Full Disk Encryption

David Klaftenegger

Department of Information Technology
Uppsala University, Sweden

22. March 2019

Caveat Auditor

- this talk contains opinions
- my opinions
- not the university's
- nor do I claim to be an expert
- ... so expect some imprecision and errors

What's the problem?

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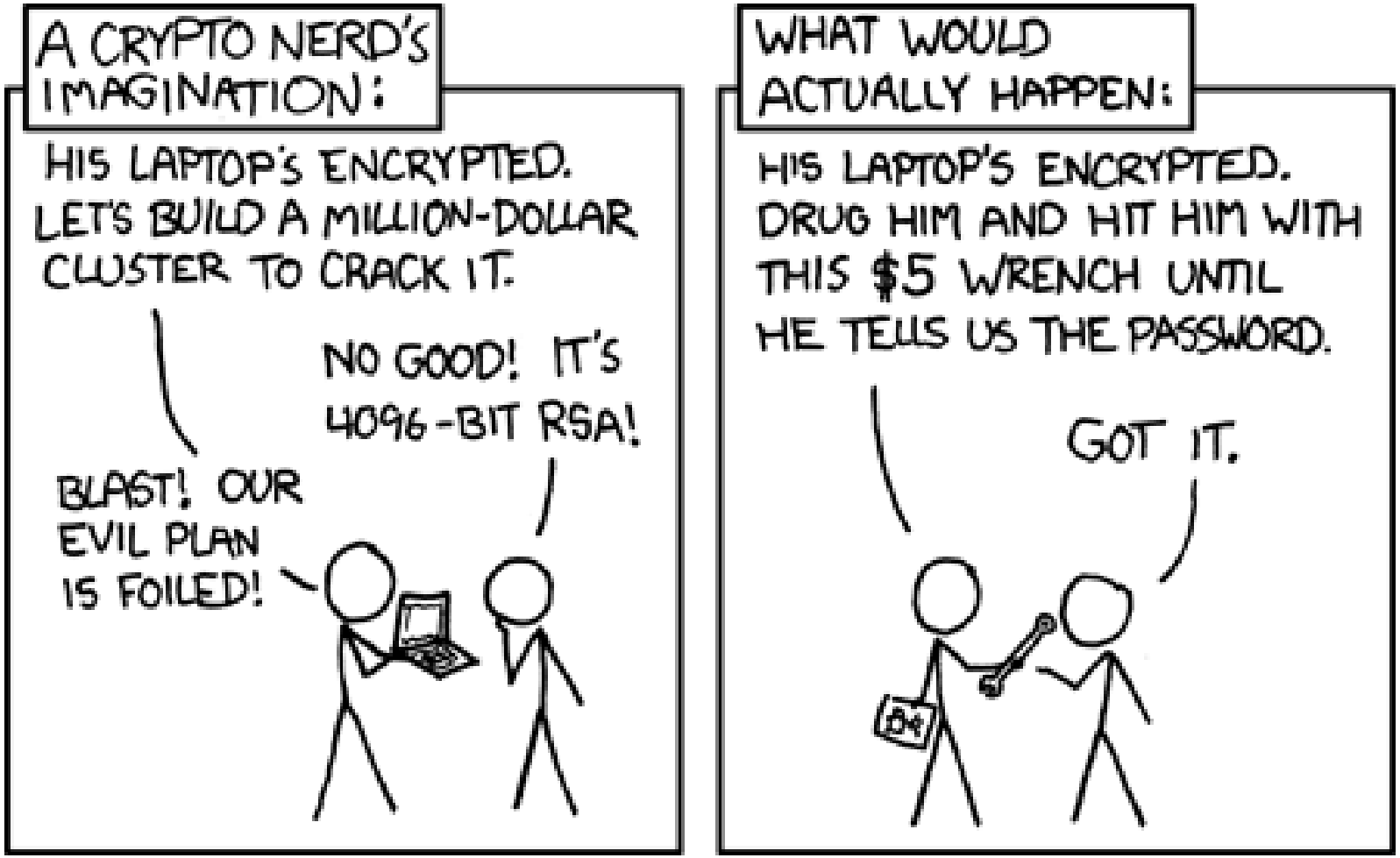

https://www.xkcd.com/538/

What's the problem?

Why encrypt data?

- important to you (that I can't see it)
- protect in case of
  - device loss?
  - theft?
  - police?
  - nation state attackers?

My choices

- loss / theft
- broken device
- selling device
- singular access by evil maid

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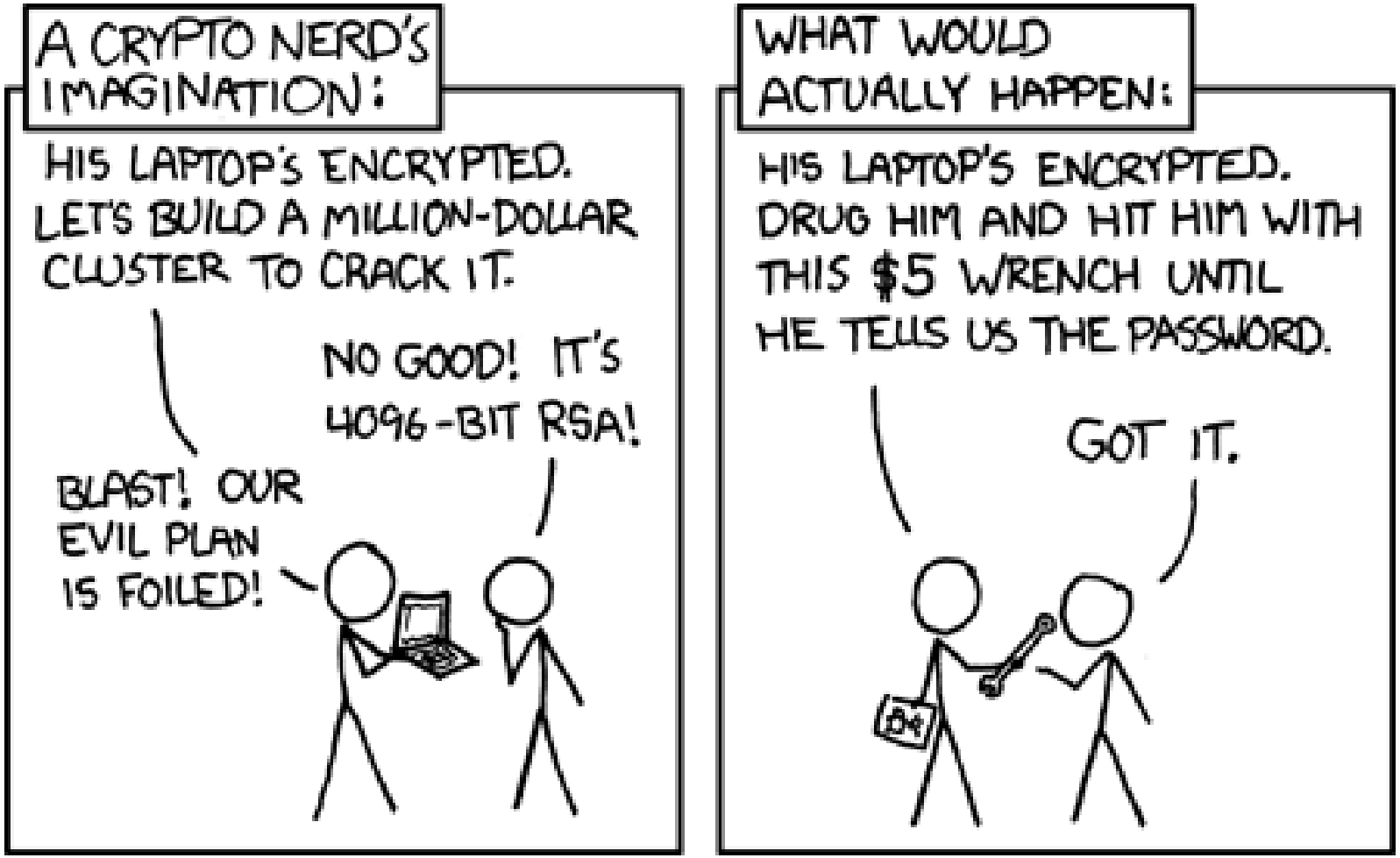
Shouldn't I use better encryption for more important stuff?

Why Full Disk Encryption?



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There is a lot of alternatives

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- From wikipedia:
  - Aloaha Crypt Disk
  - ArchiCrypt Live
  - BestCrypt
  - BitArmor DataControl
  - BitLocker
  - Bloombase Keyparc
  - Boxcryptor
  - CGD
  - CenterTools DriveLock
  - Check Point Full Disk Encryption
  - CipherShed
  - CrossCrypt
  - CryFS
  - Cryhod
  - Cryptainer
  - Cryptic Disk
  - CryptArchiver
  - Cryptoloop
  - Cryptomator
  - CryptoPro Secure Disk Enterprise

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- CryptoPro Secure Disk Enterprise
- CryptoPro Secure Disk for BitLocker
- CryptSync
- Discryptor
- DiskCryptor
- DISK Protect
- Cryptsetup / Dmsetup
- Dm-crypt / LUKS
- DriveCrypt
- DriveSentry GoAnywhere 2
- E4M
- e-Capsule Private Safe
- eCryptfs
- EgoSecure HDD Encryption
- EncFS
- EncryptStick
- FileVault
- FileVault 2
- FinalCrypt
- FREE CompuSec
- FreeOTFE
- GBDE
- GELI
- GnuPG
- gocryptfs
- Knox
- KryptOS
- LibreCrypt
- Loop-AES
- McAfee Drive Encryption (SafeBoot)
- n-Crypt Pro
- PGPDisk
- Private Disk
- ProxyCrypt
- R-Crypto
- SafeGuard Easy
- SafeGuard Enterprise
- SafeGuard PrivateDisk
- SafeHouse Professional
- Scramdisk
- Scramdisk 4 Linux
- SecuBox
- SECUDE Secure Notebook
- SecureDoc
- Seqrite Encryption Manager
- Sentry 2020
- Softraid / RAID C
- SpyProof!
- Svnd / Vnconfig
- Symantec Endpoint Encryption
- Tcplay
- Trend Micro Endpoint Encryption (Mobile Armor)
- TrueCrypt
- USBCrypt
- VeraCrypt
- TrueCrypt License Version 3.0 (legacy code only)
- CyberSafe Top Secret

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Some selection that you may want to look at:

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- Veracrypt
- LibreCrypt
- LUKS
- ZFS (native filesystem encryption)

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Maybe not that important...

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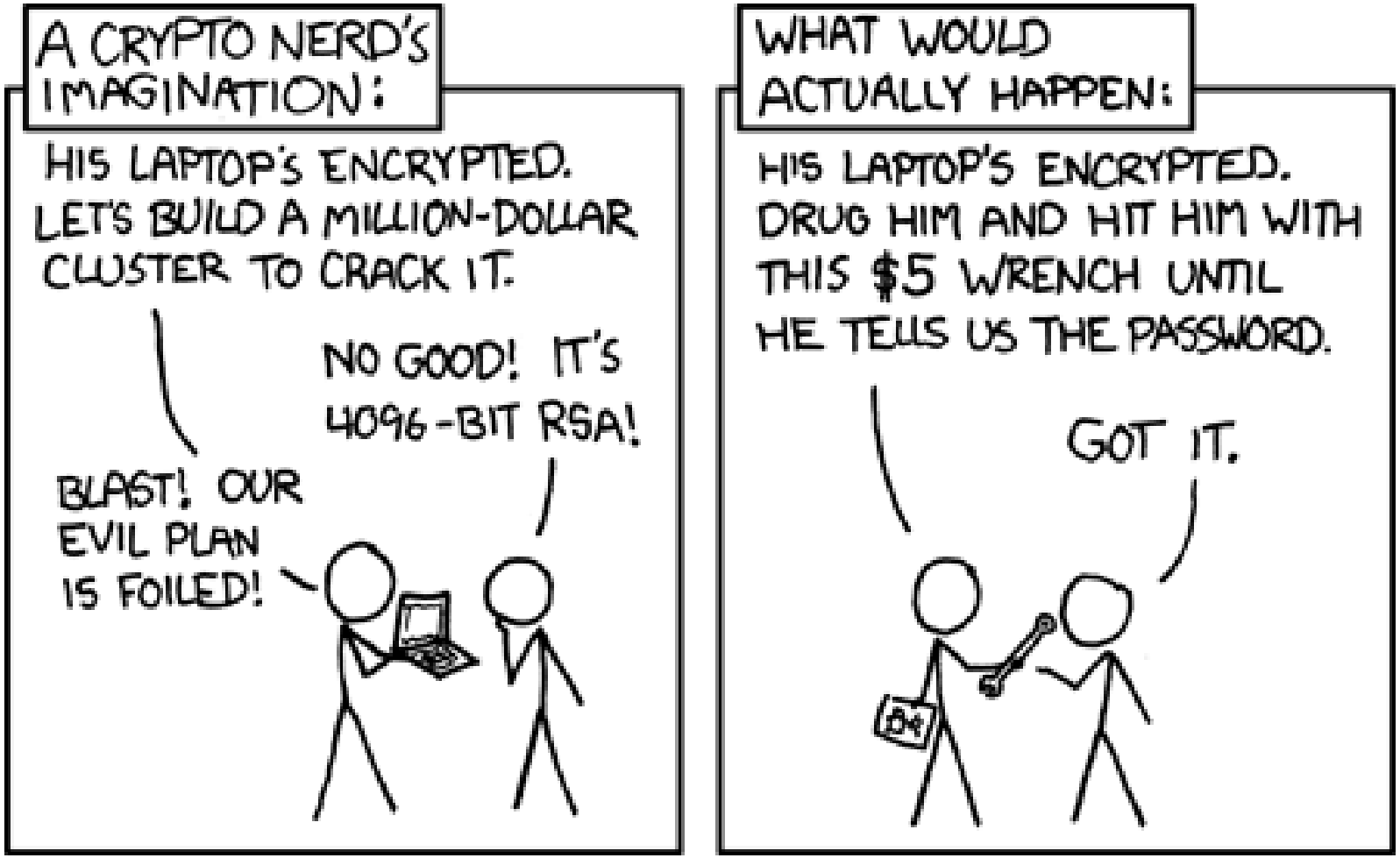

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Features

General

- full encryption vs plaintext metadata
- open source
- plausible deniability ("hidden volume")
- protection against modification
- operating systems (Linux, Windows, Mac OS X, BSD, ...)
- multiple keys

Features

General (LUKS in bold)

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LUKS

- Linux Unified Key Setup

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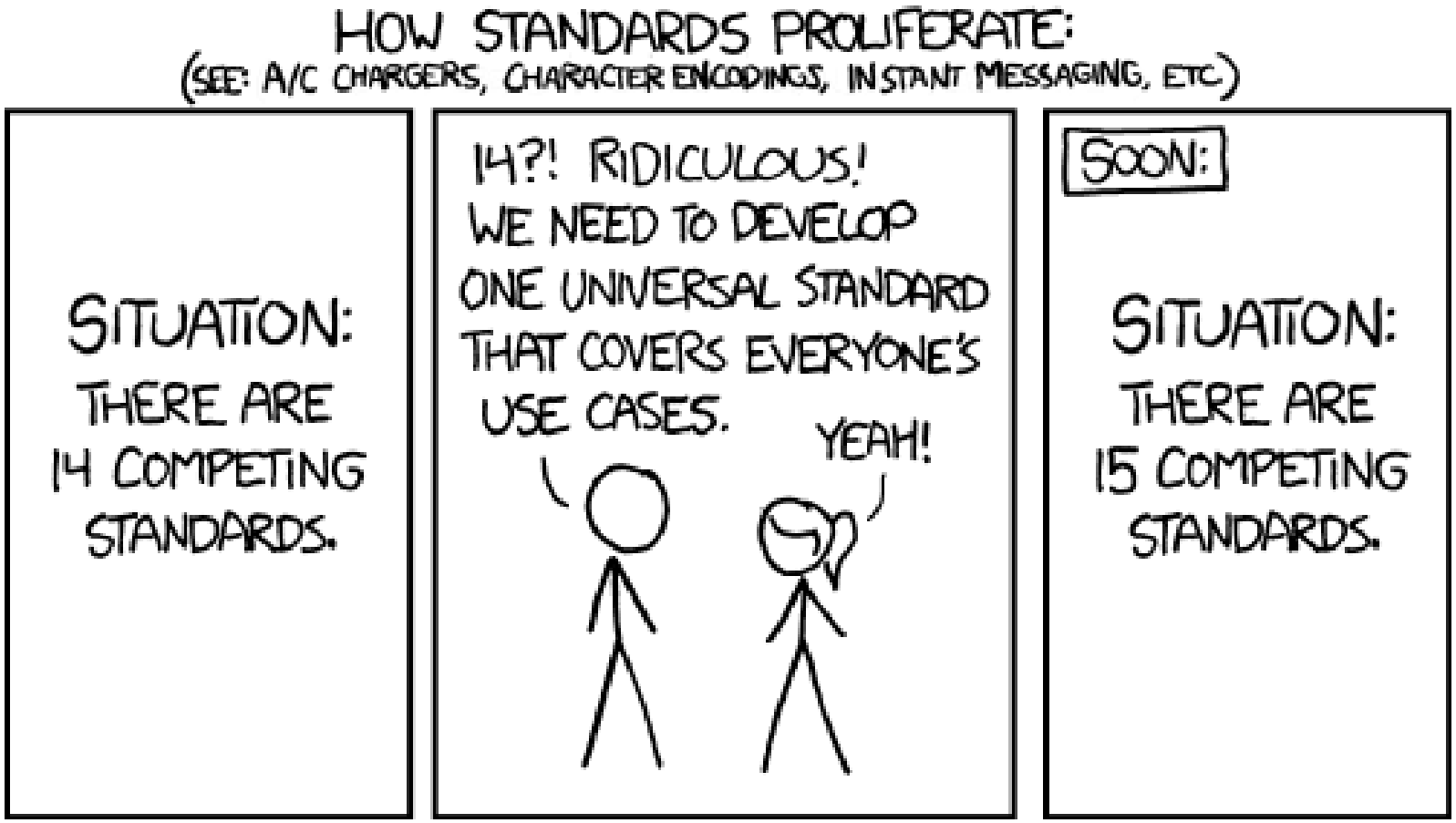

https://www.xkcd.com/927/

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LUKS

- Linux Unified Key Setup
- random master key with eight key slots
- encrypts any block device (commonly: partition)

It's really easy

Using LUKS

```
# cryptsetup -v --type luks --cipher
    aes-xts-plain64 --key-size 256 --hash
    sha256 --iter-time 2000 --use-urandom
    --verify-passphrase luksFormat
    /dev/mydevice
```

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Using LUKS

```
# cryptsetup -v luksFormat /dev/mydevice
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```
# cryptsetup -v luksFormat /dev/mydevice
WARNING!
==========
This will overwrite data on /dev/mydevice
    irrevocably.

Are you sure? (Type uppercase yes): YES
Enter passphrase: correcthorsebatterystaple
Verify passphrase: correcthorsebatterystaple
Command successful.
```

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# cryptsetup luksFormat /dev/mydevice
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Verify passphrase: correcthorsebatterystaple
```

It's really easy

Using LUKS (optional step)

```
# cryptsetup luksOpen /dev/mydevice crypto
Enter passphrase for /dev/mydevice:
    correcthorsebatterystaple

# dd if=/dev/zero of=/dev/mapper/crypto
# cryptsetup luksClose /dev/mapper/crypto
# cryptsetup luskFormat device
WARNING!
========
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Are you sure? (Type uppercase yes): YES
Enter passphrase: correcthorsebatterystaple
Verify passphrase: correcthorsebatterystaple
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It's really easy

Using LUKS

```
# cryptsetup luksOpen /dev/mydevice crypto
Enter passphrase for /dev/mydevice:
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# mkfs.ext4 /dev/mapper/crypto
# mount /dev/mapper/crypto /home
```

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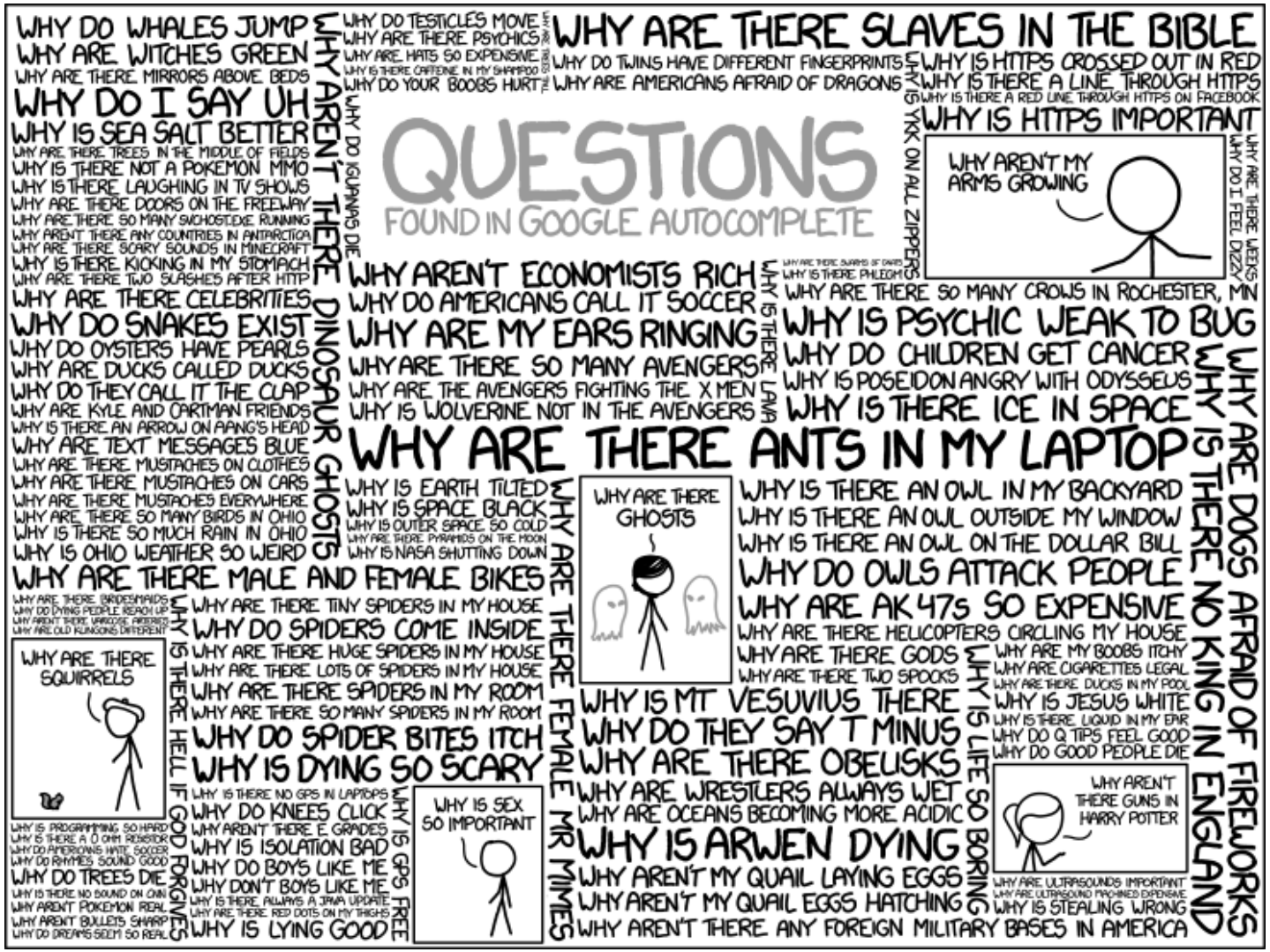
Questions?



https://www.xkcd.com/1256/