GPG4WIN

GNU'S TOOLS FOR SECURE COMMUNICATION AND DATA STORAGE

USER'S GUIDE

Version Information

GPG4WIN User's Guide version 1.0 Released July 5, 2006

Copyright

Further Copyright Information

Limitations

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Acknowledgement

We would like to thank the following people:

The GPG4Win Project Team for their effort in developing GPG4Win software

The developers and/or authors of the following software:
● *GnuPG* ● *WinPT* ● *GPA* ● *GPGol* ● *GPGee* ● *Sylpheed-Claws* ● *GPGME* ● *GLIB* ● *NSIS* ● *Pthreads-win32* ● *LIBGPG-ERROR* for making encryption, key management, and secure e-mail easier

CuteWriter and *Ghostscript* author for their Portable Document Format converter.

And all the others who made this work possible .

Table of Contents

1. Introduction

GPG4WIN is an installer package for Microsoft® Windows operating system (9x/ME/2000/XP/2003) that provides several modules. These modules are aimed in implementing OpenPGP Standard (RFC 2440[1]) for e-mail and file encryption.

It means two things:

1. everyone can use GPG4WIN and its modules to encrypt e-mails and files;
2. GPG4WIN is compatible with other software that conform with OpenPGP Standard.

The GPG4WIN modules are:

Module Name	*Description*
GnuPG[2]	Is a free software replacement for the PGP[3] suite of cryptographic software, released under the GNU General Public License. GnuPG is completely compliant with the IETF standard for OpenPGP. This module is the core module; this is the actual encryption tool.
WinPT	A key manager and helper for various encryption matters.
GPA	Another key manager.
GPGol	A plugin for Microsoft® Outlook 2003 (e-mail encryption).
GPGee	A plugin for Microsoft® Windows Explorer.
Sylpheed-Claws	A complete e-mail program with GnuPG plugin.

Depending on your requirement, you can install all or some of the modules, except for the GnuPG module. It is the core module that must be installed. If you are not sure which modules to choose, you can refer to the following tables:

If you ...	*install the following module(s)*
want to use the GnuPG command line tools only	GnuPG
have an e-mail program (Outlook, Thunderbird) and want to encrypt e-mail and files	GnuPG, WinPT or GPA

[1] Refer to http://tools.ietf.org/html/2440 for detailed information
[2] GnuPG is the GNU project's complete and free implementation of the OpenPGP standard. Visit http://www.gnupg.org for more information
[3] Pretty Good Privacy (PGP) is a computer program which provide cryptographic privacy and authentication. Visit http://www.pgp.com for more information

have an e-mail program (Outlook, Thunderbird), want to encrypt e-mail and files, and want a quick access to right-click context menu in Windows Explorer	GnuPG, WinPT or GPG, GPGee
use Microsoft Outlook 2003 and want to send e-mails using GnuPG plugin	GnuPG, WinPT or GPA, GPGol
want to use complete e-mail program with GnuPG plugin	GnuPG, Sylpheed-Claws
want to use all the GPG4WIN modules and features	All modules

Note : This document (version 1.0) will describe the third option, which provide a good compatibility for most of user's environment.

It is a good thing to understand some basic principles and concepts of Cryptography and Public Key Cryptography before using GPG4WIN (or other PGP/OpenPGP related products). You can find a good documentation here:

- *Applied Cryptography: Protocols, Algorithm, and Source Code in C, 2nd ed,* Bruce Schneier, John Wiley & Sons, 1996; ISBN 0471117099. If you are going to a remote island and could only pick one cryptography book, this is the one.
- *How PGP Works*, http://www.pgpi.org/doc/pgpintro/
- *Public-Key Cryptography – Wikipedia,* http://en.wikipedia.org/wiki/Public_key_cryptography

2. Obtaining GPG4WIN Installation Package

You can obtain the latest GPG4WIN Installation Package here:
http://www.gpg4win.org/download.html

If you want to verify the installation file integrity, you can use one of this small program to compute the installation file checksum[4] value:

- Microsoft FCIV, http://support.microsoft.com/?kbid=841290 or
- MD5sums, http://www.pc-tools.net/win32/md5sums/

and compare it with the checksum value posted on this site:
http://www.gpg4win.org/package-integrity.html

3. Installing GPG4WIN

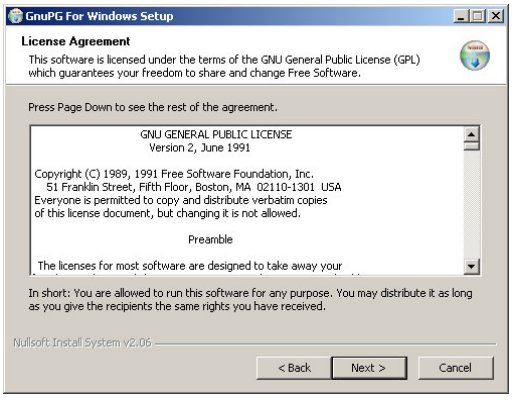
Before installing this program, please close all of other applications, especially Windows Explorer and Microsoft Outlook.

[4] Refer to http://en.wikipedia.org/wiki/Checksum for detailed information about checksum.

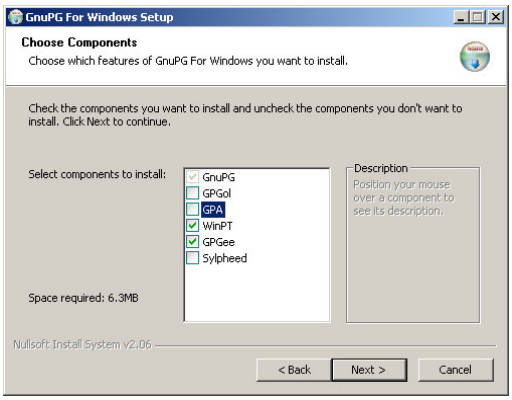
To install GPG4WIN, just double-click (or run) the Installation Package, and the installation process will start. You need, of course, administrator/power user privilege to install GPG4WIN.

Step 1:
The installation window will appear. Click '**Next >**' to proceed.

Step 2:
License Agreement window will appear. Click '**Next >**' to proceed.

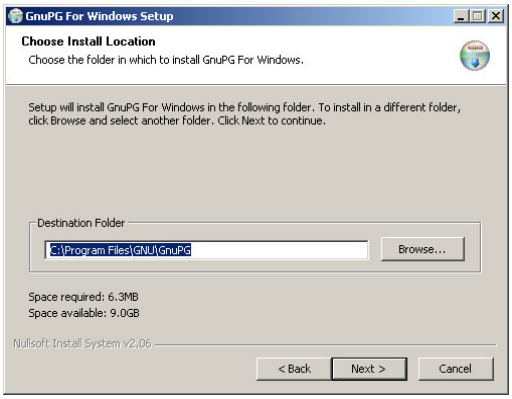


Step 3:
You may choose which components to install. In this document, we are going to use GnuPG, WinPT, and GPGee.

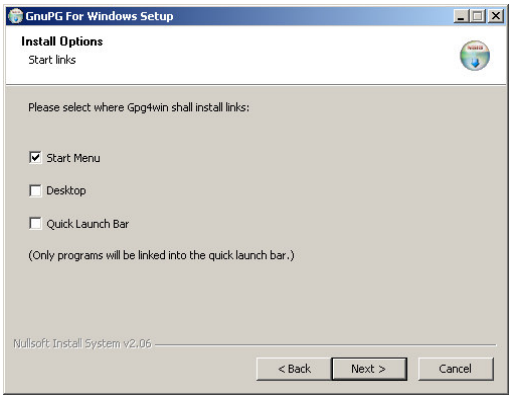


Step 4:

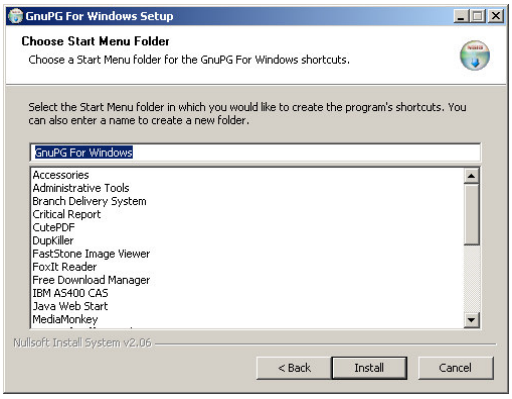
Pick the destination folder for the program. Click '**Next >**' to proceed.



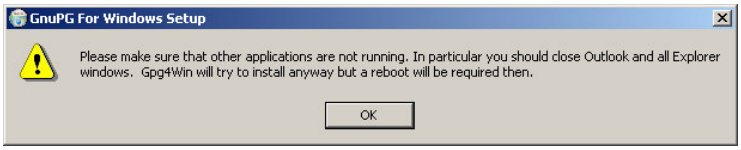
Step 5:
Pick your favourite link type. Click '**Next >**' to proceed.

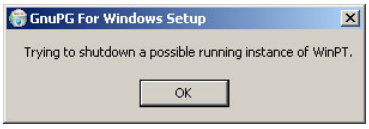


Step 6:
Pick the Start Menu folder if you choose Start Menu for your link type. Click '**Next >**' to proceed.

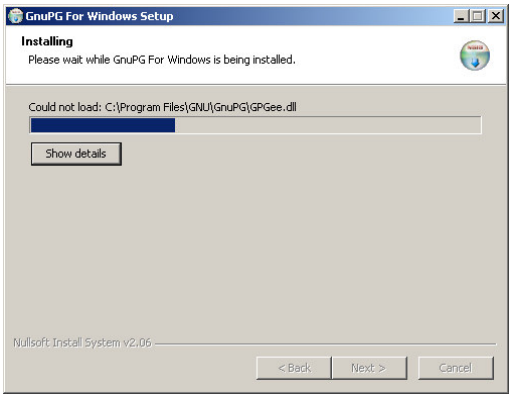


Step 7:
Some notification message might appear. Just click '**OK**'.

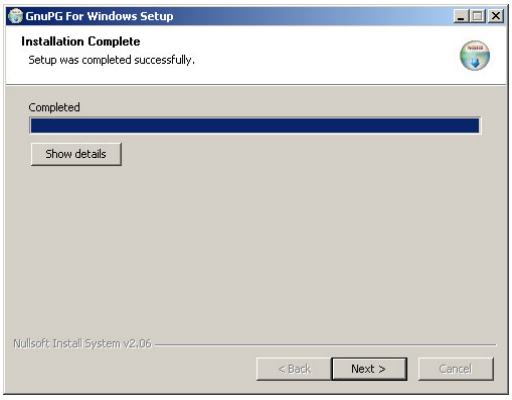




Step 8:
Now, GPG4WIN is being installed.



Step 9:
Click '**Next >**' after completed.



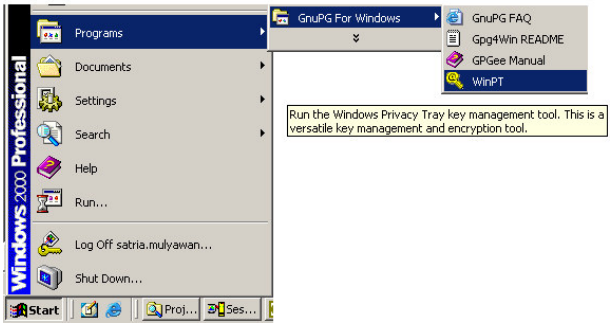
Step 10:
Installation is now complete. Click '**Finish**'.

4. Generating/Importing Your Keypair

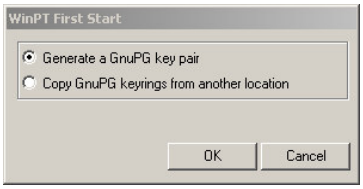
The very first step in using GPG4WIN is generating or importing your own keypair. Generate keypair if you do not have one. If you already have your own keypair, please jump to section "Importing Your Keypair".

4.1 Generating Your Keypair

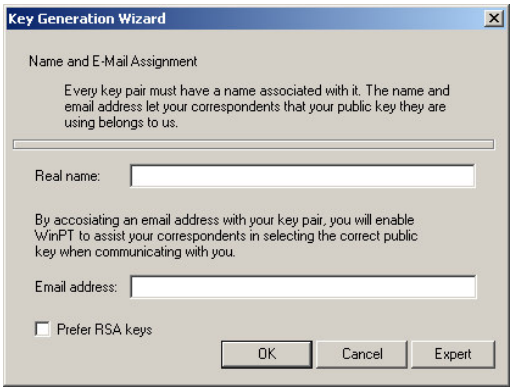
Step 1 :
You can start this process by selecting WinPT from the Windows Start Menu



Step 2:
Choose '**Generate a GnuPG key pair**'. Click '**OK'.**

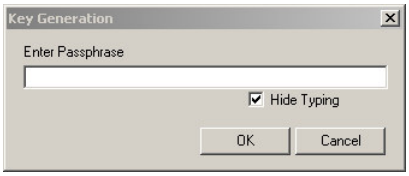


Step 3:
Enter your real name and your e-mail address. Unless you have specific need for RSA keys and other expert setting, leave the '**Prefer RSA keys**' empty[5]. Click '**OK**' to proceed.

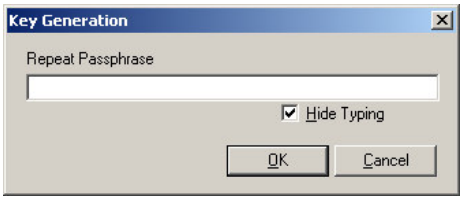


[5] For those who are curious enough, GnuPG use 2048-bit DSA and ElGamal algorithm, as specified in the OpenPGP standard as mandatory asymmetric algorithm.

Step 4:
Now you have to provide a passphrase[6] that will protect your secret key. Please note that there will be no way to retrieve or reset this passphrase if you forget it, so be very careful. And one more thing: pick a long phrase that hard-to-guess. Click '**OK**' to proceed.

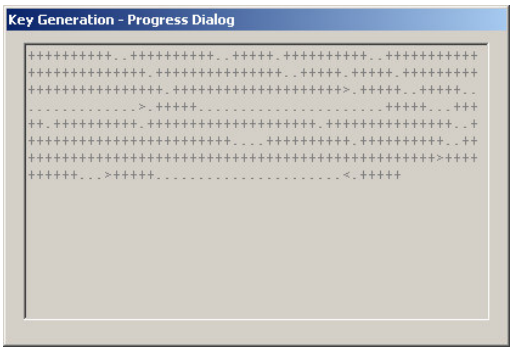


Step 5:
Re-type your passphrase for confimation. Click '**OK**' to proceed.



Step 6:
GnuPG will create your keypair by generating some random bits. To increase the randomness (and also increasing the keypair quality), you might want to try some of these:

- moving your mouse randomly
- typing random character using keyboard
- opening a large file
- running a resource-intensive program



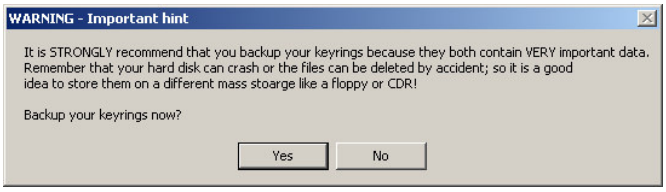
Step 7:
The key generation process is complete. Click '**OK**' to proceed.

Step 8:

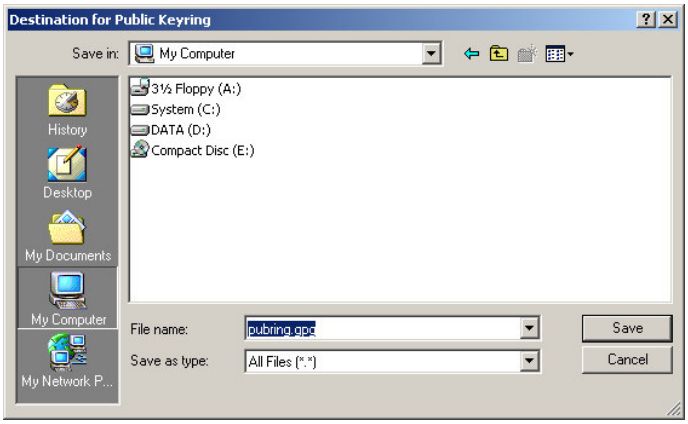
[6] Passphrase is similar to password, but (should) consists of two or more words. In means that passphrase should have more characters that ordinary password. You can read tips about passphrase at http://www.iusmentis.com/security/passphrasefaq/strength/#HowdoImakeastrongpassphrase

Since your keypair (and your keyring[7]) is an important part in public-key cryptography, we strongly recommend you to store your keyrings in a backup media (floppy disk, CDROM, or other removable media). Losing these keyrings means: (1) you cannot access your encrypted e-mails and files and (2) you need to re-distribute (or re-publish) your new public key. To back it up, choose '**Yes**'.

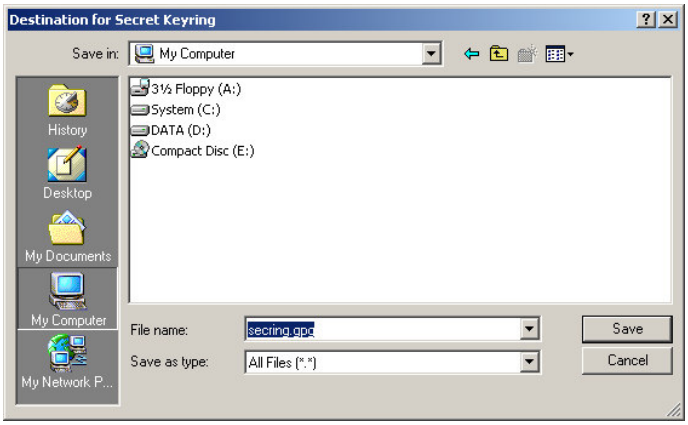
Please note that your private (secret) keyring is protected by your passphrase, so it would be safe enough to back it up in a common backup media (assuming you pick a good passphrase in previous step).



Step 9:
Now, you have two different keyring to backup: a public keyring and a private (secret) keyring. Choose your backup media to store your public keyring,



Step 10:
and your private (secret) keyring



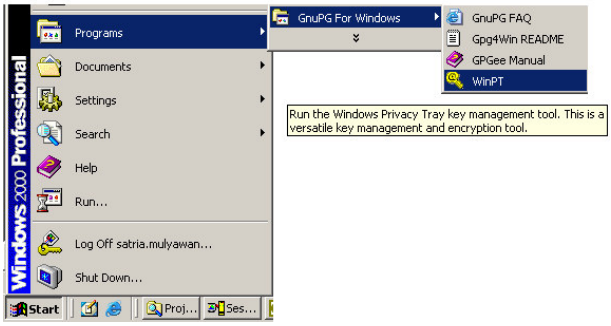
[7] A keyring is a collection of several keys

4.2 Importing Your Keypair

This section is only intended for those who already had their own keypair before WinPT installation. For example: veteran GnuPG command-line user or PGP Desktop[8].

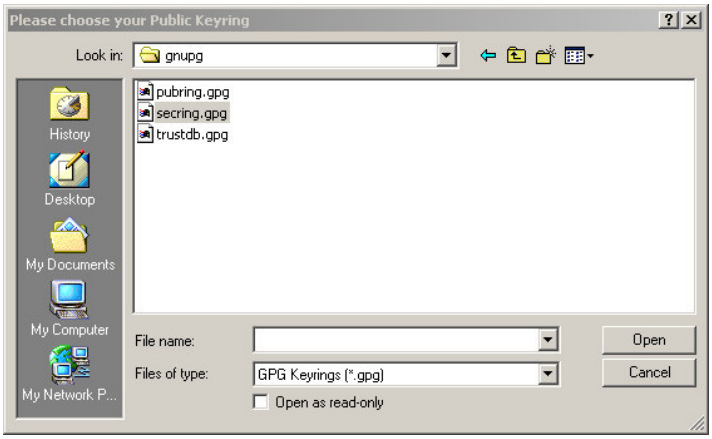
Tips for PGP Desktop user: You can import PGP Desktop keypair/keyring by simply renaming the **pubring.pkr** and **secring.skr** to **pubring.gpg** and **secring.gpg**. Then, you can import them using steps below.

Step 1:
Start the WinPT Program.



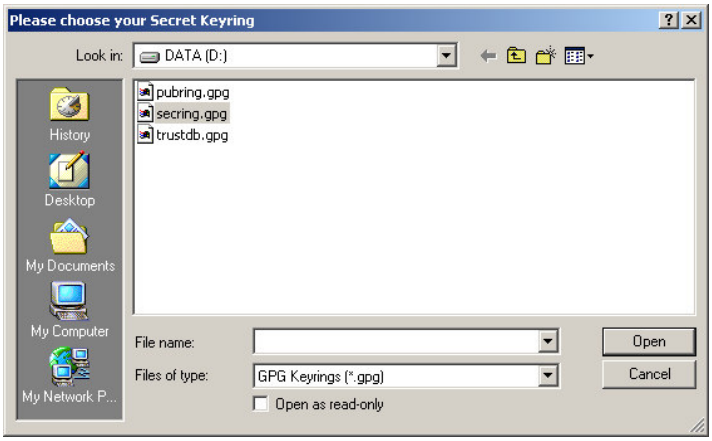
Step 2:
Choose '**Copy GnuPG keyrings from another location**' and click '**OK**'.

Step 3:
Browse to your public keyring location. Choose that keyring and click '**OK**'.

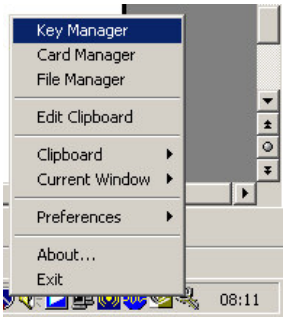


Step 4:
Browse to your private (secret) keyring location. Choose that keyring and click '**OK**'.

[8] © PGP Corporation. All rights reserved.

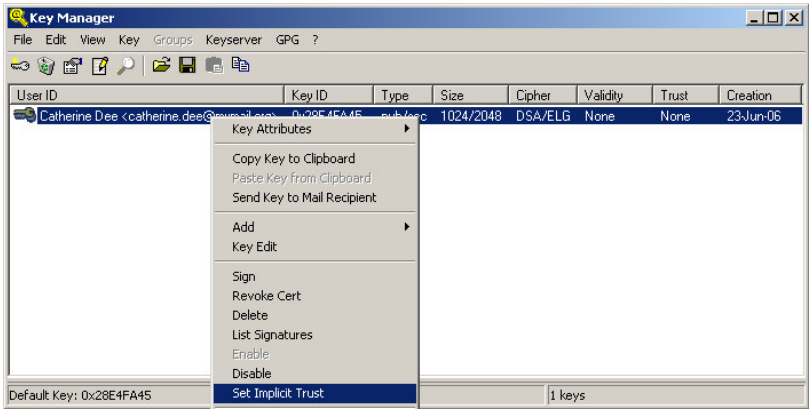


Step 5:
Right-click the WinPT System Tray icon and choose '**Key Manager**'.



Step 6:
You might encounter this message if WinPT cannot found ultimate trusted key in the current keyring. Just click '**OK**' for this message.

Step 7:
In the Key Manager, right-click on the key and choose '**Set Implicit Trust**'. This key will become valid and have ultimate trust properties.

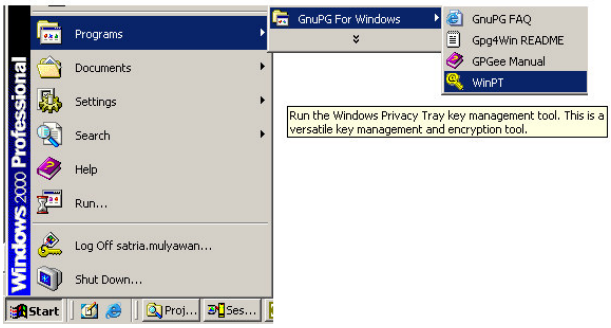


5. Exporting/Publishing Your Public Key

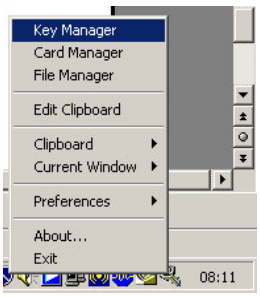
Now you have your own keypair: a public key and a private (secret) key. Bob, for example, will need your public key if he want to send encrypted e-mail to you. So the next logical step will be exporting/publishing your public key so that Bob and everyone else can send encrypted e-mail to you.

5.1 Exporting Your Public Key Into a File

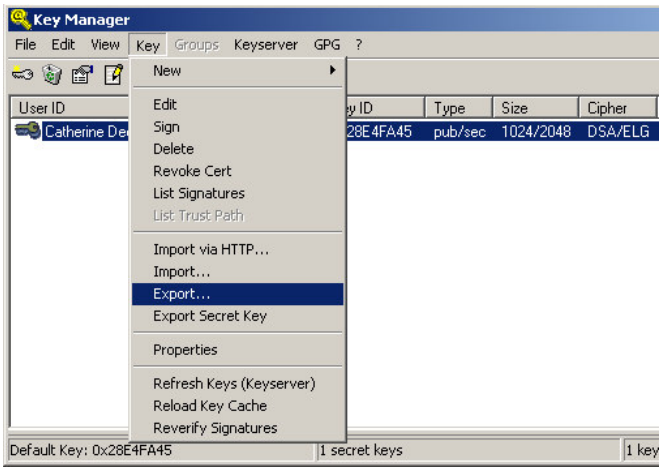
Step 1:
Start WinPT from the Start Menu.



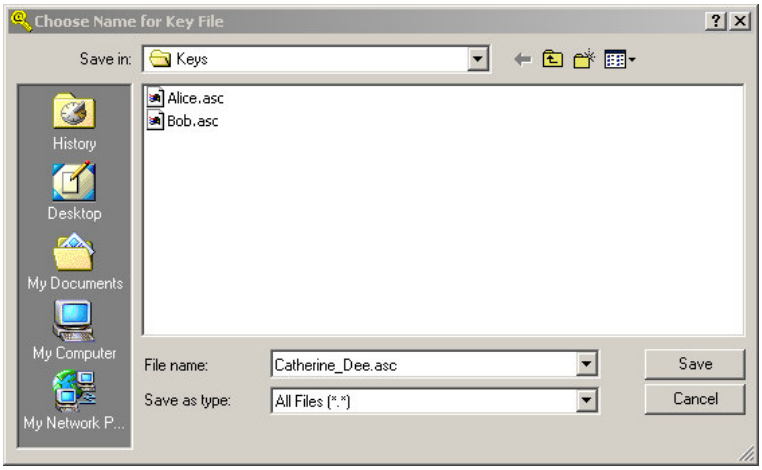
Step 2:
Activate the Key Manager by right-click on the WinPT system tray icon and choose '**Key Manager**'



Step 3:
Choose '**Key > Export...**' from the menu.



Step 4:
Name the key and save it.



Step 5:
Click '**OK**' when the notification box appears.

Now, you can send this file to anyone that need your public key. You can do it by:

- attach the file to your e-mail
- copy-paste its content (it's in ASCII format, just open it with notepad or other text editor) to your e-mail text
- put the file or its content in your website or weblog
- put it in removable media (floppy disk, USB flash, etc.) and circulating it

5.2 Publishing Your Public Key at Keyservers

If you want your public key to be recognized worldwide, you can publish your public key at some internet keyservers.

[this section is not complete yet]

6. Importing Others' Public Key

You will need Alice public key if you want to send encrypted e-mail/file to Alice. You can get her public key by asking her to send it to you by e-mail, or download it from keyservers or her website/weblog.

There are lot of methods to obtain Alice's public key. But whatever method you choose, make sure that the key is *really* Alice's, not key from someone else who pretends to be Alice.

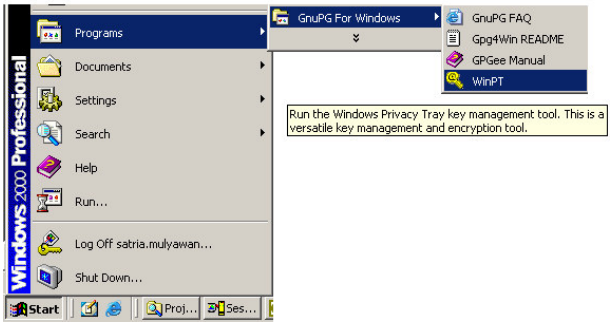
Usually, public keys are distributed in small file with **.asc** extension (e.g. charlie.asc for Charlie's public key). But if Alice sent you her public key embedded in her e-mail messages, for example :

```
From: Alice
Sent: Tuesday, 27 June, 2004 13:48
To: Catherine Dee
Subject: My public key

Hello,

I have already read your messages. I will send you the files as
soon as possible. Meanwhile, here is my public key:

-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: GnuPG v1.4.3 (MingW32)

mQGiBESbqegRBACUSFAyzJYpy/LlDNSkCyLO4/0afgifLwVt63Rd8BhPHMkI5GSZ
oh1EL9uCNKhSpRTmhWP3EzVHYsU3Vp1O7MNEcz2OAaUUDYtxpwKNrRFKPiR4M3/T
6O3xal3IXNlX3WRT/3szl2FKORqISQQYEQIACQUCRJup+wIbDAAKCRDmCGMQIAm5
KJorAKC57QqBqDeRQM9fzcGnwA2+hLBd1wCgrEXeqCr27ixJOWA+OOChi6tL84w=
=8R5H
-----END PGP PUBLIC KEY BLOCK-----

Allright, that's all for now.

Regards,

Alice
```

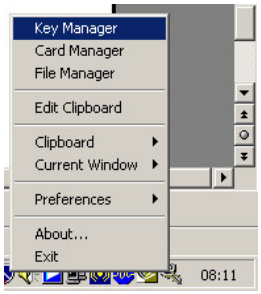
then all you have to do is copy the bold lines (from **--BEGIN PGP PUBLIC KEY BLOCK--** to **--END PGP PUBLIC KEY BLOCK--**), paste it to your favourite editor, and save it as **alice.asc** file.

After obtaining Alice's public key file, we need to import it to our public keyring

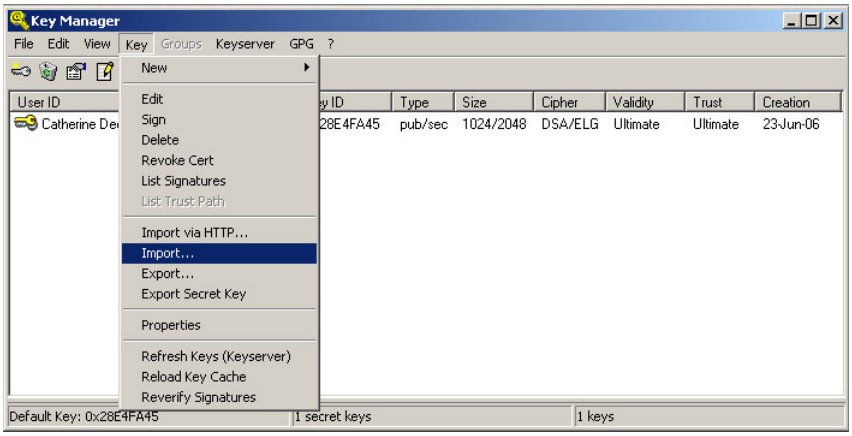
Step 1:
Start WinPT from the Start Menu.



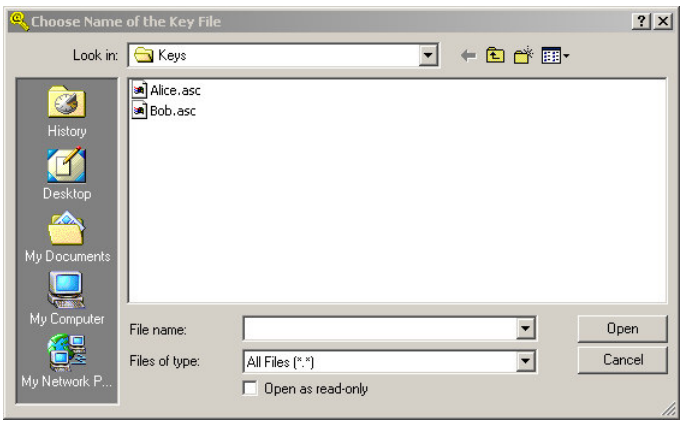
Step 2:
A WinPT System Tray icon will appear in the bottom left corner. Activate the Key Manager by right-click on the icon and choose '**Key Manager**'



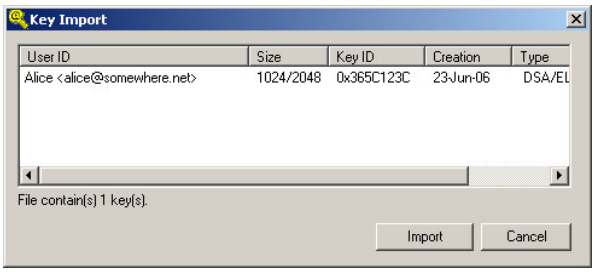
Step 3:
From the Key Manager menu, pick '**Key > Import...**'



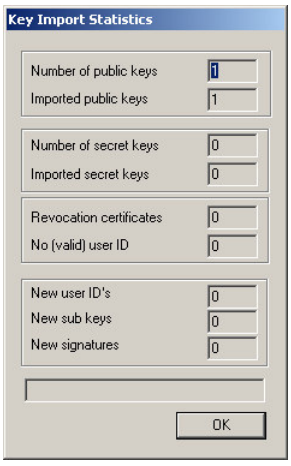
Step 4:
Browse to the public key file, click the file, and click '**OK**'



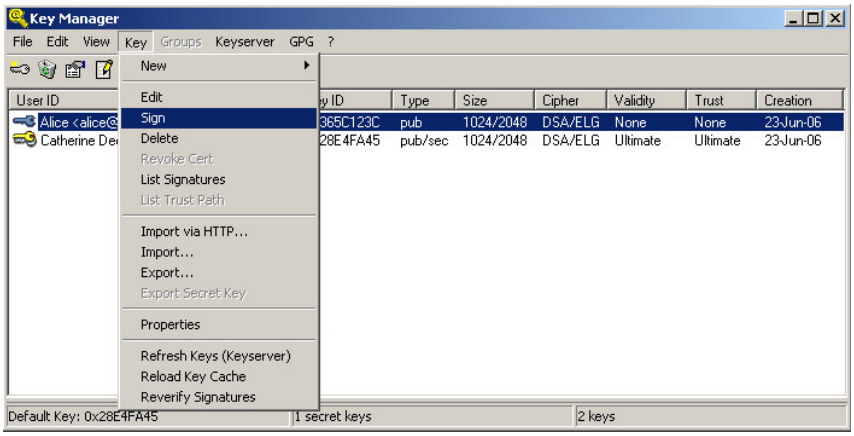
Step 5:
Information about the public key will be displayed. Click '**Import**' to proceed.



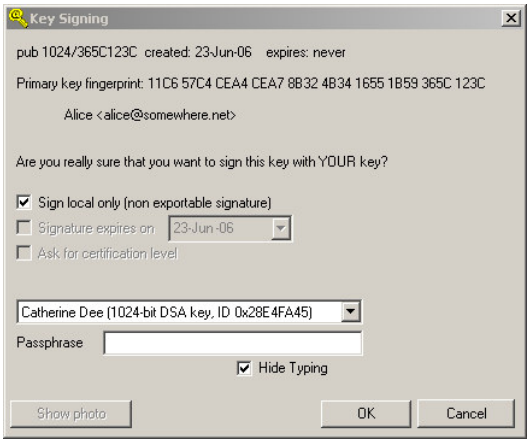
Step 6:
Key import statistic will be displayed. Click '**OK**' to proceed.



Step 7:
Now, we have to sign this public key to validate that this key is truly Alice's public key. At the Key Manager, click the Alice's key. Choose menu '**Key > Sign**'.

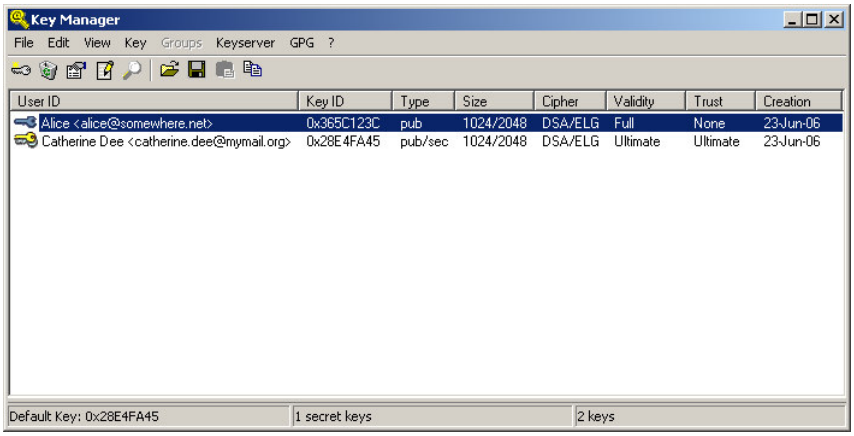


Step 8:
At the Key Signing dialog box, choose your key (it might have been chosen by default) and type your passphrase. Click '**OK**'.



Step 9:
An information box will be displayed. Click '**OK**'.

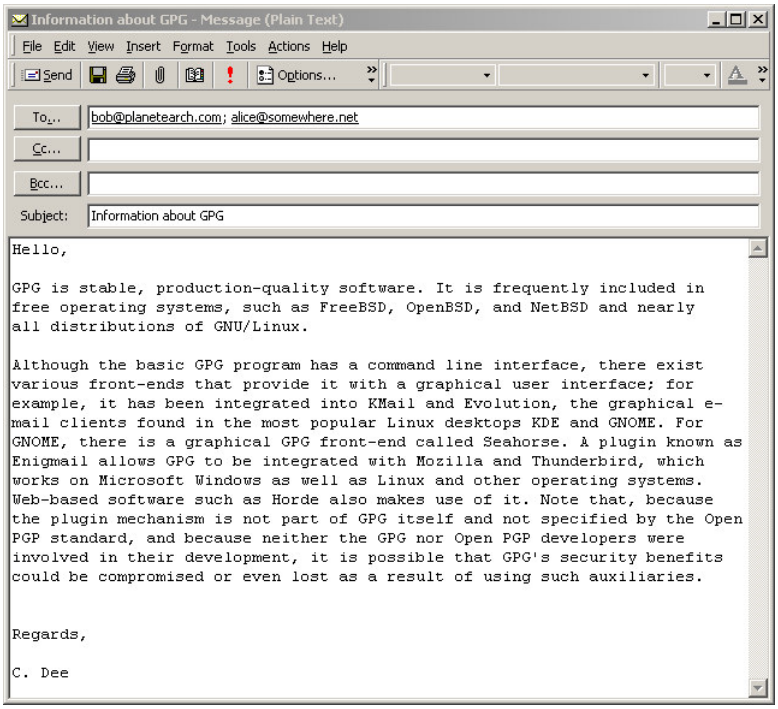
Step 10:
Alice's key will now have full validity (see Validity column).



7. Sending Encrypted E-mail

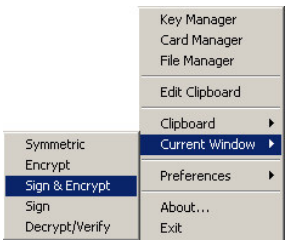
Let us assume that Alice and Bob have received our public key, and we also have import their public keys into our keyring. Now, we can send encrypted[9] e-mail to them.

Step 1:
Compose your e-mail as usual, using your favourite e-mail client. In this example we are going to use Microsoft® Outlook 2000. We are going to send it to Alice and Bob

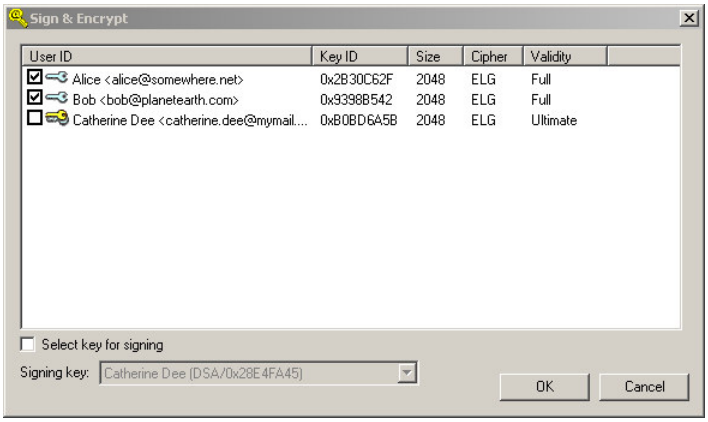


Step 2:
Right-click the WinPT sytem tray icon. Choose '**Current Window > Sign & Encrypt**'.

[9] GPG4WIN/GnuPG use Blowfish as default symmetric algorithm. Visit http://www.schneier.com/blowfish.html for more information about this algorithm.



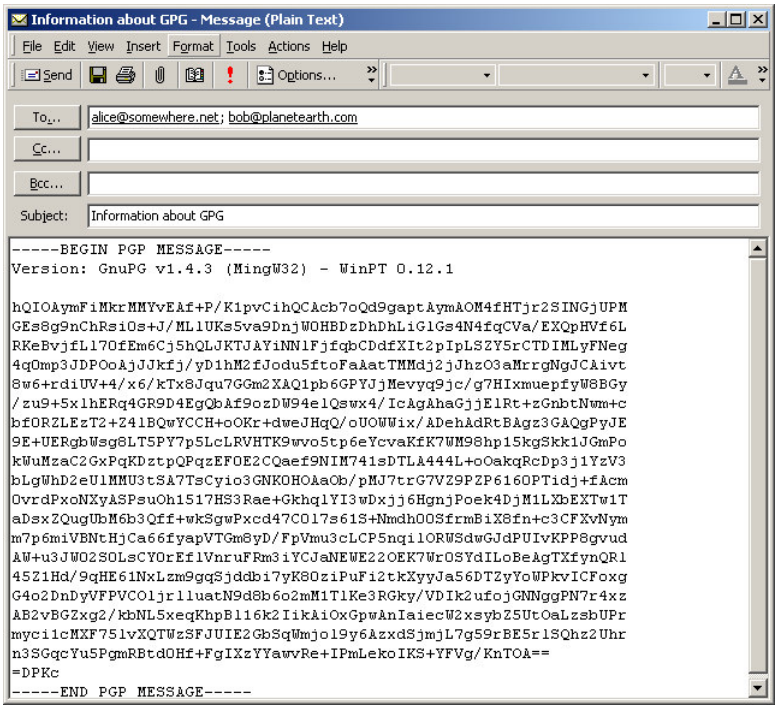
Step 3:
Put check marks on Alice and Bob keys. Click '**OK**'.



Step 4:
WinPT will ask for your passphrase. Enter your passphrase and click '**OK**'.

Step 5:
WinPT wil automatically replace your e-mail message with encrypted messages. Then, you can send this e-mail by clicking '**Send**' button.

If WinPT does not automatically replace your e-mail messages with encrypted one, you can manually replace it. This could be done easily by using **Ctrl-A** (select all) and then **Ctrl-V** (paste) combination at the e-mail client window.



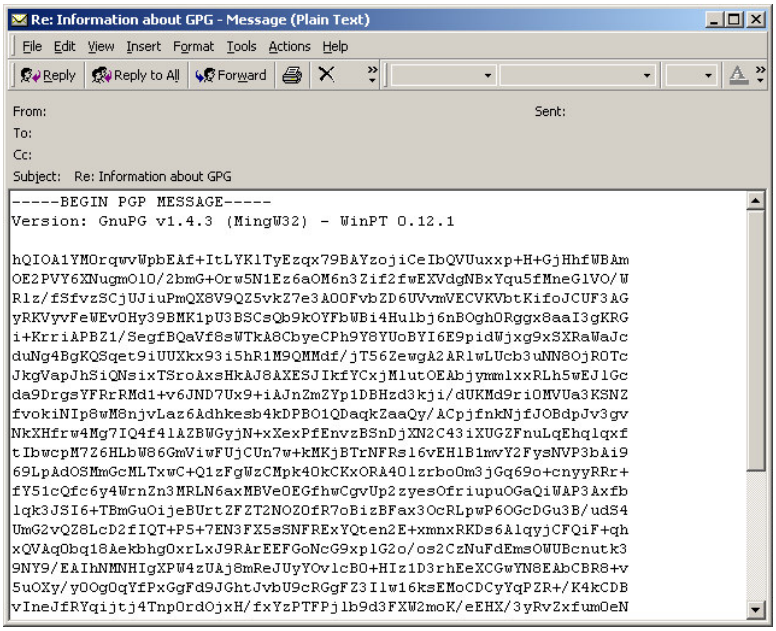
Alice and Bob will received this encrypted message and decrypt it using their own private (secret) key. They will also (automatically, by their software) verify your signature in the message to prove that it was sent by you.

If you are going to attach files in your encrypted e-mail message, you will need to encrypt the files first. Please refer to '**Encrypting Files**' section in this manual.

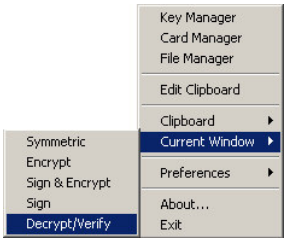
8. Receiving Encrypted E-mail

Allright, you have successfully sent encrypted e-mail now. One day later, Alice replied your e-mail using encrypted messages. Now, we are going to decrypt her message.

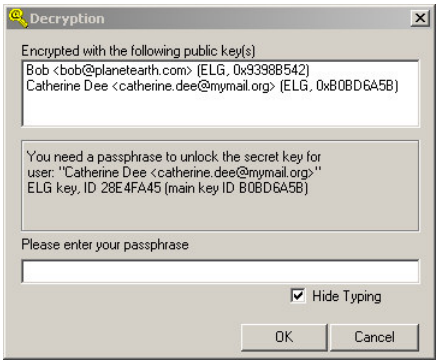
Step 1:
Open the e-mail as usual.



Step 2:
Right-click WinPT system tray icon. Choose '**Current Window > Decrypt/Verify**'.

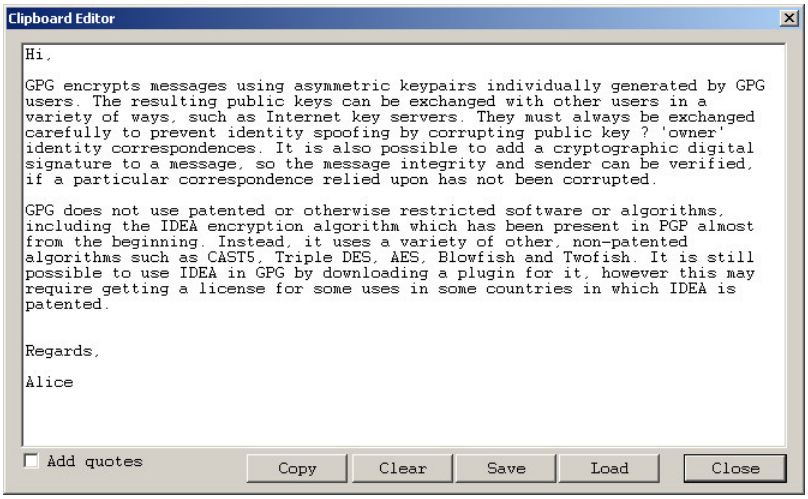


Step 3:
You need to enter your passphrase to decrypt/verify the message. Click '**OK**' to proceed. Sometimes, you will see other people names in the list (Bob, in this example). It means that Alice is also encrypt the messages with Bob's public key.



Step 4:
WinPT will decrypt the message and verify its signature. Click '**OK**' to proceed.

Step 5:
WinPT will display the plaintext message in the Clipboard Editor



You can read the message in the Clipboard Editor and then click '**Clear**' to ensure that the plaintext message will remain secret. But, of course, you can save this plaintext message into an ordinary text file by clicking '**Save**'. Click '**Close**' to end Clipboard Editor.

If Alice attach encrypted files in her e-mail, you should save the attachments in a folder and decrypt it. Please refer to '**Decrypting Files**' section for more information.

9. Encrypting Files

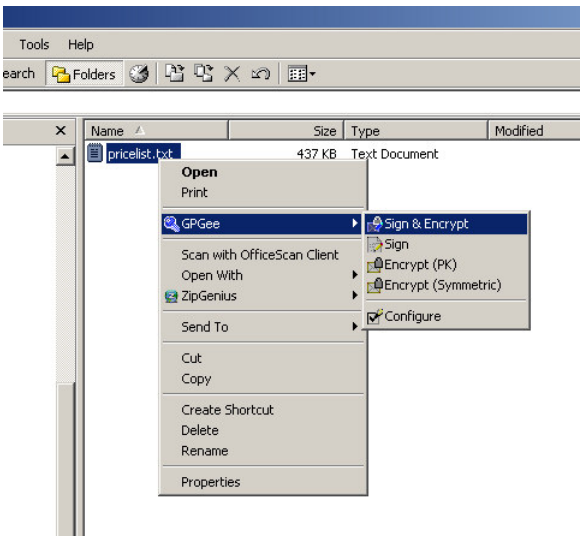
GPG4WIN, through its GPGee modules, provide encrypting/decrypting files feature thorugh it context menu. You can use this feature to protect your confidential file, either in your harddisk or in e-mail attachments.

If you are going to compress the files to reduce their size and then encrypt them, your should know two things:

1. You might want compress the files first and then encrypt them. It is almost useless to compress encrypted files because encryption algorithm will reduce (or eliminate) redundancy in digital data for –of course—security reason.
2. GPG core modules has bulit-in compression library (zlib). It means that whenever you encrypt files, GPG will automatically compress them using that library. In most cases, you do not need to compress them using seperate compression tools.

Allright, let's encrypt a file.

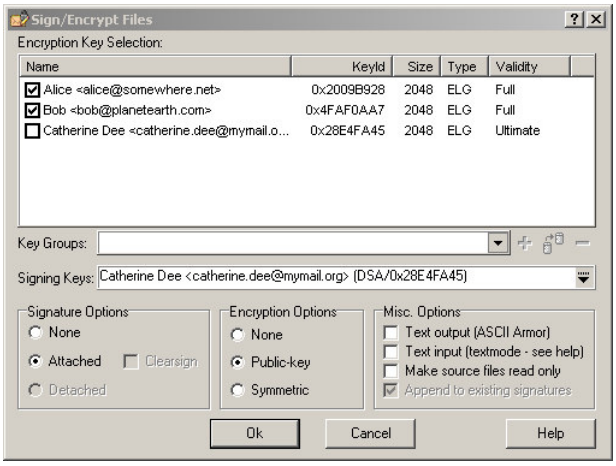
Step 1:
Right-click on the file. Choose '**GPGee > Sign & Encrypt**'



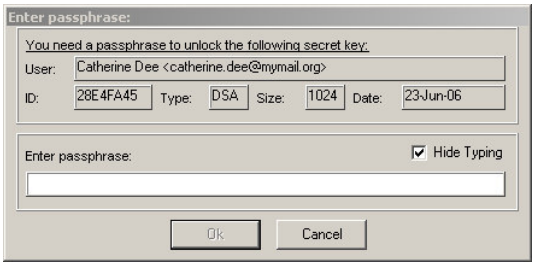
Step 2:
Now, depending on your objective, you may choose which key(s) you are going to use. If:

1. you are going to send this file to Alice and Bob as an e-mail attachment, you should encrypt it using their public keys.
2. you are going to encrypt the file to protect it from everybody but you, you should encrypt it using your key and wipe the original (plaintext) file. Refer to '**Wiping Files**' section for detailed information about wiping files.

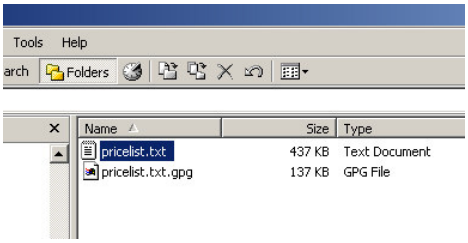
For this example, we are going to send that file to Alice and Bob as e-mail attachments. Put check marks on Alice's and Bob's key, and click '**OK**'.



Step 3:
Enter the passphrase and click '**OK**'.



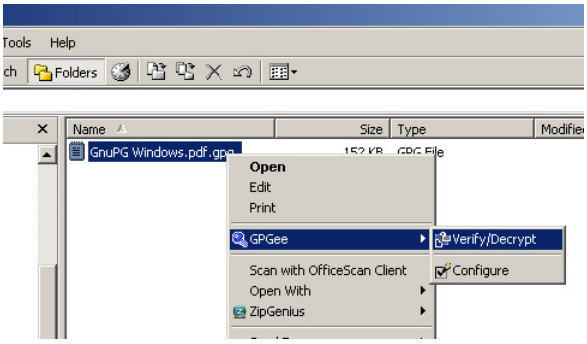
Step 4:
The new encrypted file (with .gpg extension) will be placed in the same folder. Note that the encrypted file (usually) has smaller size than the plaintext file. You can attach this encrypted file to your encrypted e-mail message to Alice and Bob.



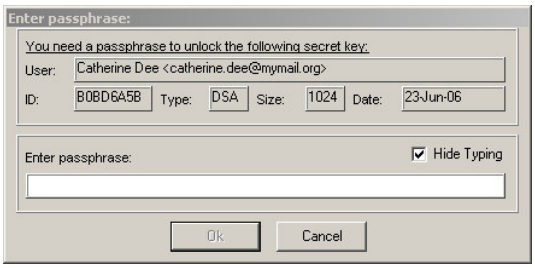
10. Decrypting Files

GPGee context menu will automatically detect .gpg, .pgp, .asc, .sig extension file as encrypted file. This is how to decrypt it:

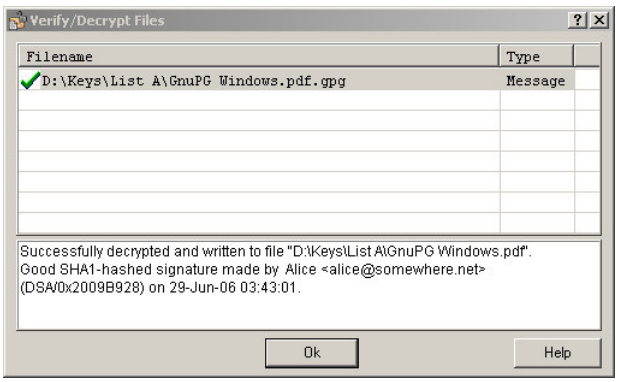
Step 1:
Right-click on the encrypted file and choose '**GPGee > Verify/Decrypt**'



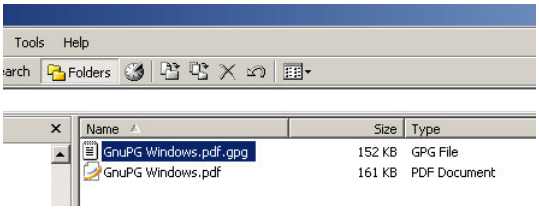
Step 2:
Enter your passphrase and click '**OK**'.



Step 3:
The report window will be displayed, click '**OK**'.



Step 4:
The decrypted file will be put in the same folder.



11. Wiping

If you delete files using **Del** or **Shift-Del** key or emptying Recycle Bin, the files will leave 'traces' in the storage media (harddisk, USB flash disk, or other storage media). Eve, for example, could use file recovery tool to recover the original files by analyzing this 'trace'. This process is called 'file/data recovery' or 'undelete'.

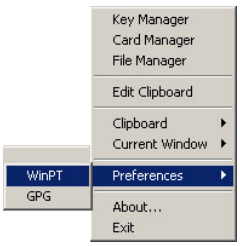
You can sweep these 'traces' away and truly erase files by overwriting it several times using some defined binary pattern. This is called wipe (or shred or purging) process. WinPT provide several pattern mode in wiping[10].

Wiping utility is a complement for encryption utility. Imagine this situation: Alice sent some encrypted secret documents to Bob. Eve, Bob's adversary, has access to his computer harddisk. Eve wants to recover the plaintext secret documents so that she can sell it to the higest bidder, but all she gets are the encrypted files. Does it means Bob's and Alice's secrets are safe? Maybe not. If Bob decrypt the files, read them, and then delete the plaintext files using Shift-Del combo, Eve could simply use file recovery tool to recover the plaintext files. And then, the encryption is futile.

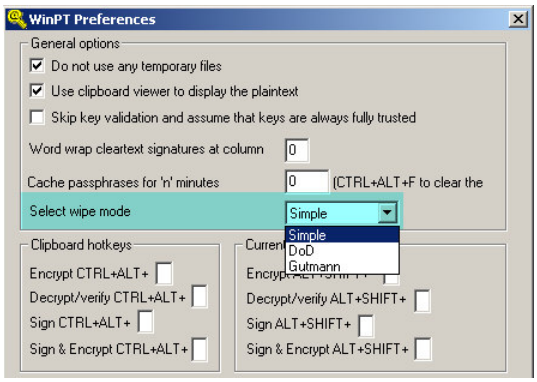
11.1 Selecting Wipe Mode

Step 1:
Right-click on WinPT system tray icon. Choose '**Preference > WinPT**'.

[10] For detailed information: http://en.wikipedia.org/wiki/Data_remanence#Standard_patterns_for_purging



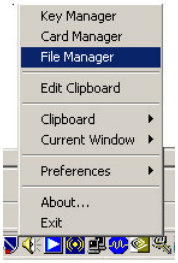
Step 2:
Pick wipe mode (method) on **'Select wipe mode**' dropdown list. The '**Simple**' mode is the quickest mode, but the least secure. The '**Gutmann**' mode is the slowest mode, but the most secure.



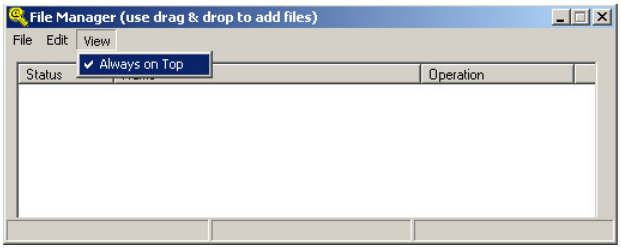
11.2 Wiping Files

You can wipe several files at once. Be very careful: it is very hard (if not impossible) to recover wiped files.

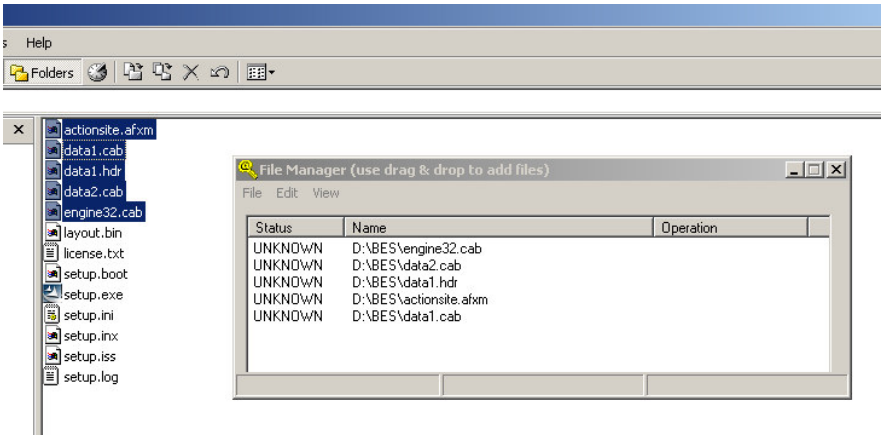
Step 1:
Right-click on WinPT system tray icon. Choose '**File Manager**'.



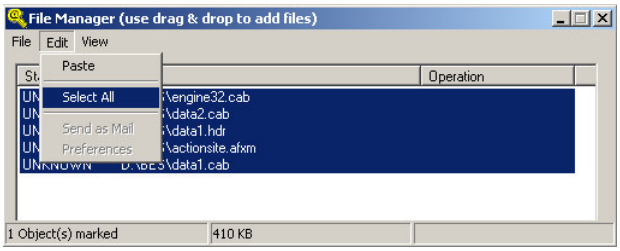
Step 2:
From File Manager menu, choose '**Always on Top**', This is not mandatory step, but it would be much easier to drag-n-drop files from Windows Explorer to the File Manager if the File Manager always on top.



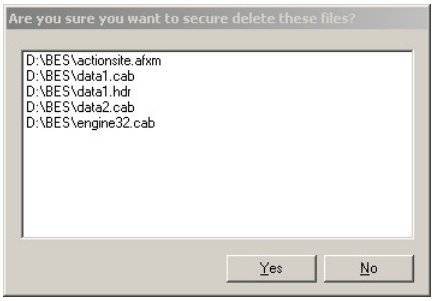
Step 3:
Drag-n-drop the files from Windows Explorer to the File Manager windows.



Step 4:
Choose '**Edit > Select All**' at File Manager window.



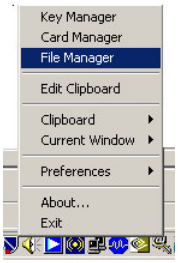
Step 5:
The confirmation dialog box will appear. Click '**Yes**' to wipe these files.



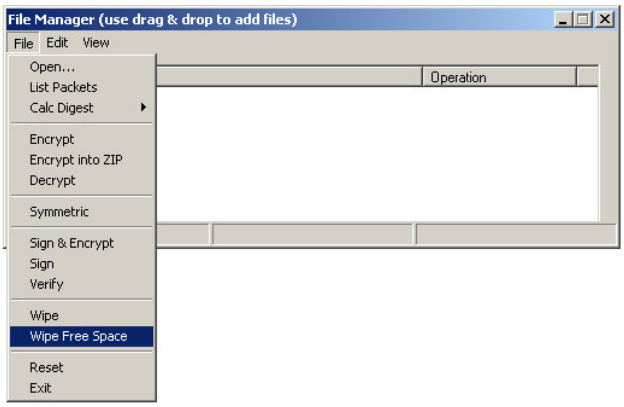
11.3 Wiping Free Space

Instead of wiping files, you can wipe the storage media's free space. This is very useful to sweep 'traces' of previously deleted files. Alice could reformatted her old harddisk and use this feature to ensure that nobody could retreive her secret documents when she dumped her old harddisk in trashcan (or gave it away to someone else).

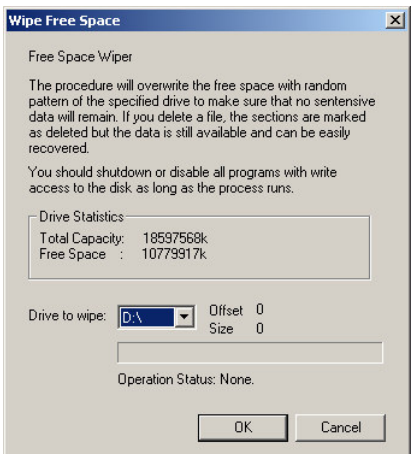
Step 1:
Right-click on WinPT system tray icon. Choose '**File Manager**'.



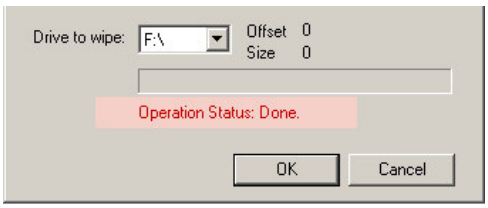
Step 2:
Choose '**File > Wipe Free Space**'



Step 3:
The Wipe Free Space dialog box will appear. Choose drive to wipe. Click '**OK**' to proceed.



Step 4:
A status message will appear after the wiping process complete.


Drive to wipe:
F:\
Offset 0
Size 0
Operation Status: Done.
OK
Cancel

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