

PictureCrypt

1.4.1

Generated by Doxygen 1.8.11



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## Chapter 1

# PictureCrypt

Project made using QT Creator in C++

### 1.1 About

A simple cross-platform steganography project which hides data in images. This project is built using MVC pattern and features GUI. [Qt](#) and [QAESEncryption](#) by [bricke](#) were used. You can read more about project at the [home page](#)

### 1.2 Structure of the project

As written earlier this project is structured with MVC pattern. Here is a small graph showing the basic structure.



## 1.3 External use

You can use [ModelPC](#) class separately from View and Control layer. You will need four files:

- [modelpc.cpp](#)
- [modelpc.h](#)
- [aes/qaesencryption.cpp](#)
- [aes/qaesencryption.h](#)

Then you can just `#include "modelpc.h"` and use API.

### 1.3.1 API

Here is are the most important methods:

- [ModelPC::Encrypt](#)
- [ModelPC::Decrypt](#)

#### 1.3.1.1 Showcase

```
// Includes
#include "modelpc.h"
#include <QImage>
#include <QByteArray>
#include <QString>
#include <QDebug> // just for showcase

...

// Basic setup
QByteArray data("some_file.txt");
QImage *image = new QImage("some_big_enough_image.jpg");
QString key = "some_password";
int bitsUsed = 3; // must be from 1 to 8

// Encrypting
QString error1, error2;
QImage *normal_resultImage = ModelPC::Encrypt(
    data,
    image,
    1,
    key,
    bitsUsed,
    &error1);
QImage *advanced_resultImage = ModelPC::Encrypt(
    data,
    image,
    2, key,
    bitsUsed /* not really used here, so put here any number from 1 to 8*/,
    &error2);

// Decrypting with given mode
QString error3, error4, error5, error6;
QByteArray output_normal = ModelPC::Decrypt(
    normal_resultImage,
    key,
    1,
    &error3);
QByteArray output_advanced = ModelPC::Decrypt(
    advanced_resultImage,
    key,
    2,
    &error4);
```

```
// Decrypting without given mode
// PictureCrypt can detect the mode of the image and adapt.
QByteArray output_normal_undefined = ModelPC::Decrypt(
    normal_resultImage,
    key,
    0,
    &error5);
QByteArray output_advanced_undefined = ModelPC::Decrypt(
    advanced_resultImage,
    key,
    0,
    &error6);

// Check (better testing with [running tests] (#run-tests))
bool data_good =
    data == output_normal &&
    data == output_advanced &&
    data == output_normal_undefined &&
    data == output_advanced_undefined;
bool no_errors =
    error1 == "ok" &&
    error2 == "ok" &&
    error3 == "ok" &&
    error4 == "ok" &&
    error5 == "ok" &&
    error6 == "ok";
if (data_good && no_errors)
    qDebug() << "PASS";
else
    qDebug() << "FAIL";
```

## 1.4 License

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## 1.5 Contact us

Visit my site: <https://www.alexkovrigin.me>

Email me at [a.kovrigin0@gmail.com](mailto:a.kovrigin0@gmail.com)

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### Copyright

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## Chapter 2

# Namespace Index

### 2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

Ui .....	13
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## Chapter 3

# Hierarchical Index

### 3.1 Class Hierarchy

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

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





## Chapter 4

# Class Index

### 4.1 Class List

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

<a href="#">AboutPC</a>	The About Page dialog . . . . .	15
<a href="#">ControllerPC</a>	The <a href="#">ControllerPC</a> class Controller class, which controls View and Model layers . . . . .	17
<a href="#">EncryptDialog</a>	Class to get the image and key to store secret info . . . . .	20
<a href="#">ModelPC</a>	The <a href="#">ModelPC</a> class Model Layer of the app. Main class that does the work of PictureCrypt logic Controlled by <a href="#">ControllerPC</a> . . . . .	25
<a href="#">QAESEncryption</a>	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: <a href="https://github.com/bricke/Qt-AES">https://github.com/bricke/Qt-AES</a> . . . . .	45
<a href="#">ViewPC</a>	View layer of the app. Controls <a href="#">EncryptDialog</a> and ProgressDialog . . . . .	53



## Chapter 5

# File Index

### 5.1 File List

Here is a list of all files with brief descriptions:

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<a href="#">controllerpc.cpp</a>	67
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## **Chapter 6**

# **Namespace Documentation**

### **6.1 Ui Namespace Reference**



## Chapter 7

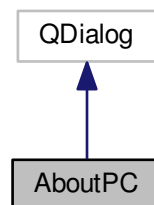
# Class Documentation

### 7.1 AboutPC Class Reference

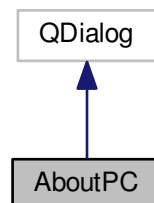
The [AboutPC](#) class The About Page dialog.

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

Inheritance diagram for AboutPC:



Collaboration diagram for AboutPC:



## Public Member Functions

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

### 7.1.1 Detailed Description

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

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

### 7.1.2 Constructor & Destructor Documentation

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

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

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

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

### 7.1.3 Member Function Documentation

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

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

Parameters

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

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

Here is the caller graph for this function:





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

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

## 7.2 ControllerPC Class Reference

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

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

Inheritance diagram for ControllerPC:



Collaboration diagram for ControllerPC:



### Public Slots

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

## Public Member Functions

- [ControllerPC](#) ( )

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

## Public Attributes

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

### 7.2.1 Detailed Description

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

See also

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

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

### 7.2.2 Constructor & Destructor Documentation

#### 7.2.2.1 ControllerPC::ControllerPC ( )

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

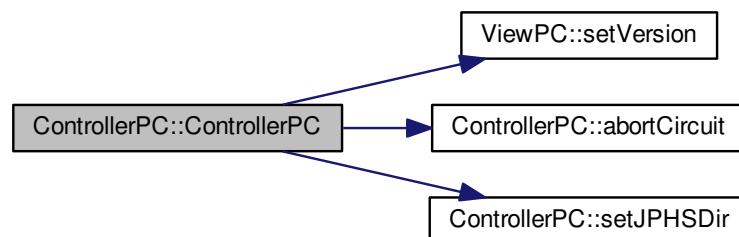
Controller class

Note

Version of the app is specified here.

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

Here is the call graph for this function:



### 7.2.3 Member Function Documentation

#### 7.2.3.1 void ControllerPC::abortCircuit ( ) [slot]

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

Definition at line 36 of file [controllerpc.cpp](#).

Here is the caller graph for this function:



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

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

##### Parameters

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

Definition at line 44 of file [controllerpc.cpp](#).

Here is the caller graph for this function:



### 7.2.4 Member Data Documentation

#### 7.2.4.1 long int ControllerPC::version

version Version of the app

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

#### 7.2.4.2 QString ControllerPC::versionString

versionString Version of the app as QString.

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

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

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

### 7.3 EncryptDialog Class Reference

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

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

Inheritance diagram for EncryptDialog:



Collaboration diagram for EncryptDialog:



## Public Slots

- void [on\\_fileButton\\_clicked](#) ()  
*EncryptDialog::on\_fileButton\_clicked* Slot to select the image.
- void [on\\_buttonBox\\_accepted](#) ()  
*EncryptDialog::on\_buttonBox\_accepted* Slot to start the encryption. Successful closing of the app.
- void [on\\_buttonBox\\_rejected](#) ()  
*EncryptDialog::on\_buttonBox\_rejected* Slot to reject the encryption.
- void [on\\_bitsSlider\\_valueChanged](#) (int value)  
*EncryptDialog::on\_bitsSlider\_valueChanged* Slot if value of the bits slider is changed.

## Public Member Functions

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

## Public Attributes

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

### 7.3.1 Detailed Description

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

#### Note

Not the most important and well written class.

#### See also

[ViewPC](#)

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

### 7.3.2 Constructor & Destructor Documentation

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

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

Parameters

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

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

Here is the call graph for this function:



#### 7.3.2.2 `EncryptDialog::~~EncryptDialog ( )`

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

### 7.3.3 Member Function Documentation

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

[EncryptDialog::on\\_bitsSlider\\_valueChanged](#) Slot if value of the bits slider is changed.

Parameters

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

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

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

[EncryptDialog::on\\_buttonBox\\_accepted](#) Slot to start the encryption. Successful closing of the app.

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

Here is the call graph for this function:



#### 7.3.3.3 void EncryptDialog::on\_buttonBox\_rejected ( ) [slot]

[EncryptDialog::on\\_buttonBox\\_rejected](#) Slot to reject the encryption.

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

#### 7.3.3.4 void EncryptDialog::on\_fileButton\_clicked ( ) [slot]

[EncryptDialog::on\\_fileButton\\_clicked](#) Slot to select the image.

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

#### 7.3.3.5 QByteArray EncryptDialog::zip ( )

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

Returns

Returns Compressed data.

See also

[ModelPC::unzip](#)

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

Here is the call graph for this function:



Here is the caller graph for this function:



### 7.3.4 Member Data Documentation

#### 7.3.4.1 int EncryptDialog::bitsUsed

bitsUsed Bits used per byte of pixel.

See also

[ModelPC::circuit](#)

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

#### 7.3.4.2 QByteArray EncryptDialog::compr\_data

compr\_data Compressed data, aka Output data.

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

#### 7.3.4.3 QByteArray EncryptDialog::data

data Input data

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

#### 7.3.4.4 bool EncryptDialog::goodPercentage

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

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

#### 7.3.4.5 QImage EncryptDialog::image

image Inputted image

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

#### 7.3.4.6 QString EncryptDialog::inputFileName

inputFileName Filename of the image.

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

#### 7.3.4.7 QString EncryptDialog::key

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

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



#### 7.3.4.8 long long int EncryptDialog::size

size Size of the image in square pixels

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

#### 7.3.4.9 bool EncryptDialog::success

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

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

#### 7.3.4.10 int EncryptDialog::val

val Value of the slider

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

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

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

## 7.4 ModelPC Class Reference

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

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

Inheritance diagram for ModelPC:



Collaboration diagram for ModelPC:



## Public Types

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

## Public Slots

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

## Signals

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

## Public Member Functions

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

## Static Public Member Functions

- static QImage \* [Encrypt](#) (QByteArray data, QImage \*image, int \_mode, QString key="", int \_bitsUsed=8, QString \*\_error=nullptr)
- static 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 Slots

- 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.*

## Protected Member Functions

- void [circuit](#) (QImage \*image, QByteArray \*data, long long int countBytes)  
*[ModelPC::circuit](#) The brain of the app. Via special circuit stores data in image.*
- void [jphs](#) (QImage \*image, QByteArray \*data)  
*[ModelPC::jphs](#) JPHS function to use jphide and jpseek (currently under development)*
- void [processPixel](#) (QPoint pos, QVector< QPoint > \*were, bool isEncrypt)  
*[ModelPC::processPixel](#) Processes every pixel. Reads its contains or writes data.*
- void [encryptv1\\_4](#) (QImage \*image, QByteArray data, QString key)  
*[ModelPC::encryptv1\\_4](#) Encrypts and injects data to image used in v1.4+.*
- QByteArray [decryptv1\\_3](#) (QImage \*image, QString key)  
*[ModelPC::decryptv1\\_3](#) Decrypts data from image in v1.3.*
- QByteArray [decryptv1\\_4](#) (QImage \*image, QString key)  
*[ModelPC::decryptv1\\_4](#) Decrypts data from image in v1.4+.*
- void [proccessPixelsv1\\_4](#) (QImage \*image, QByteArray \*data, QByteArray key, bool isEncrypt, QVector< QPair< QPoint, QPair< int, int > > > \*were, long long size=-1)  
*[ModelPC::proccessPixelsv1\\_4](#) Hides (or retrieves) data to/from pixels.*
- QByteArray [zip](#) (QByteArray data, QByteArray key)  
*[ModelPC::zip](#) Zip function, copy of [EncryptDialog::zip](#) Used for [ModelPC](#) in custom projects, other than PictureCrypt.*

## Static Protected Member Functions

- static QImage \* [Inject](#) (QByteArray encr\_data, QImage \*image, int \_mode, int \_bitsUsed=8, QString \*\_error=nullptr)

## Protected Attributes

- `QString * error`  
*error Current error*

### 7.4.1 Detailed Description

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

See also

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

Author

Alex Kovrigin (waleko)

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

### 7.4.2 Member Enumeration Documentation

#### 7.4.2.1 enum `ModelPC::CryptMode`

Enumerator

***NotDefined***  
***v1\_3***  
***v1\_4***  
***jphs\_mode***

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

### 7.4.3 Constructor & Destructor Documentation

#### 7.4.3.1 `ModelPC::ModelPC ( )`

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

See also

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

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

Here is the caller graph for this function:



#### 7.4.4 Member Function Documentation

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

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

Parameters

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

See also

[ViewPC::alert](#)

Definition at line 941 of file [modelpc.cpp](#).

Here is the caller graph for this function:



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

alertView Signal to be called to create MessageBox.

##### Parameters

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

##### See also

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

Here is the caller graph for this function:



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

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

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

## Parameters

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

## See also

[ModelPC::processPixel](#)

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

Here is the call graph for this function:



Here is the caller graph for this function:



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

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

Here is the call graph for this function:



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

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



## Parameters

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

## Returns

Returns decrypted data

## See also

[ViewPC::on\\_startButton\\_clicked](#), [ModelPC::inject](#), [ModelPC::circuit](#)

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

Here is the call graph for this function:



#### 7.4.4.6 QByteArray ModelPC::decryptv1\_3 ( QImage \* *image*, QString *key* ) [protected]

[ModelPC::decryptv1\\_3](#) Decrypts data from image in v1.3.

## Parameters

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

## Returns

Returns obtained data

Definition at line 778 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



#### 7.4.4.7 QByteArray ModelPC::decryptv1\_4 ( QImage \* *image*, QString *key* ) [protected]

[ModelPC::decryptv1\\_4](#) Decrypts data from image in v1.4+.

##### Parameters

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

##### Returns

Returns obtained data

Definition at line 603 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



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

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

Here is the call graph for this function:



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

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

#### Parameters

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

#### Returns

Returns image with embedded data

See also

[ModelPC::inject](#)

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

Here is the call graph for this function:



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

[ModelPC::encryptv1\\_4](#) Encrypts and injects data to image used in v1.4+.

Parameters

<i>image</i>	Image for injecting
<i>data</i>	Data for embedding
<i>key</i>	Key of encryption

Definition at line 561 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



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

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

## Parameters

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

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

Here is the call graph for this function:



Here is the caller graph for this function:

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

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 ) [protected],[slot]`

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

#### Parameters

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

#### Returns

Returns image with embedded data.

#### See also

[ViewPC::on\\_startButton\\_clicked](#), [ModelPC::decrypt](#), [ModelPC::circuit](#), [ModelPC::start](#)

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

Here is the call graph for this function:



Here is the caller graph for this function:



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

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

Parameters

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

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

Here is the call graph for this function:



Here is the caller graph for this function:



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

[ModelPC::processPixelsv1\\_4](#) Hides (or retrieves) data to/from pixels.

## Parameters

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

Definition at line 664 of file [modelpc.cpp](#).

Here is the caller graph for this function:



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

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

## Parameters

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

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

Here is the call graph for this function:





Here is the caller graph for this function:



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

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

##### Parameters

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

Here is the caller graph for this function:



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

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

##### Parameters

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

Here is the caller graph for this function:



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

setProgress Signal to be called to set progress of ProgressDialog.

##### Parameters

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

##### See also

[ViewPC::setProgress](#)

Here is the caller graph for this function:



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

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

##### Parameters

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

##### Returns

Returns data

##### See also

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

Definition at line 880 of file [modelpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



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

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

##### Parameters

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

##### Returns

Returns decrypted data

##### See also

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

Definition at line 897 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 92 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 80 of file [modelpc.h](#).

### 7.4.5.4 long ModelPC::version

version Version of the class

Definition at line 84 of file [modelpc.h](#).

### 7.4.5.5 QString ModelPC::versionString

versionString Version as string

Definition at line 88 of file [modelpc.h](#).

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

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

## 7.5 QAESEncryption Class Reference

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

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

Inheritance diagram for QAESEncryption:



Collaboration diagram for QAESEncryption:



### Public Types

- enum [Aes](#) { [AES\\_128](#), [AES\\_192](#), [AES\\_256](#) }

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

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

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

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

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

## Public Member Functions

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

## Static Public Member Functions

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

### 7.5.1 Detailed Description

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

#### Author

Bricke (Matteo B)

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

### 7.5.2 Member Enumeration Documentation

#### 7.5.2.1 enum [QAESEncryption::Aes](#)

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

AES\_128 AES\_192 AES\_256

#### Enumerator

**AES\_128**

**AES\_192**

**AES\_256**

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

## 7.5.2.2 enum QAESEncryption::Mode

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

Enumerator

**ECB**  
**CBC**  
**CFB**  
**OFB**

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

## 7.5.2.3 enum QAESEncryption::Padding

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

ZERO PKCS7 ISO

Enumerator

**ZERO**  
**PKCS7**  
**ISO**

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

## 7.5.3 Constructor &amp; 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 &amp; rawText, const QByteArray &amp; key, const QByteArray &amp; iv = NULL, QAESEncryption::Padding padding = QAESEncryption::ISO ) [static]

Crypt Static encode function.

## Parameters

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

## Returns

Returns encrypted data

## See also

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

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

Here is the call graph for this function:



Here is the caller graph for this function:



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

`decode` Decodes data with AES

## Note

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



## Parameters

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

## Returns

Returns decoded data

## See also

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

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

Here is the call graph for this function:



Here is the caller graph for this function:



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

Decrypt Static decode function.

## Parameters

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

**Returns**

Returns Decrypted data

**See also**

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

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

Here is the call graph for this function:



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

encode Encodes data with AES

**Note**

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

**Parameters**

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

**Returns**

Returns encoded data

**See also**

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

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

Here is the call graph for this function:



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

ExpandKey Expands the key.

Parameters

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

Returns

Returns expanded key (I guess)

See also

[QAES encryption::expandKey](#)

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

Here is the call graph for this function:



**7.5.4.6** `QByteArray QAES encryption::expandKey ( const QByteArray & key )`

ExpandKey Expands the key.

Note

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

## Parameters

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

## Returns

Returns expanded key (I guess)

## See also

[QAESEncryption::ExpandKey](#)

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

Here is the call graph for this function:



Here is the caller graph for this function:



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

`RemovePadding` Removes padding.

## Parameters

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

## Returns

Returns data with removed padding (I guess)

See also

[QAESEncryption::removePadding](#)

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

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

RemovePadding Removes padding.

Note

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

Parameters

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

Returns

Returns data with removed padding (I guess)

See also

[QAESEncryption::RemovePadding](#)

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

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

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

## 7.6 ViewPC Class Reference

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

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

Inheritance diagram for ViewPC:



Collaboration diagram for ViewPC:



## Public Slots

- void [alert](#) (QString message, bool isWarning=false)  
*ViewPC::alert* Slot to create *QMessageBox* with message.
- void [saveData](#) (QByteArray Edata)  
*ViewPC::saveData* Slot to be called to save data using *QFileDialog*.
- void [saveImage](#) (QImage \*image)  
*ViewPC::saveImage* Slot to be called to save image using *QFileDialog*.
- void [setProgress](#) (int val)  
*ViewPC::setProgress* Slot to set the value of the *ProgressDialog* (*ViewPC::dialog*).
- void [abortCircuit](#) ()  
*ViewPC::abortCircuit* Slot to close *ProgressDialog* (*ViewPC::dialog*)
- void [setEncryptMode](#) (bool encr)  
*ViewPC::setEncryptMode* Set the encrypt 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, int bitsUsed)  
*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 35 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 211 of file [viewpc.cpp](#).

Here is the caller graph for this function:



### 7.6.3.2 void ViewPC::abortModel ( ) [signal]

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

Here is the caller graph for this function:



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

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



## Parameters

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

Definition at line 125 of file [viewpc.cpp](#).

Here is the caller graph for this function:



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

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

## Parameters

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

## See also

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

Here is the caller graph for this function:



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

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

#### Parameters

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

Here is the caller graph for this function:



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

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

#### Parameters

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

**7.6.3.7** void ViewPC::on\_actionAbout\_triggered ( ) [protected],[slot]

[ViewPC::on\\_actionAbout\\_triggered](#) Opens about page.

Definition at line 268 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 278 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 248 of file [viewpc.cpp](#).

Here is the call graph for this function:



Here is the caller graph for this function:



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

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

## Parameters

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

## See also

[ModelPC::encrypt](#)

Definition at line 146 of file [viewpc.cpp](#).

Here is the call graph for this function:



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

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

## Parameters

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

## See also

[ModelPC::decrypt](#)

Definition at line 167 of file [viewpc.cpp](#).

Here is the call graph for this function:



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

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

## Parameters

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

Definition at line 224 of file [viewpc.cpp](#).

Here is the caller graph for this function:



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

setJPHSPath Sets the default JPHS directory

## Parameters

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

Here is the caller graph for this function:



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

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

## Parameters

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

## See also

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

Definition at line 185 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 286 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

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

Definition at line 239 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 }
```

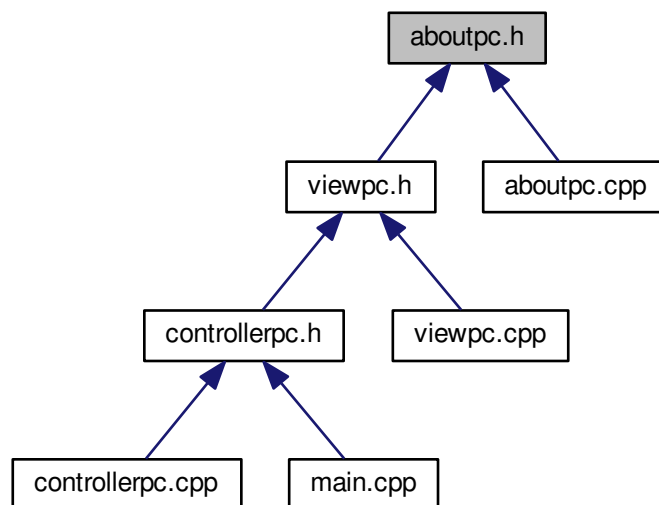
### 8.3 aboutpc.h File Reference

```
#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

```

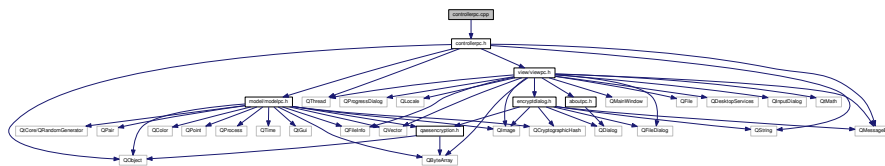
00001 #ifndef ABOUTPC_H
00002 #define ABOUTPC_H
00003
00004 #include <QDialog>
00005
00006 namespace Ui {
00007 class AboutPC;
00008 }
00012 class AboutPC : public QDialog
00013 {
00014     Q_OBJECT
00015
00016 public:
00017     explicit AboutPC(QWidget *parent = 0);
00018     ~AboutPC();
00019     void 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, int)), model, SLOT(encrypt(QByteArray,
00023     QImage*, int, QString, 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 }
00036 void ControllerPC::abortCircuit()
00037 {
00038     model->success = false;
00039 }
00044 void ControllerPC::setJPHSDir(QString dir)
00045 {
00046     model->defaultJPHSDir = dir;
00047 }

```



## 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 "model/modelpc.h"
00010 #include "view/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 }
00040
00041 QByteArray EncryptDialog::zip()
00042 {
00043     // Zip
00044     QByteArray c_data = qCompress(data, 9);
00045     // Encryption
00046     QByteArray hashKey = QCryptographicHash::hash(key.toUtf8(), QCryptographicHash::Sha256);
00047     return QAESEncryption::Crypt(QAESEncryption::AES_256,
00048     QAESEncryption::ECB, c_data, hashKey);
00049 }
00050
00051 void EncryptDialog::on_fileButton_clicked()
00052 {
00053     // Selet file
00054     inputFileName = QFileDialog::getOpenFileName(this, tr("Open File"), "/", tr("Images (*.png
00055     *.xpm *.jpg *.jpeg)"));
00056     ui->fileLabel->setText(inputFileName);
00057     // Open image
00058     QImage img(inputFileName);
00059     image = img;
00060     // Get size
00061     size = img.width() * img.height();
00062     // UI setup
00063     long long int compr_data_size = compr_data.size();
00064     ui->zippedBytes->setText(QString::number(compr_data_size));
00065     if(inputFileName.isEmpty()) {
00066         ui->percentage->setText("");
00067         return;
00068     }
00069     double perc = (compr_data_size + 14) * 100 / (size * 3) * bitsUsed / 8;
00070     ui->percentage->setText(QString::number(perc) + "%");
00071     goodPercentage = perc < 70;
00072 }
00073
00074 void EncryptDialog::on_buttonBox_accepted()
00075 {
00076     if(!goodPercentage) {
00077         alert(tr("Your encoding percentage is over 70% which is a bit ambiguous."));
00078         success = false;
00079         return;
00080     }
00081     // Final zip
00082     key = ui->keyLine->text();
00083     compr_data = zip();
00084     success = true;
00085     close();
00086 }
00087
00088 void EncryptDialog::on_buttonBox_rejected()
00089 {
00090     success = false;
00091     close();
00092 }
00093
00094 void EncryptDialog::on_bitsSlider_valueChanged(int value)
00095 {
00096     bitsUsed = value;
00097     ui->bitsUsedLbl->setText(QString::number(value));
00098     if(ui->percentage->text().isEmpty())
00099         return;
00100     double perc = (compr_data.size() + 14) * 100 / (size * 3) * 8 /
00101     bitsUsed;
00102     ui->percentage->setText(QString::number(perc) + "%");
00103 }

```

## 8.11 encryptdialog.h File Reference

```
#include <QDialog>
```

```
#include <QFileDialog>
#include <QImage>
#include <QMessageBox>
#include <QString>
#include "../model/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](#)





### 8.13.1 Function Documentation

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

Definition at line 7 of file [main.cpp](#).

## 8.14 main.cpp

```

00001 #include "controllerpc.h"
00002 #include <QApplication>
00003 #include <QTranslator>
00004 #include <QLocale>
00005 #include <QFontDatabase>
00006
00007 int main(int argc, char *argv[])
00008 {
00009     QApplication a(argc, argv);
00010
00011     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" };
00012
00013     foreach(const QString &font, fonts) {
00014         if(QFontDatabase::addApplicationFont(":/fonts/" + font) == -1)
00015             qDebug() << "Error loading font: " + font;
00016     }
00017
00018     QTranslator translator;
00019     if (translator.load(QLocale(), QLatin1String("picturecrypt"), QLatin1String("_"), QLatin1String("
:/translations"))) {
00020         a.installTranslator(&translator);
00021     } else {
00022         qDebug() << "[!!!] cannot load translator " << QLocale::system().name() << " check content of
translations.qrc";
00023     }
00024
00025     ControllerPC w;
00026     return a.exec();
00027 }

```

## 8.15 mainpage.dox File Reference

## 8.16 modelpc.cpp File Reference

```
#include "modelpc.h"
```

```
#include <QDebug>
```

```
#include <QtMath>
```

Include dependency graph for modelpc.cpp:



## 8.17 modelpc.cpp

```

00001 #include "modelpc.h"
00002 #include <QDebug>
00003 #include <QtMath>
00009 ModelPC::ModelPC()
00010 {
00011     // Version control
00012     versionString = "1.4.1";
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 vl_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 vl_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,
00140     QString *_error)
00141 {
00142     success = true;
00143     CryptMode mode = CryptMode(_mode);
00144     // Error management
00145     if(_error == nullptr)
00146         _error = new QString();
00147     *_error = "ok";
00148     error = _error;
00149
00150     bitsUsed = _bitsUsed;
00151
00152     if(encr_data == nullptr || encr_data.isEmpty()) {
00153         fail("nodata");
00154         return nullptr;
00155     }
00156     if(encr_data.size() > pow(2, 24)) {
00157         fail("muchdata");
00158         return nullptr;
00159     }
00160     if(image == nullptr || image->isNull()) {
00161         fail("nullimage");
00162         return nullptr;
00163     }
00164     if(image->width() * image->height() > pow(10, 9)) {
00165         fail("bigimage");
00166         return nullptr;
00167     }
00168     if(_bitsUsed < 1 || _bitsUsed > 8) {
00169         fail("bitsWrong");
00170         return nullptr;
00171     }
00172     if(mode == CryptMode::NotDefined) {
00173         fail("undefined_mode");
00174         return nullptr;
00175     }
00176
00177     encr_data = ver_byte + encr_data;
00178     long long int countBytes = encr_data.size();
00179     switch(mode)
00180     {
00181         case vl_3:
00182             circuit(image, &encr_data, countBytes);
00183             break;
00184         case jphs_mode:
00185             jphs(image, &encr_data);
00186             break;
00187         case vl_4:
00188             fail("inject-v1.4");
00189             return nullptr;
00190             break;
00191         default:
00192             fail("wrongmode");
00193             return nullptr;
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             qDebug() << "[Debug] !!! fail() - " << message;
00291         }
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 }
00555
00561 void ModelPC::encryptv1_4(QImage *image, QByteArray data, QString key)
00562 {
00563     if(data.size() + 98 > image->height() * image->width() * 3) {
00564         fail("bigdata");
00565         return;
00566     }
00567     QTime st = QTime::currentTime();
00568     QByteArray rand_master = GetRandomBytes(32);
00569     QByteArray pass = QCryptographicHash::hash(key.toUtf8() + rand_master + QByteArray("hi"),
00570     QCryptographicHash::Sha3_384);
00571     QByteArray noise = GetRandomBytes(data.size() / 10 + 32);
00572     QByteArray bytes_key = GetRandomBytes(32);
00573     QByteArray pass_rand = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_512);
00574     QByteArray zipped = zip(data, pass_rand);
00575     QByteArray heavy_data = zipped + noise;
00576
00577     QByteArray verification = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_256);
00578     QByteArray given_key = bytes_key.left(30);
00579     QByteArray heavy_data_size;
00580     // heavy_data_size is always 4 bytes as max for heavy_data is: 2^24 * 11/10 + 32 ~ 1.8 * 10^7 < 2^32
00581     long long raw_size = zipped.size();
00582     for(int i = 0; i < 4; i++) {

```

```

00582         int ch = raw_size % 256;
00583         raw_size >>= 8;
00584         heavy_data_size.push_front(ch);
00585     }
00586     QByteArray mid_data = verification + given_key + rand_master + heavy_data_size;
00587     // mid_data.size() = 32 + 30 + 32 + 4 = 98
00588     QVector<QPair<QPoint, QPair<int, int>>> *were = new QVector<QPair<QPoint, QPair<int, int>>>();
00589     emit setProgress(-1);
00590     proccessPixelsv1_4(image, &mid_data, key.toUtf8(), true, were);
00591     proccessPixelsv1_4(image, &heavy_data, pass_rand, true, were);
00592     emit setProgress(101);
00593     QTime final = QTime::currentTime();
00594     qDebug() << "[Debug] Finished encrypting in " << st.msecsTo(final) << " msecs.";
00595 }
00596
00603 QByteArray ModelPC::decryptv1_4(QImage *image, QString key)
00604 {
00605     QTime st = QTime::currentTime();
00606     QByteArray mid_data, heavy_data;
00607     QVector<QPair<QPoint, QPair<int, int>>> *were = new QVector<QPair<QPoint, QPair<int, int>>>();
00608     emit setProgress(-1);
00609     proccessPixelsv1_4(image, &mid_data, key.toUtf8(), false, were, 98);
00610     QByteArray verification = mid_data.left(32);
00611     QByteArray given_key = mid_data.mid(32, 30);
00612     QByteArray rand_master = mid_data.mid(62, 32);
00613     QByteArray heavy_data_size = mid_data.right(4);
00614
00615     QByteArray pass = QCryptographicHash::hash(key.toUtf8() + rand_master + QByteArray("hi"),
00616     QCryptographicHash::Sha3_384);
00617
00618     // Guessing
00619     emit setProgress(0);
00620     QByteArray bytes_key;
00621     for(long long i = 0; i < pow(2, 16); i++) {
00622         QByteArray guess_part;
00623         long long g = i;
00624         for(int q = 0; q < 2; q++) {
00625             int ch = g % 256;
00626             g >>= 8;
00627             guess_part.push_front(ch);
00628         }
00629         emit setProgress(100 * i / pow(2, 16));
00630         QByteArray guess = given_key + guess_part;
00631         QByteArray check = QCryptographicHash::hash(pass + guess, QCryptographicHash::Sha3_256);
00632         if(check == verification) {
00633             bytes_key = guess;
00634             break;
00635         }
00636     }
00637     if(bytes_key.isEmpty()) {
00638         fail("veriffail");
00639         return nullptr;
00640     }
00641
00642     QByteArray pass_rand = QCryptographicHash::hash(pass + bytes_key, QCryptographicHash::Sha3_512);
00643
00644     long long raw_size = mod(heavy_data_size[3]) +
00645         mod(heavy_data_size[2]) * pow(2, 8) +
00646         mod(heavy_data_size[1]) * pow(2, 16) +
00647         mod(heavy_data_size[0]) * pow(2, 24);
00648     emit setProgress(0);
00649     proccessPixelsv1_4(image, &heavy_data, pass_rand, false, were, raw_size);
00650     QByteArray unzipped = unzip(heavy_data, pass_rand);
00651     emit setProgress(101);
00652     QTime final = QTime::currentTime();
00653     qDebug() << "[Debug] Finished decrypting in " << st.msecsTo(final) << " msecs.";
00654     return unzipped;
00655 }
00664 void ModelPC::proccessPixelsv1_4(QImage *image, QByteArray* data, QByteArray key
, bool isEncrypt, QVector<QPair<QPoint, QPair<int, int>>> *were, long long size)
00665 {
00666     long w = image->width();
00667     long h = image->height();
00668     auto seed_hex = QCryptographicHash::hash(key, QCryptographicHash::Sha3_256).toHex().left(8).toUpper();
00669     auto seed = seed_hex.toLongLong(nullptr, 16);
00670     QRandomGenerator foo(seed);
00671
00672     bitsBuffer.clear();
00673     long long left = (size == -1 ? data->size() : size) * 8;
00674     long long all = left;
00675     long cur = 0;
00676     if(isEncrypt) {
00677         while(left > 0 && success)
00678         {
00679             if(bitsBuffer.empty())
00680                 push(mod(data->at(cur++), 8));
00681             quint64 g = foo.generate64() % (w * h);

```



```

00682         long x = g % w;
00683         long y = g / w;
00684         int c = foo.generate64() % 3;
00685         int b = foo.generate64() % 24;
00686         int bit = -1;
00687         if(b < 16)
00688             bit = 7;
00689         else if(bit < 20)
00690             bit = 6;
00691         else if(bit < 22)
00692             bit = 5;
00693         else if(bit < 23)
00694             bit = 4;
00695         else if(bit < 24)
00696             bit = 3;
00697         auto piece = qMakePair(QPoint(x, y), qMakePair(c, bit));
00698         if(were->contains(piece))
00699             continue;
00700         were->append(piece);
00701         left--;
00702         emit setProgress(100 * (all - left) / all);
00703         int wr = pop(1);
00704         QColor pixel = image->pixelColor(piece.first);
00705         int red = pixel.red();
00706         int green = pixel.green();
00707         int blue = pixel.blue();
00708         int dif;
00709         if(c == 0)
00710             dif = red;
00711         else if (c == 1)
00712             dif = green;
00713         else
00714             dif = blue;
00715         dif |= 1 << (7 - bit);
00716         dif ^= (wr ^ 1) << (7 - bit);
00717         if(c == 0)
00718             red = dif;
00719         else if(c == 1)
00720             green = dif;
00721         else
00722             blue = dif;
00723         image->setPixelColor(piece.first, QColor(red, green, blue));
00724     }
00725 } else {
00726     while(left > 0)
00727     {
00728         while (bitsBuffer.size() >= 8)
00729             data->push_back(pop(8));
00730         quint64 g = foo.generate64() % (w * h);
00731         long x = g % w;
00732         long y = g / w;
00733         int c = foo.generate64() % 3;
00734         int b = foo.generate64() % 24;
00735         int bit = -1;
00736         if(b < 16)
00737             bit = 7;
00738         else if(bit < 20)
00739             bit = 6;
00740         else if(bit < 22)
00741             bit = 5;
00742         else if(bit < 23)
00743             bit = 4;
00744         else if(bit < 24)
00745             bit = 3;
00746         auto piece = qMakePair(QPoint(x, y), qMakePair(c, bit));
00747         if(were->contains(piece))
00748             continue;
00749         were->append(piece);
00750         left--;
00751         emit setProgress(100 * (all - left) / all);
00752         QColor pixel = image->pixelColor(piece.first);
00753         int red = pixel.red();
00754         int green = pixel.green();
00755         int blue = pixel.blue();
00756         int dif;
00757         if(c == 0)
00758             dif = red;
00759         else if (c == 1)
00760             dif = green;
00761         else
00762             dif = blue;
00763         dif &= 1 << (7 - bit);
00764         int wr = dif != 0;
00765         push(wr, 1);
00766     }
00767     while (bitsBuffer.size() >= 8)
00768         data->push_back(pop(8));

```

```

00769     }
00770 }
00771
00772 QByteArray ModelPC::decryptv1_3(QImage *image, QString key)
00773 {
00774     // Image opening
00775     int w = image->width();
00776     int h = image->height();
00777
00778     // Getting corner pixels
00779     QColor colUL = image->pixelColor(0, 0).toRgb();
00780     QColor colUR = image->pixelColor(w - 1, 0).toRgb();
00781     QColor colDR = image->pixelColor(w - 1, h - 1).toRgb();
00782
00783     // Getting verification code
00784     int verifCode = (((colUR.green() % 2) << 5) + colUR.blue() % 32) << 2;
00785     verifCode += colDR.blue() % 4;
00786     if(verifCode != 166){
00787         fail("veriffail");
00788         return nullptr;
00789     }
00790     // Getting number of bytes
00791     long long int countBytes = (colUL.blue() % 32 + ((colUL.green() % 32) << 5) + ((colUL.red() % 32) << 10
00792 )) << 9;
00793     countBytes += ((colUR.red() % 32) << 4) + (colUR.green() >> 1) % 16;
00794
00795     bitsUsed = (colDR.blue() >> 2) % 8 + 1;
00796     // curMode = colDR.green() % 32;
00797
00798     // Start of the circuit
00799     QByteArray data;
00800     circuit(image, &data, countBytes);
00801
00802     // Check if circuit was successful
00803     if(!success)
00804         return nullptr;
00805     if(data.isEmpty())
00806     {
00807         fail("noreaddata");
00808         return nullptr;
00809     }
00810     // Version check
00811     long long int _ver = mod(data.at(0)) * qPow(2, 16);
00812     _ver += mod(data.at(1)) * qPow(2, 8);
00813     _ver += mod(data.at(2));
00814     data.remove(0, 3);
00815     if(_ver > version) {
00816         fail("new_version");
00817         return nullptr;
00818     }
00819     else if(_ver < version) {
00820         fail("old_version");
00821         return nullptr;
00822     }
00823     // Get the hash
00824     QByteArray hash = data.left(32);
00825     data.remove(0, 32);
00826
00827     // Unzip
00828     QByteArray unzipped_data = unzip(data, key.toUtf8());
00829     QByteArray our_hash = QCryptographicHash::hash(unzipped_data, QCryptographicHash::Sha256);
00830     if(our_hash != hash) {
00831         fail("veriffail");
00832         return QByteArray("");
00833     }
00834     return unzipped_data;
00835 }
00836
00837 long ModelPC::pop(int bits)
00838 {
00839     // Hard to say
00840     long res = 0;
00841     int poppedBits = bits == -1 ? bitsUsed : bits;
00842     if(bits == -2)
00843         poppedBits = bitsBuffer.size();
00844     for(int i = 0; i < poppedBits; i++)
00845         res += bitsBuffer[i] * qPow(2, poppedBits - i - 1);
00846     bitsBuffer.remove(0, poppedBits);
00847     return res;
00848 }
00849
00850 void ModelPC::push(int data, int bits)
00851 {
00852     // That's easier, but also hard
00853     int buf_size = bitsBuffer.size();
00854     int extraSize = bits == -1 ? bitsUsed : bits;

```

```

00861     bitsBuffer.resize(buf_size + extraSize);
00862     for(int i = bitsBuffer.size() - 1; i >= buf_size; i--, data >>= 1)
00863         bitsBuffer[i] = data % 2;
00864 }
00865
00866 bool ModelPC::mustGoOn(bool isEncrypt)
00867 {
00868     return success && (isEncrypt ? (circuitCountBytes - cur) * 8 + bitsBuffer.size() >= bitsUsed * 3
00869     :
00869         circuitData->size() * 8 + bitsBuffer.size() <
00870         circuitCountBytes * 8 - (circuitCountBytes * 8) % (bitsUsed * 3));
00871 }
00880 QByteArray ModelPC::unzip(QByteArray data, QByteArray key)
00881 {
00882     // Decryption
00883     QByteArray hashKey = QCryptographicHash::hash(key, QCryptographicHash::Sha256);
00884     QAESEncryption encryption(QAESEncryption::AES_256,
00885     QAESEncryption::ECB);
00885     QByteArray new_data = encryption.decode(data, hashKey);
00886     // Decompressing
00887     return qUncompress(new_data);
00888 }
00897 QByteArray ModelPC::zip(QByteArray data, QByteArray key)
00898 {
00899     // Zip
00900     QByteArray c_data = qCompress(data, 9);
00901     // Encryption
00902     QByteArray hashKey = QCryptographicHash::hash(key, QCryptographicHash::Sha256);
00903     return QAESEncryption::Crypt(QAESEncryption::AES_256,
00904     QAESEncryption::ECB, c_data, hashKey);
00904 }
00905
00906 bool ModelPC::fileExists(QString path)
00907 {
00908     QFileInfo check_file(path);
00909     return check_file.exists() && check_file.isFile();
00910 }
00911
00918 QByteArray ModelPC::bytes(long long n)
00919 {
00920     return QByteArray::fromHex(QByteArray::number(n, 16));
00921 }
00928 unsigned int ModelPC::mod(int input)
00929 {
00930     if(input < 0)
00931         return (unsigned int) (256 + input);
00932     else
00933         return (unsigned int) input;
00934 }
00941 void ModelPC::alert(QString message, bool isWarning)
00942 {
00943     emit alertView(message, isWarning);
00944 }
00950 QColor ModelPC::RGBbytes(long long byte)
00951 {
00952     int blue = byte % 256;
00953     int green = (byte / 256) % 256;
00954     int red = byte / qPow(2, 16);
00955     return QColor(red, green, blue);
00956 }
00957
00958 QString ModelPC::generateVersionString(long ver)
00959 {
00960     return QString::number((int) (ver / qPow(2, 16))) + "." + QString::number(((int) (ver / 256)) % 256) +
00961     "." + QString::number(ver % 256);
00961 }
00962
00963 uint ModelPC::randSeed()
00964 {
00965     QTime time = QTime::currentTime();
00966     uint randSeed = time.msecsSinceStartOfDay() % 55363 + time.minute() * 21 + time.second() * 2 + 239;
00967     qsrand(randSeed);
00968     uint randSeed_2 = qrand() % 72341 + qrand() % 3 + qrand() % 2 + 566;
00969     return randSeed_2;
00970 }
00971 QByteArray ModelPC::GetRandomBytes(long long count)
00972 {
00973     QByteArray res;
00974     for(int i = 0; i < count; i++)
00975         res.append(qrand() % 256);
00976     return res;
00977 }

```

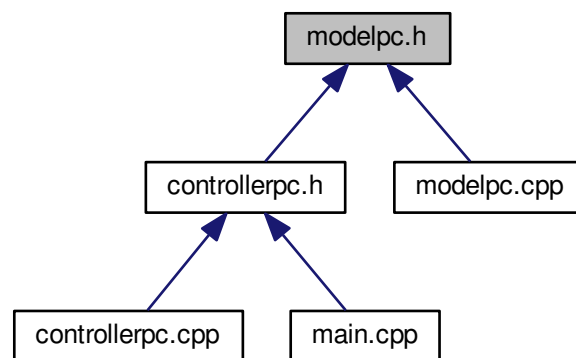
## 8.18 modelpc.h File Reference

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

Include dependency graph for modelpc.h:
```



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



## Classes

- class [ModelPC](#)

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

## 8.18.1 Detailed Description

Header of [ModelPC](#) class

See also

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

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

## 8.19 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 "gaesencryption.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 QByteArray Decrypt(QImage *image, QString key, int _mode = 0, QString *_error = nullptr)
;
00041
00042 signals:
00049     void alertView(QString messageCode, bool isWarning);
00054     void saveData(QByteArray data);
00059     void saveImage(QImage *image);
00065     void setProgress(int val);
00066
00067 public slots:
00068     QImage *encrypt(QByteArray data, QImage *image, int _mode, QString key = "", int _bitsUsed = 8,
QString *_error = nullptr);
00069     QByteArray decrypt(QImage *image, QString key, int _mode = 0, QString *_error = nullptr);
00070     void fail(QString message);
00071     void alert(QString message, bool isWarning = false);
00072
00073 public:
00074     QByteArray unzip(QByteArray data, QByteArray key);
00075
00080     bool success;
00084     long version;
00088     QString versionString;
00092     QString defaultJPHSDir;
00093 protected:
00094     static QImage *Inject(QByteArray encr_data, QImage *image, int _mode, int _bitsUsed = 8, QString
*_error = nullptr);
00095
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 protected slots:
00133     QImage *inject(QByteArray encr_data, QImage * image, int _mode, int _bitsUsed = 8, QString *
    _error = nullptr);
00134 };
00135
00136 #endif // MODELPC_H

```

## 8.20 qaesencryption.cpp File Reference

#include "qaesencryption.h"

Include dependency graph for qaesencryption.cpp:



## Functions

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

### 8.20.1 Function Documentation

#### 8.20.1.1 quint8 multiply ( quint8 x, quint8 y ) [inline]

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

Here is the call graph for this function:



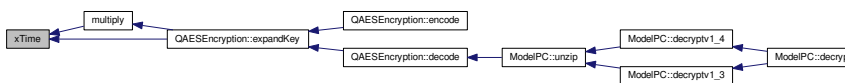
Here is the caller graph for this function:



#### 8.20.1.2 quint8 xTime ( quint8 x ) [inline]

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

Here is the caller graph for this function:



## 8.21 qaesencryption.cpp

```

00001 #include "qaesencryption.h"
00002
00003 /*
00004  * Static Functions
00005  */
00006 QByteArray QAESEncryption::Crypt(QAESEncryption::Aes level,
00007   QAESEncryption::Mode mode, const QByteArray &rawText,
00008   const QByteArray &key, const QByteArray &iv,
00009   QAESEncryption::Padding padding)
00010 {
00011     return QAESEncryption(level, mode, padding).encode(rawText, key, iv);
00012 }
00013 
```

```

00012 QByteArray QAESEncryption::Decrypt(QAESEncryption::Aes level,
00013 QAESEncryption::Mode mode, const QByteArray &rawText,
                                const QByteArray &key, const QByteArray &iv,
00014 QAESEncryption::Padding padding)
00015 {
00016     return QAESEncryption(level, mode, padding).decode(rawText, key, iv);
00017 }
00018 QByteArray QAESEncryption::ExpandKey(
00019 QAESEncryption::Aes level, QAESEncryption::Mode mode, const
00020 QByteArray &key)
00021 {
00022     return QAESEncryption(level, mode).expandKey(key);
00023 }
00024 QByteArray QAESEncryption::RemovePadding(const QByteArray &rawText,
00025 QAESEncryption::Padding padding)
00026 {
00027     QByteArray ret(rawText);
00028     switch (padding)
00029     {
00030     case Padding::ZERO:
00031         //Works only if the last byte of the decoded array is not zero
00032         while (ret.at(ret.length()-1) == 0x00)
00033             ret.remove(ret.length()-1, 1);
00034         break;
00035     case Padding::PKCS7:
00036         ret.remove(ret.length() - ret.at(ret.length()-1), ret.at(ret.length()-1));
00037         break;
00038     case Padding::ISO:
00039         ret.truncate(ret.lastIndexOf(0x80));
00040         break;
00041     default:
00042         //do nothing
00043         break;
00044     }
00045     return ret;
00046 }
00047 /*
00048 * End Static function declarations
00049 */
00050 /*
00051 * Inline Functions
00052 */
00053 inline quint8 xTime(quint8 x){
00054     return ((x<<1) ^ ((x>>7) & 1) * 0x1b));
00055 }
00056
00057 inline quint8 multiply(quint8 x, quint8 y){
00058     return ((y & 1) * x) ^ ((y>>1 & 1) * xTime(x)) ^ ((y>>2 & 1) * xTime(
00059 xTime(x))) ^ ((y>>3 & 1)
                                * xTime(xTime(xTime(x)))) ^ ((y>>4 & 1) * xTime(
00060 xTime(xTime(xTime(x))))));
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     //m_state is the input buffer...
00337     QByteArray output(in);
00338     m_state = &output;
00339
00340     // Add the First round key to the state before starting the rounds.
00341     addRoundKey(0, expKey);
00342
00343     // There will be Nr rounds.
00344     // The first Nr-1 rounds are identical.
00345     // These Nr-1 rounds are executed in the loop below.
00346     for(quint8 round = 1; round < m_nr; ++round){
00347         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,
00392     const QByteArray &iv)
00393 {
00394     if (m_mode >= CBC && (iv.isNull() || iv.size() != m_blocklen))
00395         return QByteArray();
00396
00397     QByteArray ret;
00398     QByteArray expandedKey = expandKey(key);
00399     QByteArray alignedText(rawText);
00400
00401     //Fill array with padding
00402     alignedText.append(getPadding(rawText.size(), m_blocklen));
00403
00404     switch(m_mode)
00405     {
00406     case ECB:
00407         for(int i=0; i < alignedText.size(); i+= m_blocklen)
00408             ret.append(cipher(expandedKey, alignedText.mid(i, m_blocklen)));
00409         break;
00410     case CBC: {
00411         QByteArray ivTemp(iv);
00412         for(int i=0; i < alignedText.size(); i+= m_blocklen) {
00413             alignedText.replace(i, m_blocklen, byteXor(alignedText.mid(i, m_blocklen), ivTemp));
00414             ret.append(cipher(expandedKey, alignedText.mid(i, m_blocklen)));
00415             ivTemp = ret.mid(i, m_blocklen);
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         break;
00426     case OFB: {
00427         QByteArray ofbTemp;
00428         ofbTemp.append(cipher(expandedKey, iv));
00429         for (int i=m_blocklen; i < alignedText.size(); i += m_blocklen){
00430             ofbTemp.append(cipher(expandedKey, ofbTemp.right(m_blocklen)));
00431         }
00432         ret.append(byteXor(alignedText, ofbTemp));
00433     }
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=m_blocklen; 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 }

```

## 8.22 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>.

## 8.23 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     };
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,
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,
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,
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, 0x0c, 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 the power (i-1) being powers of x (x is denoted as {02}) in the field GF(2^8)
00238 // Only the first 14 elements are needed
00239 const quint8 Rcon[256] = {
00240     0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20, 0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8, 0xab/*, 0x4d, 0x9a,
00241     0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39,
00242     0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a,
00243     0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20, 0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8,
00244     0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef,
00245     0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc,
00246     0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20, 0x40, 0x80, 0x1b,
00247     0x36, 0x6c, 0xd8, 0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3,
00248     0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94,
00249     0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04, 0x08, 0x10, 0x20,
00250     0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8, 0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63, 0xc6, 0x97, 0x35,
00251     0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd, 0x61, 0xc2, 0x9f,
00252     0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d, 0x01, 0x02, 0x04,
00253     0x08, 0x10, 0x20, 0x40, 0x80, 0x1b, 0x36, 0x6c, 0xd8, 0xab, 0x4d, 0x9a, 0x2f, 0x5e, 0xbc, 0x63,
00254     0xc6, 0x97, 0x35, 0x6a, 0xd4, 0xb3, 0x7d, 0xfa, 0xef, 0xc5, 0x91, 0x39, 0x72, 0xe4, 0xd3, 0xbd,
00255     0x61, 0xc2, 0x9f, 0x25, 0x4a, 0x94, 0x33, 0x66, 0xcc, 0x83, 0x1d, 0x3a, 0x74, 0xe8, 0xcb, 0x8d
00256 */};
00257
00258 #endif // QAESENCRYPT_H

```

## 8.24 viewpc.cpp File Reference

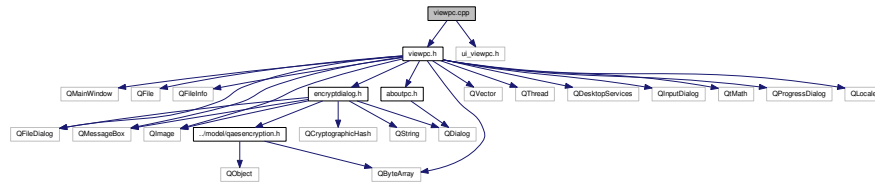
```

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

```



Include dependency graph for viewpc.cpp:



## 8.25 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
00043 files (*.txt);;All Files (*)"));
00044     else
00045         inputFileName = QFileDialog::getOpenFileName(this, tr("Select file"), "/untitled.png", tr("PNG
00046 files (*.png);;All Files (*)"));
00047     // Display the file name
00048     ui->fileLabel->setText(inputFileName.isEmpty() ? tr("File not chosen") : inputFileName);
00049 }
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     emit encrypt(data, &dialog->image, selectedMode, dialog->key, dialog->
bitsUsed);
00105 }
00106 else
00107 {
00108     // Get the filename of the image
00109     if(inputFileName.isEmpty()) {
00110         alert("no_input_file", true);
00111         return;
00112     }
00113     QByteArray key = requestKey().toUtf8();
00114     if(key.isEmpty())
00115         return;
00116     QImage * res_image = new QImage(inputFileName);
00117     emit decrypt(res_image, key, 0);
00118 }
00119 }
00125 void ViewPC::alert(QString message, bool isWarning)
00126 {
00127     // Get message
00128     if(errorsDict.contains(message))
00129         message = errorsDict[message];
00130     // Create message box
00131     QMessageBox box;
00132     if(isWarning)
00133         box.setIcon(QMessageBox::Warning);
00134     else
00135         box.setIcon(QMessageBox::Information);
00136     box.setText(message);
00137     box.setWindowIcon(QIcon(":/icons/mail.png"));
00138     box.setWindowTitle(tr("Message"));
00139     box.exec();
00140 }
00146 void ViewPC::saveData(QByteArray Edata)
00147 {
00148     // Save data using QFileDialog
00149     QString outputFileName = QFileDialog::getSaveFileName(this, tr("Save File"),
00150         "/untitled.txt",
00151         tr("Text (*.txt);;All files (*)"));
00152     QFile writeFile(outputFileName);
00153     if (!writeFile.open(QIODevice::WriteOnly))
00154     {
00155         alert("save_file_fail", true);
00156         return;
00157     }
00158     writeFile.write(Edata);
00159     writeFile.close();
00160     alert("decryption_completed");
00161 }
00167 void ViewPC::saveImage(QImage * image)
00168 {
00169     // Save image using QFileDialog
00170     QString outputFileName = QFileDialog::getSaveFileName(this, tr("Save Image"),
00171         "/untitled.png",
00172         tr("Images (*.png)"));
00173     if(!image->save(outputFileName)) {
00174         alert("save_file_fail", true);
00175         return;
00176     }
00177     alert("encryption_completed");
00178 }
00185 void ViewPC::setProgress(int val)
00186 {
00187     if(val < 0) {

```

```

00188         // Create dialog
00189         dialog = new QProgressDialog(tr("Crypton in progress."), tr("Cancel"), 0, 100);
00190         connect(dialog, SIGNAL(canceled()), this, SLOT(abortCircuit()));
00191         progressDialogClosed = false;
00192         dialog->setWindowTitle(tr("Processing"));
00193         dialog->setWindowIcon(QIcon(":/icons/loading.png"));
00194         dialog->show();
00195     }
00196     else if(val > 100 && !progressDialogClosed) {
00197         // Close dialog
00198         dialog->setValue(100);
00199         QThread::msleep(25);
00200         dialog->close();
00201         dialog->reset();
00202         progressDialogClosed = true;
00203     }
00204     // Update the progress
00205     else if(!progressDialogClosed)
00206         dialog->setValue(val);
00207 }
00211 void ViewPC::abortCircuit()
00212 {
00213     // Set the flag
00214     progressDialogClosed = true;
00215     // Close the dialog
00216     dialog->close();
00217     dialog->reset();
00218     emit abortModel();
00219 }
00224 void ViewPC::setEncryptMode(bool encr)
00225 {
00226     ui->text->setText("");
00227     ui->text->setEnabled(encr);
00228     isEncrypt = encr;
00229     ui->startButton->setText(encr ? tr("Continue configuration") : tr("Start decryption"));
00230     ui->enLabel1->setText(encr ? tr("Type in the text for encryption:") : tr("Text input isn't supported in
decryption mode"));
00231     ui->enLabel1->setEnabled(encr);
00232     ui->enLabel2->setText(encr ? tr("Or use the file dialog to choose a file:") : tr("Choose a file for
decryption:"));
00233     ui->comboBox->setEnabled(encr);
00234 }
00239 void ViewPC::setVersion(QString version)
00240 {
00241     // Version setup
00242     versionString = version;
00243 }
00248 QString ViewPC::requestKey()
00249 {
00250     bool ok;
00251     QString text = QInputDialog::getText(this, tr("Dialog"),
tr("Enter the keyphrase:"), QLineEdit::Password,
"", &ok);
00254     if(text.isEmpty() && ok) {
00255         alert("no_key", true);
00256         return QString();
00257     }
00258     return ok ? text : QString();
00259 }
00260
00261 QByteArray ViewPC::bytes(long long n)
00262 {
00263     return QByteArray::fromHex(QByteArray::number(n, 16));
00264 }
00268 void ViewPC::on_actionAbout_triggered()
00269 {
00270     AboutPC about;
00271     about.setVersion(versionString);
00272     about.exec();
00273 }
00274
00278 void ViewPC::on_actionHelp_triggered()
00279 {
00280     QUrl docLink("https://waleko.github.io/PictureCrypt/docs");
00281     QDesktopServices::openUrl(docLink);
00282 }
00286 void ViewPC::setupErrorsDict()
00287 {
00288     errorsDict["no_data"] = tr("No data given!");
00289     errorsDict["muchdata"] = tr("Data size is too big (must be less than 15MB)!");
00290     errorsDict["nullimage"] = tr("Invalid / null image!");
00291     errorsDict["bigimage"] = tr("Image is too big!");
00292     errorsDict["bitsWrong"] = tr("bitsUsed parameter is wrong!");
00293     errorsDict["no_key"] = tr("No key given!");
00294     errorsDict["big_key"] = tr("Given key is too big!");
00295     errorsDict["undefined_mode"] = tr("Undefined mode is only available when decrypting!");
00296     errorsDict["wrongmode"] = tr("Given mode isn't available!");

```

```

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

```

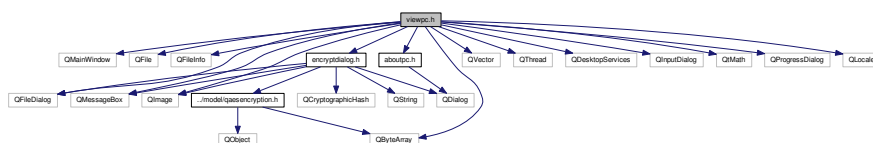
## 8.26 viewpc.h File Reference

```

#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 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](#)

### 8.26.1 Detailed Description

Header of [ViewPC](#) class

See also

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

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

## 8.27 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
00023 namespace Ui {
00024 class ViewPC;
00025 }
00035 class ViewPC : public QMainWindow
00036 {
00037     Q_OBJECT
00038
00039 public:
00040     explicit ViewPC(QWidget *parent = nullptr);
00041     ~ViewPC();
00042 private slots:
00043     void on_encryptMode_clicked();
00044
00045     void on_decryptMode_clicked();
00046
00047     void on_actionJPHS_path_triggered();
00048
00049     void on_comboBox_currentIndexChanged(int index);
00050
00051     void on_text_textChanged();
00052
00053 protected slots:
00054     void on_fileButton_clicked();
00055
00056     void on_startButton_clicked();
00057
00058     void on_actionAbout_triggered();
00059
00060     void on_actionHelp_triggered();
00061
00062     void setupErrorsDict();
00063 public slots:
00064     void alert(QString message, bool isWarning = false);
00065     void saveData(QByteArray Edata);
00066     void saveImage(QImage *image);
00067     void setProgress(int val);
00068     void abortCircuit();
00069     void setEncryptMode(bool encr);
00070     void setVersion(QString version);
00071 signals:
00080     void encrypt(QByteArray data, QImage *image, int mode, QString key, int bitsUsed);
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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