

# GPG - GNU Privacy Guard

How to use

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1 Why

2 Cryptography

3 PGP

4 KPGG-Assistant

5 -Key-Manager

6 -Editor

7 GPG4Win

8 Enigmail

# Agenda

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- 2 Cryptography
- 3 PGP
- 4 KGPG-Assistant
- 5 -Key-Manager
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- 7 GPG4Win
- 8 Enigmail

# Why to use cryptography in the computer/Internet age

## Privacy

- Privacy and digital privacy is a **human right**

## Digital privacy means

- keeping your appropriate digital data, files, accessible only by you
- keeping your digital communication not readable, accessible by third party members (through encrypting the information before sending)

## Public data

- a data sent through the Internet is public (i.e. readable, accessible by third party members), if the data is not encrypted !

## It is YOUR task to take care about your digital privacy !

- Nobody else, but YOU, have interest in it !

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# Cryptography

## Cryptography

- you encrypt a readable text (or a file) to an unreadable text (or file) using a key
- you can decrypt the file with a key

## Symmetric-key cryptography

- for encryption and decryption the same key will be used

## Public-key cryptography (asymmetric key cryptography)

- a public key and private key pair will be generated
- the public key is used for encryption
- the private key is used for decryption

# Public key cryptography

## History

### Assymmetric key cryptography

- 1976 - the paper of Diffie-Hellman: the theory of it.
  - they could not find such a system

### RSA algorithm

- 1978 - Rivest, Shamir, Adleman: a working algorithm for the public key cryptography

### PGP - Pretty Good Privacy

- 1991 - Zimmermann: algorithm and computer program

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- 7 GPG4Win
- 8 Enigmail



# Public key cryptography

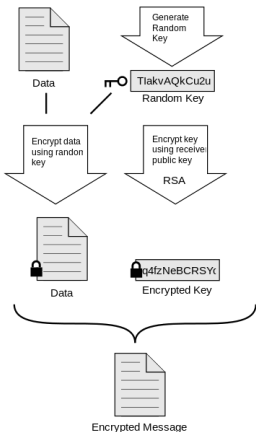
## PGP features

### PGP

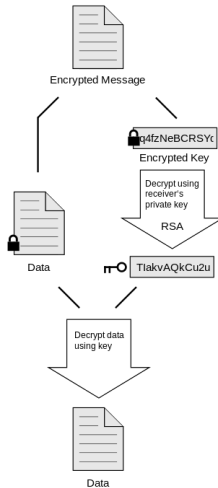
- 1991 - Zimmermann: algorithm and computer program:
  - for data encryption and decryption that provides cryptographic privacy and authentication for data communication
  - it uses for encryption a combination of hashing, data compression, symmetric-key cryptography and public-key cryptography
  - the public key is bound to the name and/or email- address
- PGP is used
  - for encryption, decryption and signing ...
  - ... for texts, e-mails, files, directories, and whole disk partitions

# How PGP works

## Encrypt



## Decrypt



# PGP, OpenPGP, GPG

## PGP

- is available without a fee but is not really free software

## OpenPGP

- it is a free software without patent problems
- is a standard of the IETF (Internet Engineering Task Force)
- last version of OpenPGP is defined in RFC 4880 (Nov.2007)

## GPG, GnuPG - Gnu Privacy Guard

- a project of the Free Software Foundation
  - OpenPGP specification implemented under GPL
- is freely available together with all source code
- is maintained separatly from GUIs, which use GPG
- <http://www.gnupg.org/>

## Versions of GnuPG

### GnuPG v-1.4

- compliant with OpenPGP described in RFC 4880.
- the standalone version of OpenPGP
  - no support for S/MIME and for key servers
  - no other tools, usefull for desktop environments
  - mostly used for servers and embedded platforms
- Debian package: gnupg

### GnuPG v-2.0

- compliant with OpenPGP described in RFC 2440 (Nov 1998)
- can be set to be compliant to RFC 4880
- the modularized version of OpenPGP
  - support for S/MIME, key servers
  - with tools, usefull for desktop environments
  - used for desktop environments
- Debian package: gnupg2

# GUI for GnuPG

## GUI for GPG is available for almost all OS

- Linux
  - KGPG - the KDE GUI
  - Seahorse - the GNU GUI
- other OS
  - GPG4Win (MS Windows)
  - MacGPG (Mac OS)
  - iPGMail (iOS)
  - APG (Android)

## Enigmail - a Thunderbird plugin which uses GPG

# Using GnuPG in Debian and Ubuntu

kgpg - the best GUI

## Packages to install

- apt-get install gnupg2
- apt-get install kgpg
- apt-get install Seahorse

## Packages for use with Mozilla Thunderbird

- apt-get install thunderbird/icedove
- apt-get install enigmail

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- 1 Why
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- 8 Enigmail

# KGPG Assistant

## KGPG Assistant

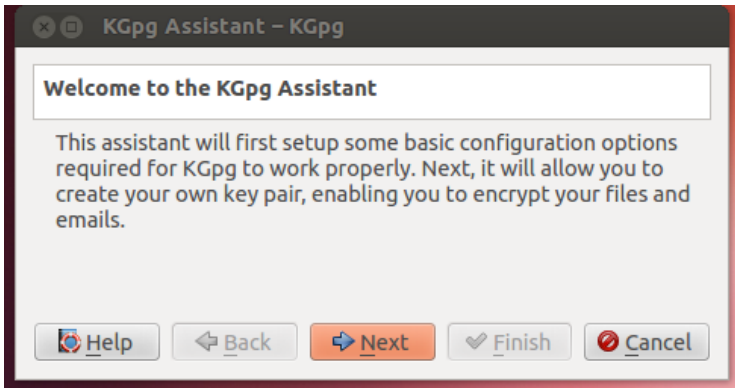
- At the first start of KGPG the Assistant window will be started
- Some basic configuration will be carried out
  - you can confirm the default values for KGPG, by clicking Next, except two values:
- Do unmark the settings for:
  - Generate new key
  - Start KGpg automatically by starting KDE
- Finish configuration

The next slides show you the configuration step-by-step

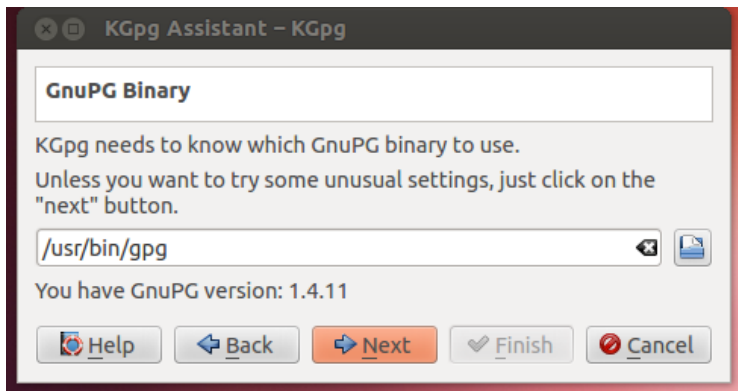


# KGPG Assistant

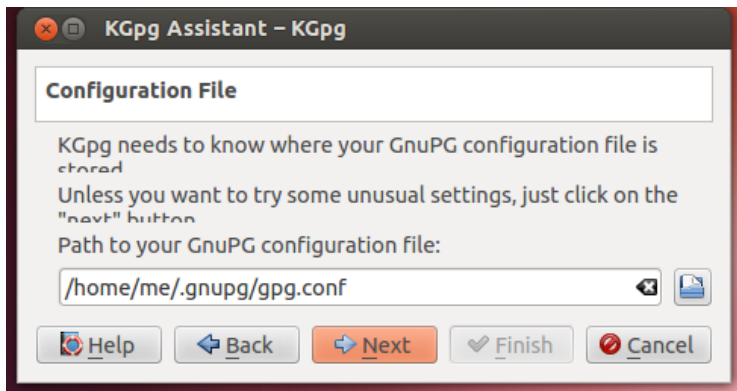
Starting



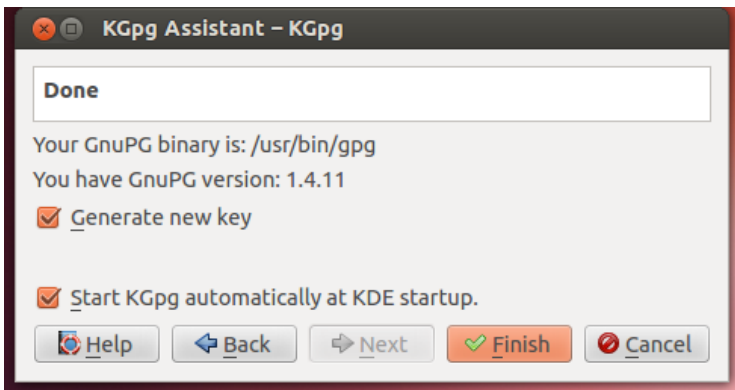
# KGPG Assistant



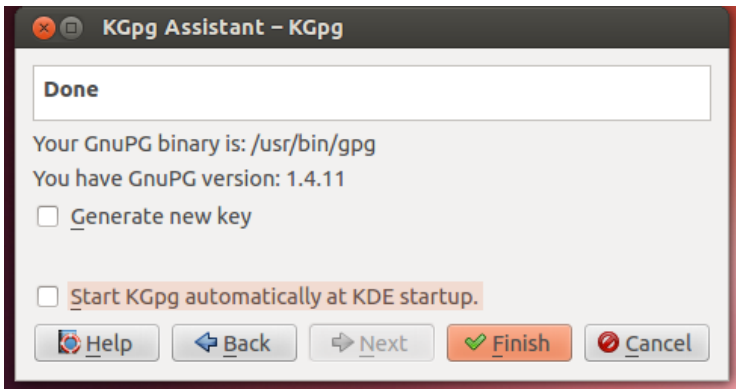
# KGPG Assistant



# KGPG Assistant



# KGPG Assistant



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# Using KGPG

## Parts

### Parts of KGPG

- Key Manager
  - start it by: `kgpg -k`
- Editor
  - start it by: `kgpg -d`
- you can start the KGPG Editor from the Key Manager
  - File / Open Editor
- you can start the Key Manager from the Editor
  - File / Open Key Manager

# Using KGPG

## Key Manager - Main features I.

### Features of the Key Manager

- Generation of private/public key pairs
  - extrem important to set a passphrase for the private key
  - choose a long, secure, memorable passphrase
  - if you forgot your passphrase you lost all data which you have/got encrypted (files, emails) - you can not decrypt them anymore !
- Exporting your private/public keys
  - always do it !!
  - write them to a CD and put them in your safe
  - print them and put the printout them in your safe
- Creating revocation certificate for the own public key
  - store it as your private/public key (write to CD/ print it out)
- Changing values in the own public key
  - adding further email addresses
  - changing expiration date
  - adding photo



# Using KGPG

## Key Manager - Main features II.

### Features of the Key Manager

- Importing public keys from files
- Listing public keys and their details
  - name, email address, key-ID, length of the key, expiration date, etc.
- Setting the level of trust for public keys
  - ultimately, fully, marginally, I do NOT trust, I do not know
- Signing public keys
- Using key servers
  - uploading the public key
  - searching for public keys, names, email addresses
  - using more key servers

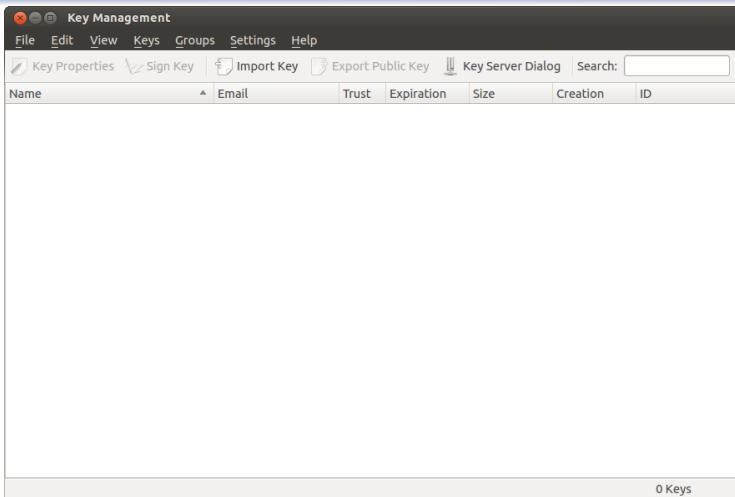
# Using KGPG starting

After starting KGPG you get



# Using KGPG key manager

## Key management window



Menu item: Key / Generate key pairs



# Using KGPG key manager

Generate key pair window

**Key Generation - KGpg**

**Generate Key Pair**

Name:

Email:

Comment (optional):

Expiration:

Key size:

Algorithm:

# Using KGPG key manager

Generate key pair window

**Key Generation - KGpg**

**Generate Key Pair**

Name:

Email:

Comment (optional):

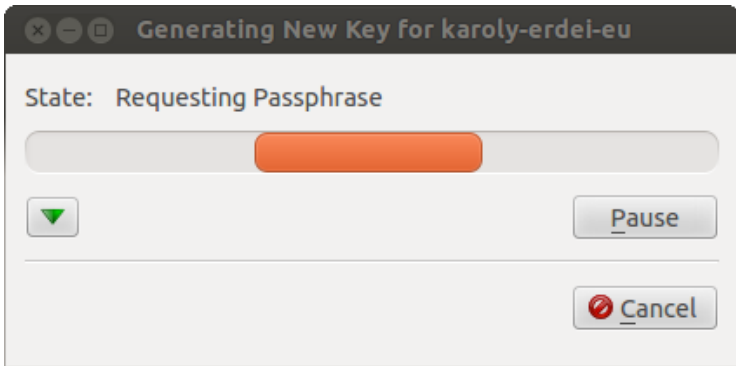
Expiration:

Key size:

Algorithm:

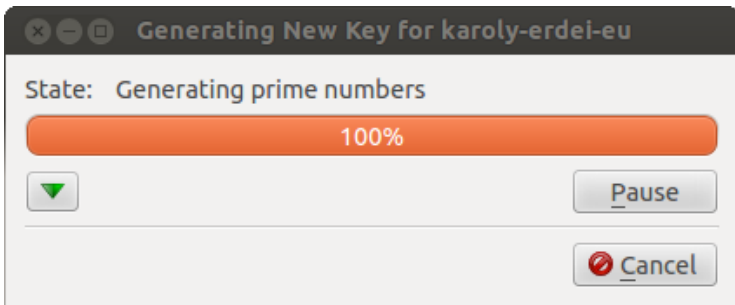
# Using KGPG key manager

Generation in progress



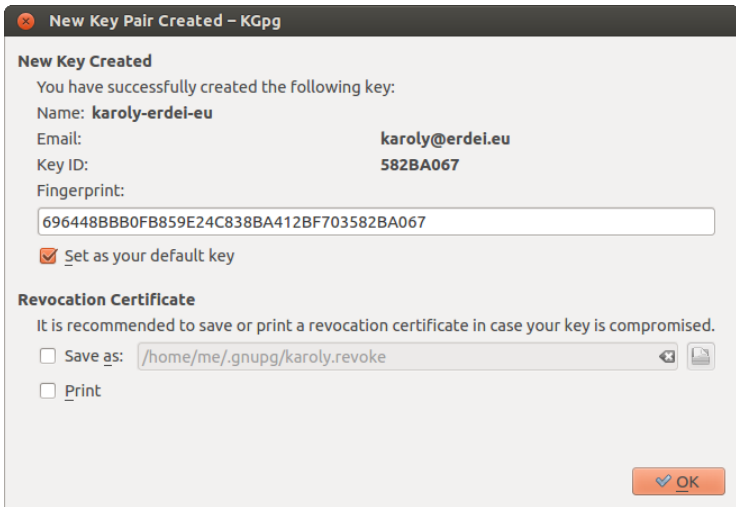
# Using KGPG key manager

Generation in progress - prime numbers



# Using KGPG key manager

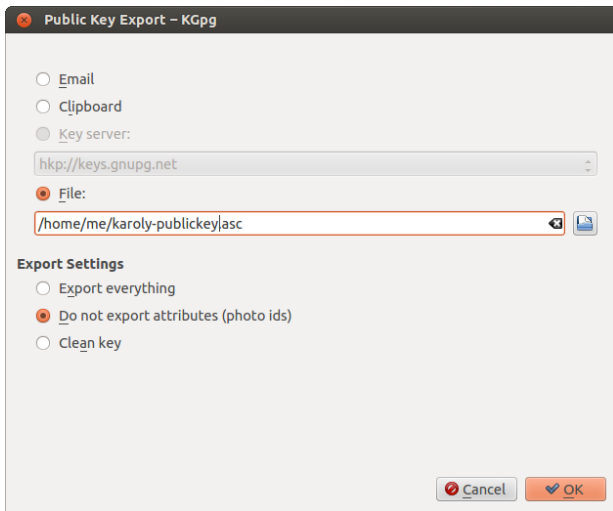
Properties of the generated key





# Using KGPG key manager

## Export public key



# Agenda

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# Using KGPG

## Editor - Main features

### Features of the Editor

- is a simple text editor, too
- encrypts, decrypts objects (file, directory)
- signs files and verifies signature

You can create your encrypted file for your internet login data, etc.

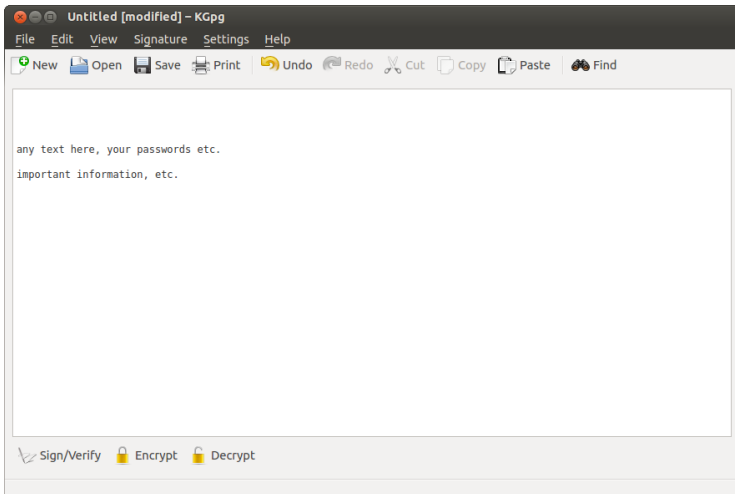
### KGPG and file managers

- KGPG work together with file managers
  - konqueror, dolphin, nautilus
- you can encrypt/files files from file manager by getting the menu item by right mouse click

# Using KGPG Editor

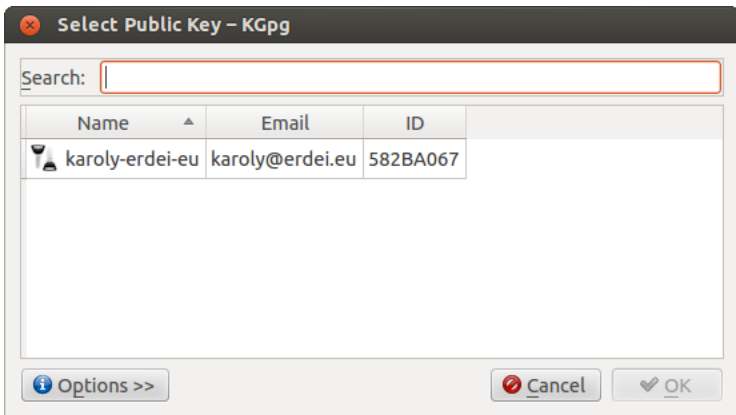
the Editor for encrypt, decrypt files

Type a text in the window and click Encrypt



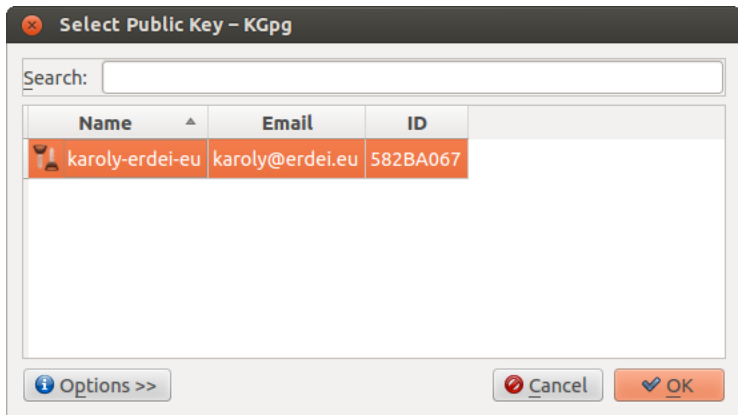
# Using KGPG Editor

Open the key files used for encryption



# Using KPGG Editor

Select the key used for encryption, click OK



# Using KGPG Editor

Here is the encrypted text:

The screenshot shows the KGPG editor interface. The title bar reads "Untitled [modified] - KGpg". The menu bar includes "File", "Edit", "View", "Signature", "Settings", and "Help". The toolbar contains icons for "New", "Open", "Save", "Print", "Undo", "Redo", "Cut", "Copy", "Paste", and "Find".

The main text area displays the following content:

```

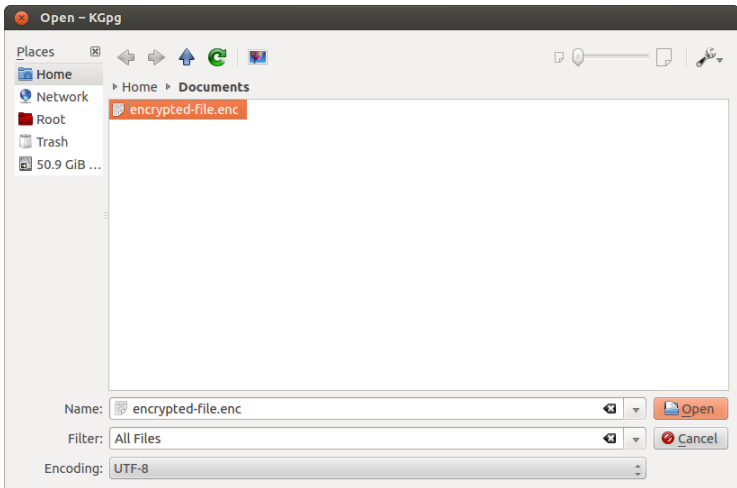
|----BEGIN PGP MESSAGE-----
Version: GnuPG v1.4.11 (GNU/Linux)

hQIMA0Er9wNYK6BnARAA0GTUpXDzxB5BaXcG5edF6eNn45q6d/3rAZhYgp09o3vk
o73DZHV0TEnCRD9n/df/IsuCJzC7RkzfSa4JBobE0suIG25PdSaVmHU19gRWmMqFG
4zp9nFlldTnSRX5aCaghI90a4uulNoTAa4AJwwj0hwnlV/ufBT1CJkX3SdytI5Cz
WjVTkrzsXeG703qK01XH2CUmjJLfnfP0BjJKpkH1LH2epiorQHBeg4t3tJPO/x7
BanBQXr6brXUISdWwJw5ZFP4rRWncqVDb2kQxr7z5m8VjA5FYnxUG00QjLDal+
qCp8e/xf0Y000fQTSR3/9nHkzWuRmLvn5HUicDxazgm+OLEiJ00aXQg4cqWE7pH/
Ori/H8k4g0jHVDzFPOXmnQ7f4u/Dn2zo6t/bK/onWFeLA0viU29B/09u6iA8UFbe
tNvgnM7Enm26f4/Y0WF9t6nnc4tI0oebfh+7ZUFzTcxNigx+7-yvwXniMqXdy9i4
rkwebCM7VsqtP/Q9ritCXZ3P8ydzaaXbq7lgWwSAFvda2scv0R/DNMZiV0i0
vqShCB8PEPMfAakYJxRfrcwWuhTvsPVw+12Iw153aoTy7zksK3axTsP11go7uQ0
T3+oq706A3j5w9Bz/jcde12mMT820QvPKLojMOL4Ejz162Vd0hnhpIbvRs0sFH75
eQE/XFp4UXFzmBfdAxwspUK0s7qq0Louqq6LQVydPPAocORHUpToWvVKFPyPMrQ5
qQ2Dz3kgzfflX4G0PNq0jW1XoMQ+KtUsk0szHrS/+bmn6+Z0NiXRTUK4qXhKKNP7
8L6ahkntzhv7smeDAs0IRQT2XpkMaMtMu3A=
=bEf+
-----END PGP MESSAGE-----
  
```

At the bottom of the window, there are three buttons: "Sign/Verify", "Encrypt", and "Decrypt".

## Using KGPG Editor

Save the encrypted file (as encrypted-file.enc)





# Using KPGP Editor

Open the file encrypted-file.enc, the encrypted content will be displayed

```

-----BEGIN PGP MESSAGE-----
Version: GnuPG v1.4.11 (GNU/Linux)

hQIMA0Er9wNYK6BnARAA0GTUpXDzxB5BaXcG5edF6eNn45q6d/3rAZhYgp09o3vk
o73DZHv0TEnCRD9n/df/IsuCJzC7RkzfSa4JBobE0suIG25PdSaVmHUl9gRwMqFG
4zp9nFlldTnSRX5aCaghI90a4uulNoTAa4AJwwj0hwnlV/ufBT1CJkX3SdytIS5C
WjVTKrzsXeG703qK01XH2CUmglFngfPQBJKpKHLH2epiorQHBeg4t3tJP0/x7
BanBQXr6brXUISdWwJw5ZFPf4rRwncqVDb2kQxr7z5m8VjA5fYnxUG00QjLDal+
qCp8e/xf0Y000fQTSR3/9nHkzWuRmLvn5HUicDxazgm+OLEiJ0QaXQg4cqWE7pH/
Ori/H8k4g0jHVDzFP0XmnQ7f4u/Dn2zo6t/bK/onWFeLA0viU29B/09u6iABUFbe
tNvgnM7Enm26f4/Y0WF9t6nnc4tI0oebfh+7ZUFzTcxNiGx+7+yyvXniMqXdy9i4
rkwebCM7VsqtP/09ritCVX23P8ydzaaXbq7lgWwSAFvda2scv0R/DNMZiV0i0
vqShCB8PEPMFAkYJxRFrkcWuhTvsPVw+12Iw153aoTy7zksK3axTsP11go7uQ0
T3+og706A3j5w9Bz/jcde12mMT820QvPKLojMOL4Ejz162VdQhnhpIbvRs0sFH75
eQE/XFp4UXFzmBfdAxwspUK0s7qq0Louqq6LQVydPPAocORHUpToWvVvKFPyPMrQ5
gQ2Dz3kgzfflX4G0PNq0jW1XoMQ+KtUsk0sZhrS/+bmn6+Z0NiXRTUK4qXhKKNP7
8L6ahkntzhv7smeDAs0TRQT2XpkMaMtMu3A=
=bEf+
-----END PGP MESSAGE-----

```

Sign/Verify Encrypt Decrypt

# Kleopatra

## Kleopatra is the KDE Key Manager for GnuPG

- all features, the KGPG has, has Kleopatra, too.
- important is this tool for Windows user ....

The screenshot shows the Kleopatra application window with a menu bar (File, View, Certificates, Tools, Settings, Window, Help) and a toolbar with buttons for Import Certificates, Export Certificates, Redisplay, Stop Operation, and Lookup Certificates on Server. A search field labeled 'Find:' is present, along with a dropdown menu set to 'All Certificates'. Below this, there are tabs for 'All Certificates', 'Trusted Certificates', and 'Other Certificates'. The main area displays a table of certificates with the following columns: Name, E-Mail, Valid From, Valid Until, Details, and Key-ID.

Name	E-Mail	Valid From	Valid Until	Details	Key-ID
Wolfgang Schreiner	Wolfgang.Schreiner@risc.jku.at	08/27/13		OpenPGP	458BA70C
Wolfgang Hennerbichler	wogri@wogri.com	06/05/12		OpenPGP	FEA1520D
The System Administration	sysadmin@risc.uni-linz.ac.at	04/27/98		OpenPGP	4B374739
Ralf Hemmecke	hemmecke@risc.jku.at	07/22/12		OpenPGP	4A245813
<b>Károly Erdei (Károly Erdei ke...</b>	<b>k.erdei@risc.uni-linz.ac.at</b>	<b>06/25/13</b>		<b>OpenPGP</b>	<b>BD8DB420</b>
Károly Bosa	Karlo.Bosa@gmail.com	09/16/13	09/15/18	OpenPGP	3474035D
Gergo Erdei	erdeigergo@netscape.net	07/20/13		OpenPGP	1FA00F6A
Gabor Bodnar	Gabor.Bodnar@risc.uni-linz.ac.at	06/11/13	06/10/18	OpenPGP	C6C99027
<b>Erich M.</b>	<b>erich@moechel.com</b>	<b>08/10/10</b>	<b>08/09/13</b>	<b>OpenPGP</b>	<b>EA7DC174</b>
Erdei Zsolt	zsolt@erdei.eu	02/23/11		OpenPGP	3F7D7098
Erdei István	ierdei@chello.hu	07/08/13	07/07/18	OpenPGP	A1667E10
Endre Szasz-Revai	szasz.endre@gmail.com	06/30/13		OpenPGP	0CCD37A2
Bruno Buchberger	Bruno.Buchberger@RISC.Uni-Linz.ac.at	11/01/99		OpenPGP	E10F98CC
Bruno Buchberger	bruno.buchberger@risc.jku.at	04/27/12		OpenPGP	4F867911
Alexander Maletzky	alexander.maletzky@risc.jku.at	09/25/13		OpenPGP	67F4C765

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- 1 Why
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# Using GnuPG in MS Windows

## GPG4Win

### GPG4Win

- <http://www.gpg4win.org/>
- the MS Windows version of GnuPG
- is a free, open source software, under active development
- uses the term **certificate** instead of **key**

### Parts of GPG4Win

- GnuPG, the basic software
- Kleopatra, a certificate manager for OpenPGP and S/MIME
- GpgEX, a plugin for Microsoft Explorer (file encryption)
- Claws Mail, a complete email application with crypto support
- Documentation
- GpgOL, plugin for MS Outlook 2003/2007/2010/2013 (email encryption)
- GPA, the Gnu Privacy Assistant

# Using GnuPG in MS Windows

Installation, configuration

## Installation

- download it from: <http://www.gpg4win.org/download.html>
- current version: Gpg4win 2.2.2 (Released: 2014-09-04)
- download the **full version** which includes the parts listed above
- by the installation unmark: GpgOL, GPA, Claws Mail

## Configuration and using Kleopatra

- go to the Webpage at GPG4Win and check the screen shots:
- <http://www.gpg4win.org/screenshots.html>

Enjoy the Gnu Privacy Guard under MS Windows, too !

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- 4 KGPG-Assistant
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- 6 -Editor
- 7 GPG4Win
- 8 Enigmail

# Using GnuPG in Thunderbird/Icedove

## Enigmail add-on

### Enigmail

- is a security extension to Mozilla Thunderbird and Seamonkey
- is a plugin, not a standalone program
- it is based on GnuPG, you have to install this first.
  - all features of GnuPG are available

### Main features

- Encrypt/sign mail when sending, decrypt/authenticate received mail
- Support for inline-PGP (RFC 4880) and PGP/MIME (RFC 3156)
- Per-Account based encryption and signing defaults
- OpenPGP key management interface
- Per-Recipient rules for automated key selection, and enabling/disabling encryption and signing
- Full features list:
  - <https://www.enigmail.net/documentation/features.php>

# Enigmail

Installation, configuration, documentation

## Installation

- through the Tools/Add-Ons/ search for Enigmail 1.7.2

## Configuration

- see: <https://www.enigmail.net/documentation/basic.php>

## Documentation

- for new users see the Quick Start Guide:
  - <https://www.enigmail.net/documentation/quickstart.php>
- user manual:
  - <https://www.enigmail.net/documentation/>

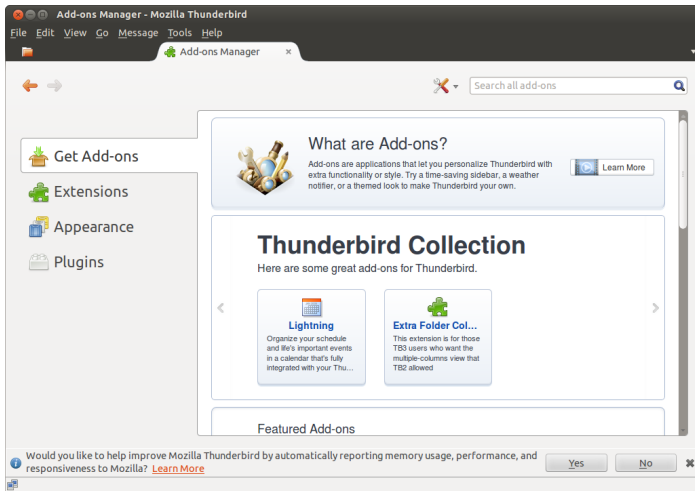
The next slides show some of the above steps



# Enigmail

## Installation I.

### Get the Add-On








# Enigmail

## Installation II.

### Search for Enigmail

The screenshot shows the Mozilla Thunderbird Add-ons Manager window. The search bar at the top contains the text 'enigmail'. Below the search bar, there are buttons for 'Name', 'Last Updated', and 'Best match'. The search results are displayed in a list format, with the following items:

Search:	My Add-ons	Available Add-ons
	<b>Enigmail 1.5.2</b>	07/23/2013
	OpenPGP message encryption and authentication for Thunderbird a... <a href="#">More</a>	<a href="#">Install</a>
	<b>X-notifier (for Gmail,Hotmail,Yahoo,AOL ...) 3.3.4</b>	08/14/2013
	Notifier for gmail, yahoo, hotmail, aol and more webmails.X-notifie... <a href="#">More</a>	<a href="#">Install</a>
	<b>Mail Merge 3.5.0</b>	04/15/2013
	Mass Mail and Personal Mail <a href="#">More</a>	<a href="#">Install</a>
	<b>MailHops 0.8.2</b>	10/27/2012
	MailHops maps the route an email took to get to you. Displaying the... <a href="#">More</a>	<a href="#">Install</a>
	<b>EditEmailSubject 2.0.3</b>	04/05/2013
	This module allows you to change email subjects <a href="#">More</a>	<a href="#">Install</a>

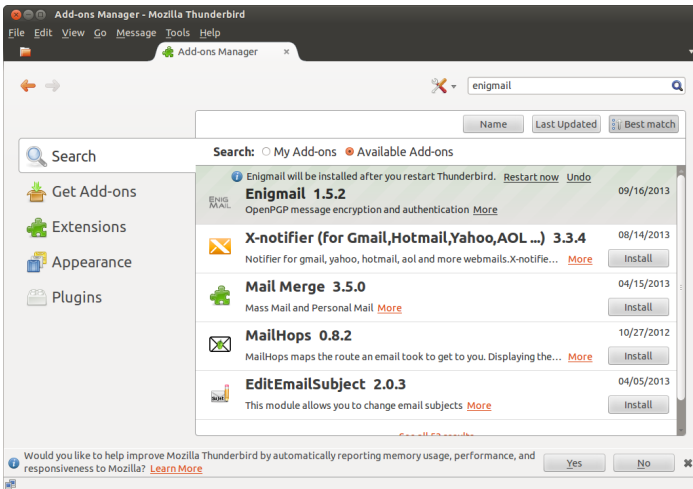
At the bottom of the list, there is a link: [See all 53 results](#).

At the bottom of the window, there is a message: "Would you like to help improve Mozilla Thunderbird by automatically reporting memory usage, performance, and responsiveness to Mozilla?" with a [Learn More](#) link and 'Yes' and 'No' buttons.

# Enigmail

## Installation III.

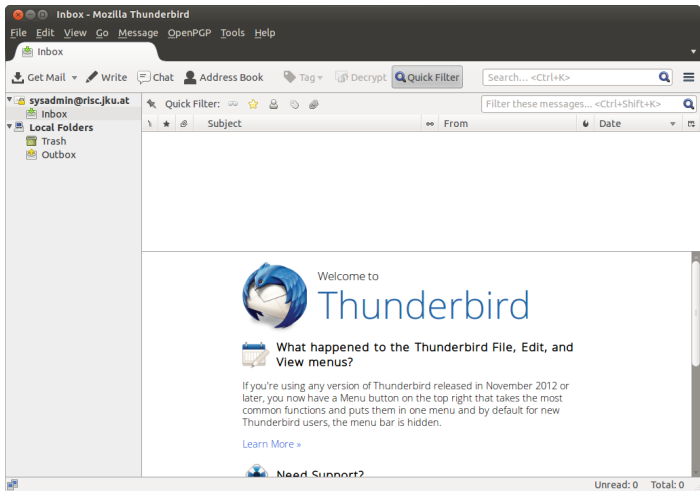
Install it and restart Thunderbird



# Enigmail

## Installation IV.

You have now the OpenPGP item in the menu list

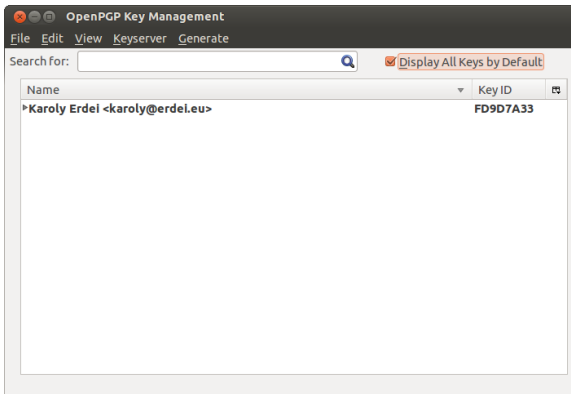


# Enigmail - Keys

Start the Key Manager

## Menue list: OpenPGP / Key Management

- Always mark: Display All Keys by Default



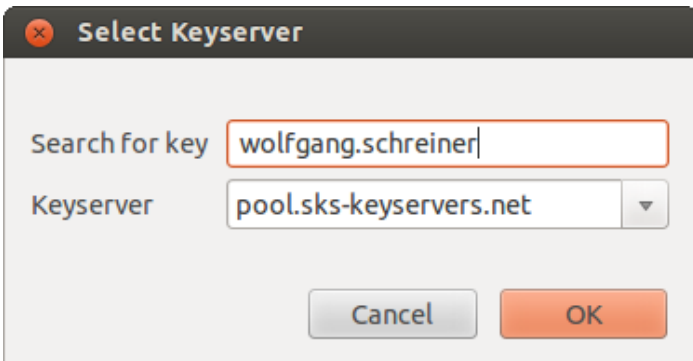
## Keyserver / Search for keys



## Enigmail - Keys

Select Keyserver Window

Type the name in the Search for key field:



**Select Keyserver**

Search for key

Keyserver  ▼

Cancel OK

## Enigmail - Keys

Download OpenPGP Keys

Select the key from the list to download

Download OpenPGP Keys

Found Keys - Select to Import

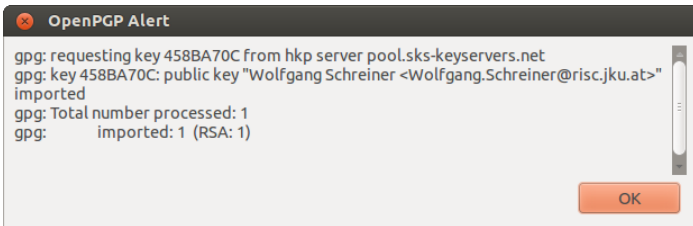
	Account / User ID	Created	Key...	
<input type="checkbox"/>	Wolfgang Schreiner (TU Wien, DSG) <schreiner@infosys.tuwien.ac...>	2005-02-01	F97862E7	
<input checked="" type="checkbox"/>	Wolfgang Schreiner <Wolfgang.Schreiner@risc.jku.at>	2013-08-27	458BA70C	
<input type="checkbox"/>	Wolfgang Schreiner <Wolfgang.Schreiner@risc.uni-linz.ac.at>	1999-11-02	450E0CFF	
<input type="checkbox"/>	Wolfgang Schreiner <e9902261@student.tuwien.ac.at>	2005-01-30	AC4B8EC3	
<input type="checkbox"/>	Wolfgang Schreiner <gangwolfs@web.de>	2001-03-22	D502AF02	
<input type="checkbox"/>	Wolfgang Schreiner <gangwolfs@web.de>	2005-01-01	FCE07153	
<input type="checkbox"/>	Wolfgang Schreiner <gangwolfs@web.de>	2006-10-22	103DB374	
<input type="checkbox"/>	Wolfgang Schreiner <gangwolfs@web.de>	2006-10-22	92D656F2	
<input type="checkbox"/>	Wolfgang Schreiner <gangwolfs@web.de>	2009-02-21	F86E2E52	
<input type="checkbox"/>	▶Wolfgang Schreiner <mail@wschreiner.at>	2009-02-16	5EAE4421	
<input type="checkbox"/>	▶Wolfgang Schreiner <schreiner@risc.uni-linz.ac.at>	1994-01-21	1855F321	
<input type="checkbox"/>	▶Wolfgang Schreiner <w.schreiner@woschnet.de>	2002-09-03	1320212C	
<input type="checkbox"/>	▶Wolfgang Schreiner <wuifi@gmx.at>	2005-09-12	90DC859C	
<input type="checkbox"/>	▶Wolfgang Schreiner <wuifi@gmx.at>	2008-09-15	EF34F78C	

OK Cancel

# Enigmail - Keys

## OpenPGP Alert

### Information about the imported key:

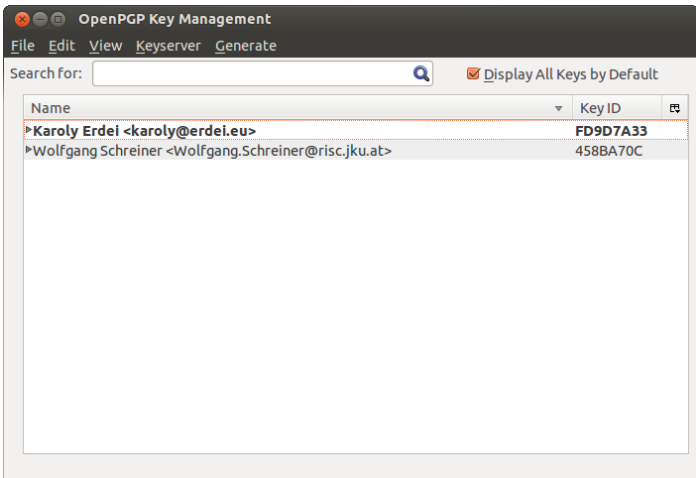




# Enigmail - Keys

OpenPGP Key Management Window

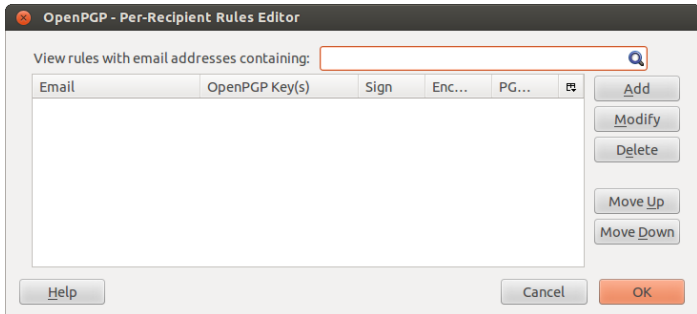
List of the imported keys:



# Enigmail

Set up a per recipient rule - I.

## OpenPGP / Edit Per Recipient Rules



Click: Add

# Enigmail

Set up a per recipient rule - II.

Fill out the fields in the Window: Edit Per Recipient Settings

**OpenPGP - Recipient Settings**

Set OpenPGP Rules for  (Separate several email addresses with spaces)

Apply rule if recipient  one of the above addresses

**Action**

Continue with next rule for the matching address

Do not check further rules for the matching address

Use the following OpenPGP keys:

**Defaults for ...**

Signing

Encryption

PGP/MIME

(Note: in case of conflicts, 'Never' overrules 'Always')

# End of GPG

Enjoy using Enigmail and using encrypted emails !

Thanks for your attention !