PictureCrypt

1.4.0

Generated by Doxygen 1.8.11

Contents

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 commuicate. 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 anyhing. 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! mainpage.gv 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 adviced.

```
#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 explaination
       ModelPC::bitsUsed)
                                    QString *error = nullptr); // Error output, if everything is ok, error
       will be "ok"
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 JPHS use

The newer versions of the app have jphs support, but they don't have jphs 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 JPHS, 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 jphs is on you, that is why we use made only optionally. That means that to use jphs with our app you will have to download the jphs yourself and specify the jphs directory. However we provide link to the site where you can download the supported version of the jphs: 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:

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

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

Chapter 4

Class Index

4.1 Class List

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

Chapter 5

File Index

5.1 File List

Here is a list of all files with brief descriptions:

Chapter 6

Namespace Documentation

6.1 Ui Namespace Reference

Chapter 7

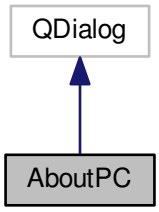
Class Documentation

7.1 AboutPC Class Reference

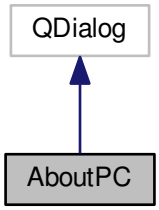
The AboutPC class The About Page dialog.

`#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*)

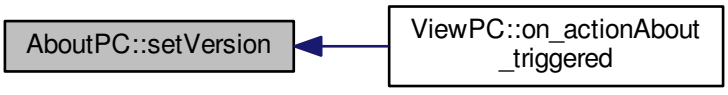
AboutPC::setVersion Function to set the version display.

Parameters

version	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:

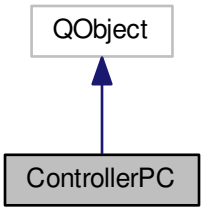
- aboutpc.h
- aboutpc.cpp

7.2 ControllerPC Class Reference

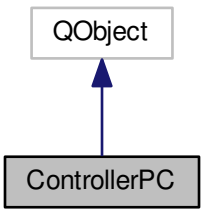
The ControllerPC class Controller class, which controls View and Model layers.

`#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.

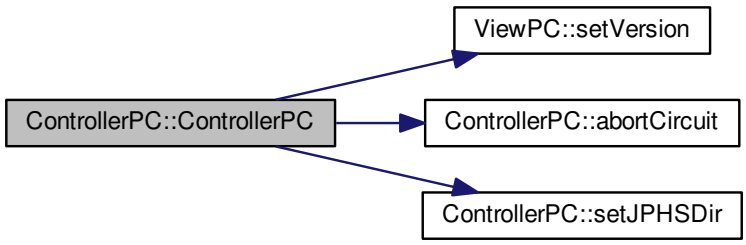
Controller class

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

dir	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:

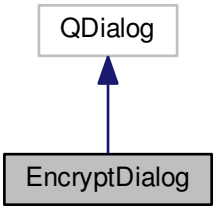
- controllerpc.h
- controllerpc.cpp

7.3 EncryptDialog Class Reference

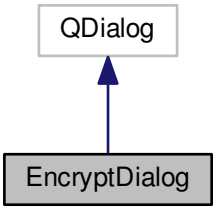
The EncryptDialog class Class to get the image and key to store secret info.

`#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 EncrytDialog::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]

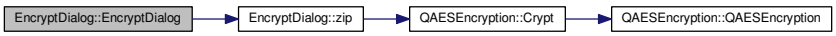
EncryptDialog::EncryptDialog Constructor of the class. Input data is saved here and some variables are set here.

Parameters

_data	Input data.
parent	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

value	Well, value

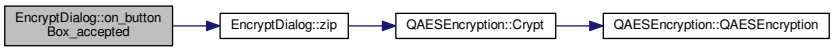
Definition at line 107 of file encryptdialog.cpp.

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

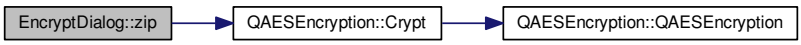
Returns Compressed data.

See also

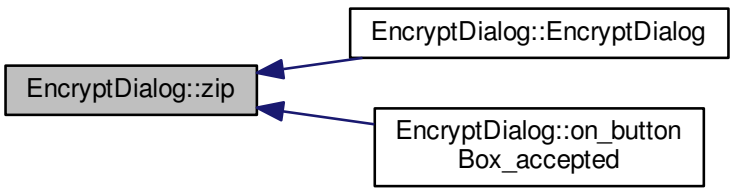
ModelPC::unzip

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 EncrytDialog::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:

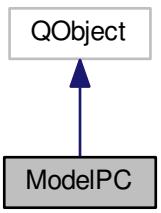
- encryptdialog.h
- encryptdialog.cpp

7.4 ModelPC Class Reference

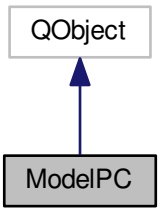
The ModelPC class Model Layer of the app. Main class that does the work of PictureCrypt logic Controled by ControllerPC.

```
#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 cryption.
- 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 Decrytps 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 Controled 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 ( )

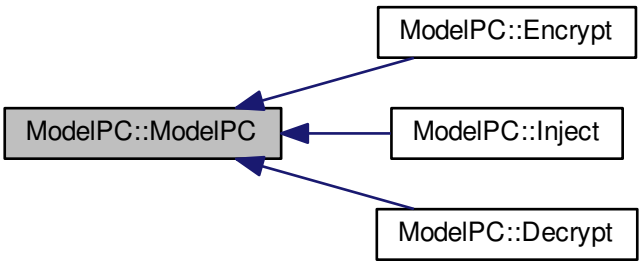
ModelPC::ModelPC Constructor Unit tests are run here.

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

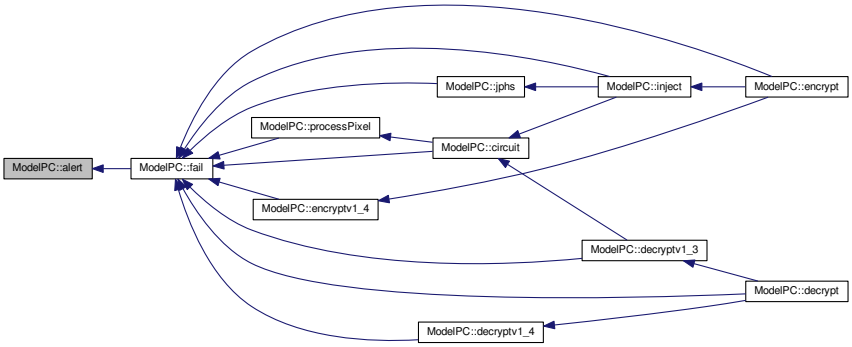
message	Message to be transmitted.
isWarning	Flag if message is critical.

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.

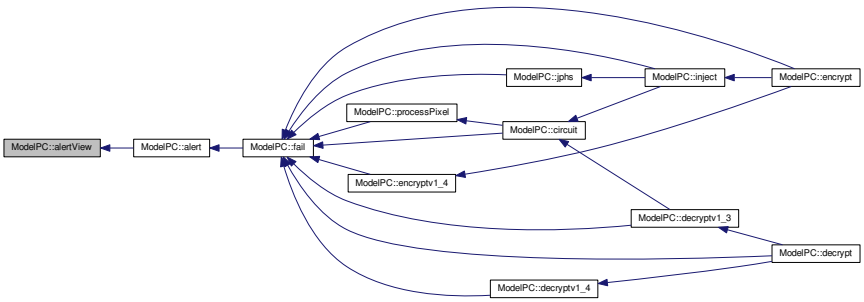
Parameters

messageCode	Message Code to be shown.
isWarning	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

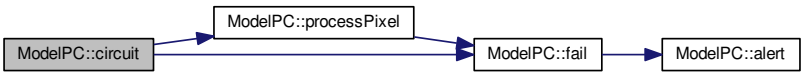
image	Image to be processed.
data	Data to be processed.
countBytes	Number of bytes to be read or written.

See also

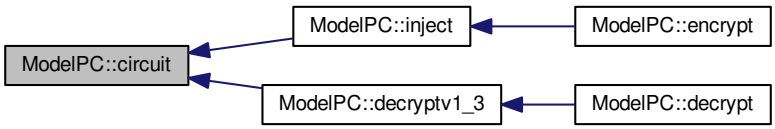
ModelPC::processPixel

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

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

Returns

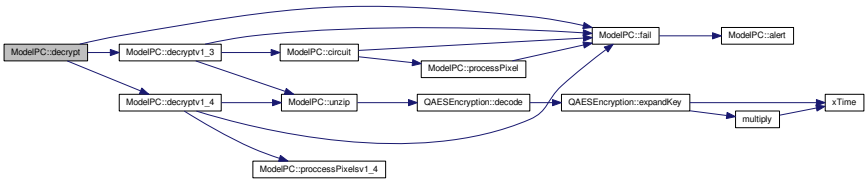
Returns decrypted data

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 Decrytps data from image in v1.3.

Parameters

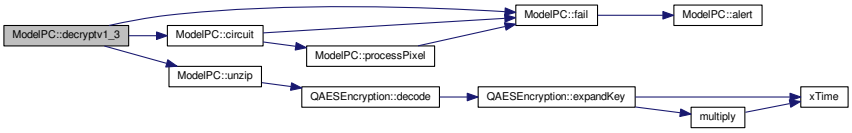
image	Image with data
key	Key

Returns

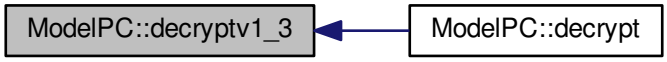
Returns obtained data

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

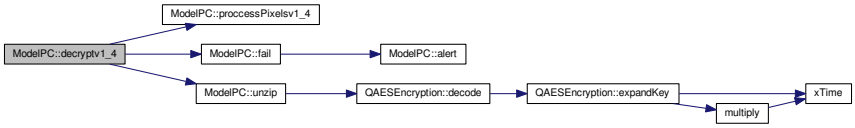
image	Image with data
key	Key

Returns

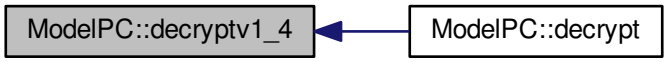
Returns obtained data

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

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

Returns

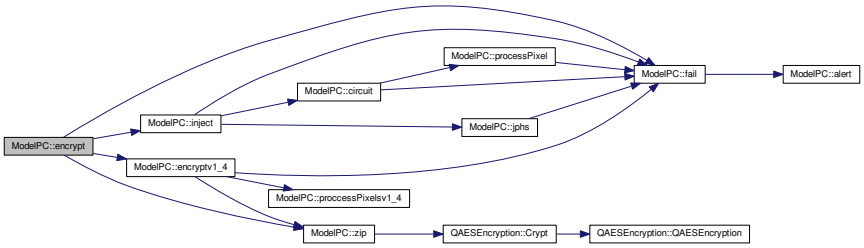
Returns image with embedded data

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]

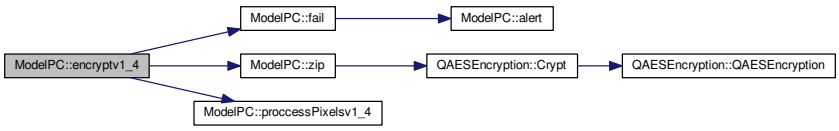
ModelPC::encryptv1_4 Encrypts and injects data to image used in v1.4+.

Parameters

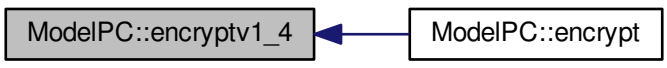
image	Image for injecting
data	Data for embedding

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 cryption.

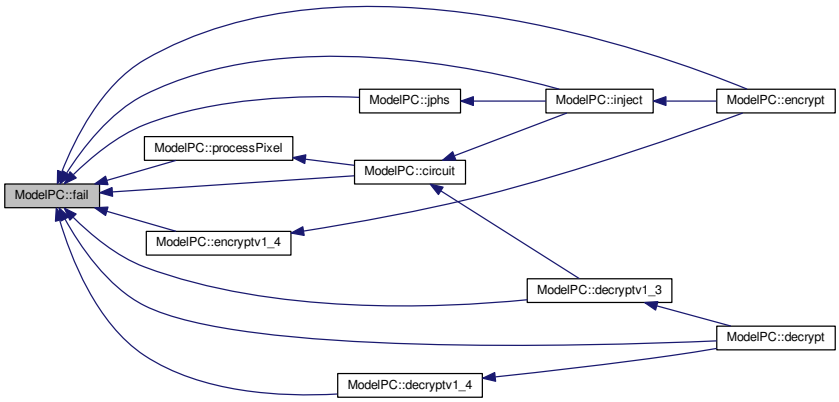
Parameters

message	Message for user

Definition at line 283 of file modelpc.cpp.

Here is the call graph for this function:

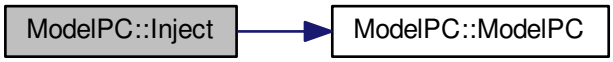
Here is the caller graph for this function:



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

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

Returns

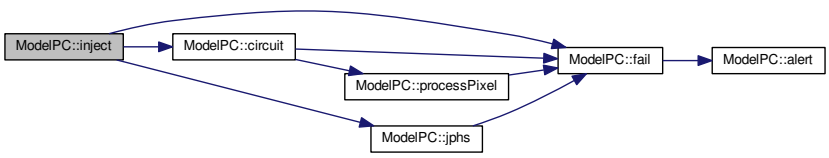
Returns image with embedded data.

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]

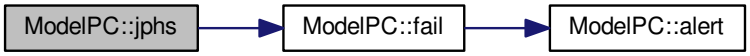
ModelPC::jphs JPHS function to use jphide and jpseek (currently under development)

Parameters

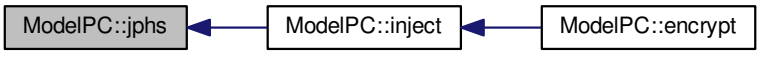
image	Image for embedding
data	Data

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::proccessPixelsv1_4 (QImage * *image*, QByteArray * *data*, QByteArray *key*, bool *isEncrypt*, QVector< QPair< QPoint, QPair< int, int > > > * *were*, long long *size* = -1) [protected]

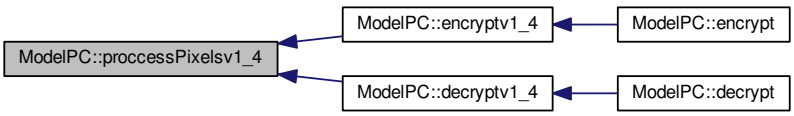
ModelPC::proccessPixelsv1_4 Hides (or retrieves) data to/from pixels.

Parameters

image	Original image
data	Data to write (Pointer to empty QByteArray if decrypting)
key	Key
isEncrypt	Mode of Cryption (true -> encryption, false -> decryption)
were	Were vector for visited pixels
size	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]

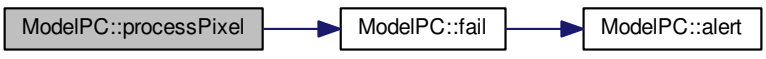
ModelPC::processPixel Processes every pixel. Reads its contains or writes data.

Parameters

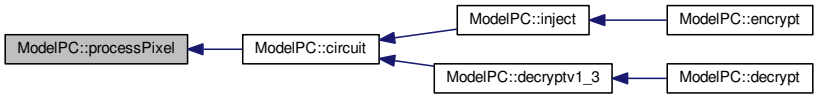
pos	Position of pixel
were	Vector array containing pixels, that were already processed.
isEncrypt	Mode of operation. If true encryption operations will continue, else the decryption ones.

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

data	Data to be saved.

Here is the caller graph for this function:

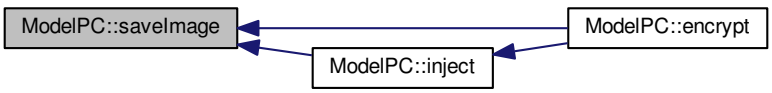
7.4.4.18 void ModelPC::saveImage (QImage * *image*) [signal]

saveImage Signal to be called to save image from ModelPC::encrypt.

Parameters

image	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.

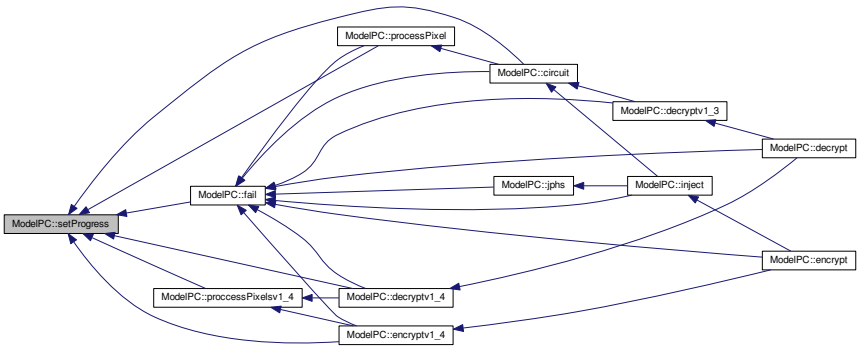
Parameters

val	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

data	Data to be decrypted.
key	Key to decrypt the data.

Returns

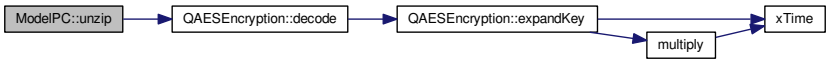
Returns data

See also

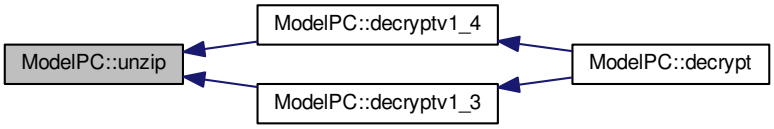
EncryptDialog::zip, ModelPC::decrypt, ModelPC::zip

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

data	Data to be encrypted
key	Key for encryption

Returns

Returns decrypted data

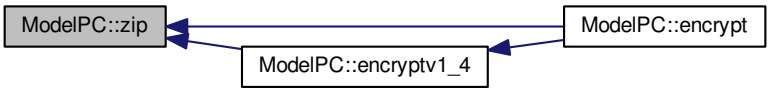
See also

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:

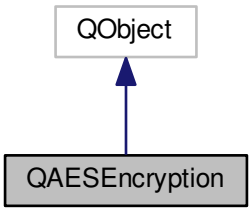
- modelpc.h
- modelpc.cpp

7.5 QAESEncryption Class Reference

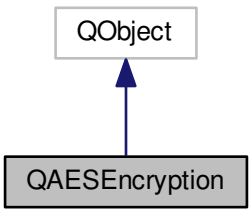
The QAESEncryption class Small and portable AES encryption class for Qt. Supports all key sizes - 128/192/256 bits - ECB, CBC, CFB and OFB modes. Class made entirely by bricke. Github: https://github.com/bricke/Qt-AES.

```
#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 lenghts.
- 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 lenghts.

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

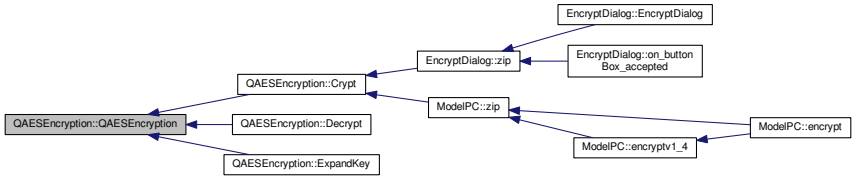
Definition at line 55 of file qaesencryption.h.

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

level	AES level of encryption
mode	AES mode
rawText	Input data
key	Key for encrytion
iv	IV vector
padding	Padding

Returns

Returns encrypted data

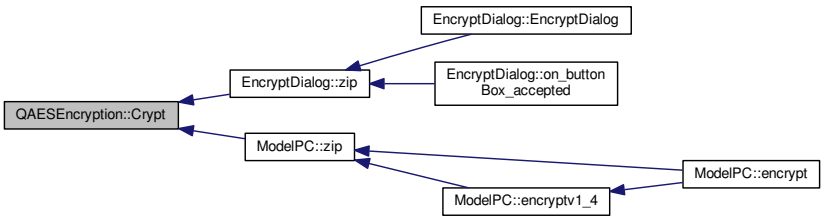
See also

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

rawText	Input data
key	Key
iv	IV vector

Returns

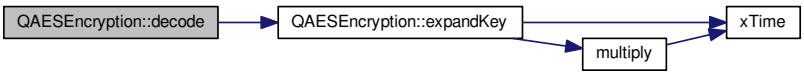
Returns decoded data

See also

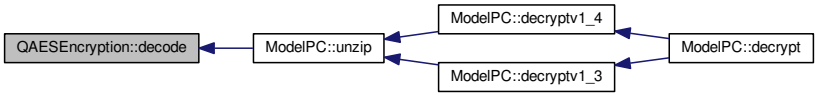
QAESEncryption::Decrypt, QAESEncryption::encode

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

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

Returns

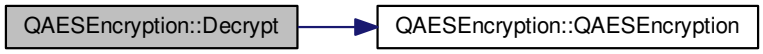
Returns Decrypted data

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

rawText	Input data
key	Key
iv	IV vector

Returns

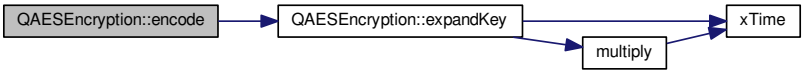
Returns encoded data

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

level	AES level
mode	AES Mode
key	key

Returns

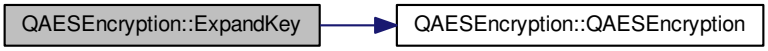
Returns expanded key (I guess)

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

key	key

Returns

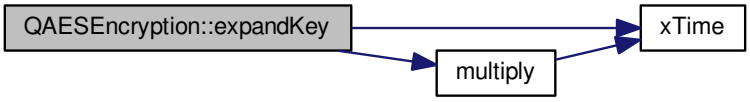
Returns expanded key (I guess)

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

rawText	Input data
padding	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

rawText	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:

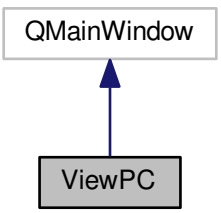
- qaesencryption.h
- qaesencryption.cpp

7.6 ViewPC Class Reference

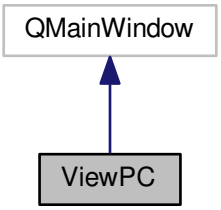
The ViewPC class View layer of the app. Controls EncryptDialog and ProgressDialog.

`#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 ModelPC::encrypt
- void inject (QByteArray data, QImage ∗image, int mode, int bitsUsed)

  inject Signal calling ModelPC::inject
- void decrypt (QImage ∗_image, QString key, int mode)

  decrypt Signal calling ModelPC::decrypt
- void abortModel ()

  abortModel Signal calling to stop ModelPC::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

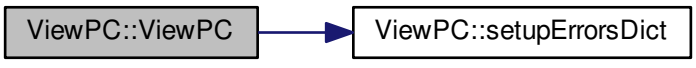
Definition at line 36 of file viewpc.h.

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:

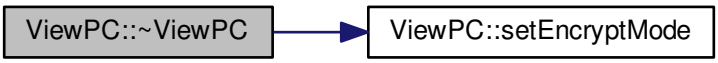


7.6.2.2 ViewPC::~ViewPC ( )

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)

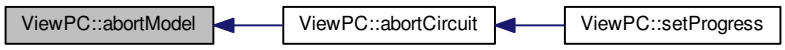
Definition at line 218 of file viewpc.cpp.

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]

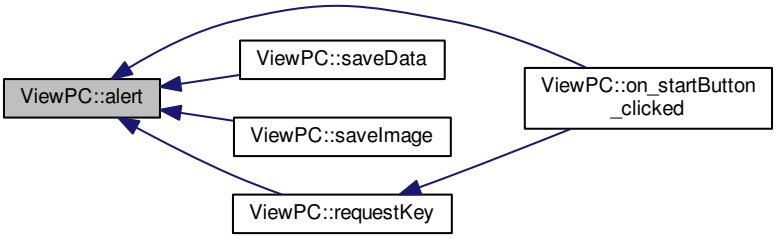
ViewPC::alert Slot to create QMessageBox with message.

Parameters

message	Message to be shown
isWarning	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

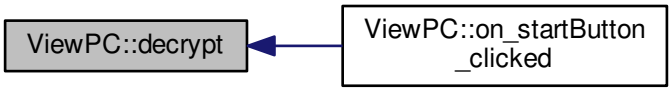
Parameters

_image	Image for decryption
key	encryption key
mode	Mode of decryption

See also

ModelPC::decrypt, ModelPC::CryptMode

Here is the caller graph for this function:



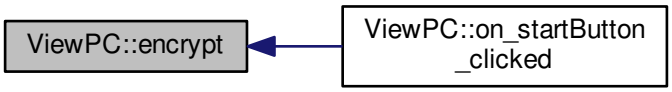
7.6.3.5 void ViewPC::encrypt (QByteArray *data*, QImage * *image*, int *mode*, QString *key*) [signal]

encrypt Signal calling ModelPC::encrypt

Parameters

data	Data to write
image	Image to be encrypted into
mode	Mode of encryption
key	Key of encryption

Here is the caller graph for this function:



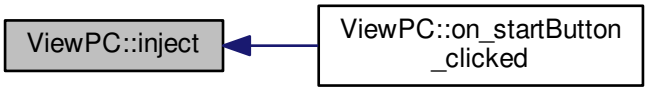
7.6.3.6 void ViewPC::inject (QByteArray *data*, QImage * *image*, int *mode*, int *bitsUsed*) [signal]

inject Signal calling ModelPC::inject

Parameters

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

Here is the caller graph for this function:

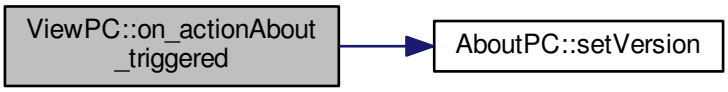


7.6.3.7 void ViewPC::on_actionAbout_triggered ( ) [protected], [slot]

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

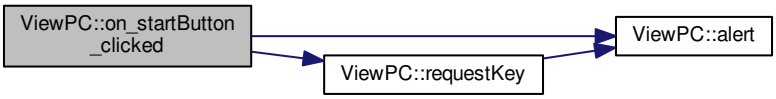
Then the EncryptDialog opens and image and key is selected. Then the ViewPC::encrypt signal is called to start ModelPC::encrypt

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]

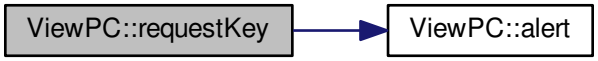
ViewPC::requestKey Request keyphrase from user using InputDialog.

Returns

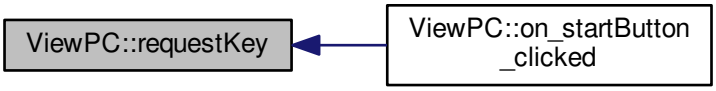
Returns keyphrase

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

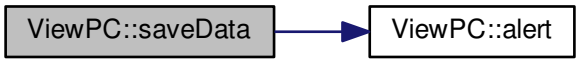
Edata	Encrypted data to be saved.

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

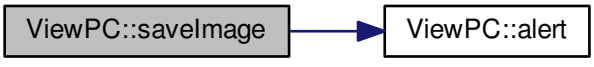
image	Image to be saved.

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]

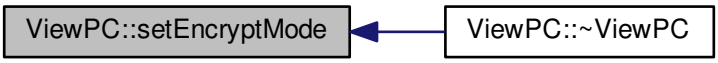
ViewPC::setEncryptMode Set the encrpt mode (ViewPC::isEncrypt)

Parameters

encr	= isEncrypt, true if encrypting, false if decrypting

Definition at line 231 of file viewpc.cpp.

Here is the caller graph for this function:



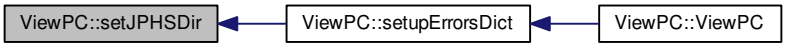
7.6.5.5 void ViewPC::setJPHSDir (QString *dir*) [signal]

setJPHSPath Sets the default JPHS directory

Parameters

dir	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

val	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.

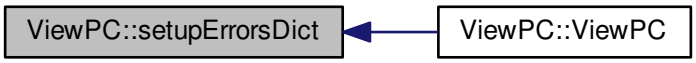
Here is the call graph for this function:

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 caller graph for this function:



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

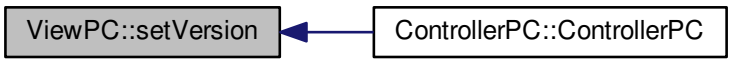
ViewPC::setVersion Set the version of the app from ControllerPC.

Parameters

version	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

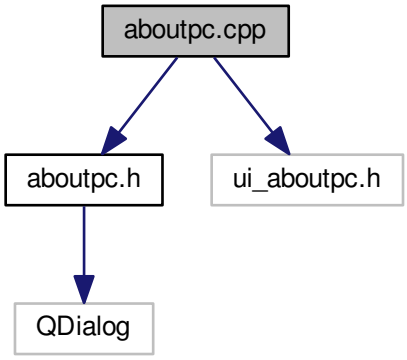
Chapter 8

File Documentation

8.1 aboutpc.cpp File Reference

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

Include dependency graph for aboutpc.cpp:



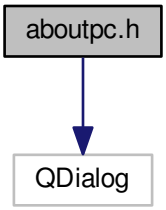
8.2 aboutpc.cpp

```
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(tr("Version ") + version);
00022 }
```

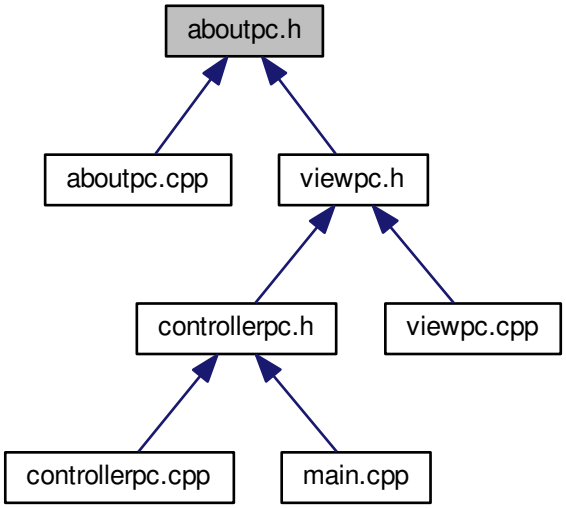
8.3 aboutpc.h File Reference

```
#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

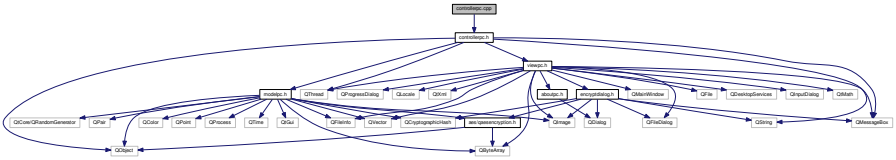
8.4 aboutpc.h

```
00001 #ifndef ABOUTPC_H
00002 #define ABOUTPC_H
00003
00004 #include <QDialog>
00005
00006 namespace Ui {
00007 class AboutPC;
00008 }
00012 class AboutPC : public QDialog
00013 {
00014     Q_OBJECT
00015
00016 public:
00017     explicit AboutPC(QWidget *parent = 0);
00018     ~AboutPC();
00019     void setVersion(QString version);
00020
00021 private:
00022     Ui::AboutPC *ui;
00023 };
00024
00025 #endif // ABOUTPC_H
```

8.5 controllerpc.cpp File Reference

`#include "controllerpc.h"`

Include dependency graph for controllerpc.cpp:



8.6 controllerpc.cpp

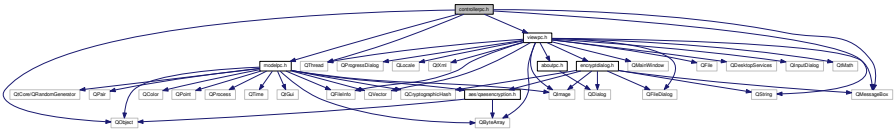
```
00001 #include "controllerpc.h"
00002
00009 ControllerPC::ControllerPC()
00010 {
00011     // Layer creation
00012     view = new ViewPC();
00013     model = new ModelPC();
00014     QThread * modelThread = new QThread();
00015     model->moveToThread(modelThread);
00016     modelThread->start();
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,
      QImage*, int, QString)));
00023     connect(view, SIGNAL(inject(QByteArray,QImage*,int, int)), model, SLOT(inject(QByteArray,QImage*, int,
      int)));
00024     connect(view, SIGNAL(decrypt(QImage*,QString,int)), model, SLOT(decrypt(QImage*, QString, int)));
00025     connect(view, SIGNAL(abortModel()), this, SLOT(abortCircuit()));
00026     connect(view, SIGNAL(setJPHSDir(QString)), this, SLOT(setJPHSDir(QString)));
00027
00028     connect(model, SIGNAL(alertView(QString,bool)), view, SLOT(alert(QString,bool)));
00029     connect(model, SIGNAL(saveData(QByteArray)), view, SLOT(saveData(QByteArray)));
00030     connect(model, SIGNAL(saveImage(QImage*)), view, SLOT(saveImage(QImage*)));
00031     connect(model, SIGNAL(setProgress(int)), view, SLOT(setProgress(int)));
00032 }
00037 void ControllerPC::abortCircuit()
```

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

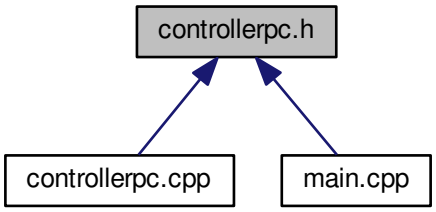
8.7 controllerpc.h File Reference

```
#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.

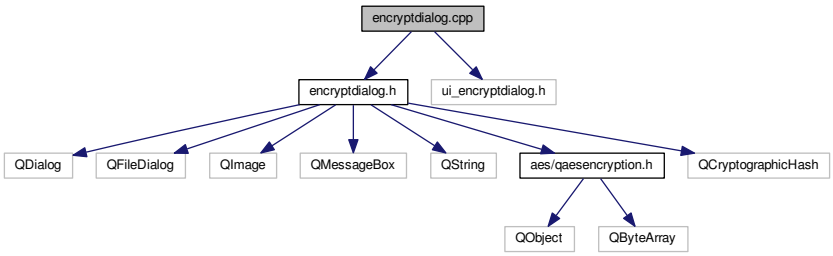
8.8 controllerpc.h

```
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;
```

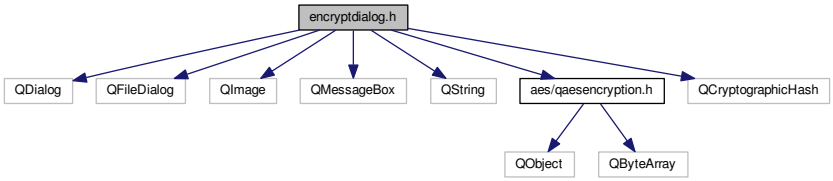
```
00023     bitsUsed = 8;
00024 }
00025
00026 EncryptDialog::~EncryptDialog()
00027 {
00028     delete ui;
00029 }
00030
00031 void EncryptDialog::alert(QString text)
00032 {
00033     QMessageBox t;
00034     t.setWindowTitle(tr("Message"));
00035     t.setIcon(QMessageBox::Warning);
00036     t.setWindowIcon(QIcon(":/mail.png"));
00037     t.setText(text);
00038     t.exec();
00039 }
00046 QByteArray EncryptDialog::zip()
00047 {
00048     // Zip
00049     QByteArray c_data = qCompress(data, 9);
00050     // Encryption
00051     QByteArray hashKey = QCryptographicHash::hash(key.toUtf8(), QCryptographicHash::Sha256);
00052     return QAESEncryption::Crypt(QAESEncryption::AES_256,
      QAESEncryption::ECB, c_data, hashKey);
00053 }
00057 void EncryptDialog::on_fileButton_clicked()
00058 {
00059     // Selet file
00060     inputFileName = QFileDialog::getOpenFileName(this, tr("Open File"), "/", tr("Images (*.png
       *.xpm *.jpg *.jpeg)"));
00061     ui->fileLabel->setText(inputFileName);
00062     // Open image
00063     QImage img(inputFileName);
00064     image = img;
00065     // Get size
00066     size = img.width() * img.height();
00067     // UI setup
00068     long long int compr_data_size = compr_data.size();
00069     ui->zippedBytes->setText(QString::number(compr_data_size));
00070     if(inputFileName.isEmpty()) {
00071         ui->percentage->setText("");
00072         return;
00073     }
00074     double perc = (compr_data_size + 14) * 100 / (size * 3) * bitsUsed / 8;
00075     ui->percentage->setText(QString::number(perc) + "%");
00076     goodPercentage = perc < 70;
00077 }
00082 void EncryptDialog::on_buttonBox_accepted()
00083 {
00084     if(!goodPercentage) {
00085         alert(tr("Your encoding percentage is over 70% which is a bit ambiguous."));
00086         success = false;
00087         return;
00088     }
00089     // Final zip
00090     key = ui->keyLine->text();
00091     compr_data = zip();
00092     success = true;
00093     close();
00094 }
00098 void EncryptDialog::on_buttonBox_rejected()
00099 {
00100     success = false;
00101     close();
00102 }
00107 void EncryptDialog::on_bitsSlider_valueChanged(int value)
00108 {
00109     bitsUsed = value;
00110     ui->bitsUsedLbl->setText(QString::number(value));
00111     if(ui->percentage->text().isEmpty())
00112         return;
00113     double perc = (compr_data.size() + 14) * 100 / (size * 3) * 8 /
      bitsUsed;
00114     ui->percentage->setText(QString::number(perc) + "%");
00115 }
```

8.11 encryptdialog.h File Reference

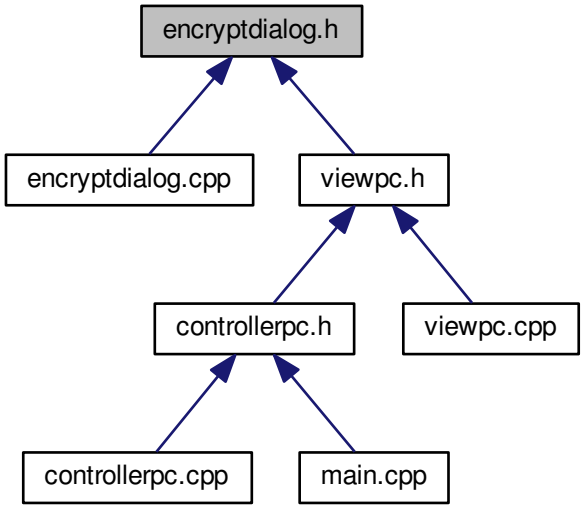
```
#include <QDialog>
```

```
#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

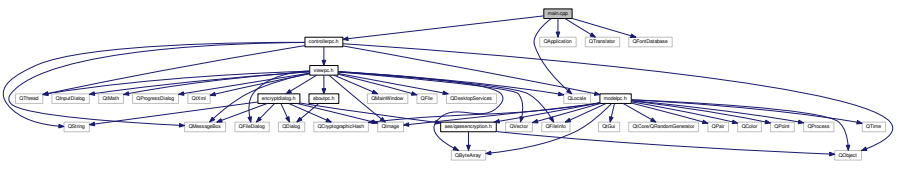
8.12 encryptdialog.h

```
00001 #ifndef ENCRYPTDIALOG_H
00002 #define ENCRYPTDIALOG_H
00003
00004 #include <QDialog>
00005 #include <QFileDialog>
00006 #include <QImage>
00007 #include <QMessageBox>
00008 #include <QString>
00009
00010 #include <aes/qaesencryption.h>
00011 #include <QCryptographicHash>
00012
00013 namespace Ui {
00014 class EncryptDialog;
00015 }
00021 class EncryptDialog : public QDialog
00022 {
00023     Q_OBJECT
00024
00025 public:
00026     explicit EncryptDialog(QByteArray _data, QWidget *parent = 0);
00027     ~EncryptDialog();
00028
00029 public slots:
00030     void on_fileButton_clicked();
00031
00032     void on_buttonBox_accepted();
00033
00034     void on_buttonBox_rejected();
00035
00036     void on_bitsSlider_valueChanged(int value);
00037
00038 public:
00042     QByteArray data;
00046     bool success;
00050     QByteArray compr_data;
00054     QString inputFileName;
00058     long long int size;
00062     QString key;
00066     bool goodPercentage;
00070     int val;
00075     int bitsUsed;
00079     QImage image;
00080     QByteArray zip();
00081 private:
00082     Ui::EncryptDialog *ui;
00083     void alert(QString text);
00084 };
00085
00086 #endif // ENCRYPTDIALOG_H
```

8.13 main.cpp File Reference

```
#include "controllerpc.h"
#include <QApplication>
#include <QTranslator>
#include <QLocale>
#include <QFontDatabase>
```

Include dependency graph for main.cpp:



Functions

- int main (int argc, char *argv[])

8.13.1 Function Documentation

8.13.1.1 int main (int *argc*, char * *argv[]*)

Definition at line 119 of file main.cpp.

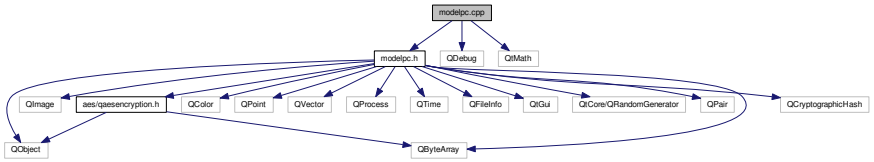
8.14 main.cpp

```
00001 #include "controllerpc.h"
00002 #include <QApplication>
00003 #include <QTranslator>
00004 #include <QLocale>
00005 #include <QFontDatabase>
00119 int main(int argc, char *argv[])
00120 {
00121     QApplication a(argc, argv);
00122
00123     QList<QString> fonts = { "Montserrat-Black.ttf", "Montserrat-BlackItalic.ttf", "Montserrat-Bold.ttf", "
      Montserrat-BoldItalic.ttf", "Montserrat-Medium.ttf", "Montserrat-MediumItalic.ttf", "Montserrat-Regular.ttf"
      , "Montserrat-Italic.ttf", "Montserrat-Light.ttf", "Montserrat-LightItalic.ttf", "Montserrat-Thin.ttf", "
      Montserrat-ThinItalic.ttf" };
00124
00125     foreach(const QString &font, fonts) {
00126         if(QFontDatabase::addApplicationFont(":/fonts/" + font) == -1)
00127             qDebug() << "Error loading font: " + font;
00128     }
00129
00130     QTranslator translator;
00131     if (translator.load(QLocale(), QLatin1String("picturecrypt"), QLatin1String("_"), QLatin1String("
      :/translations"))) {
00132         a.installTranslator(&translator);
00133     } else {
00134         qDebug() << "[!!!] cannot load translator " << QLocale::system().name() << " check content of
       translations.qrc";
00135     }
00136
00137     ControllerPC w;
00138     return a.exec();
00139 }
```

8.15 modelpc.cpp File Reference

```
#include "modelpc.h"
#include <QDebug>
#include <QtMath>
```

Include dependency graph for modelpc.cpp:



8.16 modelpc.cpp

```
00001 #include "modelpc.h"
00002 #include <QDebug>
00003 #include <QtMath>
00009 ModelPC::ModelPC()
00010 {
00011     // Version control
00012     versionString = "1.4.0.dev-beta";
00013
00014     auto ver = versionString.split(".");
00015     version = ver[0].toInt() * qPow(2, 16) + ver[1].toInt() * qPow(2, 8) + ver[2].toInt();
00016
00017     ver_byte = bytes(ver[0].toInt()) +
00018             bytes(ver[1].toInt()) +
00019             bytes(ver[2].toInt());
00020     // Random seed
00021     qsrand(randSeed());
00022 }
00023
00024 QImage *ModelPC::Encrypt(QByteArray data, QImage *image, int _mode, QString key, int
      _bitsUsed, QString *_error)
00025 {
00026     return ModelPC().encrypt(data, image, _mode, key, _bitsUsed, _error);
00027 }
00028
00029 QImage *ModelPC::Inject(QByteArray encr_data, QImage *image, int _mode, int _bitsUsed,
      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"),
      QCryptographicHash::Sha3_384);
00569     QByteArray noise = GetRandomBytes(data.size() / 10 + 32);
00570     QByteArray bytes_key = GetRandomBytes(32);
00571     QByteArray pass_rand = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_512);
00572     QByteArray zipped = zip(data, pass_rand);
00573     QByteArray heavy_data = zipped + noise;
00574 
00575     QByteArray verification = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_256);
00576     QByteArray given_key = bytes_key.left(30);
00577     QByteArray heavy_data_size;
00578     // heavy_data_size is always 4 bytes as max for heavy_data is: 2^24 * 11/10 + 32 ~ 1.8 * 10^7 < 2^32
00579     long long raw_size = zipped.size();
00580     for(int i = 0; i < 4; i++) {
```

```
00581         int ch = raw_size % 256;
00582         raw_size >>= 8;
00583         heavy_data_size.push_front(ch);
00584     }
00585     QByteArray mid_data = verification + given_key + rand_master + heavy_data_size;
00586     // mid_data.size() = 32 + 30 + 32 + 4 = 98
00587     QVector <QPair<QPoint, QPair<int, int>>> *were = new QVector <QPair<QPoint, QPair<int, int>>>();
00588     emit setProgress(-1);
00589     proccessPixelsv1_4(image, &mid_data, key.toUtf8(), true, were);
00590     proccessPixelsv1_4(image, &heavy_data, pass_rand, true, were);
00591     emit setProgress(101);
00592     QTime final = QTime::currentTime();
00593     qDebug() << "[Debug] Finished encrypting in " << st.msecsTo(final) << " msecs.";
00594 }
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));
```

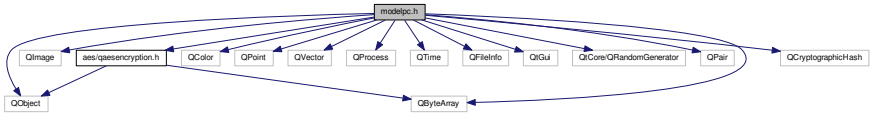
```
00768     }
00769 }
00770
00777 QByteArray ModelPC::decryptv1_3(QImage *image, QString key)
00778 {
00779     // Image opening
00780     int w = image->width();
00781     int h = image->height();
00782
00783     // Getting corner pixels
00784     QColor colUL = image->pixelColor(0, 0).toRgb();
00785     QColor colUR = image->pixelColor(w - 1, 0).toRgb();
00786     QColor colDR = image->pixelColor(w - 1, h - 1).toRgb();
00787
00788
00789     // Getting verification code
00790     int verifCode = (((colUR.green() % 2) << 5) + colUR.blue() % 32) << 2;
00791     verifCode += colDR.blue() % 4;
00792     if(verifCode != 166){
00793         fail("veriffail");
00794         return nullptr;
00795     }
00796     // Getting number of bytes
00797     long long int countBytes = (colUL.blue() % 32 + ((colUL.green() % 32) << 5) + ((colUL.red() % 32) << 10
      )) << 9;
00798     countBytes += ((colUR.red() % 32) << 4) + (colUR.green() >> 1) % 16;
00799
00800     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     }
00816     // Version check
00817     long long int _ver = mod(data.at(0)) * qPow(2, 16);
00818     _ver += mod(data.at(1)) * qPow(2, 8);
00819     _ver += mod(data.at(2));
00820     data.remove(0, 3);
00821     if(_ver > version) {
00822         fail("new_version");
00823         return nullptr;
00824     }
00825     else if(_ver < version) {
00826         fail("old_version");
00827         return nullptr;
00828     }
00829     // Get the hash
00830     QByteArray hash = data.left(32);
00831     data.remove(0, 32);
00832
00833     // Unzip
00834     QByteArray unzipped_data = unzip(data, key.toUtf8());
00835     QByteArray our_hash = QCryptographicHash::hash(unzipped_data, QCryptographicHash::Sha256);
00836     if(our_hash != hash) {
00837         fail("veriffail");
00838         return QByteArray("");
00839     }
00840     return unzipped_data;
00841 }
00842 long ModelPC::pop(int bits)
00843 {
00844     // Hard to say
00845     long res = 0;
00846     int poppedBits = bits == -1 ? bitsUsed : bits;
00847     if(bits == -2)
00848         poppedBits = bitsBuffer.size();
00849     for(int i = 0; i < poppedBits; i++)
00850         res += bitsBuffer[i] * qPow(2, poppedBits - i - 1);
00851     bitsBuffer.remove(0, poppedBits);
00852     return res;
00853 }
00854
00855 void ModelPC::push(int data, int bits)
00856 {
00857     // That's easier, but also hard
00858     int buf_size = bitsBuffer.size();
00859     int extraSize = bits == -1 ? bitsUsed : bits;
```

```
00860     bitsBuffer.resize(buf_size + extraSize);
00861     for(int i = bitsBuffer.size() - 1; i >= buf_size; i--, data >>= 1)
00862         bitsBuffer[i] = data % 2;
00863 }
00864
00865 bool ModelPC::mustGoOn(bool isEncrypt)
00866 {
00867     return success && (isEncrypt ? (circuitCountBytes - cur) * 8 + bitsBuffer.size() >= bitsUsed * 3
     :
00868                                    circuitData->size() * 8 + bitsBuffer.size() <
00869                                    circuitCountBytes * 8 - (circuitCountBytes * 8)% (bitsUsed * 3));
00870 }
00879 QByteArray ModelPC::unzip(QByteArray data, QByteArray key)
00880 {
00881     // Decryption
00882     QByteArray hashKey = QCryptographicHash::hash(key, QCryptographicHash::Sha256);
00883     QAESEncryption encryption(QAESEncryption::AES_256,
      QAESEncryption::ECB);
00884     QByteArray new_data = encryption.decode(data, hashKey);
00885     // Decompressing
00886     return qUncompress(new_data);
00887 }
00896 QByteArray ModelPC::zip(QByteArray data, QByteArray key)
00897 {
00898     // Zip
00899     QByteArray c_data = qCompress(data, 9);
00900     // Encryption
00901     QByteArray hashKey = QCryptographicHash::hash(key, QCryptographicHash::Sha256);
00902     return QAESEncryption::Crypt(QAESEncryption::AES_256,
      QAESEncryption::ECB, c_data, hashKey);
00903 }
00904
00905 bool ModelPC::fileExists(QString path)
00906 {
00907     QFileInfo check_file(path);
00908     return check_file.exists() && check_file.isFile();
00909 }
00910
00917 QByteArray ModelPC::bytes(long long n)
00918 {
00919     return QByteArray::fromHex(QByteArray::number(n, 16));
00920 }
00927 unsigned int ModelPC::mod(int input)
00928 {
00929     if(input < 0)
00930         return (unsigned int) (256 + input);
00931     else
00932         return (unsigned int) input;
00933 }
00940 void ModelPC::alert(QString message, bool isWarning)
00941 {
00942     emit alertView(message, isWarning);
00943 }
00949 QColor ModelPC::RGBbytes(long long byte)
00950 {
00951     int blue = byte % 256;
00952     int green = (byte / 256) % 256;
00953     int red = byte / qPow(2, 16);
00954     return QColor(red, green, blue);
00955 }
00956
00957 QString ModelPC::generateVersionString(long ver)
00958 {
00959     return QString::number((int)( ver / qPow(2, 16))) + "." + QString::number(((int) (ver / 256)) % 256) +
      "." + QString::number(ver % 256);
00960 }
00961
00962 uint ModelPC::randSeed()
00963 {
00964     QTime time = QTime::currentTime();
00965     uint randSeed = time.msecsSinceStartOfDay() % 55363 + time.minute() * 21 + time.second() * 2 + 239;
00966     qsrand(randSeed);
00967     uint randSeed_2 = qrand() % 72341 + qrand() % 3 + qrand() % 2 + 566;
00968     return randSeed_2;
00969 }
00970 QByteArray ModelPC::GetRandomBytes(long long count)
00971 {
00972     QByteArray res;
00973     for(int i = 0; i < count; i++)
00974        res.append(qrand() % 256);
00975     return res;
00976 }
```

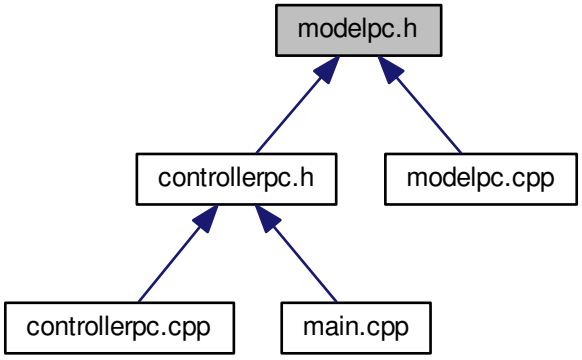
8.17 modelpc.h File Reference

```
#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 Controled 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

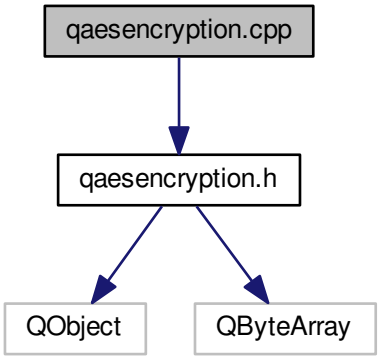
```
00001 #ifndef MODELPC_H
00002 #define MODELPC_H
00003
00004 #include <QObject>
00005 #include <QImage>
00006 #include <QByteArray>
00007 #include <QColor>
00008 #include <QPoint>
00009 #include <QVector>
00010 #include <QProcess>
00011 #include <QTime>
00012 #include <QFileInfo>
00013 #include <QtGui>
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, v1_3, v1_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 encryptv1_4(QImage *image, QByteArray data, QString key);
00100     QByteArray decryptv1_3(QImage * image, QString key);
00101     QByteArray decryptv1_4(QImage * image, QString key);
00102     void processPixelsv1_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)

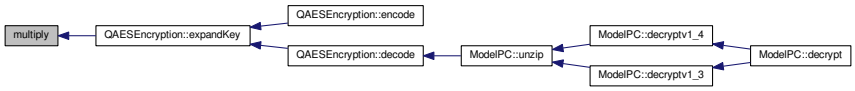
8.19.1 Function Documentation

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:

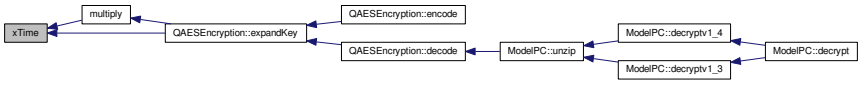
Here is the caller graph for this function:



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,
      QAESEncryption::Mode mode, const QByteArray &rawText,
00007                             const QByteArray &key, const QByteArray &iv,
      QAESEncryption::Padding padding)
00008 {
00009     return QAESEncryption(level, mode, padding).encode(rawText, key, iv);
00010 }
00011
```

```
00012 QByteArray QAESEncryption::Decrypt(QAESEncryption::Aes level,
      QAESEncryption::Mode mode, const QByteArray &rawText,
00013                                    const QByteArray &key, const QByteArray &iv,
      QAESEncryption::Padding padding)
00014 {
00015     return QAESEncryption(level, mode, padding).decode(rawText, key, iv);
00016 }
00017
00018 QByteArray QAESEncryption::ExpandKey(
      QAESEncryption::Aes level, QAESEncryption::Mode mode, const
      QByteArray &key)
00019 {
00020     return QAESEncryption(level, mode).expandKey(key);
00021 }
00022
00023 QByteArray QAESEncryption::RemovePadding(const QByteArray &rawText,
      QAESEncryption::Padding padding)
00024 {
00025     QByteArray ret(rawText);
00026     switch (padding)
00027     {
00028     case Padding::ZERO:
00029         //Works only if the last byte of the decoded array is not zero
00030         while (ret.at(ret.length()-1) == 0x00)
00031             ret.remove(ret.length()-1, 1);
00032         break;
00033     case Padding::PKCS7:
00034         ret.remove(ret.length() - ret.at(ret.length()-1), ret.at(ret.length()-1));
00035         break;
00036     case Padding::ISO:
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(
      xTime(x))) ^ ((y>>3 & 1)
00059             * xTime(xTime(xTime(x)))) ^ ((y>>4 & 1) * xTime(
      xTime(xTime(xTime(x))))));
00060 }
00061
00062 /*
00063  * End Inline functions
00064  * */
00065
00066
00067 QAESEncryption::QAESEncryption(Aes level, Mode mode,
00068                                Padding padding)
00069     : m_nb(4), m_blocklen(16), m_level(level), m_mode(mode), m_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         }
00417         break;
00418     case CFB: {
00419             ret.append(byteXor(alignedText.left(m_blocklen), cipher(expandedKey, iv)));
00420             for(int i=0; i < alignedText.size(); i+= m_blocklen) {
00421                 if (i+m_blocklen < alignedText.size())
00422                     ret.append(byteXor(alignedText.mid(i+m_blocklen, m_blocklen),
00423                                        cipher(expandedKey, ret.mid(i, m_blocklen))));
00424             }
00425         }
00426         break;
00427     case OFB: {
00428             QByteArray ofbTemp;
00429             ofbTemp.append(cipher(expandedKey, iv));
00430             for (int i=m_blocklen; i < alignedText.size(); i += m_blocklen){
00431                 ofbTemp.append(cipher(expandedKey, ofbTemp.right(m_blocklen)));
00432             }
00433             ret.append(byteXor(alignedText, ofbTemp));
00434         }
```

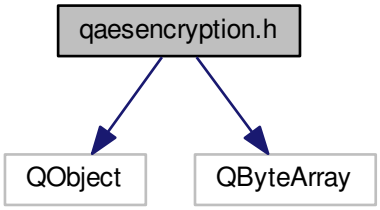
```
00435         break;
00436     default: break;
00437     }
00438     return ret;
00439 }
00440
00441 QByteArray QAESEncryption::decode(const QByteArray &rawText, const QByteArray &key,
      const QByteArray &iv)
00442 {
00443     if (m_mode >= CBC && (iv.isNull() || iv.size() != m_blocklen))
00444        return QByteArray();
00445
00446     QByteArray ret;
00447     QByteArray expandedKey = expandKey(key);
00448
00449     switch(m_mode)
00450     {
00451     case ECB:
00452         for(int i=0; i < rawText.size(); i+= m_blocklen)
00453             ret.append(invCipher(expandedKey, rawText.mid(i, m_blocklen)));
00454         break;
00455     case CBC: {
00456             QByteArray ivTemp(iv);
00457             for(int i=0; i < rawText.size(); i+= m_blocklen){
00458                 ret.append(invCipher(expandedKey, rawText.mid(i, m_blocklen)));
00459                 ret.replace(i, m_blocklen, byteXor(ret.mid(i, m_blocklen),ivTemp));
00460                 ivTemp = rawText.mid(i, m_blocklen);
00461             }
00462         }
00463         break;
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

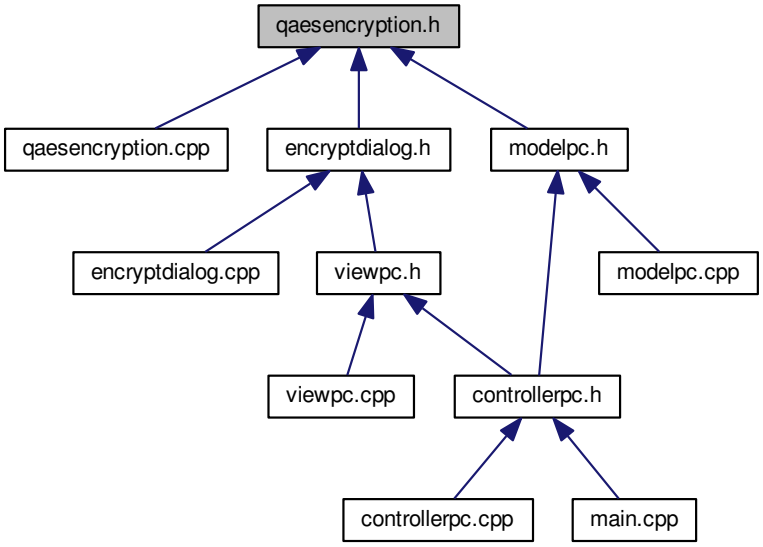
```
#include <QObject>
```

```
#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 QAESENCRYPTION_H
```

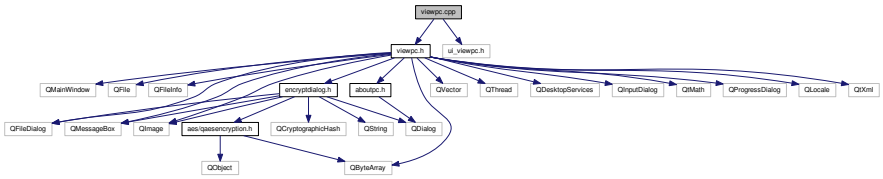
```
00002 #define QAESENCRYPTION_H
00003
00004 #include <QObject>
00005 #include <QByteArray>
00006
00014 class QAESEncryption : public QObject
00015 {
00016     Q_OBJECT
00017 public:
00027     enum Aes {
00028         AES_128,
00029         AES_192,
00030         AES_256
00031     };
00040     enum 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, 0xf1, 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 th e 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 // QAESENCRYPTION_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
00010     progressDialogClosed = true;
00011
00012     setupErrorsDict();
00013
00014     isEncrypt = true;
00015 }
00019 ViewPC::~ViewPC()
00020 {
00021     delete ui;
00022 }
00023
00024 void ViewPC::on_encryptMode_clicked()
00025 {
00026     // Encrypt radio button clicked
00027     setEncryptMode(true);
00028 }
00029
00030 void ViewPC::on_decryptMode_clicked()
00031 {
00032     // Decrypt radio button clicked
00033     setEncryptMode(false);
00034 }
00038 void ViewPC::on_fileButton_clicked()
00039 {
00040     // Opening QFileDialog depending on isEncrypt
00041     if(isEncrypt)
00042         inputFileName = QFileDialog::getOpenFileName(this, tr("Select file"), "/untitled.txt", tr("Text
      files (*.txt);;All Files (*)"));
00043     else
00044         inputFileName = QFileDialog::getOpenFileName(this, tr("Select file"), "/untitled.png", tr("PNG
      files (*.png);;All Files (*)"));
00045     // Display the file name
00046     ui->fileLabel->setText(inputFileName.isEmpty() ? tr("File not chosen") : inputFileName);
00047 }
00060 void ViewPC::on_startButton_clicked()
00061 {
00062     if(isEncrypt)
00063     {
00064         // Getting the data
00065         QString text = ui->text->toPlainText();
00066         QByteArray data;
00067         if(text.isEmpty()) {
00068             if(inputFileName.isEmpty()) {
00069                 alert("no_input_file", true);
00070                 return;
00071             }
00072             // Opening the file
00073             QFile file(inputFileName);
00074             if (!file.open(QIODevice::ReadOnly))
00075             {
00076                 alert("open_file_fail", true);
00077                 return;
00078             }
00079             // Check the data size
00080             auto size = file.size();
```

```
00081             if(size > qPow(2, 24)) {
00082                 alert("muchdata", true);
00083                 file.close();
00084                 return;
00085             }
00086             data = file.readAll();
00087             file.close();
00088         }
00089         else
00090             data = text.toUtf8();
00091         // Select image via EncryptDialog
00092         EncryptDialog * dialog = new EncryptDialog(data);
00093         dialog->exec();
00094         if(!dialog->success)
00095             return;
00096 
00097         // Get the data
00098         QByteArray encr_data = dialog->compr_data;
00099 
00100         // Save the hash
00101         QByteArray hash = QCryptographicHash::hash(data, QCryptographicHash::Sha256);
00102         encr_data = hash + encr_data;
00103 
00104         switch (selectedMode) {
00105         case 1:
00106             emit inject(encr_data, &dialog->image, selectedMode, dialog->
    bitsUsed);
00107             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(tr("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"),
00157                                 "/untitled.txt",
00158                                 tr("Text(*.txt);;All files (*)"));
00159     QFile writeFile(outputFileName);
00160     if (!writeFile.open(QIODevice::WriteOnly))
00161     {
00162         alert("save_file_fail", true);
00163         return;
00164     }
00165     writeFile.write(Edata);
00166     writeFile.close();
00167     alert("decryption_completed");
00168 }
00174 void ViewPC::saveImage(QImage * image)
00175 {
00176     // Save image using QFileDialog
00177     QString outputFileName = QFileDialog::getSaveFileName(this, tr("Save Image"),
00178                                 "/untitled.png",
00179                                 tr("Images(*.png)"));
00180     if(!image->save(outputFileName)) {
```

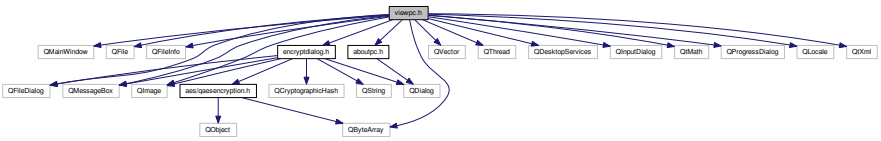
```
00181         alert("save_file_fail", true);
00182         return;
00183     }
00184     alert("encryption_completed");
00185 }
00192 void ViewPC::setProgress(int val)
00193 {
00194     if(val < 0) {
00195         // Create dialog
00196         dialog = new QProgressDialog(tr("Cryption in progress."), tr("Cancel"), 0, 100);
00197         connect(dialog, SIGNAL(canceled()), this, SLOT(abortCircuit()));
00198         progressDialogClosed = false;
00199         dialog->setWindowTitle(tr("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 ? tr("Continue configuration") : tr("Start decryption"));
00237     ui->enLabel1->setText(encr ? tr("Type in the text for encryption:") : tr("Text input isn't supported in
       decryption mode"));
00238     ui->enLabel1->setEnabled(encr);
00239     ui->enLabel2->setText(encr ? tr("Or use the file dialog to choose a file:") : tr("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("Dialog"),
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/docs");
00288     QDesktopServices::openUrl(docLink);
00289 }
00293 void ViewPC::setupErrorsDict()
00294 {
00295     errorsDict["no_data"] = tr("No data given!");
```

```
00296     errorsDict["muchdata"] = tr("Data size is too big (must be less than 15MB)!");
00297     errorsDict["nullimage"] = tr("Invalid / null image!");
00298     errorsDict["bigimage"] = tr("Image is too big!");
00299     errorsDict["bitsWrong"] = tr("bitsUsed parameter is wrong!");
00300     errorsDict["no_key"] = tr("No key given!");
00301     errorsDict["big_key"] = tr("Given key is too big!");
00302     errorsDict["undefined_mode"] = tr("Undefined mode is only available when decrypting!");
00303     errorsDict["wrongmode"] = tr("Given mode isn't available!");
00304     errorsDict["inject-v1.4"] = tr("ModelPC::inject() isn't available with v1.4 (advanced) mode")
      ;
00305     errorsDict["all_modes_fail"] = tr("Given image isn't encrypted by this app (all modes have
       failed) or is damaged!");
00306     errorsDict["nojphs"] = tr("JPHS is not installed!");
00307     errorsDict["bitsBufferFail"] = tr("bitsBufferFail (holy crap, contact me or submit a bug)");
00308     errorsDict["point_visited_twice"] = tr("One point visited twice (holy crap, contact me or
       submit a bug)");
00309     errorsDict["bigdata"] = tr("Too much data for this image!");
00310     errorsDict["veriffail"] = tr("Given image isn't encrypted with this mode or is damaged!");
00311     errorsDict["noreaddata"] = tr("No data to read from image!");
00312     errorsDict["new_version"] = tr("Version of the image is newer than yours (update!!!)");
00313     errorsDict["old_version"] = tr("Version of the image is older than yours");
00314     errorsDict["no_input_file"] = tr("No file given!");
00315     errorsDict["open_file_fail"] = tr("Cannot open file!");
00316     errorsDict["save_file_fail"] = tr("Cannot save file!");
00317     errorsDict["decryption_completed"] = tr("Decryption completed!");
00318     errorsDict["encryption_completed"] = tr("Encryption completed!");
00319 }
00320
00321 void ViewPC::on_actionJPHS_path_triggered()
00322 {
00323     QString dir = QFileDialog::getExistingDirectory(this, tr("Open JPHS folder"),
00324                                                     "/home",
00325                                                     QFileDialog::ShowDirsOnly
00326                                                     | QFileDialog::DontResolveSymlinks);
00327     emit setJPHSDir(dir);
00328 }
00329
00330 void ViewPC::on_comboBox_currentIndexChanged(int index)
00331 {
00332     selectedMode = index + 1;
00333 }
00334
00335 void ViewPC::on_text_textChanged()
00336 {
00337     ui->fileButton->setEnabled(ui->text->toPlainText().isEmpty());
00338 }
```

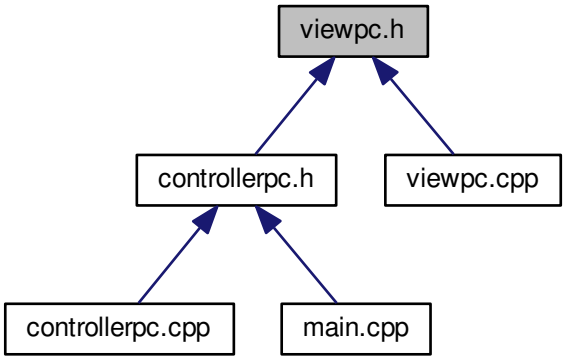
8.25 viewpc.h File Reference

```
#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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