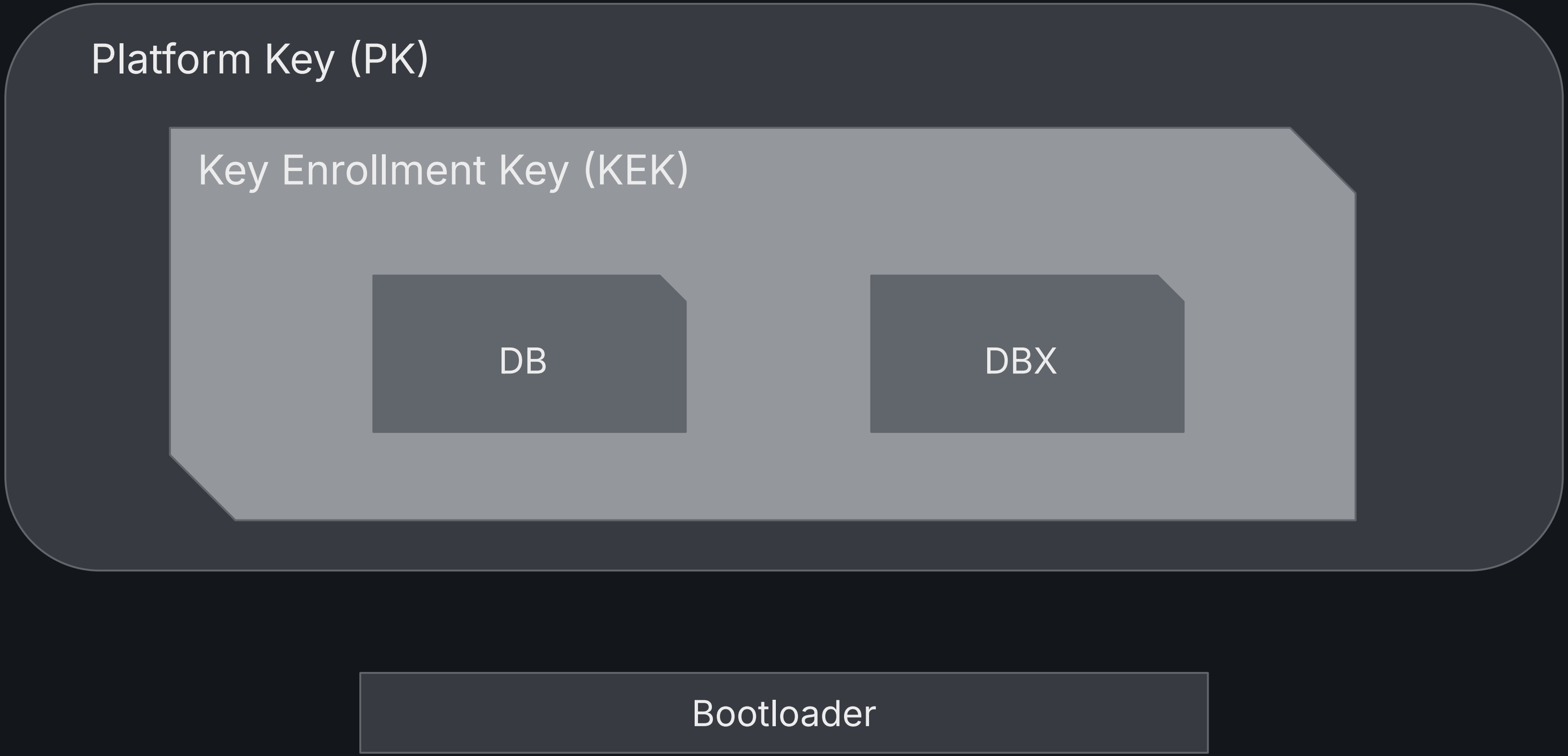
History

- 1970s - BIOS
  - Bootloader stored in MBR
  - Unable to validate trustworthiness
- 2000s - UEFI Specification
  - Remove limitations
  - Secure Boot added to spec 2006

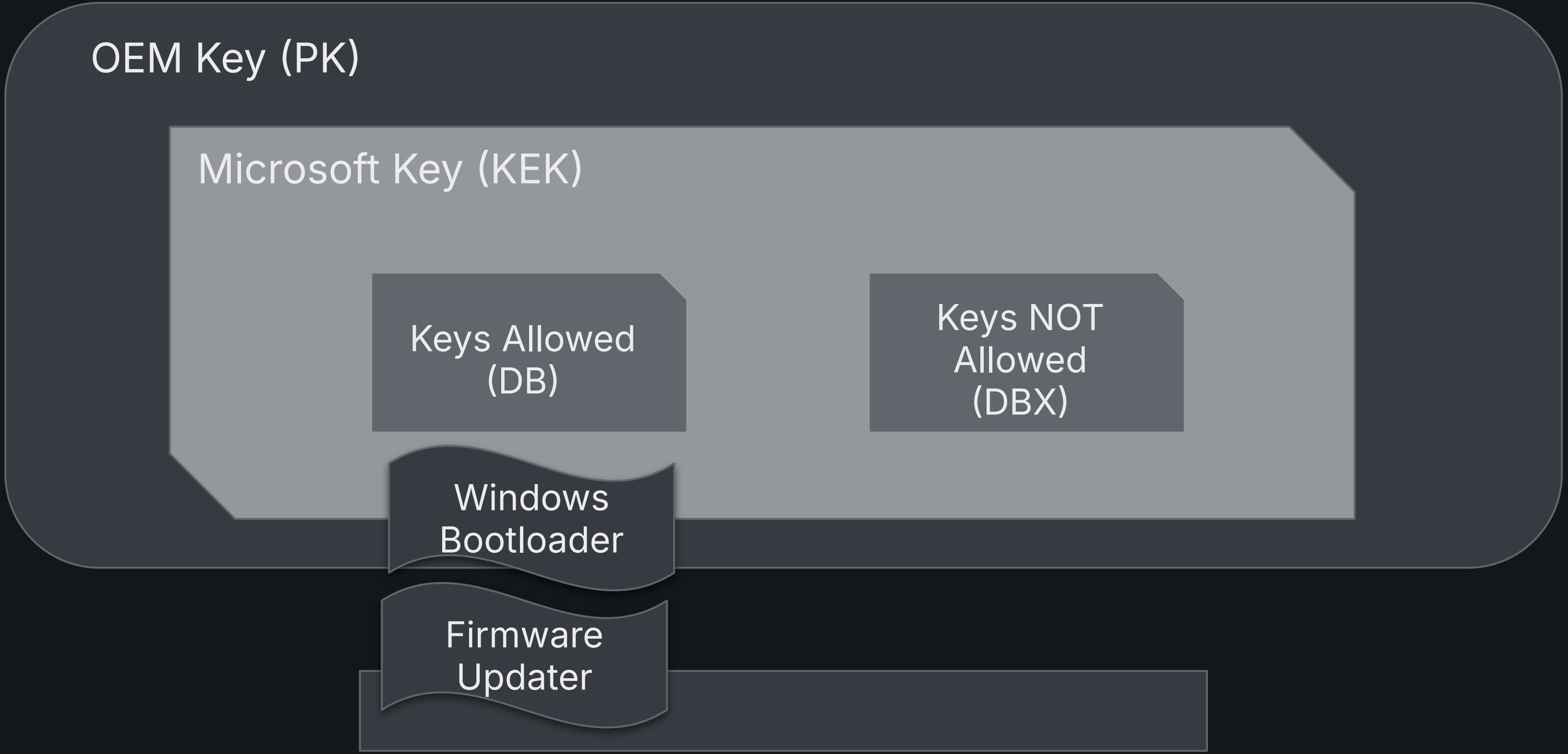
Goal

- Only allow trusted software to be run during boot
- Uses digital signatures for validation

How does it work?



Simple Terms



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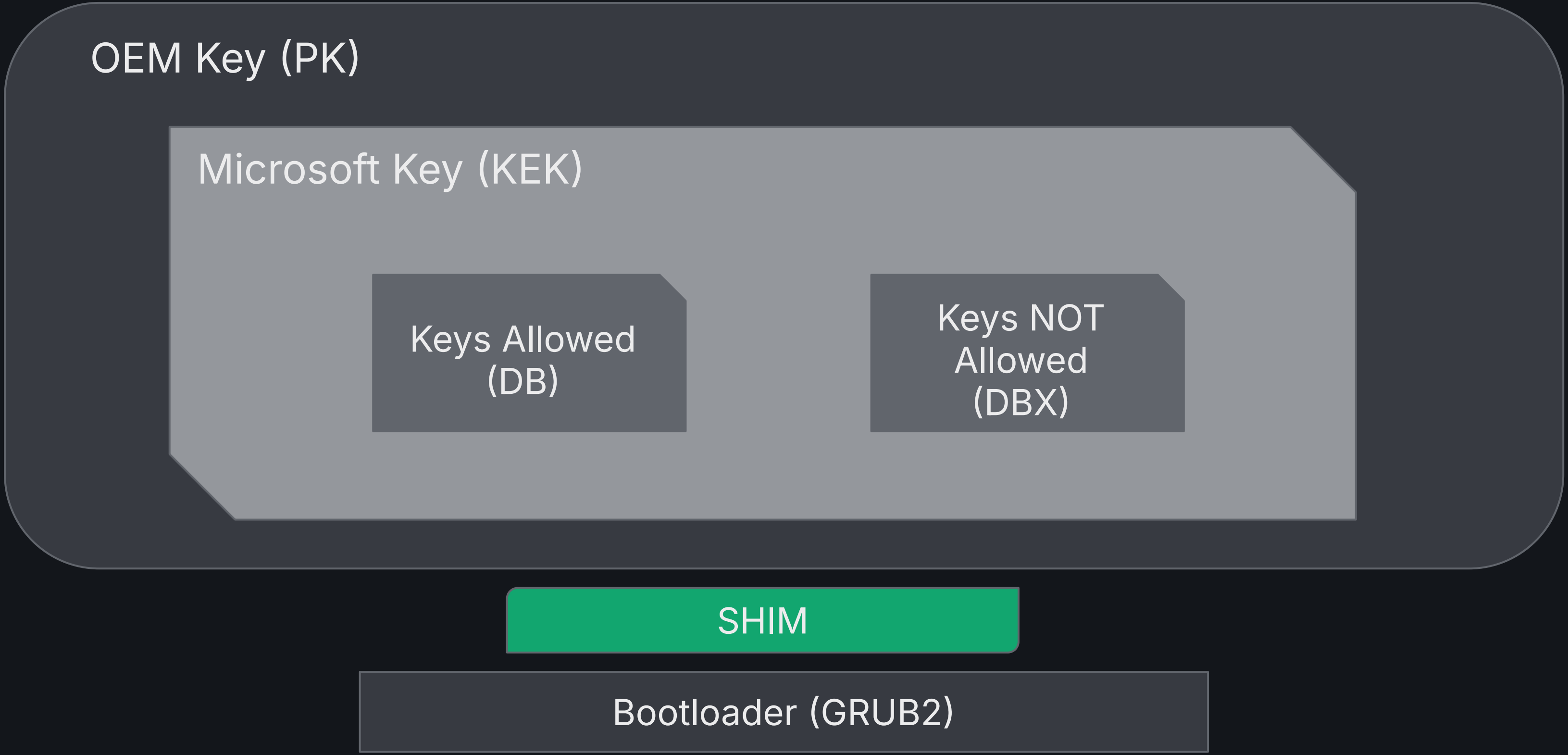
OEM Key (PK)
Microsoft Key (KEK)
Keys Allowed (DB)
Keys NOT Allowed (DBX)
SHIM
Bootloader (GRUB2)

How to get SHIM signed?

- Microsoft Hardware Program
    - Add EV code signing cert
- SHIM review
    - https://github.com/rhboot/shim-review
- Once SHIM is approved by the committee submit to Microsoft for signing
    - CAB file that contains your unsigned SHIM
- Receive back a signed SHIM

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- The Microsoft keys for KEK and UEFI from 2011 expire
- What does this mean?
    - Your current SHIM will still work...
        - As long as your firmware is not updated with the new keys from 2023
    - New install media that contains a SHIM signed with the 2023 keys will not work if firmware has not been updated
- Microsoft has a site with more information and guidance from OEMs

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Out of tree kernel modules

- If not signed by a trusted CA in the database of keys, it will not be loaded
- Create your own signing key
- Enroll using MOK Manager
  - Machine Owner Key (MOK)
- Use this key for signing your kernel drivers

Gotchas

- Need to remember to manually re-sign module after kernel or driver updates

Out of tree modules

DKMS

- Can use same signing key that you created yourself and has been enrolled (MOK)
- On kernel updates, the module will be built against kernel being installed
- Automatically signed after being built

Attempt at a

DEMO

Trends

- Requirement in the Enterprise to keep Secure Boot enabled
- Customers in highly regulated industries requiring Secure Boot be enabled
- Cloud compute instances are adding supporting for Secure Boot
- Confidential computing
    - Hardware based Trusted Execution Environment (TEE)

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Takeaways

- Frenemy?
  - We may not like the current solution but we have to work with it.
  - It is becoming a requirement for many environments, including the cloud.
- Is there a better way?
  - Probably
- What is it?
  - We don’t know yet.
  - Needs to simplify management and not allow one entity to control it all

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Thank You!

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