Debian and smart cards

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Debian Miniconf Paris, Oct. 2010

Agenda

- Who am I?
- What is a smart card
- Smart cards packages in Debian
- Why use a smart card
- What to buy?
- Online information
- Conclusion

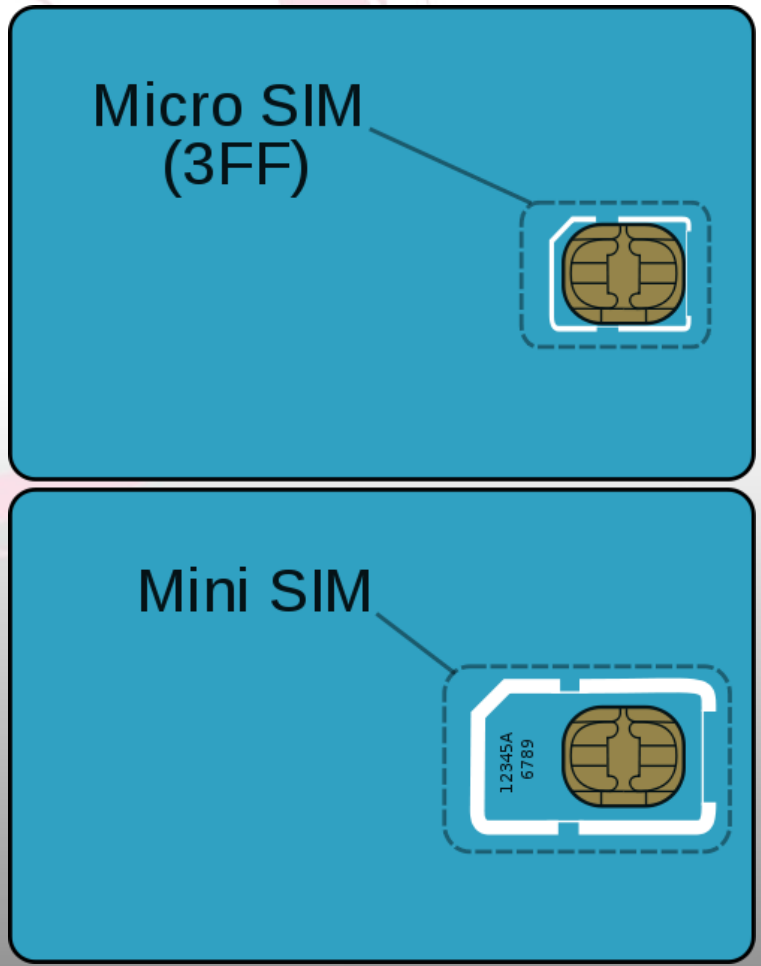
Who am I?

- Debian user since 1998
- Debian Developer since 2001

- Packages I maintain:
  - smart card
    - pcsc-lite ccid pcsc-perl pcsc-tools asedriveiiie coolkey ifd-gempc libmusclecard musclecframework musclet ools pam-pkcs11 pykcs11 pyscard xcardii
  - Palm PDA
    - jpilot jpilot-backup pilot-link plucker
  - Misc
    - bins colormake jhead

What is a smart card?

- Piece of plastic + micro controller
- 3 formats (ISO 7816-1):
  - ID-1 (full size)
  - ID-000 (SIM plugin size)
  - Micro-SIM
- Micro controller (ISO 7816-2)



Communication protocol: ISO 7816-3

- Half duplex communication
- External clock: ~4 MHz
- 2 protocols: T=0, T=1
- ATR: Answer To Reset
- PTS: Protocol Type Selection

- Communication is taken care by the software layers
  - IFD handler (driver)
  - PC/SC layer (middleware)

Commands: ISO 7816-4

- APDU: APplication Data Unit
  - Header: CLAss, INStruction, Parameter 1, Parameter 2
  - Data
- Example: VERIFY
  - 80 20 00 00 04 31 32 33 34

- Lots of commands defined
  - Standards are not complete
  - Cards manufacturers diverge from standards

Private/proprietary specifications

- French banking cards: Carte bancaire B0'
- French health cards: Carte Vitale
- Pay TV cards

It is hard to correctly use such cards...
but not *always* impossible
http://parodie.com/monetique/explorer.htm

Publicly documented specifications

- EMV bank cards
  - http://www.emvco.com/specifications.aspx
- GSM/3G cards
  - GSM 11.11/ETSI 102 221
  - http://en.wikipedia.org/wiki/Subscriber_Identity_Module
- Some National ID/eID cards
  - IAS/ECC: *Identification-Authentification-Signature European-Citizen-Card*
- Some PKI cards
  - SetCOS, ACOS5
- Biometric Passport (ICAO)
  - http://en.wikipedia.org/wiki/Biometric_passport
- OpenPGP card
  - http://www.g10code.de/p-card.html

Programmable smart cards

- JavaCard
  - a free software MUSCLE applet is available
- .NET
  - not yet tried
- BasicCard
  - example: OpenPGP V1 and V2 cards
- Multos
- GlobalPlatform

Debian packages for smart cards

- http://people.debian.org/~rousseau/smartcard.html
- 12 reader drivers
  - libacr38u libacr38ucontrol0 libacr38ucontrol-dev libasedrive-serial libasedrive-usb **libccid** libchipcardc2 libgcr410 libgempc410 libgempc430 libtowitoko2 libtowitoko-dev
- 42 middlewares/libraries
  - coolkey libbeid2 libbeid2-dbg libbeid2-dev libbeidlibopensc2 libbeidlibopensc2-dbg libbeidlibopensc2-dev libcflexplugin libchipcard-ctapi0 libchipcard-data libchipcard-dev libchipcard-libgwenhywfar47-plugins libchipcard-tools libckyapplet1 libckyapplet1-dev libengine-pkcs11-openssl libmcardplugin libmusclecard1 libmusclecard-dev libmusclepkcs11 libmusclepkcs11-dev libopenct1 libopenct1-dbg libopenct1-dev **libopensc2** libopensc2-dbg libopensc2-dev libpam-musclecard libpam-p11 libpam-pkcs11 libpam-poldi libpcscada0.6 libpcscada1-dev **libpcsclite1** libpcsclite-dev libpcsc-perl mozilla-opensc openct pam-pkcs11-dbg pcscada-dbg **pcscd python-pyscard**
- 16 applications
  - beidgui beid-tools esteidutil gnokii gnupg gnupg2 hostapd libchipcard-tools muscletools **opensc** pcsc-tools rdesktop virtualbox-ose wine wpasupplicant xcardii

CCID: Circuit(s) Cards Interface Devices

- USB specification available on http://www.usb.org/
- Define bInterfaceClass = 11 (0x0b)
- Goal: replace all the proprietary protocols by only one

- libccid: free software CCID driver
  - http://pcsclite.alioth.debian.org/ccid.html
  - 180 readers supported (or partly supported)

PC/SC: Personal Computer Smart Card

- Specification from PC/SC workgroup
  - http://www.pcscworkgroup.com/
- Implemented by Microsoft in Windows

- pcsc-lite: free software implementation of the API
  - http://pcsclite.alioth.debian.org/
  - should be the only smart card API used on Unix
    - Apple fork (Roseta)
    - SUN fork (SunRay)

PKCS#11: Cryptographic Token Interface Standard

- RSA labs defined API for PKI tokens
  - smart cards
  - software tokens (Firefox includes one)
  - PCI cards (IBM 4758)

- OpenSC: free software implementation of the API
  - using smart cards
  - https://www.opensc-project.org/opensc

pyscard: Python PC/SC wrapper

- http://pyscard.sourceforge.net/
- Direct PC/SC API
  - fine control of everything
  - I use it to write pcsc-lite Unitary Tests
- Higher level API
  - less code to write

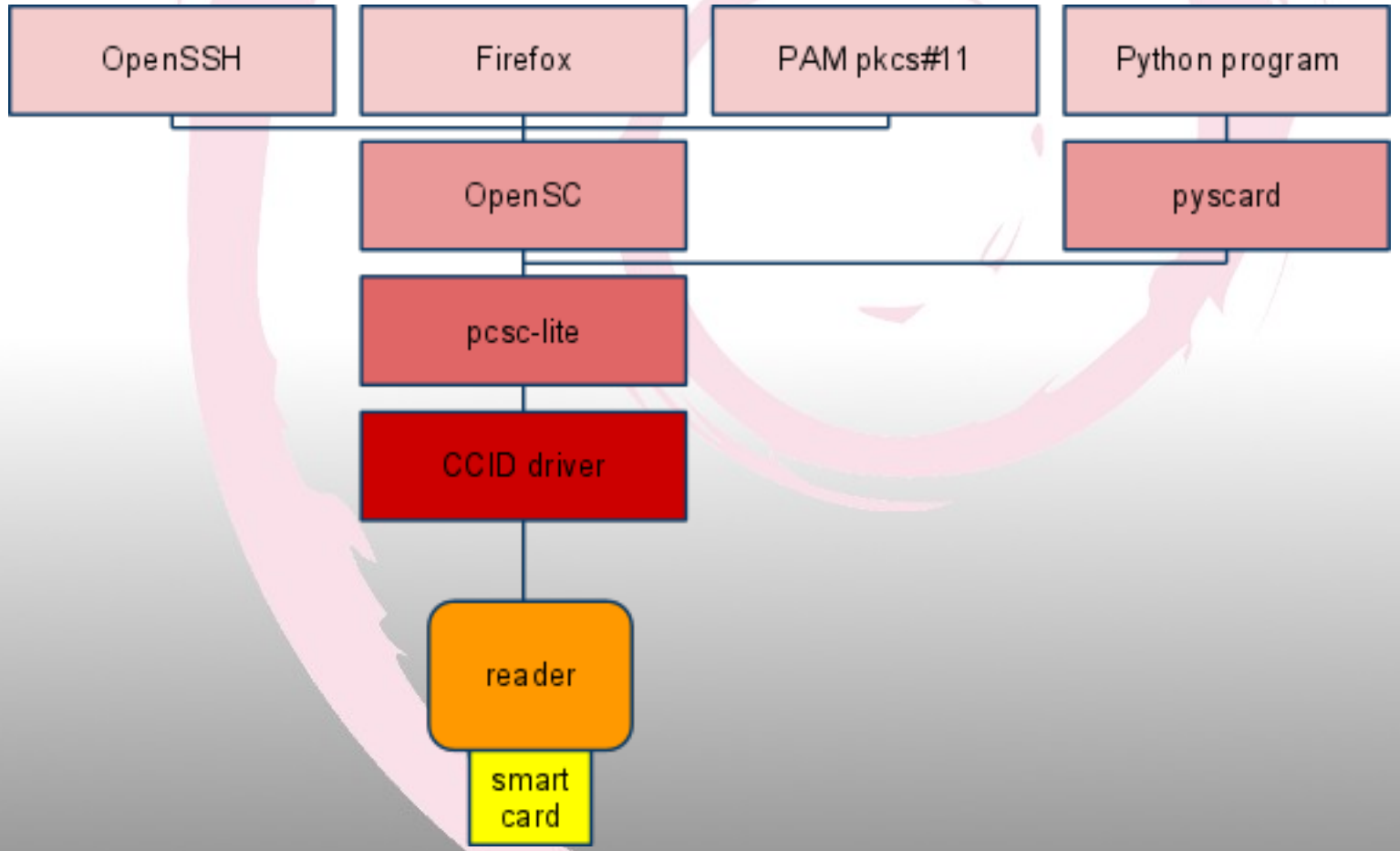
PyKCS11: Python PKCS#11 wrapper

- http://www.bit4id.org/trac/pykcs11
- Low level API
- High level API

- Sample code *soon* available on my blog

Big picture

Many other software are available (but not displayed)



What can a smart card be used for?

- In a computing system (PKI) using PKCS#11
  - Local user authentication (PAM)
  - Web SSL client authentication
  - Mail signature
  - Mail deciphering
  - SSH client authentication

- Two factor authentication
  - what I own: smart card
  - what I know: PIN code

Electronic ID cards

- Some european citizen already have an eID card
  - Estonia http://www.id.ee/?lang=en
- Most european citizens will receive an eID card (soon)
  - Spain http://www.dnielectronico.es/
  - Portuguese
  - France http://www.ants.interieur.gouv.fr/ias/-ias-.html
  - Belgium http://eid.belgium.be/
  - Germany
    - Nov 2010
  - Luxembourg
    - Q1 2011

What to buy?

- Smart card reader
  - CCID reader supported by libccid
  - contact, contactless or both?
- Smart card
  - PKI smart card supported by OpenSC
  - OpenPGP card
  - JavaCard and install the Muscle applet

Online information about smart cards and Free Software

- Wikipedia
- Muscle mailing list
  - http://musclecard.com/list.html
- OpenSC mailing lists
  - https://www.opensc-project.org/opensc/wiki/MailingLists
- My blog
  - http://ludovicrousseau.blogspot.com/

For more information (in french)

Conclusion

- Many smart card programs are in Debian
  - just one "apt-get install" away
- Free Software smart card?
  - all cards contain a proprietary "firmware"

Thanks

- Wikipedia for the images and information
- You for your participation

Questions?