

PictureCrypt

1.4.0

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Chapter 1

PictureCrypt

Project made using QT Creator in C++

1.1 About

A simple steganography project which hides data in images This project is built using MVC pattern and features GUI. [Qt](#) and [QAESEncryption](#) by [bricke](#) were used.

1.2 Download

Get the binary files at [latest release page](#) Or download latest **UNSTABLE** binary file for linux [here](#)

1.3 Realisation

To create the encrypted image, you need to select any file for encryption, then using [EncryptDialog](#) you select the image to store the data. Then output image is generated.

Attention

Output image format available is .PNG, because .jpg isn't lossless, so the pixels containing data would be seriously simplified and the data damaged. .BMP isn't used, because noone really uses it and .PNG is just compressed .BMP (more or less)

Note

JPHS support is under development :D

1.4 How can someone use it?

Well... Anyone who wants to securely communicate. For example your boss watches your inbox, so you do the work and don't chat with your friends about the bar, they've just visited. Using this app you can send them a photo of your desk, saying it's my new working space, but inside the image there is secret message saying "Wanna get another beer tonight? xD". Boss sees this image, but doesn't spot anything. Great example...

1.5 Structure of the project.

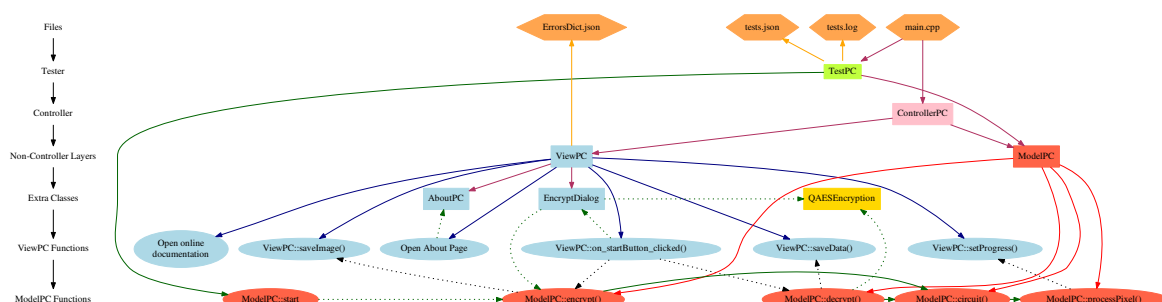
Project is done via MVC Pattern. View and Model layers are totally isolated and run on different threads.

Code from controller.cpp

```
view = new ViewPC();
model = new ModelPC(version);
QThread * modelThread = new QThread();
model->moveToThread(modelThread);
modelThread->start();
```

So when Model is hard-working, View layer is just fine.

Layers also have a ton of functions, so here is a scheme, that I was doing for about 10 hours, which demonstrates the most important functions and classes in the project. And everything is clickable here, so try it out!



Well... I think you didn't quite understand what is happening here... So hop into my "User-friendly" Documentation!

See source on <https://github.com/waleko/PictureCrypt>

Note

QAESEncryption class done by [Bricke](#)

1.6 External use

[ModelPC](#) class can be used externally (without UI)

Note

TestPC class was introduced recently, its use is advised.

```
#include <modelpc.h>
#include <testpc.h>
#include <QByteArray>
#include <QImage>

#include <QDebug> // Just for demonstration use

...

if(TestPC::Test())
    return;
ModelPC * model = new ModelPC();

// Embedding
QImage * resultImage = model->start(QByteArray data, // Data to be embedded
                                   QImage *image, // Image for embedding
                                   int mode = 0, // Mode of embedding
                                   QString key = "", // Key for extra-encryption (if empty, key will be
                                   generated automatically)
                                   int bitsUsed = 8, // Bits per Byte used (better explanation
                                   will be "ok"
                                   QString *error = nullptr); // Error output, if everything is ok, error
if(*error != "ok")
    return;
// Note *error is just a code of error (like "muchdata", dictionary of error codes is also available on
// github.

// De-embedding
QByteArray output = model->decrypt(QImage * image, // Image with hidden data
                                  QString *_error = nullptr); // Error output
if(data == output)
    qDebug() << "Great success!";
else
    qDebug() << "Fiasco :(";
```

See also

[ModelPC](#), [ModelPC::ModelPC](#), [ModelPC::saveData](#), [ModelPC::saveImage](#), [ModelPC::alertView](#), [ModelPC::setProgress](#)

1.7 JPBS use

The newer versions of the app have jpbs support, but they don't have jpbs built in as it is provided under GNU General Public License v3.0, is "for test purposes only" and is illegal in some countries, so...

Attention

We support JPBS, but we don't use any responsibility for it, we never used or downloaded it, we just used .exe output in the web, and it somehow works by chance. All responsibility for using jpbs is on you, that is why we use made only optionally. That means that to use jpbs with our app you will have to download the jpbs yourself and specify the jpbs directory. However we provide link to the site where you can download the supported version of the jpbs: <http://linux01.gwdg.de/~alatham/stego.html> As it's not our site publishing the dangerous zip file, we just put link to that site (Google does that too, so what? Sue Google?), This text is subject to United Nations' Universal Declaration of Human Rights, (see Article 19 <http://www.un.org/en/universal-declaration-human-rights>):

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.

And I typed this link randomly, and I'm scared...

1.8 License

This software is provided under the [UNLICENSE](#)

1.9 Contact us

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Chapter 2

Namespace Index

2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

Ui	13
----------	----

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

QDialog	
AboutPC	15
EncryptDialog	20
QMainWindow	
ViewPC	53
QObject	
ControllerPC	17
ModelIPC	25
QAESEncryption	45

Chapter 4

Class Index

4.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

AboutPC	The About Page dialog	15
ControllerPC	The ControllerPC class Controller class, which controls View and Model layers	17
EncryptDialog	Class to get the image and key to store secret info	20
ModelPC	The ModelPC class Model Layer of the app. Main class that does the work of PictureCrypt logic Controlled by ControllerPC	25
QAESEncryption	Small and portable AES encryption class for Qt. Supports all key sizes - 128/192/256 bits - ECB, CBC, CFB and OFB modes. Class made entirely by bricke. Github: https://github.com/bricke/Qt-AES	45
ViewPC	View layer of the app. Controls EncryptDialog and ProgressDialog	53

Chapter 5

File Index

5.1 File List

Here is a list of all files with brief descriptions:

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Chapter 6

Namespace Documentation

6.1 Ui Namespace Reference

Chapter 7

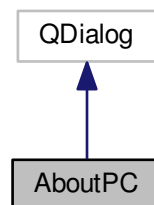
Class Documentation

7.1 AboutPC Class Reference

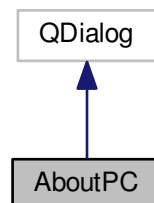
The [AboutPC](#) class The About Page dialog.

```
#include <aboutpc.h>
```

Inheritance diagram for AboutPC:



Collaboration diagram for AboutPC:



Public Member Functions

- [AboutPC](#) (QWidget *parent=0)
- [~AboutPC](#) ()
- void [setVersion](#) (QString version)
[AboutPC::setVersion](#) Function to set the version display.

7.1.1 Detailed Description

The [AboutPC](#) class The About Page dialog.

Definition at line 12 of file [aboutpc.h](#).

7.1.2 Constructor & Destructor Documentation

7.1.2.1 [AboutPC::AboutPC](#) (QWidget * *parent* = 0) [explicit]

Definition at line 4 of file [aboutpc.cpp](#).

7.1.2.2 [AboutPC::~~AboutPC](#) ()

Definition at line 11 of file [aboutpc.cpp](#).

7.1.3 Member Function Documentation

7.1.3.1 void [AboutPC::setVersion](#) (QString *version*)

[AboutPC::setVersion](#) Function to set the version display.

Parameters

<i>version</i>	Version as QString
----------------	--------------------

Definition at line 19 of file [aboutpc.cpp](#).

Here is the caller graph for this function:



The documentation for this class was generated from the following files:

- [aboutpc.h](#)
- [aboutpc.cpp](#)

7.2 ControllerPC Class Reference

The [ControllerPC](#) class Controller class, which controls View and Model layers.

```
#include <controllerpc.h>
```

Inheritance diagram for ControllerPC:



Collaboration diagram for ControllerPC:



Public Slots

- void [abortCircuit](#) ()
[ControllerPC::abortCircuit](#) Slot to be called when ProgressDialog in [ViewPC](#) is closed. It flags [ModelPC](#) to stop.
- void [setJPHSDir](#) (QString dir)
[ControllerPC::setJPHSDir](#) Sets JPHS default dir.

Public Member Functions

- [ControllerPC](#) ()

[ControllerPC::ControllerPC](#) Constructor of controller Constructor runs auto-test for [ModelPC](#), creates Model Class ([ModelPC](#)) and View Class ([ViewPC](#)). All signals and slots are connected here.

Public Attributes

- long int [version](#)
version Version of the app
- QString [versionString](#)
versionString Version of the app as QString.

7.2.1 Detailed Description

The [ControllerPC](#) class Controller class, which controls View and Model layers.

See also

[ViewPC](#), [ModelPC](#)

Definition at line 20 of file [controllerpc.h](#).

7.2.2 Constructor & Destructor Documentation

7.2.2.1 ControllerPC::ControllerPC ()

[ControllerPC::ControllerPC](#) Constructor of controller Constructor runs auto-test for [ModelPC](#), creates Model Class ([ModelPC](#)) and View Class ([ViewPC](#)). All signals and slots are connected here.

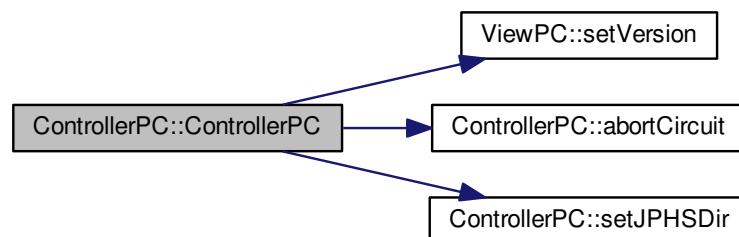
Controller class

Note

Version of the app is specified here.

Definition at line 9 of file [controllerpc.cpp](#).

Here is the call graph for this function:



7.2.3 Member Function Documentation

7.2.3.1 void ControllerPC::abortCircuit () [slot]

[ControllerPC::abortCircuit](#) Slot to be called when ProgressDialog in [ViewPC](#) is closed. It flags [ModelPC](#) to stop.

Definition at line 37 of file [controllerpc.cpp](#).

Here is the caller graph for this function:



7.2.3.2 void ControllerPC::setJPHSDir (QString dir) [slot]

[ControllerPC::setJPHSDir](#) Sets JPHS default dir.

Parameters

<i>dir</i>	Directory
------------	-----------

Definition at line 45 of file [controllerpc.cpp](#).

Here is the caller graph for this function:



7.2.4 Member Data Documentation

7.2.4.1 long int ControllerPC::version

version Version of the app

Definition at line 28 of file [controllerpc.h](#).

7.2.4.2 QString ControllerPC::versionString

versionString Version of the app as QString.

Definition at line 32 of file [controllerpc.h](#).

The documentation for this class was generated from the following files:

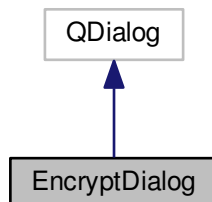
- [controllerpc.h](#)
- [controllerpc.cpp](#)

7.3 EncryptDialog Class Reference

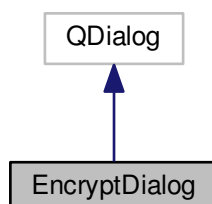
The [EncryptDialog](#) class Class to get the image and key to store secret info.

```
#include <encryptdialog.h>
```

Inheritance diagram for EncryptDialog:



Collaboration diagram for EncryptDialog:



Public Slots

- void [on_fileButton_clicked](#) ()
EncryptDialog::on_fileButton_clicked Slot to select the image.
- void [on_buttonBox_accepted](#) ()
EncryptDialog::on_buttonBox_accepted Slot to start the encryption. Successful closing of the app.
- void [on_buttonBox_rejected](#) ()
EncryptDialog::on_buttonBox_rejected Slot to reject the encryption.
- void [on_bitsSlider_valueChanged](#) (int value)
EncryptDialog::on_bitsSlider_valueChanged Slot if value of the bits slider is changed.

Public Member Functions

- [EncryptDialog](#) (QByteArray _data, QWidget *parent=0)
EncryptDialog::EncryptDialog Constructor of the class. Input data is saved here and some variables are set here.
- [~EncryptDialog](#) ()
- QByteArray [zip](#) ()
EncryptDialog::zip Zipping algorithm It copresses the data and then compresses it using qCompress()

Public Attributes

- QByteArray [data](#)
data Input data
- bool [success](#)
success Flag, if image was successfully selected and data was encrypted.
- QByteArray [compr_data](#)
compr_data Compressed data, aka Output data.
- QString [inputFileName](#)
inputFileName Filename of the image.
- long long int [size](#)
size Size of the image in square pixels
- QString [key](#)
key Key to be used for encryption in *EncryptDialog::zip*
- bool [goodPercentage](#)
goodPercentage Flag if area of the used data via encryption is less than 70% of the area of the image.
- int [val](#)
val Value of the slider
- int [bitsUsed](#)
bitsUsed Bits used per byte of pixel.
- QImage [image](#)
image Inputted image

7.3.1 Detailed Description

The [EncryptDialog](#) class Class to get the image and key to store secret info.

Note

Not the most important and well written class.

See also

[ViewPC](#)

Definition at line 21 of file [encryptdialog.h](#).

7.3.2 Constructor & Destructor Documentation

7.3.2.1 `EncryptDialog::EncryptDialog (QByteArray _data, QWidget * parent = 0) [explicit]`

[EncryptDialog::EncryptDialog](#) Constructor of the class. Input data is saved here and some variables are set here.

Parameters

<code>_data</code>	Input data.
<code>parent</code>	Parent (not in use)

Definition at line 9 of file [encryptdialog.cpp](#).

Here is the call graph for this function:



7.3.2.2 `EncryptDialog::~~EncryptDialog ()`

Definition at line 26 of file [encryptdialog.cpp](#).

7.3.3 Member Function Documentation

7.3.3.1 `void EncryptDialog::on_bitsSlider_valueChanged (int value) [slot]`

[EncryptDialog::on_bitsSlider_valueChanged](#) Slot if value of the bits slider is changed.

Parameters

<code>value</code>	Well, value
--------------------	-------------

Definition at line 107 of file [encryptdialog.cpp](#).

7.3.3.2 `void EncryptDialog::on_buttonBox_accepted () [slot]`

[EncryptDialog::on_buttonBox_accepted](#) Slot to start the encryption. Successful closing of the app.

Definition at line 82 of file [encryptdialog.cpp](#).

Here is the call graph for this function:



7.3.3.3 void EncryptDialog::on_buttonBox_rejected () [slot]

[EncryptDialog::on_buttonBox_rejected](#) Slot to reject the encryption.

Definition at line 98 of file [encryptdialog.cpp](#).

7.3.3.4 void EncryptDialog::on_fileButton_clicked () [slot]

[EncryptDialog::on_fileButton_clicked](#) Slot to select the image.

Definition at line 57 of file [encryptdialog.cpp](#).

7.3.3.5 QByteArray EncryptDialog::zip ()

[EncryptDialog::zip](#) Zipping algorithm It copresses the data and then compresses it using qCompress()

Returns

Returns Compressed data.

See also

[ModelPC::unzip](#)

Definition at line 46 of file [encryptdialog.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.3.4 Member Data Documentation

7.3.4.1 int EncryptDialog::bitsUsed

bitsUsed Bits used per byte of pixel.

See also

[ModelPC::circuit](#)

Definition at line 75 of file [encryptdialog.h](#).

7.3.4.2 QByteArray EncryptDialog::compr_data

compr_data Compressed data, aka Output data.

Definition at line 50 of file [encryptdialog.h](#).

7.3.4.3 QByteArray EncryptDialog::data

data Input data

Definition at line 42 of file [encryptdialog.h](#).

7.3.4.4 bool EncryptDialog::goodPercentage

goodPercentage Flag if area of the used data via encryption is less than 70% of the area of the image.

Definition at line 66 of file [encryptdialog.h](#).

7.3.4.5 QImage EncryptDialog::image

image Inputted image

Definition at line 79 of file [encryptdialog.h](#).

7.3.4.6 QString EncryptDialog::inputFileName

inputFileName Filename of the image.

Definition at line 54 of file [encryptdialog.h](#).

7.3.4.7 QString EncryptDialog::key

key Key to be used for encryption in EncryptDialog::zip

Definition at line 62 of file [encryptdialog.h](#).

7.3.4.8 long long int EncryptDialog::size

size Size of the image in square pixels

Definition at line 58 of file [encryptdialog.h](#).

7.3.4.9 bool EncryptDialog::success

success Flag, if image was successfully selected and data was encrypted.

Definition at line 46 of file [encryptdialog.h](#).

7.3.4.10 int EncryptDialog::val

val Value of the slider

Definition at line 70 of file [encryptdialog.h](#).

The documentation for this class was generated from the following files:

- [encryptdialog.h](#)
- [encryptdialog.cpp](#)

7.4 ModelPC Class Reference

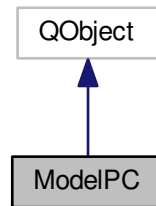
The [ModelPC](#) class Model Layer of the app. Main class that does the work of PictureCrypt logic Controlled by [ControllerPC](#).

```
#include <modelpc.h>
```

Inheritance diagram for ModelPC:



Collaboration diagram for ModelPC:



Public Types

- enum `CryptMode` { `NotDefined`, `v1_3`, `v1_4`, `jphs_mode` }

Public Slots

- QImage * `encrypt` (QByteArray data, QImage *image, int _mode, QString key="", int _bitsUsed=8, QString *_error=NULLPTR)
ModelPC::encrypt Slot to zip and inject data and provide it with some extra stuff After completion start standard
ModelPC::inject Isn't used in PictureCrypt, but used can be used in other - custom projects.
- QImage * `inject` (QByteArray encr_data, QImage *image, int _mode, int _bitsUsed=8, QString *_error=NULLPTR)
ModelPC::inject Slot to be called when encrypt mode in *ViewPC* is selected and started.
- QByteArray `decrypt` (QImage *image, QString key, int _mode=0, QString *_error=NULLPTR)
ModelPC::decrypt Slot to be called when decrypt mode in *ViewPC* is selected and started.
- void `fail` (QString message)
ModelPC::fail Slot to stop execution of crypton.
- void `alert` (QString message, bool isWarning=false)
ModelPC::alert Function emits signal *ModelPC::alertView* and calls *ViewPC::alert*.

Signals

- void `alertView` (QString messageCode, bool isWarning)
alertView Signal to be called to create MessageBox.
- void `saveData` (QByteArray data)
saveData Signal to be called to save data from *ModelPC::decrypt*.
- void `saveImage` (QImage *image)
saveImage Signal to be called to save image from *ModelPC::encrypt*.
- void `setProgress` (int val)
setProgress Signal to be called to set progress of ProgressDialog.

Public Member Functions

- [ModelPC](#) ()
ModelPC::ModelPC Constructor Unit tests are run here.
- QByteArray [unzip](#) (QByteArray data, QByteArray key)
ModelPC::unzip Unzip data from [ModelPC::decrypt](#). Just mirrored [EncryptDialog::zip](#).

Static Public Member Functions

- static QImage * [Encrypt](#) (QByteArray data, QImage *image, int _mode, QString key="", int _bitsUsed=8, QString *_error=NULLPTR)
- static QImage * [Inject](#) (QByteArray encr_data, QImage *image, int _mode, int _bitsUsed=8, QString *_error=NULLPTR)
- static QByteArray [Decrypt](#) (QImage *image, QString key, int _mode=0, QString *_error=NULLPTR)

Public Attributes

- bool [success](#)
success Flag that true by default, but in case of error or cancelling of ProgressDialog it turns to false, which stops execution of [ModelPC::circuit](#)
- long [version](#)
version Version of the class
- QString [versionString](#)
versionString Version as string
- QString [defaultJPHSDir](#)
defaultJPHSDir Default JPHS directory

Protected Member Functions

- void [circuit](#) (QImage *image, QByteArray *data, long long int countBytes)
ModelPC::circuit The brain of the app. Via special circuit stores data in image.
- void [jphs](#) (QImage *image, QByteArray *data)
ModelPC::jphs JPHS function to use jphide and jpseek (currently under development)
- void [processPixel](#) (QPoint pos, QVector< QPoint > *were, bool isEncrypt)
ModelPC::processPixel Processes every pixel. Reads its contains or writes data.
- void [encryptv1_4](#) (QImage *image, QByteArray data, QString key)
ModelPC::encryptv1_4 Encrypts and injects data to image used in v1.4+.
- QByteArray [decryptv1_3](#) (QImage *image, QString key)
ModelPC::decryptv1_3 Decrypts data from image in v1.3.
- QByteArray [decryptv1_4](#) (QImage *image, QString key)
ModelPC::decryptv1_4 Decrypts data from image in v1.4+.
- void [proccessPixelsv1_4](#) (QImage *image, QByteArray *data, QByteArray key, bool isEncrypt, QVector< QPair< QPoint, QPair< int, int > > > *were, long long size=-1)
ModelPC::proccessPixelsv1_4 Hides (or retrieves) data to/from pixels.
- QByteArray [zip](#) (QByteArray data, QByteArray key)
ModelPC::zip Zip function, copy of [EncryptDialog::zip](#) Used for [ModelPC](#) in custom projects, other than PictureCrypt.

Protected Attributes

- `QString * error`
error Current error

7.4.1 Detailed Description

The [ModelPC](#) class Model Layer of the app. Main class that does the work of PictureCrypt logic Controlled by [ControllerPC](#).

See also

[ViewPC](#), [ControllerPC](#)

Author

Alex Kovrigin (waleko)

Definition at line 33 of file [modelpc.h](#).

7.4.2 Member Enumeration Documentation

7.4.2.1 enum `ModelPC::CryptMode`

Enumerator

NotDefined
v1_3
v1_4
jphs_mode

Definition at line 38 of file [modelpc.h](#).

7.4.3 Constructor & Destructor Documentation

7.4.3.1 `ModelPC::ModelPC ()`

[ModelPC::ModelPC](#) Constructor Unit tests are run here.

See also

[ControllerPC](#), [ViewPC](#)

Definition at line 9 of file [modelpc.cpp](#).

Here is the caller graph for this function:



7.4.4 Member Function Documentation

7.4.4.1 `void ModelPC::alert (QString message, bool isWarning = false) [slot]`

[ModelPC::alert](#) Function emits signal [ModelPC::alertView](#) and calls [ViewPC::alert](#).

Parameters

<i>message</i>	Message to be transmitted.
<i>isWarning</i>	Flag if message is critical.

See also

[ViewPC::alert](#)

Definition at line 940 of file [modelpc.cpp](#).

Here is the caller graph for this function:



7.4.4.2 void ModelPC::alertView (QString *messageCode*, bool *isWarning*) [signal]

alertView Signal to be called to create MessageBox.

Parameters

<i>messageCode</i>	Message Code to be shown.
<i>isWarning</i>	Flag if message is critical.

See also

[ModelPC::alert](#), [ViewPC::alert](#)

Here is the caller graph for this function:



7.4.4.3 void ModelPC::circuit (QImage * *image*, QByteArray * *data*, long long int *countBytes*) [protected]

[ModelPC::circuit](#) The brain of the app. Via special circuit stores data in image.

The circuit itself can be found in documentation or in commentaries in source.

Parameters

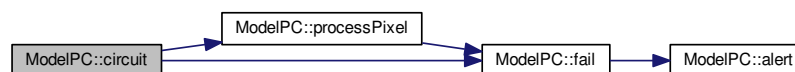
<i>image</i>	Image to be processed.
<i>data</i>	Data to be processed.
<i>countBytes</i>	Number of bytes to be read or written.

See also

[ModelPC::processPixel](#)

Definition at line 359 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.4 QByteArray ModelPC::Decrypt (QImage * image, QString key, int _mode = 0, QString * _error = nullptr) [static]

Definition at line 34 of file [modelpc.cpp](#).

Here is the call graph for this function:



7.4.4.5 `QByteArray ModelPC::decrypt (QImage * image, QString key, int _mode = 0, QString * _error = nullptr)`
[slot]

[ModelPC::decrypt](#) Slot to be called when decrypt mode in [ViewPC](#) is selected and started.

Parameters

<i>image</i>	Image to be decrypted.
<i>key</i>	Keyphrase with which the data is injected
<i>_mode</i>	Mode for decryption
<i>_error</i>	Error output

Returns

Returns decrypted data

See also

[ViewPC::on_startButton_clicked](#), [ModelPC::inject](#), [ModelPC::circuit](#)

Definition at line 212 of file [modelpc.cpp](#).

Here is the call graph for this function:



7.4.4.6 QByteArray ModelPC::decryptv1_3 (QImage * *image*, QString *key*) [protected]

[ModelPC::decryptv1_3](#) Decrypts data from image in v1.3.

Parameters

<i>image</i>	Image with data
<i>key</i>	Key

Returns

Returns obtained data

Definition at line 777 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.7 QByteArray ModelPC::decryptv1_4 (QImage * *image*, QString *key*) [protected]

[ModelPC::decryptv1_4](#) Decrypts data from image in v1.4+.

Parameters

<i>image</i>	Image with data
<i>key</i>	Key

Returns

Returns obtained data

Definition at line 602 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.8 `QImage * ModelPC::Encrypt (QByteArray data, QImage * image, int _mode, QString key = " ", int _bitsUsed = 8, QString *_error = nullptr) [static]`

Definition at line 24 of file [modelpc.cpp](#).

Here is the call graph for this function:



7.4.4.9 `QImage * ModelPC::encrypt (QByteArray data, QImage * image, int _mode, QString key = " ", int _bitsUsed = 8, QString *_error = nullptr) [slot]`

[ModelPC::encrypt](#) Slot to zip and inject data and provide it with some extra stuff After completion start standard [ModelPC::inject](#) Isn't used in PictureCrypt, but used can be used in other - custom projects.

Parameters

<i>data</i>	Data for embedding
<i>image</i>	Image for embedding
<i>mode</i>	Mode for embedding
<i>key</i>	Key for extra encryption
<i>_bitsUsed</i>	Bits per byte (see <code>ModelPC::bitsUsed</code>)
<i>_error</i>	Error output

Returns

Returns image with embedded data

See also

[ModelPC::inject](#)

Definition at line 51 of file [modelpc.cpp](#).

Here is the call graph for this function:



7.4.4.10 `void ModelPC::encryptv1_4 (QImage * image, QByteArray data, QString key)` [protected]

[ModelPC::encryptv1_4](#) Encrypts and injects data to image used in v1.4+.

Parameters

<i>image</i>	Image for injecting
<i>data</i>	Data for embedding

Definition at line 560 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.11 void ModelPC::fail (QString *message*) [slot]

[ModelPC::fail](#) Slot to stop execution of crypton.

Parameters

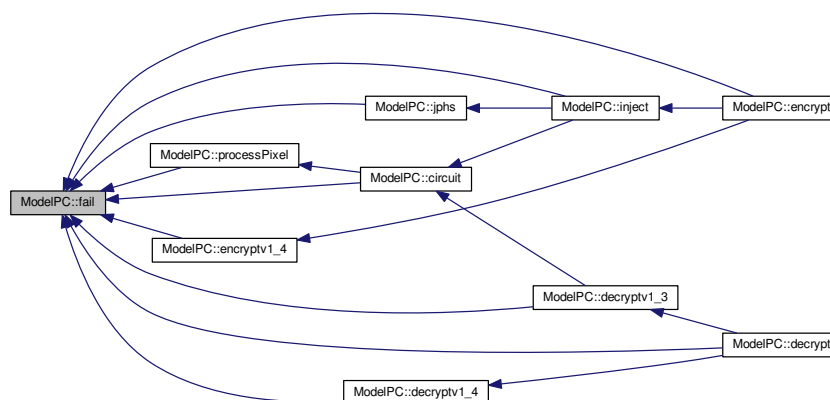
<i>message</i>	Message for user
----------------	------------------

Definition at line 283 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:

7.4.4.12 QImage * ModelPC::Inject (QByteArray *encr_data*, QImage * *image*, int *_mode*, int *_bitsUsed* = 8, QString * *_error* = nullptr) [static]

Definition at line 29 of file [modelpc.cpp](#).

Here is the call graph for this function:



7.4.4.13 `QImage * ModelPC::inject (QByteArray encr_data, QImage * image, int _mode, int _bitsUsed = 8, QString * _error = nullptr) [slot]`

[ModelPC::inject](#) Slot to be called when encrypt mode in [ViewPC](#) is selected and started.

Parameters

<i>encr_data</i>	Data to be inserted to an image.
<i>image</i>	Image to be inserted in.
<i>mode</i>	Mode of encryption
<i>_bitsUsed</i>	Bits per byte used
<i>_error</i>	Error output

Returns

Returns image with embedded data.

See also

[ViewPC::on_startButton_clicked](#), [ModelPC::decrypt](#), [ModelPC::circuit](#), [ModelPC::start](#)

Definition at line 139 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.14 `void ModelPC::jphs (QImage * image, QByteArray * data)` `[protected]`

[ModelPC::jphs](#) JPHS function to use jpshide and jpseek (currently under development)

Parameters

<i>image</i>	Image for embedding
<i>data</i>	Data

Definition at line [298](#) of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.15 `void ModelPC::processPixelsv1_4 (QImage * image, QByteArray * data, QByteArray key, bool isEncrypt, QVector< QPair< QPoint, QPair< int, int > > * were, long long size = -1)` `[protected]`

[ModelPC::processPixelsv1_4](#) Hides (or retrieves) data to/from pixels.

Parameters

<i>image</i>	Original image
<i>data</i>	Data to write (Pointer to empty QByteArray if decrypting)
<i>key</i>	Key
<i>isEncrypt</i>	Mode of Crypton (true -> encryption, false -> decryption)
<i>were</i>	Were vector for visited pixels
<i>size</i>	Size of reading data, unneeded if writing

Definition at line 663 of file [modelpc.cpp](#).

Here is the caller graph for this function:



7.4.4.16 `void ModelPC::processPixel (QPoint pos, QVector< QPoint > * were, bool isEncrypt)` [protected]

[ModelPC::processPixel](#) Processes every pixel. Reads its contains or writes data.

Parameters

<i>pos</i>	Position of pixel
<i>were</i>	Vector array containing pixels, that were already processed.
<i>isEncrypt</i>	Mode of operation. If true encryption operations will continue, else the decryption ones.

Definition at line 500 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.17 void ModelPC::saveData (QByteArray *data*) [signal]

saveData Signal to be called to save data from [ModelPC::decrypt](#).

Parameters

<i>data</i>	Data to be saved.
-------------	-------------------

Here is the caller graph for this function:



7.4.4.18 void ModelPC::saveImage (QImage * *image*) [signal]

saveImage Signal to be called to save image from [ModelPC::encrypt](#).

Parameters

<i>image</i>	Image to be saved.
--------------	--------------------

Here is the caller graph for this function:



7.4.4.19 void ModelPC::setProgress (int *val*) [signal]

setProgress Signal to be called to set progress of ProgressDialog.

Parameters

<i>val</i>	Value to be set.
------------	------------------

See also

[ViewPC::setProgress](#)

Here is the caller graph for this function:



7.4.4.20 QByteArray ModelPC::unzip (QByteArray *data*, QByteArray *key*)

[ModelPC::unzip](#) Unzip data from [ModelPC::decrypt](#). Just mirrored [EncryptDialog::zip](#).

Parameters

<i>data</i>	Data to be decrypted.
<i>key</i>	Key to decrypt the data.

Returns

Returns data

See also

[EncryptDialog::zip](#), [ModelPC::decrypt](#), [ModelPC::zip](#)

Definition at line 879 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.4.21 QByteArray ModelPC::zip (QByteArray data, QByteArray key) [protected]

[ModelPC::zip](#) Zip function, copy of [EncryptDialog::zip](#) Used for [ModelPC](#) in custom projects, other than PictureCrypt.

Parameters

<i>data</i>	Data to be encrypted
<i>key</i>	Key for encryption

Returns

Returns decrypted data

See also

ModelPC::start, [ModelPC::inject](#), [ModelPC::unzip](#)

Definition at line 896 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.5 Member Data Documentation

7.4.5.1 QString ModelPC::defaultJPHSDir

defaultJPHSDir Default JPHS directory

Definition at line 94 of file [modelpc.h](#).

7.4.5.2 QString* ModelPC::error [protected]

error Current error

Definition at line 108 of file [modelpc.h](#).

7.4.5.3 bool ModelPC::success

success Flag that true by default, but in case of error or cancelling of ProgressDialog it turns to false, which stops execution of [ModelPC::circuit](#)

Definition at line 82 of file [modelpc.h](#).

7.4.5.4 long ModelPC::version

version Version of the class

Definition at line 86 of file [modelpc.h](#).

7.4.5.5 QString ModelPC::versionString

versionString Version as string

Definition at line 90 of file [modelpc.h](#).

The documentation for this class was generated from the following files:

- [modelpc.h](#)
- [modelpc.cpp](#)

7.5 QAESEncryption Class Reference

The [QAESEncryption](#) class Small and portable AES encryption class for Qt. Supports all key sizes - 128/192/256 bits - ECB, CBC, CFB and OFB modes. Class made entirely by bricke. Github: <https://github.com/bricke/Qt-AES>.

```
#include <qaesencryption.h>
```

Inheritance diagram for QAESEncryption:



Collaboration diagram for QAESEncryption:



Public Types

- enum [Aes](#) { [AES_128](#), [AES_192](#), [AES_256](#) }

The Aes enum AES Level AES Levels The class supports all AES key lengths.

- enum [Mode](#) { [ECB](#), [CBC](#), [CFB](#), [OFB](#) }

The Mode enum AES Mode The class supports the following operating modes ECB CBC CFB OFB.

- enum [Padding](#) { [ZERO](#), [PKCS7](#), [ISO](#) }

The Padding enum Padding By default the padding method is ISO, however, the class supports:

Public Member Functions

- [QAESEncryption](#) ([QAESEncryption::Aes](#) level, [QAESEncryption::Mode](#) mode, [QAESEncryption::Padding](#) padding=[QAESEncryption::ISO](#))
- QByteArray [encode](#) (const QByteArray &rawText, const QByteArray &key, const QByteArray &iv=NULL)
encode Encodes data with AES
- QByteArray [decode](#) (const QByteArray &rawText, const QByteArray &key, const QByteArray &iv=NULL)
decode Decodes data with AES
- QByteArray [removePadding](#) (const QByteArray &rawText)
RemovePadding Removes padding.
- QByteArray [expandKey](#) (const QByteArray &key)
ExpandKey Expands the key.

Static Public Member Functions

- static QByteArray [Crypt](#) ([QAESEncryption::Aes](#) level, [QAESEncryption::Mode](#) mode, const QByteArray &rawText, const QByteArray &key, const QByteArray &iv=NULL, [QAESEncryption::Padding](#) padding=[QAESEncryption::ISO](#))
Crypt Static encode function.
- static QByteArray [Decrypt](#) ([QAESEncryption::Aes](#) level, [QAESEncryption::Mode](#) mode, const QByteArray &rawText, const QByteArray &key, const QByteArray &iv=NULL, [QAESEncryption::Padding](#) padding=[QAESEncryption::ISO](#))
Decrypt Static decode function.
- static QByteArray [ExpandKey](#) ([QAESEncryption::Aes](#) level, [QAESEncryption::Mode](#) mode, const QByteArray &key)
ExpandKey Expands the key.
- static QByteArray [RemovePadding](#) (const QByteArray &rawText, [QAESEncryption::Padding](#) padding)
RemovePadding Removes padding.

7.5.1 Detailed Description

The [QAESEncryption](#) class Small and portable AES encryption class for Qt. Supports all key sizes - 128/192/256 bits - ECB, CBC, CFB and OFB modes. Class made entirely by bricke. Github: <https://github.com/bricke/Qt-AES>.

Author

Bricke (Matteo B)

Definition at line 14 of file [qaesencryption.h](#).

7.5.2 Member Enumeration Documentation

7.5.2.1 enum QAESEncryption::Aes

The Aes enum AES Level AES Levels The class supports all AES key lengths.

AES_128 AES_192 AES_256

Enumerator

AES_128

AES_192

AES_256

Definition at line 27 of file [qaesencryption.h](#).

7.5.2.2 enum QAESEncryption::Mode

The Mode enum AES Mode The class supports the following operating modes ECB CBC CFB OFB.

Enumerator

ECB
CBC
CFB
OFB

Definition at line 40 of file [qaesencryption.h](#).

7.5.2.3 enum QAESEncryption::Padding

The Padding enum Padding By default the padding method is ISO, however, the class supports:

ZERO PKCS7 ISO

Enumerator

ZERO
PKCS7
ISO

Definition at line 55 of file [qaesencryption.h](#).

7.5.3 Constructor & Destructor Documentation

7.5.3.1 QAESEncryption::QAESEncryption (QAESEncryption::Aes level, QAESEncryption::Mode mode, QAESEncryption::Padding padding = QAESEncryption::ISO)

Definition at line 67 of file [qaesencryption.cpp](#).

Here is the caller graph for this function:



7.5.4 Member Function Documentation

7.5.4.1 QByteArray QAESEncryption::Crypt (QAESEncryption::Aes level, QAESEncryption::Mode mode, const QByteArray & rawText, const QByteArray & key, const QByteArray & iv = NULL, QAESEncryption::Padding padding = QAESEncryption::ISO) [static]

Crypt Static encode function.

Parameters

<i>level</i>	AES level of encryption
<i>mode</i>	AES mode
<i>rawText</i>	Input data
<i>key</i>	Key for encryption
<i>iv</i>	IV vector
<i>padding</i>	Padding

Returns

Returns encrypted data

See also

[QAESEncryption::encode](#), [QAESEncryption::Decrypt](#)

Definition at line 6 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.5.4.2 `QByteArray QAESEncryption::decode (const QByteArray & rawText, const QByteArray & key, const QByteArray & iv = NULL)`

decode Decodes data with AES

Note

Basically the non-static method of [QAESEncryption::Decrypt](#)

Parameters

<i>rawText</i>	Input data
<i>key</i>	Key
<i>iv</i>	IV vector

Returns

Returns decoded data

See also

[QAESEncryption::Decrypt](#), [QAESEncryption::encode](#)

Definition at line 441 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.5.4.3 `QByteArray QAESEncryption::Decrypt (QAESEncryption::Aes level, QAESEncryption::Mode mode, const QByteArray & rawText, const QByteArray & key, const QByteArray & iv = NULL, QAESEncryption::Padding padding = QAESEncryption::ISO) [static]`

Decrypt Static decode function.

Parameters

<i>level</i>	AES level of encryption
<i>mode</i>	AES mode
<i>rawText</i>	Encrypted data
<i>key</i>	Key for encrytion
<i>iv</i>	IV vector
<i>padding</i>	Padding

Returns

Returns Decrypted data

See also

[QAESEncryption::decode](#), [QAESEncryption::Crypt](#)

Definition at line 12 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



7.5.4.4 `QByteArray QAESEncryption::encode (const QByteArray & rawText, const QByteArray & key, const QByteArray & iv = NULL)`

encode Encodes data with AES

Note

Basically the non-static method of [QAESEncryption::Crypt](#)

Parameters

<i>rawText</i>	Input data
<i>key</i>	Key
<i>iv</i>	IV vector

Returns

Returns encoded data

See also

[QAESEncryption::Crypt](#), [QAESEncryption::decode](#)

Definition at line 391 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



7.5.4.5 `QByteArray QAESEncryption::ExpandKey (QAESEncryption::Aes level, QAESEncryption::Mode mode, const QByteArray & key) [static]`

ExpandKey Expands the key.

Parameters

<i>level</i>	AES level
<i>mode</i>	AES Mode
<i>key</i>	key

Returns

Returns expanded key (I guess)

See also

[QAESEncryption::expandKey](#)

Definition at line 18 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



7.5.4.6 `QByteArray QAESEncryption::expandKey (const QByteArray & key)`

ExpandKey Expands the key.

Note

Basically the non-static method of [QAESEncryption::ExpandKey](#)

Parameters

<i>key</i>	key
------------	-----

Returns

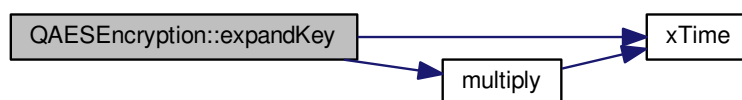
Returns expanded key (I guess)

See also

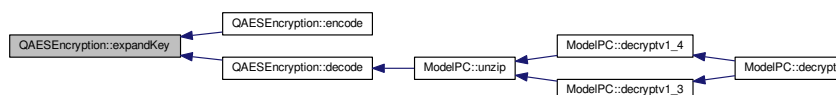
[QAESEncryption::ExpandKey](#)

Definition at line 132 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.5.4.7 `QByteArray QAESEncryption::RemovePadding (const QByteArray & rawText, QAESEncryption::Padding padding) [static]`

`RemovePadding` Removes padding.

Parameters

<i>rawText</i>	Input data
<i>padding</i>	Padding

Returns

Returns data with removed padding (I guess)

See also

[QAESEncryption::removePadding](#)

Definition at line 23 of file [qaesencryption.cpp](#).

7.5.4.8 QByteArray QAESEncryption::removePadding (const QByteArray & *rawText*)

RemovePadding Removes padding.

Note

Basically the non-static method of [QAESEncryption::RemovePadding](#)

Parameters

<i>rawText</i>	Input data
----------------	------------

Returns

Returns data with removed padding (I guess)

See also

[QAESEncryption::RemovePadding](#)

Definition at line 490 of file [qaesencryption.cpp](#).

The documentation for this class was generated from the following files:

- [qaesencryption.h](#)
- [qaesencryption.cpp](#)

7.6 ViewPC Class Reference

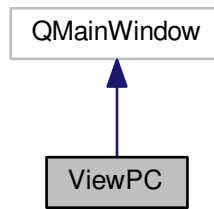
The [ViewPC](#) class View layer of the app. Controls [EncryptDialog](#) and ProgressDialog.

```
#include <viewpc.h>
```

Inheritance diagram for ViewPC:



Collaboration diagram for ViewPC:



Public Slots

- void [alert](#) (QString message, bool isWarning=false)
ViewPC::alert Slot to create *QMessageBox* with message.
- void [saveData](#) (QByteArray Edata)
ViewPC::saveData Slot to be called to save data using *QFileDialog*.
- void [saveImage](#) (QImage *image)
ViewPC::saveImage Slot to be called to save image using *QFileDialog*.
- void [setProgress](#) (int val)
ViewPC::setProgress Slot to set the value of the *ProgressDialog* (*ViewPC::dialog*).
- void [abortCircuit](#) ()
ViewPC::abortCircuit Slot to close *ProgressDialog* (*ViewPC::dialog*)
- void [setEncryptMode](#) (bool encr)
ViewPC::setEncryptMode Set the encrpt mode (*ViewPC::isEncrypt*)
- void [setVersion](#) (QString version)
ViewPC::setVersion Set the version of the app from *ControllerPC*.

Signals

- void [encrypt](#) (QByteArray data, QImage *image, int mode, QString key)
encrypt Signal calling *ModelIPC::encrypt*
- void [inject](#) (QByteArray data, QImage *image, int mode, int bitsUsed)
inject Signal calling *ModelIPC::inject*
- void [decrypt](#) (QImage *_image, QString key, int mode)
decrypt Signal calling *ModelIPC::decrypt*
- void [abortModel](#) ()
abortModel Signal calling to stop *ModelIPC::circuit*
- void [setJPHSDir](#) (QString dir)
setJPHSPath Sets the default JPHS directory

Public Member Functions

- [ViewPC](#) (QWidget *parent=nullptr)
- [~ViewPC](#) ()
ViewPC::~~ViewPC Simple destructor for this layer.

Public Attributes

- QProgressDialog * [dialog](#)
dialog ProgressDialog used.
- bool [progressDialogClosed](#)
progressDialogClosed Flag, if dialog is closed.
- QMap< QString, QString > [errorsDict](#)
errorsDict QMap - Errors dictionary

Protected Slots

- void [on_fileButton_clicked](#) ()
ViewPC::on_fileButton_clicked Slot to be called, when according button is pressed.
- void [on_startButton_clicked](#) ()
ViewPC::on_startButton_clicked Slot to be called, when Start Button is pressed.
- void [on_actionAbout_triggered](#) ()
ViewPC::on_actionAbout_triggered Opens about page.
- void [on_actionHelp_triggered](#) ()
ViewPC::on_actionHelp_triggered Opens online documentation.
- void [setupErrorsDict](#) ()
ViewPC::setupErrorsDict Setups errorsDict from strings.xml.

Protected Member Functions

- QString [requestKey](#) ()
ViewPC::requestKey Request keyphrase from user using InputDialog.

7.6.1 Detailed Description

The [ViewPC](#) class View layer of the app. Controls [EncryptDialog](#) and ProgressDialog.

See also

[ControllerPC](#), [ModelPC](#), [EncryptDialog](#)

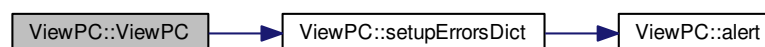
Definition at line 36 of file [viewpc.h](#).

7.6.2 Constructor & Destructor Documentation

7.6.2.1 ViewPC::ViewPC (QWidget * *parent* = nullptr) [explicit]

Definition at line 4 of file [viewpc.cpp](#).

Here is the call graph for this function:



7.6.2.2 ViewPC::~~ViewPC ()

[ViewPC::~~ViewPC](#) Simple destructor for this layer.

Definition at line 19 of file [viewpc.cpp](#).

Here is the call graph for this function:



7.6.3 Member Function Documentation

7.6.3.1 void ViewPC::abortCircuit () [slot]

[ViewPC::abortCircuit](#) Slot to close ProgressDialog ([ViewPC::dialog](#))

Definition at line 218 of file [viewpc.cpp](#).

Here is the caller graph for this function:



7.6.3.2 void ViewPC::abortModel () [signal]

`abortModel` Signal calling to stop [ModelPC::circuit](#)

Here is the caller graph for this function:



7.6.3.3 void ViewPC::alert (QString message, bool isWarning = false) [slot]

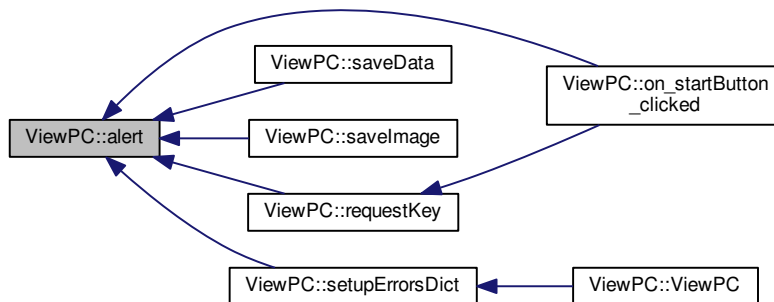
[ViewPC::alert](#) Slot to create QMessageBox with message.

Parameters

<i>message</i>	Message to be shown
<i>isWarning</i>	Flag, if message is critical.

Definition at line 132 of file [viewpc.cpp](#).

Here is the caller graph for this function:



7.6.3.4 `void ViewPC::decrypt (QImage * _image, QString key, int mode) [signal]`

decrypt Signal calling [ModelPC::decrypt](#)

Parameters

<i>_image</i>	Image for decryption
<i>key</i>	encryption key
<i>mode</i>	Mode of decryption

See also

[ModelPC::decrypt](#), [ModelPC::CryptMode](#)

Here is the caller graph for this function:



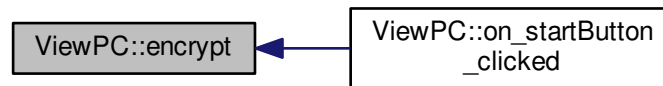
7.6.3.5 void ViewPC::encrypt (QByteArray *data*, QImage * *image*, int *mode*, QString *key*) [signal]

encrypt Signal calling [ModelPC::encrypt](#)

Parameters

<i>data</i>	Data to write
<i>image</i>	Image to be encrypted into
<i>mode</i>	Mode of encryption
<i>key</i>	Key of encryption

Here is the caller graph for this function:



7.6.3.6 void ViewPC::inject (QByteArray *data*, QImage * *image*, int *mode*, int *bitsUsed*) [signal]

inject Signal calling [ModelPC::inject](#)

Parameters

<i>data</i>	Data to write
<i>image</i>	Image to be encrypted into.
<i>mode</i>	Mode of encryption
<i>bitsUsed</i>	Bits used per byte

Here is the caller graph for this function:

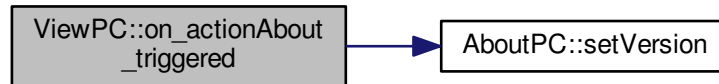


7.6.3.7 `void ViewPC::on_actionAbout_triggered () [protected],[slot]`

[ViewPC::on_actionAbout_triggered](#) Opens about page.

Definition at line 275 of file [viewpc.cpp](#).

Here is the call graph for this function:



7.6.3.8 `void ViewPC::on_actionHelp_triggered () [protected],[slot]`

[ViewPC::on_actionHelp_triggered](#) Opens online documentation.

Definition at line 285 of file [viewpc.cpp](#).

7.6.3.9 `void ViewPC::on_fileButton_clicked () [protected],[slot]`

[ViewPC::on_fileButton_clicked](#) Slot to be called, when according button is pressed.

Definition at line 38 of file [viewpc.cpp](#).

7.6.3.10 `void ViewPC::on_startButton_clicked () [protected],[slot]`

[ViewPC::on_startButton_clicked](#) Slot to be called, when Start Button is pressed.

7.6.4 Encrypting

If Encrypting mode is active the data from text browser or from file from file selector will be opened and checked in size.

Note

File size limit is 16MB

Then the [EncryptDialog](#) opens and image and key is selected. Then the [ViewPC::encrypt](#) signal is called to start [ModelPC::encrypt](#)

7.6.5 Decrypting

Else, the image from file selector is transmitted to [ModelPC::decrypt](#)

Definition at line 60 of file [viewpc.cpp](#).

Here is the call graph for this function:



7.6.5.1 QString ViewPC::requestKey () [protected]

[ViewPC::requestKey](#) Request keyphrase from user using InputDialog.

Returns

Returns keyphrase

Definition at line 255 of file [viewpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.6.5.2 void ViewPC::saveData (QByteArray Edata) [slot]

[ViewPC::saveData](#) Slot to be called to save data using QFileDialog.

Parameters

<i>Edata</i>	Encrypted data to be saved.
--------------	-----------------------------

See also

[ModelPC::encrypt](#)

Definition at line 153 of file [viewpc.cpp](#).

Here is the call graph for this function:



7.6.5.3 void ViewPC::saveImage (QImage * *image*) [slot]

[ViewPC::saveImage](#) Slot to be called to save image using QFileDialog.

Parameters

<i>image</i>	Image to be saved.
--------------	--------------------

See also

[ModelPC::decrypt](#)

Definition at line 174 of file [viewpc.cpp](#).

Here is the call graph for this function:



7.6.5.4 void ViewPC::setEncryptMode (bool *encr*) [slot]

[ViewPC::setEncryptMode](#) Set the encrpt mode (`ViewPC::isEncrypt`)

Parameters

<i>encr</i>	= isEncrypt, true if encrypting, false if decrypting
-------------	--

Definition at line 231 of file [viewpc.cpp](#).

Here is the caller graph for this function:



7.6.5.5 void ViewPC::setJPHSDir (QString *dir*) [signal]

setJPHSPath Sets the default JPHS directory

Parameters

<i>dir</i>	Directory
------------	-----------

Here is the caller graph for this function:



7.6.5.6 void ViewPC::setProgress (int *val*) [slot]

[ViewPC::setProgress](#) Slot to set the value of the ProgressDialog ([ViewPC::dialog](#)).

Parameters

<i>val</i>	New value of the dialog. If -1, creates ProgressDialog, if 101 closes the dialog.
------------	---

See also

[ViewPC::abortCircuit\(\)](#), [ModelPC::setProgress\(\)](#)

Definition at line 192 of file [viewpc.cpp](#).

Here is the call graph for this function:

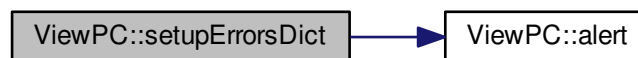


7.6.5.7 `void ViewPC::setupErrorsDict ()` `[protected]`, `[slot]`

[ViewPC::setupErrorsDict](#) Setups errorsDict from strings.xml.

Definition at line 293 of file [viewpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.6.5.8 `void ViewPC::setVersion (QString version)` `[slot]`

[ViewPC::setVersion](#) Set the version of the app from [ControllerPC](#).

Parameters

<i>version</i>	Version as QString
----------------	--------------------

Definition at line 246 of file [viewpc.cpp](#).

Here is the caller graph for this function:



7.6.6 Member Data Documentation

7.6.6.1 `QProgressDialog*` `ViewPC::dialog`

`dialog` `ProgressDialog` used.

See also

[ViewPC::setProgress](#), [ViewPC::cancel](#), [ModelPC::setProgress](#)

Definition at line 111 of file [viewpc.h](#).

7.6.6.2 `QMap<QString, QString>` `ViewPC::errorsDict`

`errorsDict` `QMap` - Errors dictionary

Definition at line 120 of file [viewpc.h](#).

7.6.6.3 `bool` `ViewPC::progressDialogClosed`

`progressDialogClosed` Flag, if dialog is closed.

See also

[ViewPC::abortCircuit](#), [ViewPC::setProgress](#)

Definition at line 116 of file [viewpc.h](#).

The documentation for this class was generated from the following files:

- [viewpc.h](#)
- [viewpc.cpp](#)

Chapter 8

File Documentation

8.1 aboutpc.cpp File Reference

```
#include "aboutpc.h"  
#include "ui_aboutpc.h"
```

Include dependency graph for aboutpc.cpp:



8.2 aboutpc.cpp

```
00001 #include "aboutpc.h"  
00002 #include "ui_aboutpc.h"  
00003  
00004 AboutPC::AboutPC(QWidget *parent) :  
00005     QDialog(parent),  
00006     ui(new Ui::AboutPC)  
00007 {  
00008     ui->setupUi(this);  
00009 }  
00010  
00011 AboutPC::~AboutPC()  
00012 {  
00013     delete ui;  
00014 }  
00019 void AboutPC::setVersion(QString version)  
00020 {  
00021     ui->versionLabel->setText("Version " + version);  
00022 }
```

8.3 aboutpc.h File Reference

```
#include <QDialog>
```

Include dependency graph for aboutpc.h:



This graph shows which files directly or indirectly include this file:



Classes

- class [AboutPC](#)

The [AboutPC](#) class The About Page dialog.

Namespaces

- [Ui](#)

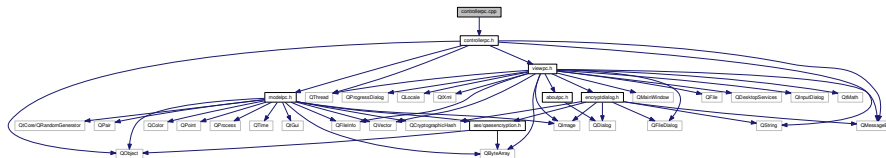
8.4 aboutpc.h

```
00001 #ifndef ABOUTPC_H
00002 #define ABOUTPC_H
00003
00004 #include <QDialog>
00005
00006 namespace Ui {
00007     class AboutPC;
00008 }
00009
00010 class AboutPC : public QDialog
00011 {
00012     Q_OBJECT
00013
00014 public:
00015     explicit AboutPC(QWidget *parent = 0);
00016     ~AboutPC();
00017     void setVersion(QString version);
00018
00019 private:
00020     Ui::AboutPC *ui;
00021 };
00022
00023 #endif // ABOUTPC_H
```

8.5 controllerpc.cpp File Reference

```
#include "controllerpc.h"
```

Include dependency graph for controllerpc.cpp:



8.6 controllerpc.cpp

```
00001 #include "controllerpc.h"
00002
00009 ControllerPC::ControllerPC()
00010 {
00011     // Layer creation
00012     view = new ViewPC();
00013     model = new ModelPC();
00014     QThread * modelThread = new QThread();
00015     model->moveToThread(modelThread);
00016     modelThread->start();
00017
00018     view->setVersion(model->versionString);
00019     view->show();
00020
00021     // Layers Connection
00022     connect(view, SIGNAL(encrypt(QByteArray, QImage*, int, QString)), model, SLOT(encrypt(QByteArray,
00023 QImage*, int, QString)));
00024     connect(view, SIGNAL(inject(QByteArray,QImage*,int, int)), model, SLOT(inject(QByteArray,QImage*, int,
00025 int)));
00026     connect(view, SIGNAL(decrypt(QImage*,QString,int)), model, SLOT(decrypt(QImage*, QString, int)));
00027     connect(view, SIGNAL(abortModel()), this, SLOT(abortCircuit()));
00028     connect(view, SIGNAL(setJPHSDir(QString)), this, SLOT(setJPHSDir(QString)));
00029
00030     connect(model, SIGNAL(alertView(QString,bool)), view, SLOT(alert(QString,bool)));
00031     connect(model, SIGNAL(saveData(QByteArray)), view, SLOT(saveData(QByteArray)));
00032     connect(model, SIGNAL(saveImage(QImage*)), view, SLOT(saveImage(QImage*)));
00033     connect(model, SIGNAL(setProgress(int)), view, SLOT(setProgress(int)));
00034 }
00035 void ControllerPC::abortCircuit()
```

```

00038 {
00039     model->success = false;
00040 }
00045 void ControllerPC::setJPHSDir(QString dir)
00046 {
00047     model->defaultJPHSDir = dir;
00048 }

```

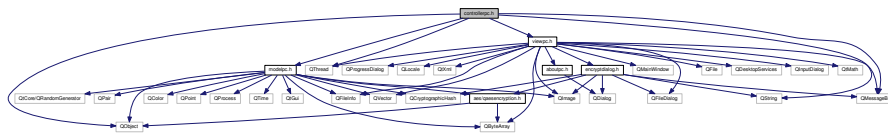
8.7 controllerpc.h File Reference

```

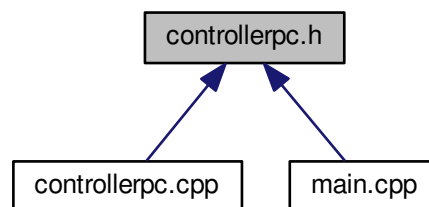
#include <QObject>
#include <QString>
#include <QThread>
#include <QMessageBox>
#include <modelpc.h>
#include <viewpc.h>

```

Include dependency graph for controllerpc.h:



This graph shows which files directly or indirectly include this file:



Classes

- class [ControllerPC](#)

The [ControllerPC](#) class Controller class, which controls View and Model layers.

8.7.1 Detailed Description

Header of [ControllerPC](#) class

See also

[ControllerPC](#), [ModelPC](#), [ViewPC](#)

Definition in file [controllerpc.h](#).

8.8 controllerpc.h

```

00001 #ifndef CONTROLLERPC_H
00002 #define CONTROLLERPC_H
00003
00004 #include <QObject>
00005 #include <QString>
00006 #include <QThread>
00007 #include <QMessageBox>
00008
00009 #include <modelpc.h>
00010 #include <viewpc.h>
00020 class ControllerPC : public QObject
00021 {
00022     Q_OBJECT
00023 public:
00024     ControllerPC();
00028     long int version;
00032     QString versionString;
00033 public slots:
00034     void abortCircuit();
00035     void setJPHSDir(QString dir);
00036 private:
00037     ViewPC * view;
00038     ModelPC * model;
00039 };
00040
00041 #endif // CONTROLLERPC_H

```

8.9 encryptdialog.cpp File Reference

```

#include "encryptdialog.h"
#include "ui_encryptdialog.h"

```

Include dependency graph for encryptdialog.cpp:



8.10 encryptdialog.cpp

```

00001 #include "encryptdialog.h"
00002 #include "ui_encryptdialog.h"
00009 EncryptDialog::EncryptDialog(QByteArray _data, QWidget *parent) :
00010     QDialog(parent),
00011     ui(new Ui::EncryptDialog)
00012 {
00013     ui->setupUi(this);
00014     data = _data;
00015     success = false;
00016     // UI setup
00017     ui->totalBytes->setText(QString::number(data.size()));
00018     key = "";
00019     compr_data = zip();
00020     long long int compr_data_size = compr_data.size();
00021     ui->zippedBytes->setText(QString::number(compr_data_size));
00022     goodPercentage = false;

```

```

00023     bitsUsed = 8;
00024 }
00025
00026 EncryptDialog::~EncryptDialog()
00027 {
00028     delete ui;
00029 }
00030
00031 void EncryptDialog::alert(QString text)
00032 {
00033     QMessageBox t;
00034     t.setWindowTitle("Message");
00035     t.setIcon(QMessageBox::Warning);
00036     t.setWindowIcon(QIcon(":/mail.png"));
00037     t.setText(text);
00038     t.exec();
00039 }
00040 QByteArray EncryptDialog::zip()
00041 {
00042     // Zip
00043     QByteArray c_data = qCompress(data, 9);
00044     // Encryption
00045     QByteArray hashKey = QCryptographicHash::hash(key.toUtf8(), QCryptographicHash::Sha256);
00046     return QAESEncryption::Crypt(QAESEncryption::AES_256,
00047     QAESEncryption::ECB, c_data, hashKey);
00048 }
00049 void EncryptDialog::on_fileButton_clicked()
00050 {
00051     // Selet file
00052     inputFileName = QFileDialog::getOpenFileName(this, tr("Open File"), "/", tr("Images (*.png
00053     *.xpm *.jpg *.jpeg)"));
00054     ui->fileLabel->setText(inputFileName);
00055     // Open image
00056     QImage img(inputFileName);
00057     image = img;
00058     // Get size
00059     size = img.width() * img.height();
00060     // UI setup
00061     long long int compr_data_size = compr_data.size();
00062     ui->zippedBytes->setText(QString::number(compr_data_size));
00063     if(inputFileName.isEmpty()) {
00064         ui->percentage->setText("");
00065         return;
00066     }
00067     double perc = (compr_data_size + 14) * 100 / (size * 3) * bitsUsed / 8;
00068     ui->percentage->setText(QString::number(perc) + "%");
00069     goodPercentage = perc < 70;
00070 }
00071 void EncryptDialog::on_buttonBox_accepted()
00072 {
00073     if(!goodPercentage) {
00074         alert("Your encoding percentage is over 70% which is a bit ambiguous :(");
00075         success = false;
00076         return;
00077     }
00078     // Final zip
00079     key = ui->keyLine->text();
00080     compr_data = zip();
00081     success = true;
00082     close();
00083 }
00084 void EncryptDialog::on_buttonBox_rejected()
00085 {
00086     success = false;
00087     close();
00088 }
00089 void EncryptDialog::on_bitsSlider_valueChanged(int value)
00090 {
00091     bitsUsed = value;
00092     ui->bitsUsedLbl->setText(QString::number(value));
00093     if(ui->percentage->text().isEmpty())
00094         return;
00095     double perc = (compr_data.size() + 14) * 100 / (size * 3) * 8 /
00096     bitsUsed;
00097     ui->percentage->setText(QString::number(perc) + "%");
00098 }

```

8.11 encryptdialog.h File Reference

```
#include <QDialog>
```

```
#include <QFileDialog>
#include <QImage>
#include <QMessageBox>
#include <QString>
#include <aes/qaesencryption.h>
#include <QCryptographicHash>
Include dependency graph for encryptdialog.h:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [EncryptDialog](#)

The [EncryptDialog](#) class Class to get the image and key to store secret info.

Namespaces

- [Ui](#)


```

        QString *_error)
00030 {
00031     return ModelPC().inject(encr_data, image, _mode, _bitsUsed, _error);
00032 }
00033
00034 QByteArray ModelPC::Decrypt(QImage *image, QString key, int _mode, QString *_error)
00035 {
00036     return ModelPC().decrypt(image, key, _mode, _error);
00037 }
00051 QImage * ModelPC::encrypt(QByteArray data, QImage * image, int _mode, QString key, int
    _bitsUsed, QString *_error)
00052 {
00053     success = true;
00054     CryptMode mode = CryptMode(_mode);
00055     // Error management
00056     if(_error == nullptr)
00057         _error = new QString();
00058     *_error = "ok";
00059     error = _error;
00060
00061     if(data == nullptr || data.isEmpty()) {
00062         fail("nodata");
00063         return nullptr;
00064     }
00065     if(data.size() > pow(2, 24)) {
00066         fail("muchdata");
00067         return nullptr;
00068     }
00069     if(image == nullptr || image->isNull()) {
00070         fail("nullimage");
00071         return nullptr;
00072     }
00073     if(image->width() * image->height() > pow(10, 9)) {
00074         fail("bigimage");
00075         return nullptr;
00076     }
00077     if(_bitsUsed < 1 || _bitsUsed > 8) {
00078         fail("bitsWrong");
00079         return nullptr;
00080     }
00081     if(key == nullptr || key.isEmpty()) {
00082         fail("no_key");
00083         return nullptr;
00084     }
00085     else if(key.size() > 255) {
00086         fail("bigkey");
00087         return nullptr;
00088     }
00089     if(mode == CryptMode::NotDefined) {
00090         fail("undefined_mode");
00091         return nullptr;
00092     }
00093     long long usedBytes = data.size() + 14 + key.size();
00094     long long size = image->width() * image->height();
00095     if(usedBytes * 100 / (size * 3) * 8 / _bitsUsed > 70) {
00096         fail("bigdata");
00097         return nullptr;
00098     }
00099
00100     switch(mode)
00101     {
00102     case v1_3:
00103     {
00104         QByteArray zipped_data = zip(data, key.toUtf8());
00105         QByteArray hash = QCryptographicHash::hash(data, QCryptographicHash::Sha256);
00106         QByteArray encr_data = hash + zipped_data;
00107         if(*error == "ok")
00108             return inject(encr_data, image, _mode, _bitsUsed, error);
00109         else
00110             return nullptr;
00111         break;
00112     }
00113     case v1_4:
00114         bitsUsed = _bitsUsed;
00115         encryptv1_4(image, data, key);
00116         emit saveImage(image);
00117         return image;
00118         break;
00119     case jphs_mode:
00120         // TODO add jphs
00121         return nullptr;
00122         break;
00123     default:
00124         fail("wrongmode");
00125         return nullptr;
00126     }
00127 }

```

```

00128
00139 QImage * ModelPC::inject(QByteArray encr_data, QImage * image, int _mode, int _bitsUsed,
    QString *_error)
00140 {
00141     success = true;
00142     CryptMode mode = CryptMode(_mode);
00143     // Error management
00144     if(_error == nullptr)
00145         _error = new QString();
00146     *_error = "ok";
00147     error = _error;
00148
00149     bitsUsed = _bitsUsed;
00150
00151     if(encr_data == nullptr || encr_data.isEmpty()) {
00152         fail("nodata");
00153         return nullptr;
00154     }
00155     if(encr_data.size() > pow(2, 24)) {
00156         fail("muchdata");
00157         return nullptr;
00158     }
00159     if(image == nullptr || image->isNull()) {
00160         fail("nullimage");
00161         return nullptr;
00162     }
00163     if(image->width() * image->height() > pow(10, 9)) {
00164         fail("bigimage");
00165         return nullptr;
00166     }
00167     if(_bitsUsed < 1 || _bitsUsed > 8) {
00168         fail("bitsWrong");
00169         return nullptr;
00170     }
00171     if(mode == CryptMode::NotDefined) {
00172         fail("undefined_mode");
00173         return nullptr;
00174     }
00175
00176     encr_data = ver_byte + encr_data;
00177     long long int countBytes = encr_data.size();
00178     switch(mode)
00179     {
00180     case v1_3:
00181         circuit(image, &encr_data, countBytes);
00182         break;
00183     case jphs_mode:
00184         jphs(image, &encr_data);
00185         break;
00186     case v1_4:
00187         fail("inject-v1.4");
00188         return nullptr;
00189         break;
00190     default:
00191         fail("wrongmode");
00192         return nullptr;
00193     }
00194
00195     // Saving
00196     if(success) {
00197         emit saveImage(image);
00198         return image;
00199     }
00200     else
00201         return nullptr;
00202 }
00212 QByteArray ModelPC::decrypt(QImage * image, QString key, int _mode, QString *_error)
00213 {
00214     success = true;
00215     CryptMode mode = CryptMode(_mode);
00216     // Error management
00217     if(_error == nullptr)
00218         _error = new QString();
00219     *_error = "ok";
00220     error = _error;
00221     if(image == nullptr || image->isNull()) {
00222         fail("nullimage");
00223         return nullptr;
00224     }
00225     if(image->width() * image->height() > pow(10, 9)) {
00226         fail("bigimage");
00227         return nullptr;
00228     }
00229     if(key == nullptr || key.isEmpty()) {
00230         fail("no_key");
00231         return nullptr;
00232     }

```

```

00233     QByteArray result;
00234
00235     switch (mode) {
00236     case v1_3:
00237         result = decryptv1_3(image, key);
00238         break;
00239     case v1_4:
00240         result = decryptv1_4(image, key);
00241         break;
00242     case jphs_mode:
00243         // TODO add jphs support
00244         break;
00245     case NotDefined:
00246         isTry = true;
00247
00248         // v1_3
00249         result = decryptv1_3(new QImage(*image), key);
00250         if(success) {
00251             isTry = false;
00252             break;
00253         }
00254         success = true;
00255
00256         // v1_4
00257         result = decryptv1_4(image, key);
00258         if(success) {
00259             isTry = false;
00260             break;
00261         }
00262         success = true;
00263
00264         // TODO add jphs support
00265
00266         isTry = false;
00267         fail("all_modes_fail");
00268         return nullptr;
00269     break;
00270     default:
00271         // For invalid modes
00272         fail("wrongmode");
00273         return nullptr;
00274     }
00275     if(*error == "ok")
00276         emit saveData(result);
00277     return result;
00278 }
00283 void ModelPC::fail(QString message)
00284 {
00285     success = false;
00286     if(!isTry) {
00287         *error = message;
00288         alert(message, true);
00289         emit setProgress(101);
00290     }
00291     qDebug() << "[Debug] !!! fail() - " << message;
00292 }
00298 void ModelPC::jphs(QImage *image, QByteArray *data)
00299 {
00300     // Under Development
00301     return;
00302
00303     // Dead code
00304
00305     success = true;
00306     bool isEncrypt = !data->isEmpty();
00307     QString targetEXE = defaultJPHSDir + (isEncrypt ? "/jphide.exe" : "/jpseek.exe");
00308     if(!fileExists(targetEXE))
00309     {
00310         fail("nojphs");
00311         return;
00312     }
00313
00314     QString randomFileName = defaultJPHSDir + "/";
00315     qsrand(randSeed());
00316     for(int i = 0; i < 10; i++)
00317         randomFileName.append(97 + qrand() % 25);
00318     image->save(randomFileName + ".jpg");
00319     if(isEncrypt) {
00320         QFile file(randomFileName + ".pc");
00321         if(!file.open(QFile::WriteOnly)) {
00322             fail("save_file_fail");
00323             return;
00324         }
00325         file.write(*data);
00326         file.close();
00327
00328     QStringList args;

```

```

00329         args << (randomFileName + ".jpg") << (randomFileName + "_out.jpg") << (randomFileName + ".pc");
00330         QProcess prog(this);
00331         prog.start(targetEXE, args);
00332         prog.waitForStarted();
00333         prog.write("test\n");
00334         prog.waitForBytesWritten();
00335         prog.write("test\n");
00336         prog.waitForBytesWritten();
00337         prog.waitForReadyRead();
00338         QByteArray bytes = prog.readAll();
00339         prog.waitForFinished();
00340         //QByteArray readData = prog.readAll();
00341         prog.close();
00342         // Cleaning - Deleting temp files
00343     }
00344 }
00345 else {
00346 }
00347 }
00348 }
00349 }
00350
00359 void ModelPC::circuit(QImage *image, QByteArray *data, long long countBytes)
00360 {
00361     // Some flags and creation of the ProgressDialog
00362     success = true;
00363     emit setProgress(-1);
00364     bool isEncrypt = !data->isEmpty();
00365
00366     // Image setup
00367     int w = image->width();
00368     int h = image->height();
00369
00370     // Visited pixels array
00371     QVector<QPoint> were;
00372     were.push_back(QPoint(0, 0));
00373     were.push_back(QPoint(0, h - 1));
00374     were.push_back(QPoint(w - 1, 0));
00375     were.push_back(QPoint(w - 1, h - 1));
00376
00377     long long int offset = 0;
00378
00379     // Pre-start Cleaning
00380     circuitData = data;
00381     circuitImage = image;
00382     circuitCountBytes = countBytes;
00383     cur = 0;
00384     bitsBuffer.clear();
00385
00386     // Writing Top-Left to Bottom-Left
00387     for(int i = 1; i < h - 1 && mustGoOn(isEncrypt); i++) {
00388         QPoint pos(0, i);
00389         processPixel(pos, &were, isEncrypt);
00390     }
00391     // Writing Bottom-Right to Top-Right
00392     if(mustGoOn(isEncrypt))
00393     {
00394         for(int i = h - 2; i >= 1 && mustGoOn(isEncrypt); i--){
00395             QPoint pos(w - 1, i);
00396             processPixel(pos, &were, isEncrypt);
00397         }
00398     }
00399     // Main cycle
00400     // Strong is considered as actual corner pixel and weak as pixel near it like (1, 0) or (0, 1)
00401     while(mustGoOn(isEncrypt))
00402     {
00403         // Strong Top-Right to Strong Bottom-Right
00404         for(int i = offset; i < h - offset && mustGoOn(isEncrypt); i++){
00405             QPoint pos(w - offset - 2, i);
00406             processPixel(pos, &were, isEncrypt);
00407         }
00408         // Strong Top-Left to Weak Top-Right
00409         for(int i = offset + 1; i < w - offset - 2 && mustGoOn(isEncrypt); i++){
00410             QPoint pos(i, offset);
00411             processPixel(pos, &were, isEncrypt);
00412         }
00413         // Weak Bottom-Right to Weak Bottom-Left
00414         for(int i = w - 3 - offset; i >= offset + 2 && mustGoOn(isEncrypt); i--){
00415             QPoint pos(i, h - offset - 1);
00416             processPixel(pos, &were, isEncrypt);
00417         }
00418         // Weak Top-Left to Strong Bottom-Left
00419         for(int i = offset + 1; i < h - offset && mustGoOn(isEncrypt); i++){
00420             QPoint pos(offset + 1, i);
00421             processPixel(pos, &were, isEncrypt);
00422         }
00423         offset++;

```

```

00424     }
00425     // Extra writing
00426     if(!success)
00427         return;
00428     if(isEncrypt)
00429     {
00430         // Getting past colors
00431         QColor colUL = image->pixelColor(0, 0).toRgb();
00432         QColor colUR = image->pixelColor(w - 1, 0).toRgb();
00433         QColor colDL = image->pixelColor(0, h - 1).toRgb();
00434         QColor colDR = image->pixelColor(w - 1, h - 1).toRgb();
00435         int red = 0;
00436         int green = 0;
00437         int blue = 0;
00438
00439         // Writing Upper Left
00440         red = (colUL.red() & 224) + (countBytes >> 19);
00441         green = (colUL.green() & 224) + (countBytes >> 14) % 32;
00442         blue = (colUL.blue() & 224) + (countBytes >> 9) % 32;
00443         image->setPixelColor(0, 0, QColor(red, green, blue));
00444
00445         // Writing Upper Right
00446         red = (colUR.red() & 224) + (countBytes >> 4) % 32;
00447         green = (colUR.green() & 224) + ((countBytes % 16) << 1) + 1;
00448         blue = (colUR.blue() & 224) + 9;
00449         image->setPixelColor(w - 1, 0, QColor(red, green, blue));
00450
00451         // Getting extra bytes if left
00452         while(cur < countBytes)
00453             push(mod(circuitData->at(cur++), 8));
00454         if(bitsBuffer.size() > 20) {
00455             fail("bitsBufferFail");
00456             return;
00457         }
00458         // Getting extra data as long.
00459         long extraData = pop(-2);
00460
00461         // Writing Down Left
00462         red = (colDL.red() & 224) + (extraData >> 15);
00463         green = (colDL.green() & 224) + (extraData >> 10) % 32;
00464         blue = (colDL.blue() & 224) + (extraData >> 5) % 32;
00465         image->setPixelColor(0, h - 1, QColor(red, green, blue));
00466
00467         // Writing Down Right
00468         red = (colDR.red() & 224) + extraData % 32;
00469         green = (colDR.green() & 224);
00470         blue = (colDR.blue() & 224) + ((bitsUsed - 1) << 2) + 2;
00471         image->setPixelColor(w - 1, h - 1, QColor(red, green, blue));
00472     }
00473     else
00474     {
00475         // Read the past pixels
00476         QColor colDL = image->pixelColor(0, h - 1).toRgb();
00477         QColor colDR = image->pixelColor(w - 1, h - 1).toRgb();
00478
00479         // Read extra data
00480         long extraData = ((colDL.red() % 32) << 15) + ((colDL.green() % 32) << 10);
00481         extraData += ((colDL.blue() % 32) << 5) + colDR.red() % 32;
00482
00483         // Add extra data to the bitsBuffer
00484         push(extraData, (countBytes - cur) * 8 - bitsBuffer.size());
00485
00486         // Move bits from bitsBuffer to the QByteArray
00487         while(!bitsBuffer.isEmpty())
00488             data->append(pop(8));
00489     }
00490     emit setProgress(101);
00491 }
00492
00500 void ModelPC::processPixel(QPoint pos, QVector<QPoint> *were, bool isEncrypt)
00501 {
00502     if(!success)
00503         return;
00504     // Check if point was already visited
00505     if(were->contains(pos)){
00506         fail("point_visited_twice");
00507         return;
00508     }
00509     else
00510         were->push_back(pos);
00511     if(isEncrypt)
00512     {
00513         // Make sure that there are enough bits in bitsBuffer to write
00514         while(bitsBuffer.size() < 3 * bitsUsed)
00515             push(mod(circuitData->at(cur++), 8));
00516         // Read past contains
00517         QColor pixelColor = circuitImage->pixelColor(pos);

```

```

00518         int red = pixelColor.red();
00519         int green = pixelColor.green();
00520         int blue = pixelColor.blue();
00521
00522         // Write new data in last bitsUsed pixels
00523         red += pop() - red % (int) qPow(2, bitsUsed);
00524         green += pop() - green % (int) qPow(2, bitsUsed);
00525         blue += pop() - blue % (int) qPow(2, bitsUsed);
00526
00527         circuitImage->setPixelColor(pos, QColor(red, green, blue));
00528     }
00529     else
00530     {
00531         QColor read_color = circuitImage->pixelColor(pos).toRgb();
00532         // Reading the pixel
00533         int red = read_color.red();
00534         int green = read_color.green();
00535         int blue = read_color.blue();
00536
00537         // Reading the last bitsUsed pixels
00538         red %= (int) qPow(2, bitsUsed);
00539         green %= (int) qPow(2, bitsUsed);
00540         blue %= (int) qPow(2, bitsUsed);
00541
00542         // Getting the data in the bitsBuffer.
00543         push(red);
00544         push(green);
00545         push(blue);
00546
00547         // Getting data to QByteArray
00548         while(bitsBuffer.size() >= 8) {
00549             circuitData->append(pop(8));
00550             cur++;
00551         }
00552     }
00553     emit setProgress(100 * cur / circuitCountBytes);
00554 }
00560 void ModelPC::encryptv1_4(QImage *image, QByteArray data, QString key)
00561 {
00562     if(data.size() + 98 > image->height() * image->width() * 3) {
00563         fail("bigdata");
00564         return;
00565     }
00566     QTime st = QTime::currentTime();
00567     QByteArray rand_master = GetRandomBytes(32);
00568     QByteArray pass = QCryptographicHash::hash(key.toUtf8() + rand_master + QByteArray("hi"),
00569         QCryptographicHash::Sha3_384);
00570     QByteArray noise = GetRandomBytes(data.size() / 10 + 32);
00571     QByteArray bytes_key = GetRandomBytes(32);
00572     QByteArray pass_rand = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_512);
00573     QByteArray zipped = zip(data, pass_rand);
00574     QByteArray heavy_data = zipped + noise;
00575
00576     QByteArray verification = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_256);
00577     QByteArray given_key = bytes_key.left(30);
00578     QByteArray heavy_data_size;
00579     // heavy_data_size is always 4 bytes as max for heavy_data is:  $2^{24} * 11/10 + 32 \sim 1.8 * 10^7 < 2^{32}$ 
00580     long long raw_size = zipped.size();
00581     for(int i = 0; i < 4; i++) {
00582         int ch = raw_size % 256;
00583         raw_size >>= 8;
00584         heavy_data_size.push_front(ch);
00585     }
00586     QByteArray mid_data = verification + given_key + rand_master + heavy_data_size;
00587     // mid_data.size() = 32 + 30 + 32 + 4 = 98
00588     QVector <QPair<QPoint, QPair<int, int>>> *were = new QVector <QPair<QPoint, QPair<int, int>>>();
00589     emit setProgress(-1);
00590     proccessPixelsv1_4(image, &mid_data, key.toUtf8(), true, were);
00591     proccessPixelsv1_4(image, &heavy_data, pass_rand, true, were);
00592     emit setProgress(101);
00593     QTime final = QTime::currentTime();
00594     qDebug() << "[Debug] Finished encrypting in " << st.msecsTo(final) << " msecs.";
00595 }
00602 QByteArray ModelPC::decryptv1_4(QImage *image, QString key)
00603 {
00604     QTime st = QTime::currentTime();
00605     QByteArray mid_data, heavy_data;
00606     QVector <QPair<QPoint, QPair<int, int>>> *were = new QVector <QPair<QPoint, QPair<int, int>>>();
00607     emit setProgress(-1);
00608     proccessPixelsv1_4(image, &mid_data, key.toUtf8(), false, were, 98);
00609     QByteArray verification = mid_data.left(32);
00610     QByteArray given_key = mid_data.mid(32, 30);
00611     QByteArray rand_master = mid_data.mid(62, 32);
00612     QByteArray heavy_data_size = mid_data.right(4);
00613
00614     QByteArray pass = QCryptographicHash::hash(key.toUtf8() + rand_master + QByteArray("hi"),

```

```

    QCryptographicHash::Sha3_384);
00615
00616     // Guessing
00617     emit setProgress(0);
00618     QByteArray bytes_key;
00619     for(long long i = 0; i < pow(2, 16); i++) {
00620         QByteArray guess_part;
00621         long long g = i;
00622         for(int q = 0; q < 2; q++) {
00623             int ch = g % 256;
00624             g >>= 8;
00625             guess_part.push_front(ch);
00626         }
00627         emit setProgress(100 * i / pow(2, 16));
00628         QByteArray guess = given_key + guess_part;
00629         QByteArray check = QCryptographicHash::hash(pass + guess, QCryptographicHash::Sha3_256);
00630         if(check == verification) {
00631             bytes_key = guess;
00632             break;
00633         }
00634     }
00635     if(bytes_key.isEmpty()) {
00636         fail("veriffail");
00637         return nullptr;
00638     }
00639
00640     QByteArray pass_rand = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_512);
00641
00642     long long raw_size = mod(heavy_data_size[3]) +
00643         mod(heavy_data_size[2]) * pow(2, 8) +
00644         mod(heavy_data_size[1]) * pow(2, 16) +
00645         mod(heavy_data_size[0]) * pow(2, 24);
00646     emit setProgress(0);
00647     proccessPixelsv1_4(image, &heavy_data, pass_rand, false, were, raw_size);
00648     QByteArray unzipped = unzip(heavy_data, pass_rand);
00649     emit setProgress(101);
00650     QTime final = QTime::currentTime();
00651     qDebug() << "[Debug] Finished decrypting in " << st.msecsTo(final) << " msecs.";
00652     return unzipped;
00653 }
00663 void ModelPC::proccessPixelsv1_4(QImage *image, QByteArray* data, QByteArray key
, bool isEncrypt, QVector<QPair<QPoint, QPair<int, int>>> *were, long long size)
00664 {
00665     long w = image->width();
00666     long h = image->height();
00667     auto seed_hex = QCryptographicHash::hash(key, QCryptographicHash::Sha3_256).toHex().left(8).toUpper();
00668     auto seed = seed_hex.toLongLong(nullptr, 16);
00669     QRandomGenerator foo(seed);
00670
00671     bitsBuffer.clear();
00672     long long left = (size == -1 ? data->size() : size) * 8;
00673     long long all = left;
00674     long cur = 0;
00675     if(isEncrypt) {
00676         while(left > 0 && success)
00677         {
00678             if(bitsBuffer.empty())
00679                 push(mod(data->at(cur++), 8);
00680             quint64 g = foo.generate64() % (w * h);
00681             long x = g % w;
00682             long y = g / w;
00683             int c = foo.generate64() % 3;
00684             int b = foo.generate64() % 24;
00685             int bit = -1;
00686             if(b < 16)
00687                 bit = 7;
00688             else if(bit < 20)
00689                 bit = 6;
00690             else if(bit < 22)
00691                 bit = 5;
00692             else if(bit < 23)
00693                 bit = 4;
00694             else if(bit < 24)
00695                 bit = 3;
00696             auto piece = qMakePair(QPoint(x, y), qMakePair(c, bit));
00697             if(were->contains(piece))
00698                 continue;
00699             were->append(piece);
00700             left--;
00701             emit setProgress(100 * (all - left) / all);
00702             int wr = pop(1);
00703             QColor pixel = image->pixelColor(piece.first);
00704             int red = pixel.red();
00705             int green = pixel.green();
00706             int blue = pixel.blue();
00707             int dif;
00708             if(c == 0)

```



```

00709         dif = red;
00710     else if (c == 1)
00711         dif = green;
00712     else
00713         dif = blue;
00714     dif |= 1 << (7 - bit);
00715     dif ^= (wr ^ 1) << (7 - bit);
00716     if(c == 0)
00717         red = dif;
00718     else if(c == 1)
00719         green = dif;
00720     else
00721         blue = dif;
00722     image->setPixelColor(piece.first, QColor(red, green, blue));
00723 }
00724 } else {
00725     while(left > 0)
00726     {
00727         while (bitsBuffer.size() >= 8)
00728             data->push_back(pop(8));
00729         quint64 g = foo.generate64() % (w * h);
00730         long x = g % w;
00731         long y = g / w;
00732         int c = foo.generate64() % 3;
00733         int b = foo.generate64() % 24;
00734         int bit = -1;
00735         if(b < 16)
00736             bit = 7;
00737         else if(bit < 20)
00738             bit = 6;
00739         else if(bit < 22)
00740             bit = 5;
00741         else if(bit < 23)
00742             bit = 4;
00743         else if(bit < 24)
00744             bit = 3;
00745         auto piece = qMakePair(QPoint(x, y), qMakePair(c, bit));
00746         if(were->contains(piece))
00747             continue;
00748         were->append(piece);
00749         left--;
00750         emit setProgress(100 * (all - left) / all);
00751         QColor pixel = image->pixelColor(piece.first);
00752         int red = pixel.red();
00753         int green = pixel.green();
00754         int blue = pixel.blue();
00755         int dif;
00756         if(c == 0)
00757             dif = red;
00758         else if (c == 1)
00759             dif = green;
00760         else
00761             dif = blue;
00762         dif &= 1 << (7 - bit);
00763         int wr = dif != 0;
00764         push(wr, 1);
00765     }
00766     while (bitsBuffer.size() >= 8)
00767         data->push_back(pop(8));
00768 }
00769 }
00770
00771 QByteArray ModelPC::decryptv1_3(QImage *image, QString key)
00772 {
00773     // Image opening
00774     int w = image->width();
00775     int h = image->height();
00776
00777     // Getting corner pixels
00778     QColor colUL = image->pixelColor(0, 0).toRgb();
00779     QColor colUR = image->pixelColor(w - 1, 0).toRgb();
00780     QColor colDR = image->pixelColor(w - 1, h - 1).toRgb();
00781
00782     // Getting verification code
00783     int verifCode = (((colUR.green() % 2) << 5) + colUR.blue() % 32) << 2;
00784     verifCode += colDR.blue() % 4;
00785     if(verifCode != 166){
00786         fail("veriffail");
00787         return nullptr;
00788     }
00789     // Getting number of bytes
00790     long long int countBytes = (colUL.blue() % 32 + ((colUL.green() % 32) << 5) + ((colUL.red() % 32) << 10)
00791 ) << 9;
00792     countBytes += ((colUR.red() % 32) << 4) + (colUR.green() >> 1) % 16;
00793
00794     bitsUsed = (colDR.blue() >> 2) % 8 + 1;

```

```

00801 // curMode = colDR.green() % 32;
00802
00803 // Start of the circuit
00804 QByteArray data;
00805 circuit(image, &data, countBytes);
00806
00807 // Check if circuit was successful
00808 if(!success)
00809     return nullptr;
00810 if(data.isEmpty())
00811 {
00812     fail("noreaddata");
00813     return nullptr;
00814 }
00815 // Version check
00816 long long int _ver = mod(data.at(0)) * qPow(2, 16);
00817 _ver += mod(data.at(1)) * qPow(2, 8);
00818 _ver += mod(data.at(2));
00819 data.remove(0, 3);
00820 if(_ver > version) {
00821     fail("new_version");
00822     return nullptr;
00823 }
00824 else if(_ver < version) {
00825     fail("old_version");
00826     return nullptr;
00827 }
00828 // Get the hash
00829 QByteArray hash = data.left(32);
00830 data.remove(0, 32);
00831
00832 // Unzip
00833 QByteArray unzipped_data = unzip(data, key.toUtf8());
00834 QByteArray our_hash = QCryptographicHash::hash(unzipped_data, QCryptographicHash::Sha256);
00835 if(our_hash != hash) {
00836     fail("veriffail");
00837     return QByteArray("");
00838 }
00839 return unzipped_data;
00840 }
00841 long ModelPC::pop(int bits)
00842 {
00843     // Hard to say
00844     long res = 0;
00845     int poppedBits = bits == -1 ? bitsUsed : bits;
00846     if(bits == -2)
00847         poppedBits = bitsBuffer.size();
00848     for(int i = 0; i < poppedBits; i++)
00849         res += bitsBuffer[i] * qPow(2, poppedBits - i - 1);
00850     bitsBuffer.remove(0, poppedBits);
00851     return res;
00852 }
00853 void ModelPC::push(int data, int bits)
00854 {
00855     // That's easier, but also hard
00856     int buf_size = bitsBuffer.size();
00857     int extraSize = bits == -1 ? bitsUsed : bits;
00858     bitsBuffer.resize(buf_size + extraSize);
00859     for(int i = bitsBuffer.size() - 1; i >= buf_size; i--, data >= 1)
00860         bitsBuffer[i] = data % 2;
00861 }
00862 bool ModelPC::mustGoOn(bool isEncrypt)
00863 {
00864     return success && (isEncrypt ? (circuitCountBytes - cur) * 8 + bitsBuffer.size() >= bitsUsed * 3
00865 :
00866 circuitData->size() * 8 + bitsBuffer.size() <
00867 circuitCountBytes * 8 - (circuitCountBytes * 8) % (bitsUsed * 3));
00868 }
00869 QByteArray ModelPC::unzip(QByteArray data, QByteArray key)
00870 {
00871     // Decryption
00872     QByteArray hashKey = QCryptographicHash::hash(key, QCryptographicHash::Sha256);
00873     QAESEncryption encryption(QAESEncryption::AES_256,
00874 QAESEncryption::ECB);
00875     QByteArray new_data = encryption.decode(data, hashKey);
00876     // Decompressing
00877     return qUncompress(new_data);
00878 }
00879 QByteArray ModelPC::zip(QByteArray data, QByteArray key)
00880 {
00881     // Zip
00882     QByteArray c_data = qCompress(data, 9);
00883     // Encryption
00884     QByteArray hashKey = QCryptographicHash::hash(key, QCryptographicHash::Sha256);

```

```

00902     return QAESEncryption::Crypt(QAESEncryption::AES_256,
00903     QAESEncryption::ECB, c_data, hashKey);
00904 }
00905 bool ModelPC::fileExists(QString path)
00906 {
00907     QFileInfo check_file(path);
00908     return check_file.exists() && check_file.isFile();
00909 }
00910
00911 QByteArray ModelPC::bytes(long long n)
00912 {
00913     return QByteArray::fromHex(QByteArray::number(n, 16));
00914 }
00915
00916 unsigned int ModelPC::mod(int input)
00917 {
00918     if(input < 0)
00919         return (unsigned int) (256 + input);
00920     else
00921         return (unsigned int) input;
00922 }
00923
00924 void ModelPC::alert(QString message, bool isWarning)
00925 {
00926     emit alertView(message, isWarning);
00927 }
00928
00929 QColor ModelPC::RGBbytes(long long byte)
00930 {
00931     int blue = byte % 256;
00932     int green = (byte / 256) % 256;
00933     int red = byte / qPow(2, 16);
00934     return QColor(red, green, blue);
00935 }
00936
00937 QString ModelPC::generateVersionString(long ver)
00938 {
00939     return QString::number((int)( ver / qPow(2, 16))) + "." + QString::number(((int) (ver / 256)) % 256) +
00940     "." + QString::number(ver % 256);
00941 }
00942
00943 uint ModelPC::randSeed()
00944 {
00945     QTime time = QTime::currentTime();
00946     uint randSeed = time.msecsSinceStartOfDay() % 55363 + time.minute() * 21 + time.second() * 2 + 239;
00947     qsrand(randSeed);
00948     uint randSeed_2 = qrand() % 72341 + qrand() % 3 + qrand() % 2 + 566;
00949     return randSeed_2;
00950 }
00951
00952 QByteArray ModelPC::GetRandomBytes(long long count)
00953 {
00954     QByteArray res;
00955     for(int i = 0; i < count; i++)
00956         res.append(qrand() % 256);
00957     return res;
00958 }
00959

```

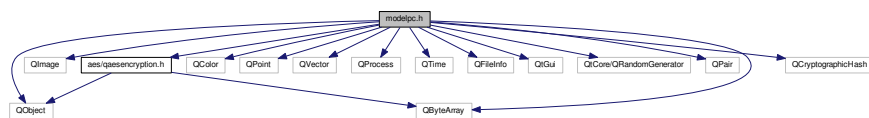
8.17 modelpc.h File Reference

```

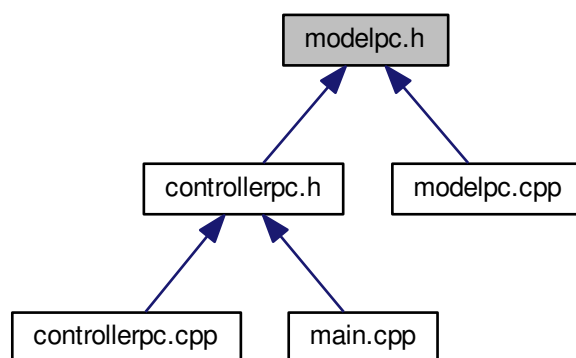
#include <QObject>
#include <QImage>
#include <QByteArray>
#include <QColor>
#include <QPoint>
#include <QVector>
#include <QProcess>
#include <QTime>
#include <QFileInfo>
#include <QtGui>
#include <QtCore/QRandomGenerator>
#include <QPair>
#include "aes/qaesencryption.h"
#include <QCryptographicHash>

```

Include dependency graph for `modelpc.h`:



This graph shows which files directly or indirectly include this file:



Classes

- class [ModelPC](#)

The [ModelPC](#) class Model Layer of the app. Main class that does the work of PictureCrypt logic Controlled by [ControllerPC](#).

8.17.1 Detailed Description

Header of [ModelPC](#) class

See also

[ControllerPC](#), [ModelPC](#), [ViewPC](#)

Definition in file [modelpc.h](#).

8.18 modelpc.h

```

00001 #ifndef MODELPC_H
00002 #define MODELPC_H
00003
00004 #include <QObject>
00005 #include <QImage>
00006 #include <QByteArray>
00007 #include <QColor>
00008 #include <QPoint>
00009 #include <QVector>
00010 #include <QProcess>
00011 #include <QTime>
00012 #include <QFileInfo>
00013 #include <QtGui>
00014 #include <QtCore/QRandomGenerator>
00015 #include <QPair>
00016
00017 #include "aes/qaesencryption.h"
00018 #include <QCryptographicHash>
00019
00020
00033 class ModelPC : public QObject
00034 {
00035     Q_OBJECT
00036 public:
00037     ModelPC();
00038     enum CryptMode {NotDefined, vl_3, vl_4, jphs_mode};
00039     static QImage *Encrypt(QByteArray data, QImage *image, int _mode, QString key = "", int
_bitsUsed = 8, QString *_error = nullptr);
00040     static QImage *Inject(QByteArray encr_data, QImage * image, int _mode, int _bitsUsed = 8, QString
*_error = nullptr);
00041     static QByteArray Decrypt(QImage * image, QString key, int _mode = 0, QString *_error = nullptr)
;
00042
00043 signals:
00050     void alertView(QString messageCode, bool isWarning);
00055     void saveData(QByteArray data);
00060     void saveImage(QImage *image);
00066     void setProgress(int val);
00067
00068 public slots:
00069     QImage *encrypt(QByteArray data, QImage *image, int _mode, QString key = "", int _bitsUsed = 8,
QString *_error = nullptr);
00070     QImage *inject(QByteArray encr_data, QImage * image, int _mode, int _bitsUsed = 8, QString *
_error = nullptr);
00071     QByteArray decrypt(QImage * image, QString key, int _mode = 0, QString *_error = nullptr);
00072     void fail(QString message);
00073     void alert(QString message, bool isWarning = false);
00074
00075 public:
00076     QByteArray unzip(QByteArray data, QByteArray key);
00077
00082     bool success;
00086     long version;
00090     QString versionString;
00094     QString defaultJPHSDir;
00095 protected:
00096     void circuit(QImage * image, QByteArray * data, long long int countBytes);
00097     void jphs(QImage * image, QByteArray * data);
00098     void processPixel(QPoint pos, QVector<QPoint> *were, bool isEncrypt);
00099     void encryptvl_4(QImage *image, QByteArray data, QString key);
00100     QByteArray decryptvl_3(QImage * image, QString key);
00101     QByteArray decryptvl_4(QImage * image, QString key);
00102     void processPixelsvl_4(QImage *image, QByteArray* data, QByteArray key, bool
isEncrypt, QVector<QPair<QPoint, QPair<int, int> > > *were, long long size = -1);
00103     QByteArray zip(QByteArray data, QByteArray key);
00104
00108     QString * error;
00109 private:
00110     int bitsUsed;
00111     bool fileExists(QString path);
00112     QByteArray bytes(long long n);
00113     unsigned int mod(int input);
00114     QByteArray ver_byte;
00115     QColor RGBbytes(long long byte);
00116     QString generateVersionString(long ver);
00117     uint randSeed();
00118     bool isTry = false;
00119
00120     QByteArray * circuitData;
00121     QImage * circuitImage;
00122     long long circuitCountBytes;
00123     long cur;
00124     bool mustGoOn(bool isEncrypt);
00125

```

```

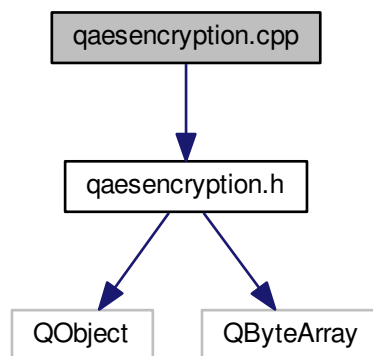
00126     QVector <bool> bitsBuffer;
00127     long pop(int bits = -1);
00128     void push(int data, int bits = -1);
00129
00130     void setError(QString word);
00131     QByteArray GetRandomBytes(long long count = 32);
00132 };
00133
00134 #endif // MODELPC_H

```

8.19 qaesencryption.cpp File Reference

#include "qaesencryption.h"

Include dependency graph for qaesencryption.cpp:



Functions

- quint8 [xTime](#) (quint8 x)
- quint8 [multiply](#) (quint8 x, quint8 y)

8.19.1 Function Documentation

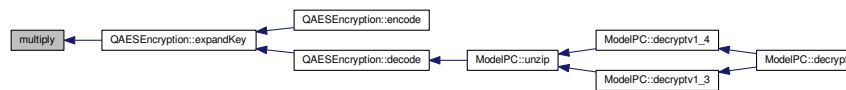
8.19.1.1 quint8 multiply (quint8 x, quint8 y) [inline]

Definition at line 57 of file [qaesencryption.cpp](#).

Here is the call graph for this function:



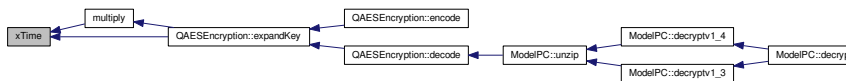
Here is the caller graph for this function:



8.19.1.2 quint8 xTime (quint8 x) [inline]

Definition at line 53 of file [qaesencryption.cpp](#).

Here is the caller graph for this function:



8.20 qaesencryption.cpp

```

00001 #include "qaesencryption.h"
00002
00003 /*
00004  * Static Functions
00005  */
00006 QByteArray QAESEncryption::Crypt(QAESEncryption::Aes level,
00007   QAESEncryption::Mode mode, const QByteArray &rawText,
00008   const QByteArray &key, const QByteArray &iv,
00009   QAESEncryption::Padding padding)
00010 {
00011     return QAESEncryption(level, mode, padding).encode(rawText, key, iv);
00012 }
00013 QByteArray QAESEncryption::Decrypt(QAESEncryption::Aes level,
00014   QAESEncryption::Mode mode, const QByteArray &rawText,
00015   const QByteArray &key, const QByteArray &iv,
00016   QAESEncryption::Padding padding)
00017 {
00018     return QAESEncryption(level, mode, padding).decode(rawText, key, iv);
00019 }
00020 QByteArray QAESEncryption::ExpandKey(
00021   QAESEncryption::Aes level, QAESEncryption::Mode mode, const
00022   QByteArray &key)
00023 {
00024     return QAESEncryption(level, mode).expandKey(key);
00025 }
00026 QByteArray QAESEncryption::RemovePadding(const QByteArray &rawText,
00027   QAESEncryption::Padding padding)
00028 {
00029     QByteArray ret(rawText);
00030     switch (padding)
00031     {
00032     case Padding::ZERO:
00033         //Works only if the last byte of the decoded array is not zero
00034         while (ret.at(ret.length()-1) == 0x00)
00035             ret.remove(ret.length()-1, 1);
00036         break;
00037     case Padding::PKCS7:
00038         ret.remove(ret.length() - ret.at(ret.length()-1), ret.at(ret.length()-1));
00039         break;
00040     case Padding::ISO:
00041         break;
00042     }
00043     return ret;
00044 }
  
```

```

00037         ret.truncate(ret.lastIndexOf(0x80));
00038         break;
00039     default:
00040         //do nothing
00041         break;
00042     }
00043     return ret;
00044 }
00045 /*
00046  * End Static function declarations
00047  * */
00048
00049 /*
00050  * Inline Functions
00051  * */
00052
00053 inline quint8 xTime(quint8 x){
00054     return ((x<<1) ^ ((x>>7) & 1) * 0x1b));
00055 }
00056
00057 inline quint8 multiply(quint8 x, quint8 y){
00058     return ((y & 1) * x) ^ ((y>>1 & 1) * xTime(x)) ^ ((y>>2 & 1) * xTime(
00059         xTime(x))) ^ ((y>>3 & 1)
00060         * xTime(xTime(xTime(x)))) ^ ((y>>4 & 1) * xTime(
00061         xTime(xTime(xTime(x))))));
00062 }
00063
00064 /*
00065  * End Inline functions
00066  * */
00067
00068 QAESEncryption::QAESEncryption(Aes level, Mode mode,
00069                                 Padding padding)
00070 {
00071     m_state = NULL;
00072
00073     switch (level)
00074     {
00075     case AES_128: {
00076         AES128 aes;
00077         m_nk = aes.nk;
00078         m_keyLen = aes.keylen;
00079         m_nr = aes.nr;
00080         m_expandedKey = aes.expandedKey;
00081     }
00082     break;
00083     case AES_192: {
00084         AES192 aes;
00085         m_nk = aes.nk;
00086         m_keyLen = aes.keylen;
00087         m_nr = aes.nr;
00088         m_expandedKey = aes.expandedKey;
00089     }
00090     break;
00091     case AES_256: {
00092         AES256 aes;
00093         m_nk = aes.nk;
00094         m_keyLen = aes.keylen;
00095         m_nr = aes.nr;
00096         m_expandedKey = aes.expandedKey;
00097     }
00098     break;
00099     default: {
00100         AES128 aes;
00101         m_nk = aes.nk;
00102         m_keyLen = aes.keylen;
00103         m_nr = aes.nr;
00104         m_expandedKey = aes.expandedKey;
00105     }
00106     break;
00107     }
00108 }
00109
00110 QByteArray QAESEncryption::getPadding(int currSize, int alignment)
00111 {
00112     int size = (alignment - currSize % alignment) % alignment;
00113     if (size == 0) return QByteArray();
00114     switch(m_padding)
00115     {
00116     case Padding::ZERO:
00117         return QByteArray(size, 0x00);
00118     break;
00119     case Padding::PKCS7:
00120         return QByteArray(size,size);
00121     break;

```



```

00122     case Padding::ISO:
00123         return QByteArray (size-1, 0x00).prepend(0x80);
00124         break;
00125     default:
00126         return QByteArray(size, 0x00);
00127         break;
00128     }
00129     return QByteArray(size, 0x00);
00130 }
00131
00132 QByteArray QAESEncryption::expandKey(const QByteArray &key)
00133 {
00134     int i, k;
00135     quint8 tempa[4]; // Used for the column/row operations
00136     QByteArray roundKey(key);
00137
00138     // The first round key is the key itself.
00139     // ...
00140
00141     // All other round keys are found from the previous round keys.
00142     // i == Nk
00143     for(i = m_nk; i < m_nb * (m_nr + 1); i++)
00144     {
00145         tempa[0] = (quint8) roundKey.at((i-1) * 4 + 0);
00146         tempa[1] = (quint8) roundKey.at((i-1) * 4 + 1);
00147         tempa[2] = (quint8) roundKey.at((i-1) * 4 + 2);
00148         tempa[3] = (quint8) roundKey.at((i-1) * 4 + 3);
00149
00150         if (i % m_nk == 0)
00151         {
00152             // This function shifts the 4 bytes in a word to the left once.
00153             // [a0,a1,a2,a3] becomes [a1,a2,a3,a0]
00154
00155             // Function RotWord()
00156             k = tempa[0];
00157             tempa[0] = tempa[1];
00158             tempa[1] = tempa[2];
00159             tempa[2] = tempa[3];
00160             tempa[3] = k;
00161
00162             // Function Subword()
00163             tempa[0] = getSBoxValue(tempa[0]);
00164             tempa[1] = getSBoxValue(tempa[1]);
00165             tempa[2] = getSBoxValue(tempa[2]);
00166             tempa[3] = getSBoxValue(tempa[3]);
00167
00168             tempa[0] = tempa[0] ^ Rcon[i/m_nk];
00169         }
00170         if (m_level == AES_256 && i % m_nk == 4)
00171         {
00172             // Function Subword()
00173             tempa[0] = getSBoxValue(tempa[0]);
00174             tempa[1] = getSBoxValue(tempa[1]);
00175             tempa[2] = getSBoxValue(tempa[2]);
00176             tempa[3] = getSBoxValue(tempa[3]);
00177         }
00178         roundKey.insert(i * 4 + 0, (quint8) roundKey.at((i - m_nk) * 4 + 0) ^ tempa[0]);
00179         roundKey.insert(i * 4 + 1, (quint8) roundKey.at((i - m_nk) * 4 + 1) ^ tempa[1]);
00180         roundKey.insert(i * 4 + 2, (quint8) roundKey.at((i - m_nk) * 4 + 2) ^ tempa[2]);
00181         roundKey.insert(i * 4 + 3, (quint8) roundKey.at((i - m_nk) * 4 + 3) ^ tempa[3]);
00182     }
00183     return roundKey;
00184 }
00185
00186 // This function adds the round key to state.
00187 // The round key is added to the state by an XOR function.
00188 void QAESEncryption::addRoundKey(const quint8 round, const QByteArray expKey)
00189 {
00190     QByteArray::iterator it = m_state->begin();
00191     for(int i=0; i < 16; ++i)
00192         it[i] = (quint8) it[i] ^ (quint8) expKey.at(round * m_nb * 4 + (i/4) * m_nb + (i%4));
00193 }
00194
00195 // The SubBytes Function Substitutes the values in the
00196 // state matrix with values in an S-box.
00197 void QAESEncryption::subBytes()
00198 {
00199     QByteArray::iterator it = m_state->begin();
00200     for(int i = 0; i < 16; i++)
00201         it[i] = getSBoxValue((quint8) it[i]);
00202 }
00203
00204 // The ShiftRows() function shifts the rows in the state to the left.
00205 // Each row is shifted with different offset.
00206 // Offset = Row number. So the first row is not shifted.
00207 void QAESEncryption::shiftRows()
00208 {

```

```

00209     QByteArray::iterator it = m_state->begin();
00210     quint8 temp;
00211     //Keep in mind that QByteArray is column-driven!!
00212
00213     //Shift 1 to left
00214     temp = (quint8)it[1];
00215     it[1] = (quint8)it[5];
00216     it[5] = (quint8)it[9];
00217     it[9] = (quint8)it[13];
00218     it[13] = (quint8)temp;
00219
00220     //Shift 2 to left
00221     temp = (quint8)it[2];
00222     it[2] = (quint8)it[10];
00223     it[10] = (quint8)temp;
00224     temp = (quint8)it[6];
00225     it[6] = (quint8)it[14];
00226     it[14] = (quint8)temp;
00227
00228     //Shift 3 to left
00229     temp = (quint8)it[3];
00230     it[3] = (quint8)it[15];
00231     it[15] = (quint8)it[11];
00232     it[11] = (quint8)it[7];
00233     it[7] = (quint8)temp;
00234 }
00235
00236 // MixColumns function mixes the columns of the state matrix
00237 //optimized!!
00238 void QAESEncryption::mixColumns()
00239 {
00240     QByteArray::iterator it = m_state->begin();
00241     quint8 tmp, tm, t;
00242
00243     for(int i = 0; i < 16; i += 4){
00244         t = (quint8)it[i];
00245         tmp = (quint8)it[i] ^ (quint8)it[i+1] ^ (quint8)it[i+2] ^ (quint8)it[i+3] ;
00246
00247         tm = xTime( (quint8)it[i] ^ (quint8)it[i+1] );
00248         it[i] = (quint8)it[i] ^ (quint8)tm ^ (quint8)tmp;
00249
00250         tm = xTime( (quint8)it[i+1] ^ (quint8)it[i+2]);
00251         it[i+1] = (quint8)it[i+1] ^ (quint8)tm ^ (quint8)tmp;
00252
00253         tm = xTime( (quint8)it[i+2] ^ (quint8)it[i+3]);
00254         it[i+2] = (quint8)it[i+2] ^ (quint8)tm ^ (quint8)tmp;
00255
00256         tm = xTime((quint8)it[i+3] ^ (quint8)t);
00257         it[i+3] = (quint8)it[i+3] ^ (quint8)tm ^ (quint8)tmp;
00258     }
00259 }
00260
00261 // MixColumns function mixes the columns of the state matrix.
00262 // The method used to multiply may be difficult to understand for the inexperienced.
00263 // Please use the references to gain more information.
00264 void QAESEncryption::invMixColumns()
00265 {
00266     QByteArray::iterator it = m_state->begin();
00267     quint8 a,b,c,d;
00268     for(int i = 0; i < 16; i+=4){
00269         a = (quint8) it[i];
00270         b = (quint8) it[i+1];
00271         c = (quint8) it[i+2];
00272         d = (quint8) it[i+3];
00273
00274         it[i] = (quint8) (multiply(a, 0x0e) ^ multiply(b, 0x0b) ^
multiply(c, 0x0d) ^ multiply(d, 0x09));
00275         it[i+1] = (quint8) (multiply(a, 0x09) ^ multiply(b, 0x0e) ^
multiply(c, 0x0b) ^ multiply(d, 0x0d));
00276         it[i+2] = (quint8) (multiply(a, 0x0d) ^ multiply(b, 0x09) ^
multiply(c, 0x0e) ^ multiply(d, 0x0b));
00277         it[i+3] = (quint8) (multiply(a, 0x0b) ^ multiply(b, 0x0d) ^
multiply(c, 0x09) ^ multiply(d, 0x0e));
00278     }
00279 }
00280
00281 // The SubBytes Function Substitutes the values in the
00282 // state matrix with values in an S-box.
00283 void QAESEncryption::invSubBytes()
00284 {
00285     QByteArray::iterator it = m_state->begin();
00286     for(int i = 0; i < 16; ++i)
00287         it[i] = getSBoxInvert((quint8) it[i]);
00288 }
00289
00290 void QAESEncryption::invShiftRows()
00291 {

```

```

00292     QByteArray::iterator it = m_state->begin();
00293     uint8_t temp;
00294
00295     //Keep in mind that QByteArray is column-driven!!
00296
00297     //Shift 1 to right
00298     temp = (quint8)it[13];
00299     it[13] = (quint8)it[9];
00300     it[9] = (quint8)it[5];
00301     it[5] = (quint8)it[1];
00302     it[1] = (quint8)temp;
00303
00304     //Shift 2
00305     temp = (quint8)it[10];
00306     it[10] = (quint8)it[2];
00307     it[2] = (quint8)temp;
00308     temp = (quint8)it[14];
00309     it[14] = (quint8)it[6];
00310     it[6] = (quint8)temp;
00311
00312     //Shift 3
00313     temp = (quint8)it[15];
00314     it[15] = (quint8)it[3];
00315     it[3] = (quint8)it[7];
00316     it[7] = (quint8)it[11];
00317     it[11] = (quint8)temp;
00318 }
00319
00320 QByteArray QAESEncryption::byteXor(const QByteArray &a, const QByteArray &b)
00321 {
00322     QByteArray::const_iterator it_a = a.begin();
00323     QByteArray::const_iterator it_b = b.begin();
00324     QByteArray ret;
00325
00326     //for(int i = 0; i < m_blocklen; i++)
00327     for(int i = 0; i < std::min(a.size(), b.size()); i++)
00328         ret.insert(i, it_a[i] ^ it_b[i]);
00329
00330     return ret;
00331 }
00332
00333 // Cipher is the main function that encrypts the PlainText.
00334 QByteArray QAESEncryption::cipher(const QByteArray &expKey, const QByteArray &in)
00335 {
00336
00337     //m_state is the input buffer...
00338     QByteArray output(in);
00339     m_state = &output;
00340
00341     // Add the First round key to the state before starting the rounds.
00342     addRoundKey(0, expKey);
00343
00344     // There will be Nr rounds.
00345     // The first Nr-1 rounds are identical.
00346     // These Nr-1 rounds are executed in the loop below.
00347     for(quint8 round = 1; round < m_nr; ++round){
00348         subBytes();
00349         shiftRows();
00350         mixColumns();
00351         addRoundKey(round, expKey);
00352     }
00353
00354     // The last round is given below.
00355     // The MixColumns function is not here in the last round.
00356     subBytes();
00357     shiftRows();
00358     addRoundKey(m_nr, expKey);
00359
00360     return output;
00361 }
00362
00363 QByteArray QAESEncryption::invCipher(const QByteArray &expKey, const QByteArray &in)
00364 {
00365     //m_state is the input buffer.... handle it!
00366     QByteArray output(in);
00367     m_state = &output;
00368
00369     // Add the First round key to the state before starting the rounds.
00370     addRoundKey(m_nr, expKey);
00371
00372     // There will be Nr rounds.
00373     // The first Nr-1 rounds are identical.
00374     // These Nr-1 rounds are executed in the loop below.
00375     for(quint8 round=m_nr-1; round>0 ; round--){
00376         invShiftRows();
00377         invSubBytes();
00378         addRoundKey(round, expKey);

```

```

00379         invMixColumns();
00380     }
00381
00382     // The last round is given below.
00383     // The MixColumns function is not here in the last round.
00384     invShiftRows();
00385     invSubBytes();
00386     addRoundKey(0, expKey);
00387
00388     return output;
00389 }
00390
00391 QByteArray QAESEncryption::encode(const QByteArray &rawText, const QByteArray &key,
    const QByteArray &iv)
00392 {
00393     if (m_mode >= CBC && (iv.isNull() || iv.size() != m_blocklen))
00394         return QByteArray();
00395
00396     QByteArray ret;
00397     QByteArray expandedKey = expandKey(key);
00398     QByteArray alignedText(rawText);
00399
00400     //Fill array with padding
00401     alignedText.append(getPadding(rawText.size(), m_blocklen));
00402
00403     switch(m_mode)
00404     {
00405     case ECB:
00406         for(int i=0; i < alignedText.size(); i+= m_blocklen)
00407             ret.append(cipher(expandedKey, alignedText.mid(i, m_blocklen)));
00408         break;
00409     case CBC: {
00410         QByteArray ivTemp(iv);
00411         for(int i=0; i < alignedText.size(); i+= m_blocklen){
00412             alignedText.replace(i, m_blocklen, byteXor(alignedText.mid(i, m_blocklen), ivTemp));
00413             ret.append(cipher(expandedKey, alignedText.mid(i, m_blocklen)));
00414             ivTemp = ret.mid(i, m_blocklen);
00415         }
00416         break;
00417     case CFB: {
00418         ret.append(byteXor(alignedText.left(m_blocklen), cipher(expandedKey, iv)));
00419         for(int i=0; i < alignedText.size(); i+= m_blocklen) {
00420             if (i+m_blocklen < alignedText.size())
00421                 ret.append(byteXor(alignedText.mid(i+m_blocklen, m_blocklen),
00422                                     cipher(expandedKey, ret.mid(i, m_blocklen))));
00423         }
00424         break;
00425     case OFB: {
00426         QByteArray ofbTemp;
00427         ofbTemp.append(cipher(expandedKey, iv));
00428         for (int i=m_blocklen; i < alignedText.size(); i += m_blocklen){
00429             ofbTemp.append(cipher(expandedKey, ofbTemp.right(m_blocklen)));
00430         }
00431         ret.append(byteXor(alignedText, ofbTemp));
00432         break;
00433     default: break;
00434     }
00435     return ret;
00436 }
00437
00438 QByteArray QAESEncryption::decode(const QByteArray &rawText, const QByteArray &key,
    const QByteArray &iv)
00439 {
00440     if (m_mode >= CBC && (iv.isNull() || iv.size() != m_blocklen))
00441         return QByteArray();
00442
00443     QByteArray ret;
00444     QByteArray expandedKey = expandKey(key);
00445
00446     switch(m_mode)
00447     {
00448     case ECB:
00449         for(int i=0; i < rawText.size(); i+= m_blocklen)
00450             ret.append(invCipher(expandedKey, rawText.mid(i, m_blocklen)));
00451         break;
00452     case CBC: {
00453         QByteArray ivTemp(iv);
00454         for(int i=0; i < rawText.size(); i+= m_blocklen){
00455             ret.append(invCipher(expandedKey, rawText.mid(i, m_blocklen)));
00456             ret.replace(i, m_blocklen, byteXor(ret.mid(i, m_blocklen), ivTemp));
00457             ivTemp = rawText.mid(i, m_blocklen);
00458         }
00459         break;
00460     }
00461     }
00462     break;
00463 }

```

```

00464     case CFB: {
00465         ret.append(byteXor(rawText.mid(0, m_blocklen), cipher(expandedKey, iv)));
00466         for(int i=0; i < rawText.size(); i+= m_blocklen){
00467             if (i+m_blocklen < rawText.size()) {
00468                 ret.append(byteXor(rawText.mid(i+m_blocklen, m_blocklen),
00469                                     cipher(expandedKey, rawText.mid(i, m_blocklen))));
00470             }
00471         }
00472     }
00473     break;
00474     case OFB: {
00475         QByteArray ofbTemp;
00476         ofbTemp.append(cipher(expandedKey, iv));
00477         for (int i=m_blocklen; i < rawText.size(); i += m_blocklen){
00478             ofbTemp.append(cipher(expandedKey, ofbTemp.right(m_blocklen)));
00479         }
00480         ret.append(byteXor(rawText, ofbTemp));
00481     }
00482     break;
00483     default:
00484         //do nothing
00485         break;
00486 }
00487 return ret;
00488 }
00489
00490 QByteArray QAESEncryption::removePadding(const QByteArray &rawText)
00491 {
00492     QByteArray ret(rawText);
00493     switch (m_padding)
00494     {
00495     case Padding::ZERO:
00496         //Works only if the last byte of the decoded array is not zero
00497         while (ret.at(ret.length()-1) == 0x00)
00498             ret.remove(ret.length()-1, 1);
00499         break;
00500     case Padding::PKCS7:
00501         ret.remove(ret.length() - ret.at(ret.length()-1), ret.at(ret.length()-1));
00502         break;
00503     case Padding::ISO:
00504         ret.truncate(ret.lastIndexOf(0x80));
00505         break;
00506     default:
00507         //do nothing
00508         break;
00509     }
00510     return ret;
00511 }

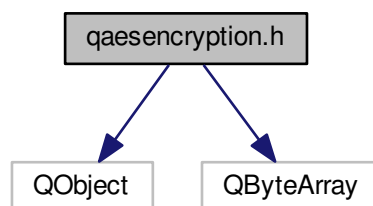
```

8.21 qaesencryption.h File Reference

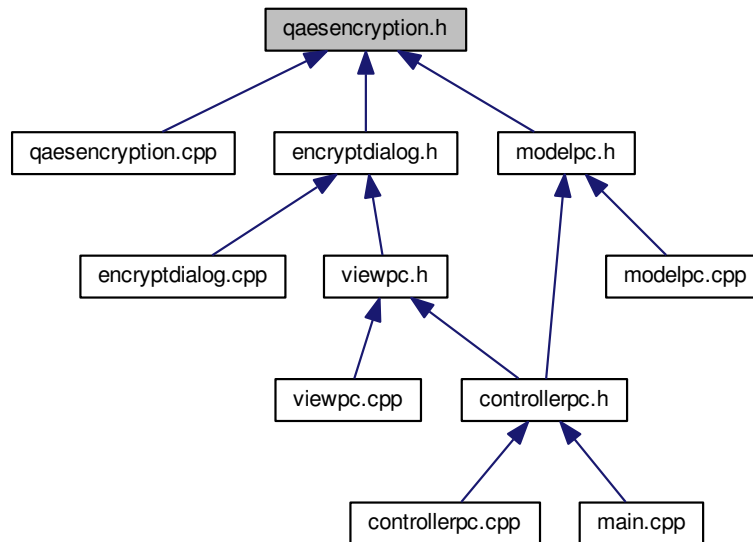
```
#include <QObject>
```

```
#include <QByteArray>
```

Include dependency graph for qaesencryption.h:



This graph shows which files directly or indirectly include this file:



Classes

- class [QAESEncryption](#)

The [QAESEncryption](#) class Small and portable AES encryption class for Qt. Supports all key sizes - 128/192/256 bits - ECB, CBC, CFB and OFB modes. Class made entirely by bricke. Github: <https://github.com/bricke/qt-AES>.

8.22 qaesencryption.h

```

00001 #ifndef QAESENCRIPTION_H
00002 #define QAESENCRIPTION_H
00003
00004 #include <QObject>
00005 #include <QByteArray>
00006
00014 class QAESEncryption : public QObject
00015 {
00016     Q_OBJECT
00017 public:
00027     enum Aes {
00028         AES_128,
00029         AES_192,
00030         AES_256
00031     };
00040     enum Mode {
00041         ECB,
00042         CBC,
00043         CFB,
00044         OFB
00045     };
00046
00055     enum Padding {
00056         ZERO,
00057         PKCS7,
00058         ISO
00059     };
00071     static QByteArray Crypt(QAESEncryption::Aes level,

```

```

    QAESEncryption::Mode mode, const QByteArray &rawText, const QByteArray &key,
00072         const QByteArray &iv = NULL, QAESEncryption::Padding
padding = QAESEncryption::ISO);
00084     static QByteArray Decrypt(QAESEncryption::Aes level,
QAESEncryption::Mode mode, const QByteArray &rawText, const QByteArray &key,
00085         const QByteArray &iv = NULL,
QAESEncryption::Padding padding = QAESEncryption::ISO);
00094     static QByteArray ExpandKey(QAESEncryption::Aes level,
QAESEncryption::Mode mode, const QByteArray &key);
00102     static QByteArray RemovePadding(const QByteArray &rawText,
QAESEncryption::Padding padding);
00103
00104     QAESEncryption(QAESEncryption::Aes level,
QAESEncryption::Mode mode,
00105         QAESEncryption::Padding padding =
QAESEncryption::ISO);
00116     QByteArray encode(const QByteArray &rawText, const QByteArray &key, const QByteArray &iv = NULL);
00127     QByteArray decode(const QByteArray &rawText, const QByteArray &key, const QByteArray &iv = NULL);
00136     QByteArray removePadding(const QByteArray &rawText);
00145     QByteArray expandKey(const QByteArray &key);
00146
00147 signals:
00148
00149 public slots:
00150
00151 private:
00152     int m_nb;
00153     int m_blocklen;
00154     int m_level;
00155     int m_mode;
00156     int m_nk;
00157     int m_keyLen;
00158     int m_nr;
00159     int m_expandedKey;
00160     int m_padding;
00161     QByteArray* m_state;
00162
00163     struct AES256{
00164         int nk = 8;
00165         int keylen = 32;
00166         int nr = 14;
00167         int expandedKey = 240;
00168     };
00169
00170     struct AES192{
00171         int nk = 6;
00172         int keylen = 24;
00173         int nr = 12;
00174         int expandedKey = 209;
00175     };
00176
00177     struct AES128{
00178         int nk = 4;
00179         int keylen = 16;
00180         int nr = 10;
00181         int expandedKey = 176;
00182     };
00183
00184     quint8 getSBoxValue(quint8 num){return sbox[num];}
00185     quint8 getSBoxInvert(quint8 num){return rsbox[num];}
00186
00187     void addRoundKey(const quint8 round, const QByteArray expKey);
00188     void subBytes();
00189     void shiftRows();
00190     void mixColumns();
00191     void invMixColumns();
00192     void invSubBytes();
00193     void invShiftRows();
00194     QByteArray getPadding(int currSize, int alignment);
00195     QByteArray cipher(const QByteArray &expKey, const QByteArray &plainText);
00196     QByteArray invCipher(const QByteArray &expKey, const QByteArray &plainText);
00197     QByteArray byteXor(const QByteArray &in, const QByteArray &iv);
00198
00199     const quint8 sbox[256] = {
00200         //0      1      2      3      4      5      6      7      8      9      A      B      C      D      E      F
00201         0x63, 0x7c, 0x77, 0x7b, 0xf2, 0x6b, 0x6f, 0xc5, 0x30, 0x01, 0x67, 0x2b, 0xfe, 0xd7, 0xab, 0x76,
00202         0xca, 0x82, 0xc9, 0x7d, 0xfa, 0x59, 0x47, 0xf0, 0xad, 0xd4, 0xa2, 0xaf, 0x9c, 0xa4, 0x72, 0xc0,
00203         0xb7, 0xfd, 0x93, 0x26, 0x36, 0x3f, 0xf7, 0xcc, 0x34, 0xa5, 0xe5, 0xf1, 0x71, 0xd8, 0x31, 0x15,
00204         0x04, 0xc7, 0x23, 0xc3, 0x18, 0x96, 0x05, 0x9a, 0x07, 0x12, 0x80, 0xe2, 0xeb, 0x27, 0xb2, 0x75,
00205         0x09, 0x83, 0x2c, 0x1a, 0x1b, 0x6e, 0x5a, 0xa0, 0x52, 0x3b, 0xd6, 0xb3, 0x29, 0xe3, 0x2f, 0x84,
00206         0x53, 0xd1, 0x00, 0xed, 0x20, 0xfc, 0xb1, 0x5b, 0x6a, 0xcb, 0xbe, 0x39, 0x4a, 0x4c, 0x58, 0xcf,
00207         0xd0, 0xef, 0xaa, 0xfb, 0x43, 0x4d, 0x33, 0x85, 0x45, 0xf9, 0x02, 0x7f, 0x50, 0x3c, 0x9f, 0xa8,
00208         0x51, 0xa3, 0x40, 0x8f, 0x92, 0x9d, 0x38, 0xf5, 0xbc, 0xb6, 0xda, 0x21, 0x10, 0xff, 0xf3, 0xd2,
00209         0xcd, 0x0c, 0x13, 0xec, 0x5f, 0x97, 0x44, 0x17, 0xc4, 0xa7, 0x7e, 0x3d, 0x64, 0x5d, 0x19, 0x73,
00210         0x60, 0x81, 0x4f, 0xdc, 0x22, 0x2a, 0x90, 0x88, 0x46, 0xee, 0xb8, 0x14, 0xde, 0x5e, 0x0b, 0xdb,
00211         0xe0, 0x32, 0x3a, 0x0a, 0x49, 0x06, 0x24, 0x5c, 0xc2, 0xd3, 0xac, 0x62, 0x91, 0x95, 0xe4, 0x79,
00212         0xe7, 0xc8, 0x37, 0x6d, 0x8d, 0xd5, 0x4e, 0xa9, 0x6c, 0x56, 0xf4, 0xea, 0x65, 0x7a, 0xae, 0x08,

```

```

00213     0xba, 0x78, 0x25, 0x2e, 0x1c, 0xa6, 0xb4, 0xc6, 0xe8, 0xdd, 0x74, 0x1f, 0x4b, 0xbd, 0x8b, 0x8a,
00214     0x70, 0x3e, 0xb5, 0x66, 0x48, 0x03, 0xf6, 0x0e, 0x61, 0x35, 0x57, 0xb9, 0x86, 0xc1, 0x1d, 0x9e,
00215     0xe1, 0xf8, 0x98, 0x11, 0x69, 0xd9, 0x8e, 0x94, 0x9b, 0x1e, 0x87, 0xe9, 0xce, 0x55, 0x28, 0xdf,
00216     0x8c, 0xa1, 0x89, 0x0d, 0xbf, 0xe6, 0x42, 0x68, 0x41, 0x99, 0x2d, 0x0f, 0xb0, 0x54, 0xbb, 0x16 };
00217
00218     const quint8 rsbox[256] =
00219     { 0x52, 0x09, 0x6a, 0xd5, 0x30, 0x36, 0xa5, 0x38, 0xbf, 0x40, 0xa3, 0x9e, 0x81, 0xf3, 0xd7, 0xfb,
00220     0x7c, 0xe3, 0x39, 0x82, 0x9b, 0x2f, 0xff, 0x87, 0x34, 0x8e, 0x43, 0x44, 0xc4, 0xde, 0xe9, 0xcb,
00221     0x54, 0x7b, 0x94, 0x32, 0xa6, 0xc2, 0x23, 0x3d, 0xee, 0x4c, 0x95, 0x0b, 0x42, 0xfa, 0xc3, 0x4e,
00222     0x08, 0x2e, 0xa1, 0x66, 0x28, 0xd9, 0x24, 0xb2, 0x76, 0x5b, 0xa2, 0x49, 0x6d, 0x8b, 0xd1, 0x25,
00223     0x72, 0xf8, 0xf6, 0x64, 0x86, 0x68, 0x98, 0x16, 0xd4, 0xa4, 0x5c, 0xcc, 0x5d, 0x65, 0xb6, 0x92,
00224     0x6c, 0x70, 0x48, 0x50, 0xfd, 0xed, 0xb9, 0xda, 0x5e, 0x15, 0x46, 0x57, 0xa7, 0x8d, 0x9d, 0x84,
00225     0x90, 0xd8, 0xab, 0x00, 0x8c, 0xbc, 0xd3, 0x0a, 0xf7, 0xe4, 0x58, 0x05, 0xb8, 0xb3, 0x45, 0x06,
00226     0xd0, 0x2c, 0x1e, 0x8f, 0xca, 0x3f, 0x0f, 0x02, 0xc1, 0xaf, 0xbd, 0x03, 0x01, 0x13, 0x8a, 0x6b,
00227     0x3a, 0x91, 0x11, 0x41, 0x4f, 0x67, 0xdc, 0xea, 0x97, 0xf2, 0xcf, 0xce, 0xf0, 0xb4, 0xe6, 0x73,
00228     0x96, 0xac, 0x74, 0x22, 0xe7, 0xad, 0x35, 0x85, 0xe2, 0xf9, 0x37, 0xe8, 0x1c, 0x75, 0xdf, 0x6e,
00229     0x47, 0xff, 0x1a, 0x71, 0x1d, 0x29, 0xc5, 0x89, 0x6f, 0xb7, 0x62, 0x0e, 0xaa, 0x18, 0xbe, 0x1b,
00230     0xfc, 0x56, 0x3e, 0x4b, 0xc6, 0xd2, 0x79, 0x20, 0x9a, 0xdb, 0xc0, 0xfe, 0x78, 0xcd, 0x5a, 0xf4,
00231     0x1f, 0xdd, 0xa8, 0x33, 0x88, 0x07, 0xc7, 0x31, 0xb1, 0x12, 0x10, 0x59, 0x27, 0x80, 0xec, 0x5f,
00232     0x60, 0x51, 0x7f, 0xa9, 0x19, 0xb5, 0x4a, 0x0d, 0x2d, 0xe5, 0x7a, 0x9f, 0x93, 0xc9, 0x9c, 0xef,
00233     0xa0, 0xe0, 0x3b, 0x4d, 0xae, 0x2a, 0xf5, 0xb0, 0xc8, 0xeb, 0xbb, 0x3c, 0x83, 0x53, 0x99, 0x61,
00234     0x17, 0x2b, 0x04, 0x7e, 0xba, 0x77, 0xd6, 0x26, 0xe1, 0x69, 0x14, 0x63, 0x55, 0x21, 0x0c, 0x7d };
00235
00236     // The round constant word array, Rcon[i], contains the values given by
00237     // x to the power (i-1) being powers of x (x is denoted as {02}) in the field GF(2^8)
00238     // Only the first 14 elements are needed
00239     const quint8 Rcon[256] = {
00240         0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20, 0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8, 0xab/*, 0x4d, 0x9a,
00241         0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39,
00242         0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a,
00243         0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20, 0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8,
00244         0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef,
00245         0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc,
00246         0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20, 0x40, 0x80, 0x1b,
00247         0x36, 0x6c, 0xd8, 0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3,
00248         0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94,
00249         0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20,
00250         0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8, 0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35,
00251         0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f,
00252         0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04,
00253         0x08, 0x10, 0x20, 0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8, 0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63,
00254         0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd,
00255         0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d
00256     */};
00257 };
00258 #endif // QAESENCRIPTION_H

```

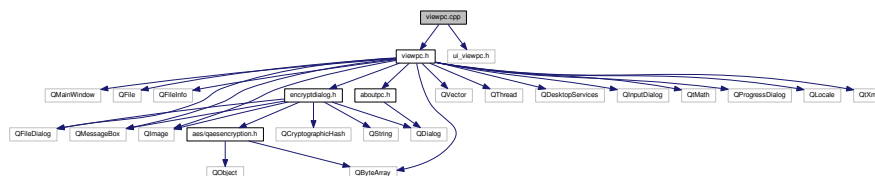
8.23 viewpc.cpp File Reference

```

#include "viewpc.h"
#include "ui_viewpc.h"

```

Include dependency graph for viewpc.cpp:



8.24 viewpc.cpp

```

00001 #include "viewpc.h"
00002 #include "ui_viewpc.h"
00003
00004 ViewPC::ViewPC(QWidget *parent) :
00005     QMainWindow(parent),

```



```

00006     ui(new Ui::ViewPC)
00007 {
00008     ui->setupUi(this);
00009     progressDialogClosed = true;
00010     setupErrorsDict();
00011     isEncrypt = true;
00012 }
00013 ViewPC::~ViewPC()
00014 {
00015     delete ui;
00016 }
00017 void ViewPC::on_encryptMode_clicked()
00018 {
00019     // Encrypt radio button clicked
00020     setEncryptMode(true);
00021 }
00022 void ViewPC::on_decryptMode_clicked()
00023 {
00024     // Decrypt radio button clicked
00025     setEncryptMode(false);
00026 }
00027 void ViewPC::on_fileButton_clicked()
00028 {
00029     // Opening QFileDialog depending on isEncrypt
00030     if(isEncrypt)
00031         inputFileName = QFileDialog::getOpenFileName(this, tr("Select file"), "/untitled.txt", tr("Text
files (*.txt);;All Files (*)"));
00032     else
00033         inputFileName = QFileDialog::getOpenFileName(this, tr("Select file"), "/untitled.png", tr("PNG
files (*.png);;All Files (*)"));
00034     // Display the file name
00035     ui->fileLabel->setText(inputFileName.isEmpty() ? "File not chosen" : inputFileName);
00036 }
00037 void ViewPC::on_startButton_clicked()
00038 {
00039     if(isEncrypt)
00040     {
00041         // Getting the data
00042         QString text = ui->text->toPlainText();
00043         QByteArray data;
00044         if(text.isEmpty()) {
00045             if(inputFileName.isEmpty()) {
00046                 alert("no_input_file", true);
00047                 return;
00048             }
00049             // Opening the file
00050             QFile file(inputFileName);
00051             if (!file.open(QIODevice::ReadOnly))
00052             {
00053                 alert("open_file_fail", true);
00054                 return;
00055             }
00056             // Check the data size
00057             auto size = file.size();
00058             if(size > qPow(2, 24)) {
00059                 alert("muchdata", true);
00060                 file.close();
00061                 return;
00062             }
00063             data = file.readAll();
00064             file.close();
00065         }
00066         else
00067             data = text.toUtf8();
00068         // Select image via EncryptDialog
00069         EncryptDialog * dialog = new EncryptDialog(data);
00070         dialog->exec();
00071         if(!dialog->success)
00072             return;
00073         // Get the data
00074         QByteArray encr_data = dialog->compr_data;
00075         // Save the hash
00076         QByteArray hash = QCryptographicHash::hash(data, QCryptographicHash::Sha256);
00077         encr_data = hash + encr_data;
00078         switch (selectedMode) {
00079             case 1:
00080                 emit inject(encr_data, &dialog->image, selectedMode, dialog->
bitsUsed);
00081                 break;

```

```

00108         case 2:
00109             emit encrypt(data, &dialog->image, selectedMode, dialog->
key);
00110             break;
00111         }
00112     }
00113     else
00114     {
00115         // Get the filename of the image
00116         if(inputFileName.isEmpty()) {
00117             alert("no_input_file", true);
00118             return;
00119         }
00120         QByteArray key = requestKey().toUtf8();
00121         if(key.isEmpty())
00122             return;
00123         QImage * res_image = new QImage(inputFileName);
00124         emit decrypt(res_image, key, 0);
00125     }
00126 }
00132 void ViewPC::alert(QString message, bool isWarning)
00133 {
00134     // Get message
00135     if(errorsDict.contains(message))
00136         message = errorsDict[message];
00137     // Create message box
00138     QMessageBox box;
00139     if(isWarning)
00140         box.setIcon(QMessageBox::Warning);
00141     else
00142         box.setIcon(QMessageBox::Information);
00143     box.setText(message);
00144     box.setWindowIcon(QIcon(":/icons/mail.png"));
00145     box.setWindowTitle("Message");
00146     box.exec();
00147 }
00153 void ViewPC::saveData(QByteArray Edata)
00154 {
00155     // Save data using QFileDialog
00156     QString outputFileName = QFileDialog::getSaveFileName(this, tr("Save File"),
"/untitled.txt",
tr("Text (*.txt);;All files (*)"));
00157
00158     QFile writeFile(outputFileName);
00159     if (!writeFile.open(QIODevice::WriteOnly))
00160     {
00161         alert("save_file_fail", true);
00162         return;
00163     }
00164     writeFile.write(Edata);
00165     writeFile.close();
00166     alert("decryption_completed");
00167 }
00174 void ViewPC::saveImage(QImage * image)
00175 {
00176     // Save image using QFileDialog
00177     QString outputFileName = QFileDialog::getSaveFileName(this, tr("Save Image"),
"/untitled.png",
tr("Images (*.png)"));
00178
00179     if(!image->save(outputFileName)) {
00180         alert("save_file_fail", true);
00181         return;
00182     }
00183     alert("encryption_completed");
00184 }
00185 }
00192 void ViewPC::setProgress(int val)
00193 {
00194     if(val < 0) {
00195         // Create dialog
00196         dialog = new QProgressDialog("Crypton in progress.", "Cancel", 0, 100);
00197         connect(dialog, SIGNAL(canceled()), this, SLOT(abortCircuit()));
00198         progressDialogClosed = false;
00199         dialog->setWindowTitle("Processing");
00200         dialog->setWindowIcon(QIcon(":/icons/loading.png"));
00201         dialog->show();
00202     }
00203     else if(val > 100 && !progressDialogClosed) {
00204         // Close dialog
00205         dialog->setValue(100);
00206         QThread::msleep(25);
00207         dialog->close();
00208         dialog->reset();
00209         progressDialogClosed = true;
00210     }
00211     // Update the progress
00212     else if(!progressDialogClosed)
00213         dialog->setValue(val);
00214 }

```

```

00218 void ViewPC::abortCircuit()
00219 {
00220     // Set the flag
00221     progressDialogClosed = true;
00222     // Close the dialog
00223     dialog->close();
00224     dialog->reset();
00225     emit abortModel();
00226 }
00231 void ViewPC::setEncryptMode(bool encr)
00232 {
00233     ui->text->setText("");
00234     ui->text->setEnabled(encr);
00235     isEncrypt = encr;
00236     ui->startButton->setText(encr ? "Continue configuration" : "Start decryption");
00237     ui->enLabel1->setText(encr ? "Type in the text for encryption:" : "Text input isn't supported in
    decryption mode");
00238     ui->enLabel1->setEnabled(encr);
00239     ui->enLabel2->setText(encr ? "Or use the file dialog to choose a file:" : "Choose a file for
    decryption:");
00240     ui->comboBox->setEnabled(encr);
00241 }
00246 void ViewPC::setVersion(QString version)
00247 {
00248     // Version setup
00249     versionString = version;
00250 }
00255 QString ViewPC::requestKey()
00256 {
00257     bool ok;
00258     QString text = QInputDialog::getText(this, tr("QInputDialog::getText()"),
00259                                         tr("Enter the keyphrase:"), QLineEdit::Normal,
00260                                         QDir::home().dirName(), &ok);
00261     if(text.isEmpty() && ok) {
00262         alert("no_key", true);
00263         return QString();
00264     }
00265     return ok ? text : QString();
00266 }
00267
00268 QByteArray ViewPC::bytes(long long n)
00269 {
00270     return QByteArray::fromHex(QByteArray::number(n, 16));
00271 }
00275 void ViewPC::on_actionAbout_triggered()
00276 {
00277     AboutPC about;
00278     about.setVersion(versionString);
00279     about.exec();
00280 }
00281
00285 void ViewPC::on_actionHelp_triggered()
00286 {
00287     QUrl docLink("https://alexkovrigin.me/PictureCrypt");
00288     QDesktopServices::openUrl(docLink);
00289 }
00293 void ViewPC::setupErrorsDict()
00294 {
00295     QString locale = QLocale::system().name().left(2);
00296     QString folderName = "values-" + locale;
00297     QString defaultPath = "://res/values/errors.xml";
00298     QString path = "://res/" + folderName + "/errors.xml";
00299     if(locale == "en")
00300         path = defaultPath;
00301
00302     QFileInfo foo(path);
00303     if(!foo.exists() || !foo.isFile()) {
00304         path = defaultPath;
00305         qDebug() << locale + " unsupported. Switching to en";
00306     }
00307
00308     QFile file(path);
00309     if(!file.open(QFile::ReadOnly | QFile::Text)) {
00310         alert("Cannot open config file!");
00311         return;
00312     }
00313     QByteArray readData = file.readAll();
00314     file.close();
00315     QDomDocument doc;
00316     doc.setContent(readData);
00317
00318     QDomElement root = doc.documentElement();
00319     QDomElement Component = root.firstChild().toElement();
00320
00321     // Loop while there is a child
00322     while(!Component.isNull())
00323     {

```

```

00324         // Check if the child tag name is string
00325         if (Component.tagName() == "string")
00326         {
00327             QString name = Component.attribute("name", "no name");
00328             QString value = Component.firstChild().toText().data();
00329             errorsDict[name] = value;
00330         }
00331         Component = Component.nextSibling().toElement();
00332     }
00333 }
00334
00335 void ViewPC::on_actionJPHS_path_triggered()
00336 {
00337     QString dir = QFileDialog::getExistingDirectory(this, tr("Open JPHS folder"),
00338                                                    "/home",
00339                                                    QFileDialog::ShowDirsOnly
00340                                                    | QFileDialog::DontResolveSymlinks);
00341     emit setJPHSDir(dir);
00342 }
00343
00344 void ViewPC::on_comboBox_currentIndexChanged(int index)
00345 {
00346     selectedMode = index + 1;
00347 }
00348
00349 void ViewPC::on_text_textChanged()
00350 {
00351     ui->fileButton->setEnabled(ui->text->toPlainText().isEmpty());
00352 }

```

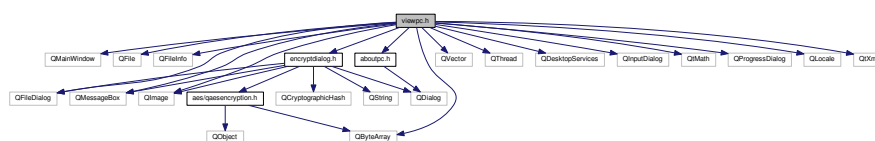
8.25 viewpc.h File Reference

```

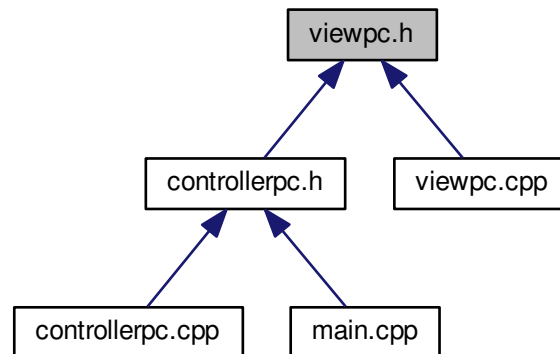
#include <QMainWindow>
#include <QFile>
#include <QFileInfo>
#include <QFileDialog>
#include <QMessageBox>
#include <QImage>
#include <QByteArray>
#include <QVector>
#include <QThread>
#include <QDesktopServices>
#include <QInputDialog>
#include <QtMath>
#include <encryptdialog.h>
#include <QProgressDialog>
#include <aboutpc.h>
#include <QLocale>
#include <QtXml>

```

Include dependency graph for viewpc.h:



This graph shows which files directly or indirectly include this file:



Classes

- class [ViewPC](#)

The [ViewPC](#) class View layer of the app. Controls [EncryptDialog](#) and [ProgressDialog](#).

Namespaces

- [Ui](#)

8.25.1 Detailed Description

Header of [ViewPC](#) class

See also

[ControllerPC](#), [ModelPC](#), [ViewPC](#)

Definition in file [viewpc.h](#).

8.26 viewpc.h

```
00001 #ifndef VIEWPC_H
00002 #define VIEWPC_H
00003
00004 #include <QMainWindow>
00005 #include <QFile>
00006 #include <QFileInfo>
00007 #include <QFileDialog>
00008 #include <QMessageBox>
00009 #include <QImage>
00010 #include <QByteArray>
00011 #include <QVector>
```

```

00012 #include <QThread>
00013 #include <QDesktopServices>
00014 #include <QInputDialog>
00015 #include <QtMath>
00016
00017 #include <encryptdialog.h>
00018 #include <QProgressDialog>
00019 #include <aboutpc.h>
00020
00021 #include <QLocale>
00022 #include <QtXml>
00023
00024 namespace Ui {
00025 class ViewPC;
00026 }
00036 class ViewPC : public QMainWindow
00037 {
00038     Q_OBJECT
00039
00040 public:
00041     explicit ViewPC(QWidget *parent = nullptr);
00042     ~ViewPC();
00043 private slots:
00044     void on_encryptMode_clicked();
00045
00046     void on_decryptMode_clicked();
00047
00048     void on_actionJPHS_path_triggered();
00049
00050     void on_comboBox_currentIndexChanged(int index);
00051
00052     void on_text_textChanged();
00053
00054 protected slots:
00055     void on_fileButton_clicked();
00056
00057     void on_startButton_clicked();
00058
00059     void on_actionAbout_triggered();
00060
00061     void on_actionHelp_triggered();
00062
00063     void setupErrorsDict();
00064 public slots:
00065     void alert(QString message, bool isWarning = false);
00066     void saveData(QByteArray Edata);
00067     void saveImage(QImage *image);
00068     void setProgress(int val);
00069     void abortCircuit();
00070     void setEncryptMode(bool encr);
00071     void setVersion(QString version);
00072 signals:
00080     void encrypt(QByteArray data, QImage *image, int mode, QString key);
00088     void inject(QByteArray data, QImage *image, int mode, int bitsUsed);
00096     void decrypt(QImage * _image, QString key, int mode);
00100     void abortModel();
00105     void setJPHSDir(QString dir);
00106 public:
00111     QProgressDialog * dialog;
00116     bool progressDialogClosed;
00120     QMap<QString, QString> errorsDict;
00121 protected:
00122     QString requestKey();
00123 private:
00124     Ui::ViewPC *ui;
00125     bool isEncrypt;
00126     QString inputFileName;
00127     QByteArray bytes(long long n);
00128     QString versionString;
00129     int selectedMode = 2;
00130 };
00131
00132 #endif // VIEWPC_H

```

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