Smartcard Jungle

Using security devices should be easy.

Jean-Michel Pouré
Http://www.gooze.eu

Hands-up!

- How many of your friends use:
  - smartcards,
  - crypto sticks,
  - or one-time passwords (OTPs)?
- How many of your friends use credit cards with a chip?

Preliminary question

- Can you explain why:
  - **so many** people use credit cards ?
  - And **so few** people use security devices?

Possible answers

- Denial: we don’t need security devices.
- Patents: destroyed the market.
- Budgets and size: only large companies.

- We may have to admit ...

Possible answers

- It should be possible to improve the integration and usability of security devices.

- This is one of the reason that we are all here in Brussels to discuss about security at FOSDEM.

Plan

- Part 1: Hardware and standards.
- Part 2: Operating systems.
- Part 3: Applications.
- Conclusion: get a free smartcard.

Part 1

Hardware and standards

Hardware

- Smartcards and tokens

+

=

Hardware

- Smartcards and tokens:
  - May preserve a secret (RSA key).
  - May compute secrets without displaying them.
  - Are inside your wallet (you know you have them).
  - May be destroyed if opened.
- Standards:
  - PCSC: smartcards.
  - PKCS#11: interface.
  - PKCS#15: information formats.

Hardware

- One-time password (OTP) generators.

Hardware

- OATH (Open AuTHentication)
  - HOTP: event-base
    - RFC 4226
  - TOTP: time-based
    - RFC 4226 extension
- Several implementations.

Part 2

Operating Systems

Operating systems

We will focus on libraries
and take the example of single-sing-on
using smartcards.

Windows Vista/7

- One single API: WinScard
  - CSP + CAPI interfaces.
- No PKCS#11 direct interface
  - Each vendor provides a PKCS#11 interface.
  - OpenSC PKCS#11 is available.

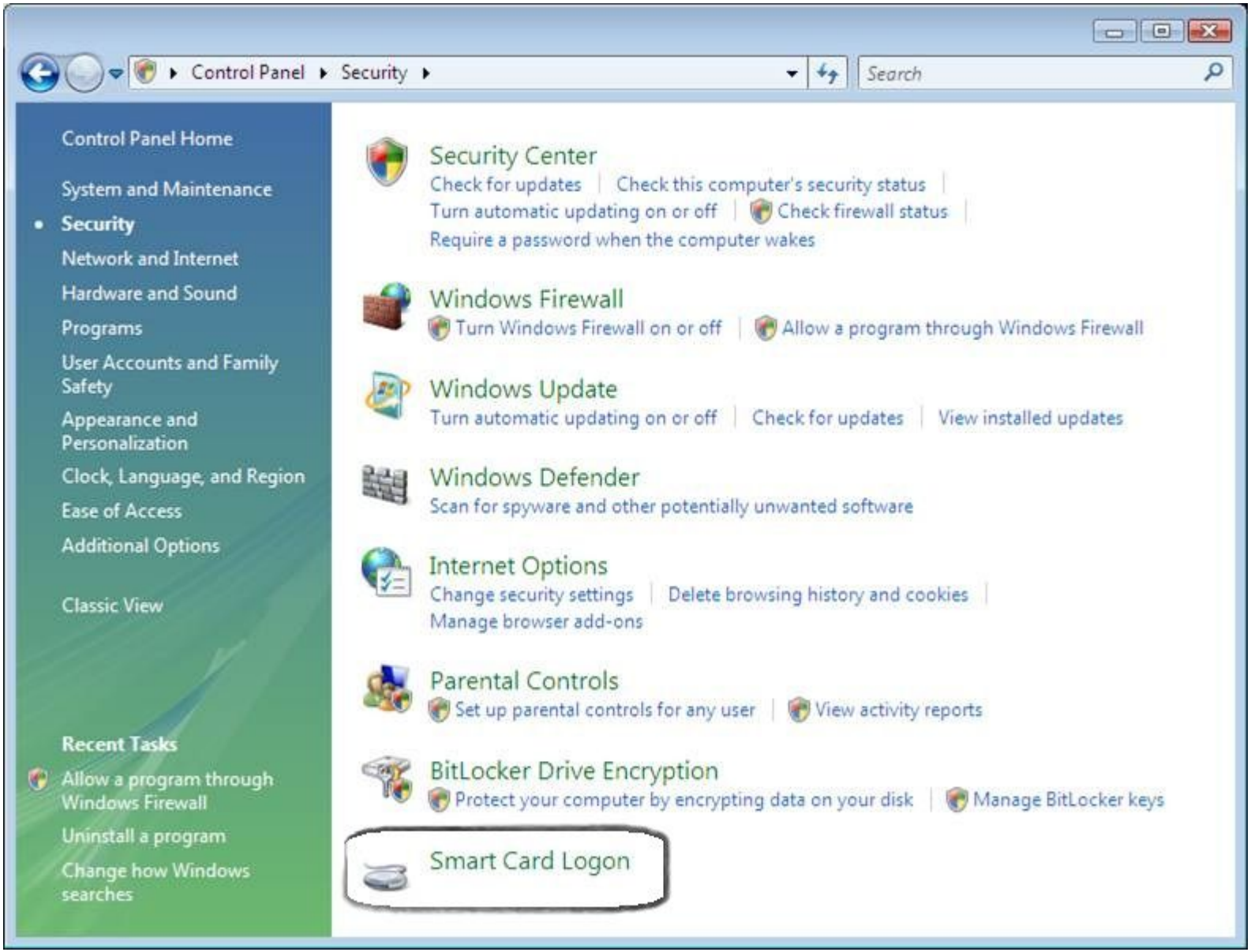
Windows Vista/7

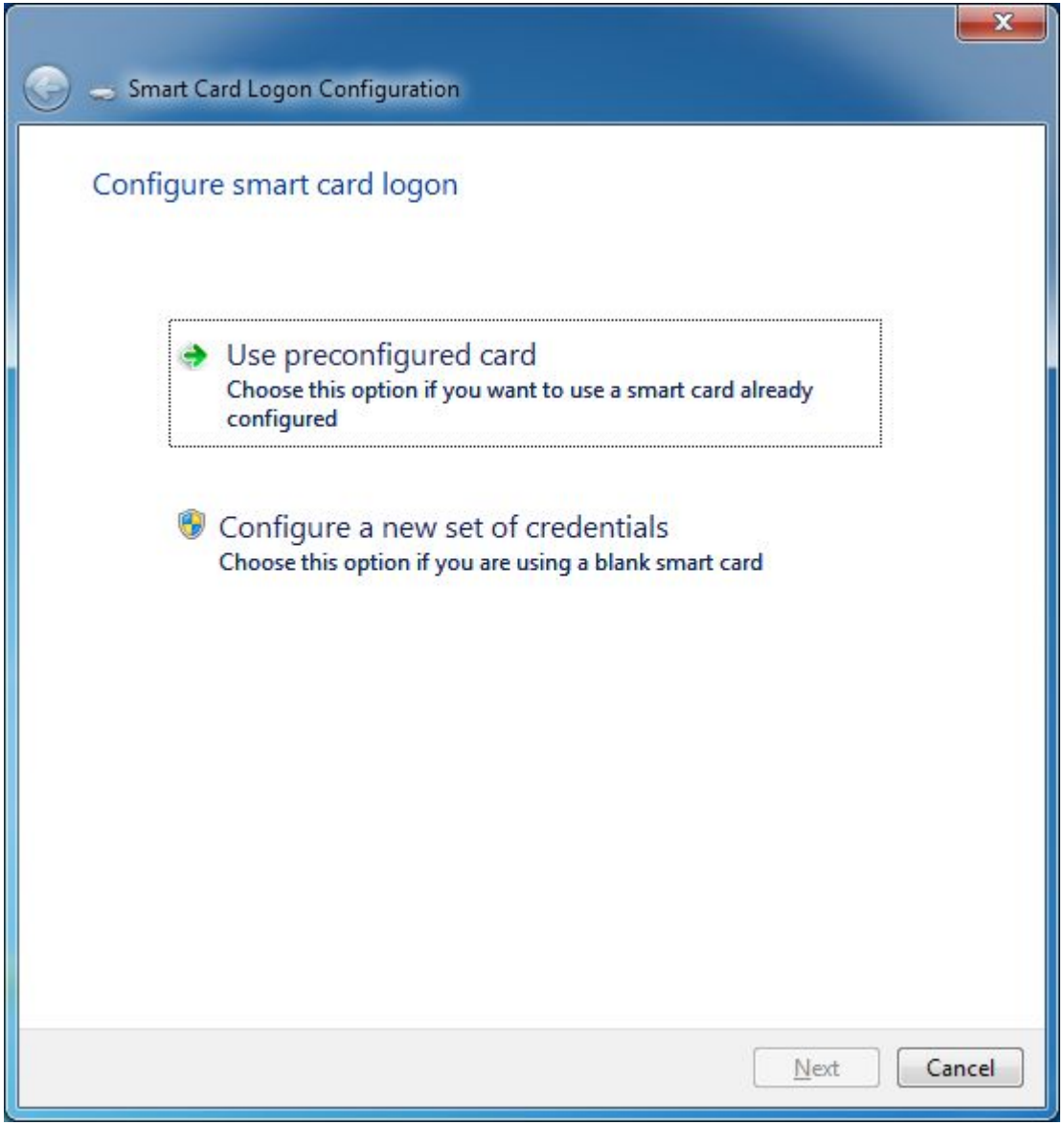
- Smartcard logon can be implemented with Windows 2003 server + CSP interface.

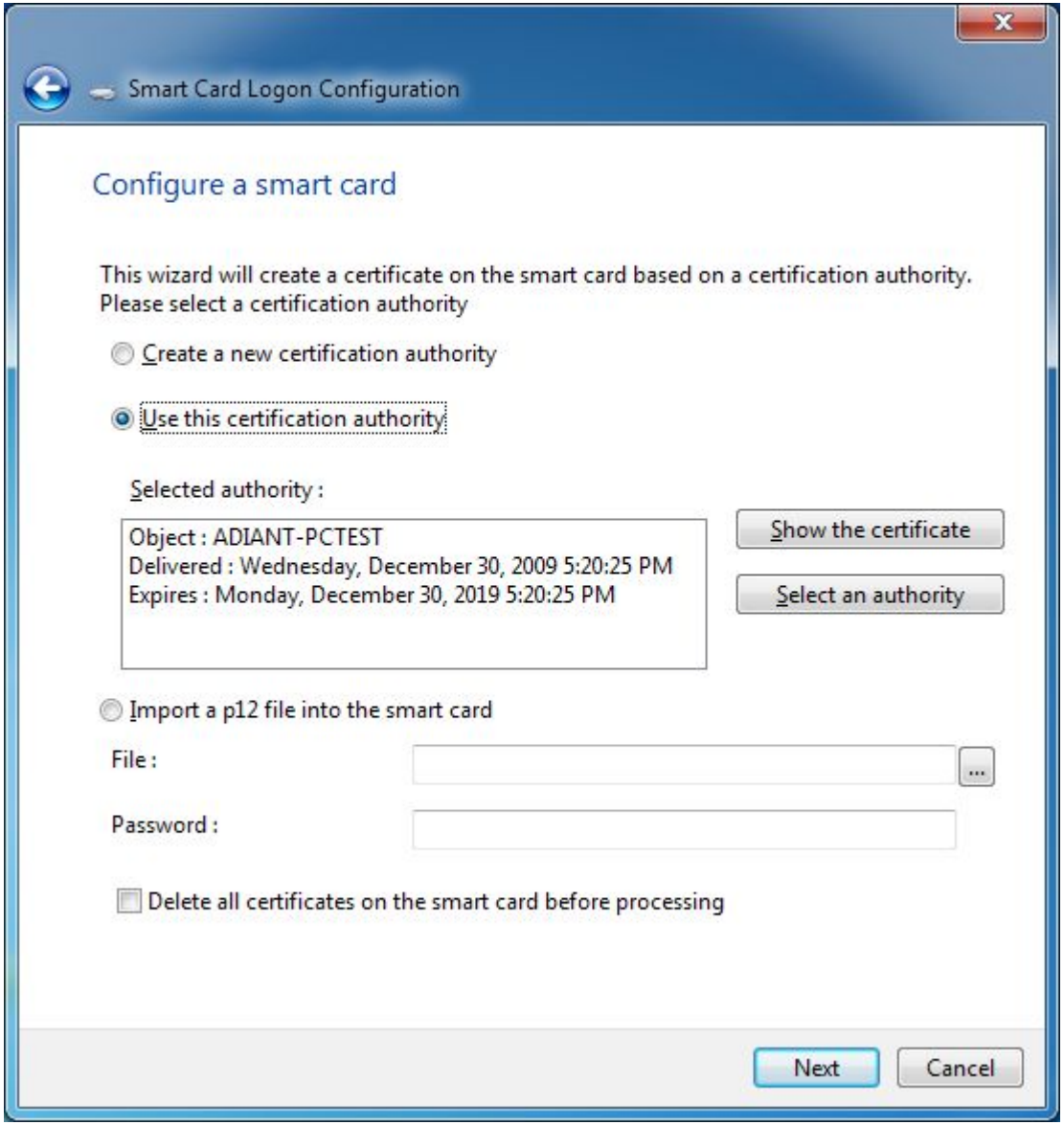
  => This kills the market for smartcards.

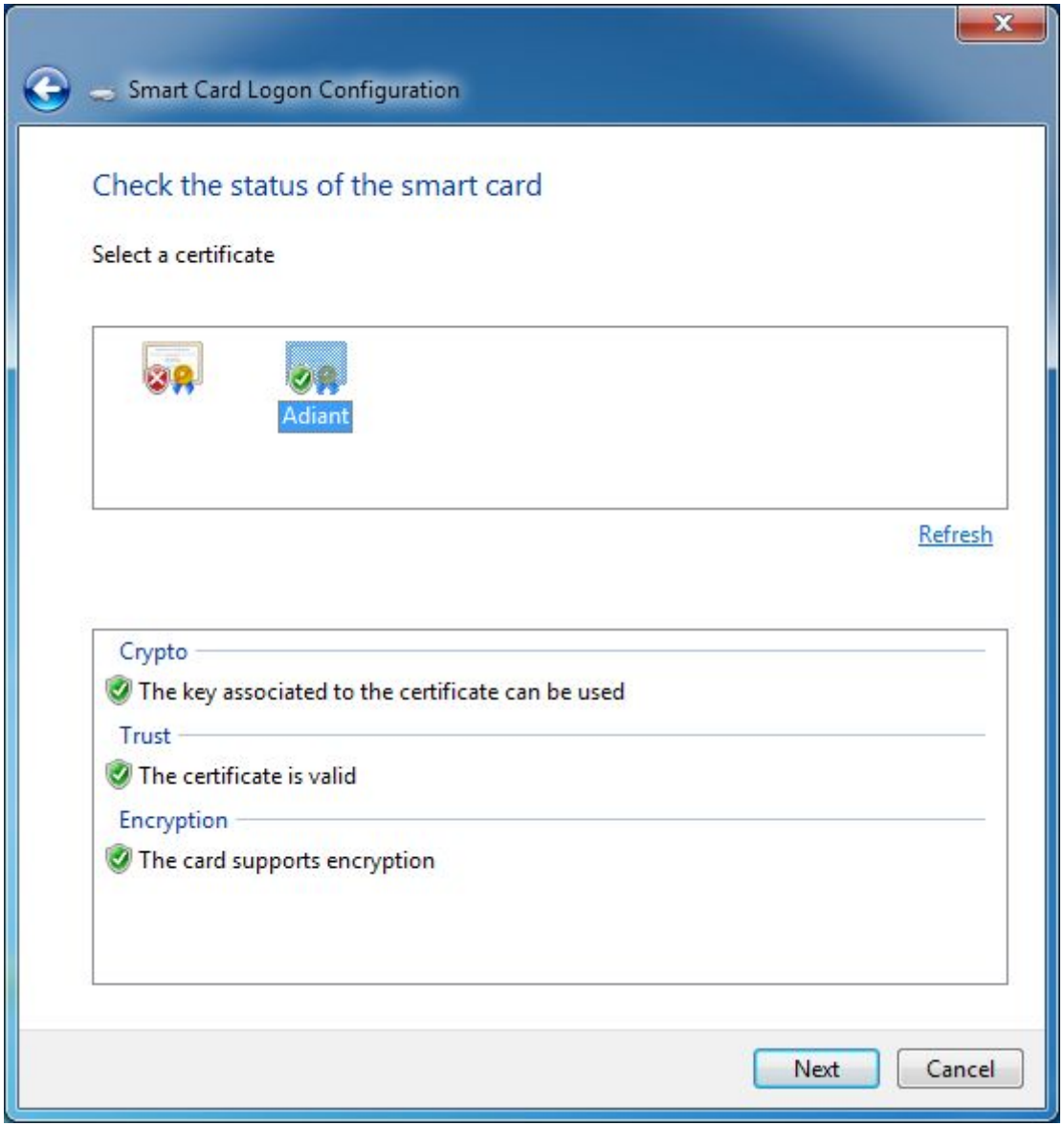
- You may use the free software alternative MySmartLogon.

  => Excellent interface.


Control Panel
Security
Search
Control Panel Home
System and Maintenance
Security
Network and Internet
Hardware and Sound
Programs
User Accounts and Family Safety
Appearance and Personalization
Clock, Language, and Region
Ease of Access
Additional Options
Classic View
Recent Tasks
Allow a program through Windows Firewall
Uninstall a program
Change how Windows searches
Security Center
Check for updates
Check this computer's security status
Turn automatic updating on or off
Check firewall status
Require a password when the computer wakes
Windows Firewall
Turn Windows Firewall on or off
Allow a program through Windows Firewall
Windows Update
Turn automatic updating on or off
Check for updates
View installed updates
Windows Defender
Scan for spyware and other potentially unwanted software
Internet Options
Change security settings
Delete browsing history and cookies
Manage browser add-ons
Parental Controls
Set up parental controls for any user
View activity reports
BitLocker Drive Encryption
Protect your computer by encrypting data on your disk
Manage BitLocker keys
Smart Card Logon


Smart Card Logon Configuration
Configure smart card logon
Use preconfigured card
Choose this option if you want to use a smart card already configured
Configure a new set of credentials
Choose this option if you are using a blank smart card
Next
Cancel


Smart Card Logon Configuration
Configure a smart card
This wizard will create a certificate on the smart card based on a certification authority.
Please select a certification authority
Create a new certification authority
Use this certification authority
Selected authority :
Object : ADIANT-PCTEST
Delivered : Wednesday, December 30, 2009 5:20:25 PM
Expires : Monday, December 30, 2019 5:20:25 PM
Show the certificate
Select an authority
Import a p12 file into the smart card
File :
Password :
Delete all certificates on the smart card before processing
Next
Cancel


Smart Card Logon Configuration
Check the status of the smart card
Select a certificate
Adiant
Refresh
Crypto
The key associated to the certificate can be used
Trust
The certificate is valid
Encryption
The card supports encryption
Next
Cancel


Smart card PIN change
SCM Microsystems Inc. SCR33x USB Smart Card Reader 0
Enter your old PIN and your new PIN.
PIN
New PIN
New PIN confirmation
Other Credentials
Cancel
FR
Windows Vista Ultimate

GNU/Linux and Unixes

- PCSC muscle framework:
  - CCID subsystem (standard).
- OpenSC
  - PKCS#11 library.
  - OpenSC utilities.

GNU/Linux and Unixes

- Single-logon:
  - Pam-p11
    - SSH mapper.
  - Pam-pkcs11
    - LDAP, SSH, Kerberos mappers.
- No graphical interface
  for setting up single-logon

Mac OS X

- PCSC muscle framework.
- Tokend framework.

Mac OS X

- Single log-on
  - Terrible to set-up using XML files.
  - A lot of people tried, very few succeded.

Mac OS X 10.4: Enabling smart card login - Iceweasel

Fichier Édition Affichage Historique Marque-pages Outils Aide

http://support.apple.com/kb/TA24244?viewlocale=en_US

Admin | Shipping quotes | Conditional actions | Modules | Recent log entries | Available updates | Traduction de l'interf... | Translations | Langues

Mac OS X 10.4: Enabling smart ...

Store | Mac | iPod | iPhone | iPad | iTunes | Support

Mac OS X 10.4: Enabling smart card login

Last Modified: October 04, 2008 **Old Article:** 304035

Article: TA24244

Products Affected

Mac OS X 10.4

Mac OS X 10.4 Tiger greatly enhances integration for smart cards, as described in this advanced article. The configuration required is much simpler than in previous Mac OS X versions.

Important: The format of the configuration file and the scripts used to configure smart card login have changed from Mac OS X 10.3.x. Do **not** copy or use these files directly from a previous version of Mac OS X, or it may make the system unusable. It is no longer necessary to manually run pcscd, as this daemon is started automatically by Mac OS X when it detects a smart card reader.

It is safe to install a successfully modified /etc/authorization to enable smart card login on any client system, even those without smart card readers. If no reader or card is present, the user will continue to see the default login window, and there will be no performance impact.

To support login with a smart card on Mac OS X 10.4, the card must support signing with a public key. In addition, the card

Terminé

Mac OS X 10.4: Enabling smart card login - Iceweasel

Fichier Édition Affichage Historique Marque-pages Outils Aide

http://support.apple.com/kb/TA24244?viewlocale=en_US

Admin | Shipping quotes | Conditional actions | Modules | Recent log entries | Available updates | Traduction de l'interf... | Translations | Langues

Mac OS X 10.4: Enabling smart ...

To support login with a smart card on Mac OS X 10.4, the card must support signing with a public key. In addition, the card itself must have a plugin, known as a tokend, that can communicate with securityd and the card itself.

Tokends installed with Mac OS X 10.4

There are three tokends installed as part of the base Mac OS X installation.

Tokend	Smart card specification
"CAC"	US Federal Government: CAC: Common Access Card GSC-IS: Government Smart Card Interoperability Specification v2.1
"BELPIC"	Belgian Personal Identity Card
"JPKI"	Japanese Public Key Infrastructure card

Smart cards that are not compliant with the specifications listed above would require a supporting tokend be installed for the smart card to be recognized and available to applications.

Enabling smart card login

Enabling smart card login is controlled through entries in the /etc/authorization file. Perform the following steps in Terminal to modify the authorization file.

1. Execute this command: `sudo -s`
2. Execute this command: `cd /etc`
3. Execute this command: `cp authorization authorization.orig`
4. Execute this command: `cp authorization /tmp/authorization.mod`
   Don't quit Terminal.
5. Next, edit the "/tmp/authorization.mod" file in pico, or your favorite text editor, or the plist editor that comes with the Apple Developer Kit.

Terminé

Mac OS X 10.4: Enabling smart card login - Iceweasel

Fichier Édition Affichage Historique Marque-pages Outils Aide

http://support.apple.com/kb/TA24244?viewlocale=en_US

Admin | Shipping quotes | Conditional actions | Modules | Recent log entries | Available updates | Traduction de l'interf... | Translations | Langues

Mac OS X 10.4: Enabling smart ...

5. Next, edit the "/tmp/authorization.mod" file in pico, or your favorite text editor, or the plist editor that comes with the Apple Developer Kit.
6. Make the following changes to the"mechanisms" Array inside the "system.login.console" rights:
   - After the string "<string>builtin:auto-login,privileged</string>" add the string "<string>builtin:smartcard-sniffer,privileged</string>"
   - After the string "<string>builtin:reset-password,privileged</string>" remove the string "<string>authinternal</string>" then add string "<string>builtin:authenticate,privileged</string>"
7. Make the following changes to the "mechanisms" Array inside the "authenticate" rules:
   - add the following string to the beginning of the array "<string>builtin:smartcard-sniffer,privileged</string>"
   - after the string "<string>builtin:authenticate</string>" remove the string "<string>authinternal</string>" then add the string "<string>builtin:authenticate,privileged</string>"
8. After saving the changes, go back to Terminal and execute the following command (while still in the sudo -s session):

```
cp /tmp/authorization.mod /etc/authorization
```

This final step will replace the system's active authorization file with your edited version. These changes take place immediately so you do not need to restart.

Terminé

Mac OS X 10.4: Enabling smart card login - Iceweasel

Fichier Édition Affichage Historique Marque-pages Outils Aide

http://support.apple.com/kb/TA24244?viewlocale=en_US

Admin | Shipping quotes | Conditional actions | Modules | Recent log entries | Available updates | Traduction de l'interf... | Translations | Langues

Mac OS X 10.4: Enabling smart ...

Developer Kit.

6. Make the following changes to the"mechanisms" Array inside the "system.login.console" rights:
   - After the string "<string>builtin:auto-login,privileged</string>" add the string "<string>builtin:smartcard-sniffer,privileged</string>"
   - After the string "<string>builtin:reset-password,privileged</string>" remove the string "<string>authinternal</string>" then add string "<string>builtin:authenticate,privileged</string>"
7. Make the following changes to the "mechanisms" Array inside the "authenticate" rules:
   - add the following string to the beginning of the array "<string>builtin:smartcard-sniffer,privileged</string>"
   - after the string "<string>builtin:authenticate</string>" remove the string "<string>authinternal</string>" then add the string "<string>builtin:authenticate,privileged</string>"
8. After saving the changes, go back to Terminal and execute the following command (while still in the sudo -s session):

```
cp /tmp/authorization.mod /etc/authorization
```

This final step will replace the system's active authorization file with your edited version. These changes take place immediately so you do not need to restart.

Smart cards and Directory Services

Part of the login process is to do a lookup for the expected user in a directory service such as Open Directory, LDAP, or Active

Terminé

Mac OS X 10.4: Enabling smart card login - Iceweasel

Fichier Édition Affichage Historique Marque-pages Outils Aide

http://support.apple.com/kb/TA24244?viewlocale=en_US

Admin | Shipping quotes | Conditional actions | Modules | Recent log entries | Available updates | Traduction de l'interf... | Translations | Langues

Mac OS X 10.4: Enabling smart ...

Part of the login process is to do a lookup for the expected user in a directory service such as Open Directory, LDAP, or Active Directory. The first and recommended method to link a smart card user with a record in a directory service is to add the hash of the public key to the user's directory record. This is the most convenient and most secure way of identifying a smart card user. The second method is to lookup the user based on values drawn from the email signing certificate as required for the US Federal Government smart card use.

A script is preinstalled to assist you in binding a smart card to a user's local directory domain record. This is /usr/sbin/sc_auth:

```
myhostname#  /usr/sbin/sc_auth -h
Usage:  sc_auth accept [-v] [-u user] [-k keyname] # by key on inserted card(s)
        sc_auth accept [-v] [-u user] -h hash # by known pubkey hash
        sc_auth remove [-v] [-u user] # remove all public keys for this user
        sc_auth hash [-k keyname] # print hashes for keys on inserted card(s)
```

An example of the output from this for a US Department of Defense Common Access Card is:

```
myhostname% sc_auth hash
01C2F20D8964BE7701B57B63B0A1795B8F2604C1 Identity Private Key
443F30C356E676F447CD4DA89F46CC0CCED19737 Email Signing Private Key
4845564C1F8C6B378C19B8F262CE422933CF1FD1 Email Encryption Private Key
```

To add a user to the local directory

```
myhostname% sudo sc_auth accept -u myuser -h 01C2F20D8964BE7701B57B63B0A1795B8F2604C1
```

...where "01C2F20D8964BE7701B57B63B0A1795B8F2604C1" is the hash for the key associated with the Identity Private Key. Refer to the script for further usage instructions. You will need to run this as a user authorized to modify the directory. In this example, any of the hash entries listed could have been used for associating the card to the account. If desired, more than one smart card can be associated with a single user account by running the script again with the hash from the additional card(s).

Terminé

Mac OS X

It takes 8 pages to reach the end.

End of part 2

Single sign-on:

- Windows: buy Windows $erver .
- GNU/Linux: satisfactory, but not GUI.
- Mac OS X: impossible to set-up.

As a result … « peut-mieux faire ».

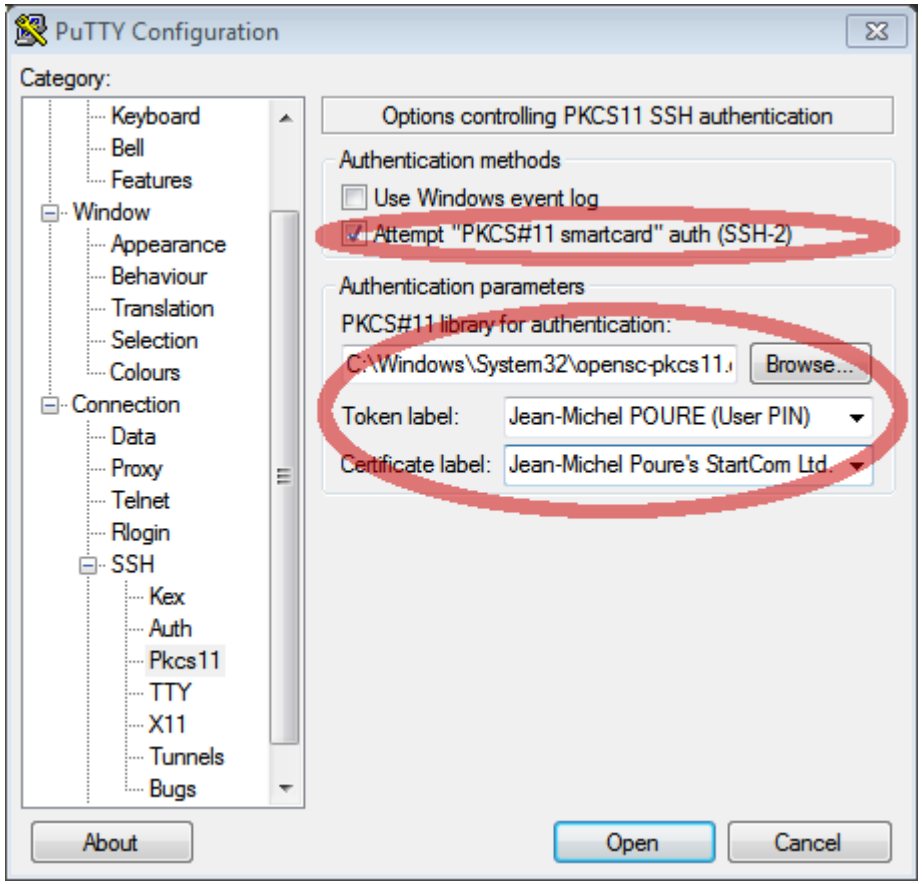
Part 3: applications

The rule:

Smartcard features are
Always hidden
and/or difficult to set up.

Here are a few examples:

Putty

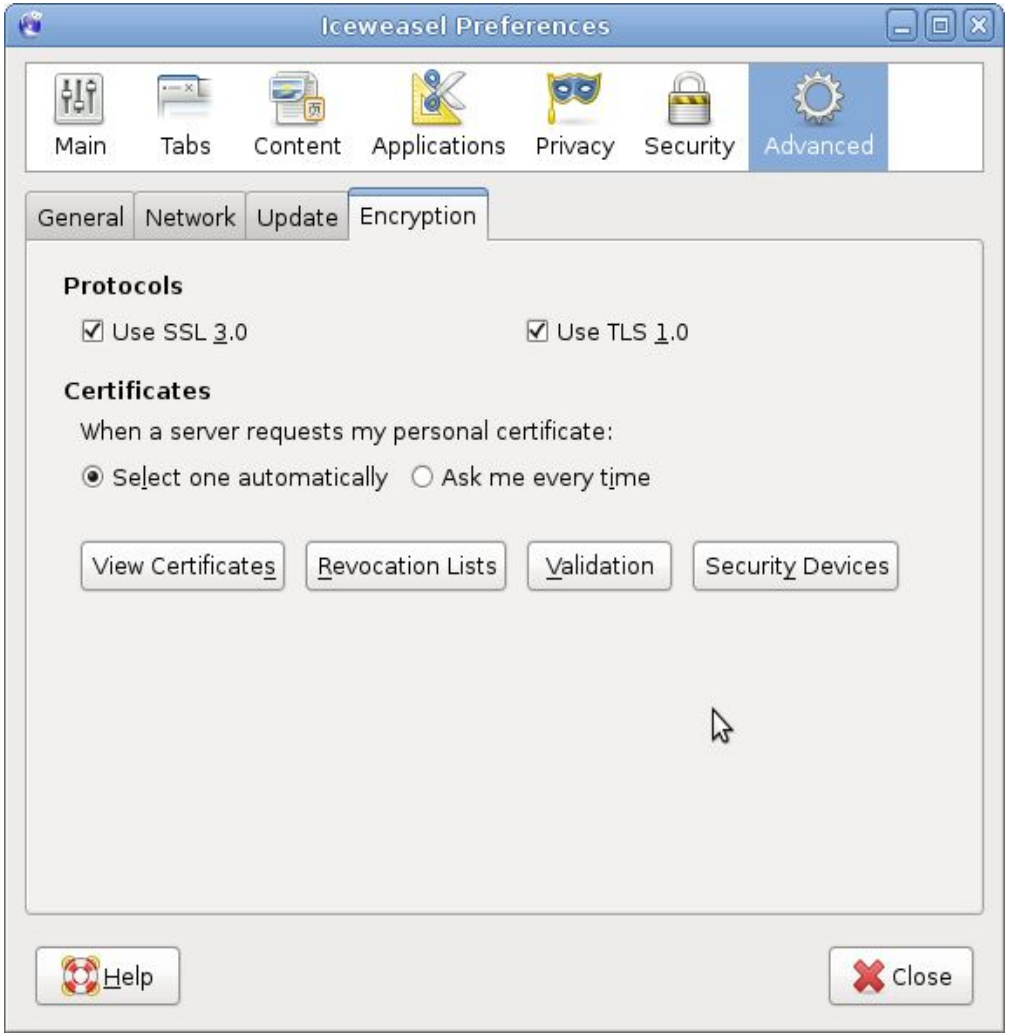

PuTTY Configuration
Category:
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Kex
Auth
Pkcs11
TTY
X11
Tunnels
Bugs
Options controlling PKCS11 SSH authentication
Authentication methods
Use Windows event log
Attempt "PKCS#11 smartcard" auth (SSH-2)
Authentication parameters
PKCS#11 library for authentication:
C:\Windows\System32\opensc-pkcs11.
Browse...
Token label:
Jean-Michel POURE (User PIN)
Certificate label:
Jean-Michel Poure's StartCom Ltd.
About
Open
Cancel

OpenSSH client

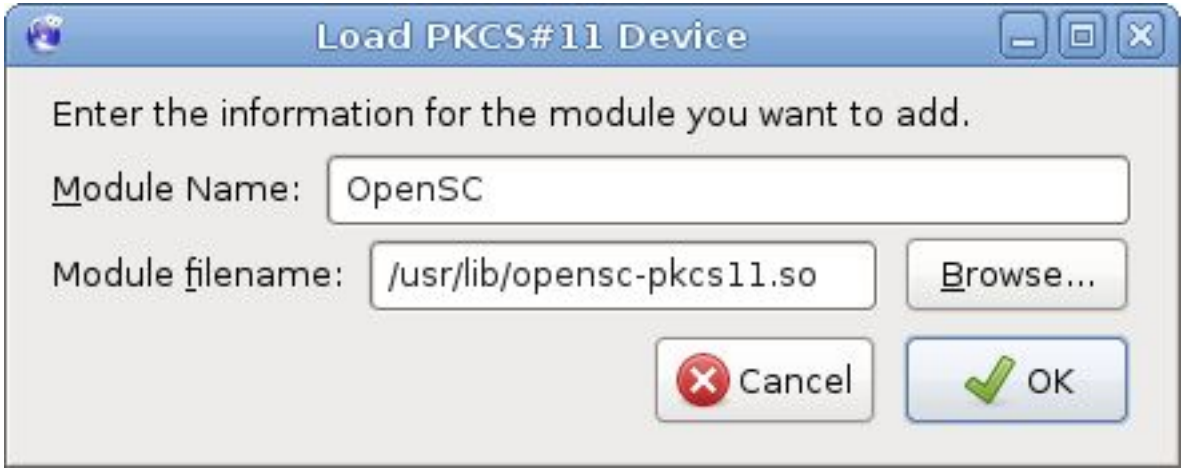
- Adding the key:
  - ssh-add -s /usr/lib/pkcs11.so to add
- Remove the key:
  - ssh-add -d /usr/lib/pkcs11.so to remove

Patches available since 2006. Never implemented using OpenSC. OpenSSH finally used its own PKCS#11 library. Implementation not complete.

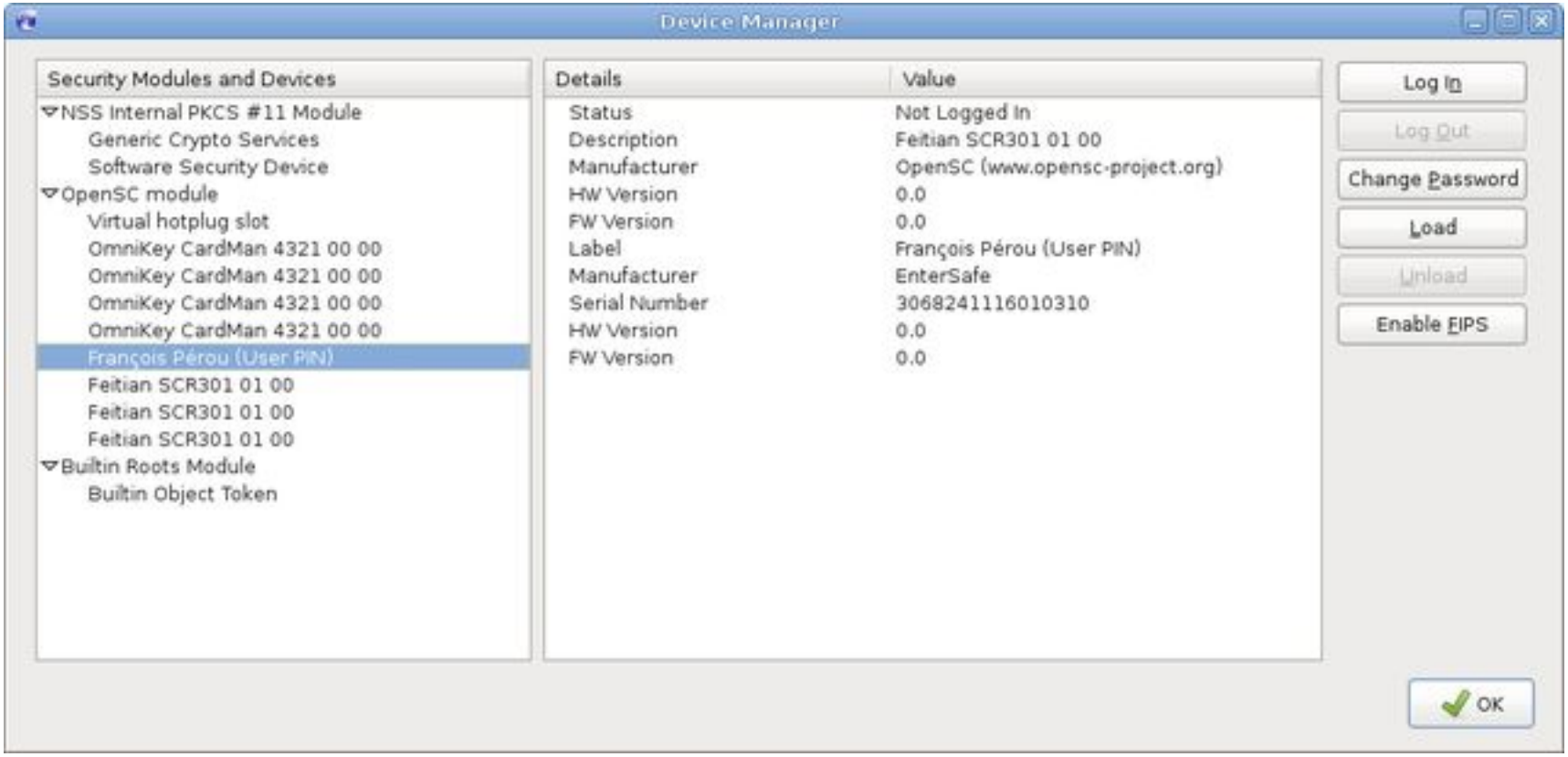
Firefox / Iceweasel



Firefox / Iceweasel



Firefox / Iceweasel



Conclusion

- Muscle and OpenSC provide a complete solution. Soon available a new CSP driver for Windows. All this seems very exciting.
- Integration of frameworks in OS (logon) and applications is poor and can be enhanced.
- Credit cards are a success because you simply need to insert, enter PIN code and it works.
- Other conclusions will come during the day.

Get a free smartcard

And start contributing to OpenSC.