ionCube PHP Encoder 8.2

Evaluation User Guide

ionCube

ioncube.com

CONTACTS AND LINKS

Contacting ionCube

Please see our contact details at http://www.ioncube.com/contact.php

FAQ

Find answers to common questions in our FAQ at http://www.ioncube.com/faq.php

Support

For online support please visit http://support.ioncube.com

Purchasing Products

To purchase ionCube products please visit http://www.ioncube.com/purchase.php

Latest Loaders

To obtain the latest Loaders or the Loader Wizard please visit http://loaders.ioncube.com

CONTENTS

1 INTRODUCTION

The ionCube PHP Encoder is a powerful, high performance solution for encoding and licensing PHP scripts, plus encrypting files of any type.

Encoding and Encryption Total Solution

The Encoder protects PHP /HTML scripts with obfuscated bytecode protection and a custom execution engine. In addition, any other project files can be automatically encrypted if required, which is ideal for protecting files such as templates or XML documents. This is complemented by Loader API functions for reading and writing encrypted files. For most existing template engines, a small change is all that would be required to add the ability to read encrypted templates.

Bytecode Compilation and Obfuscation

The Encoder achieves script protection by first compiling and then optimising PHP scripts to highly efficient binary data. The compilation process replaces source with virtual-machine instructions and then applies several layers of encoding and transformations to produce the final platform independent files. Optional class, method, function name and local variable obfuscation adds extra protection, with further internal obfuscations applied at compile and runtime. This approach has the advantage that files are never restored to PHP source code, compiled code is changed and hidden from the Open Source PHP engine, and run-time performance is comparable to source due to the parsing and compilation taking place at encoding time. Other Encoder features offer further benefits, such as the easy addition of tamper resistant plain text to the start of files, which is ideal for including custom copyright or license details.

License File Creation

License files can be created for your projects with the Pro and Cerberus Encoders that lock your projects to particular machines. License files can also have an optional time expiry, and can store arbitrary key/value data that can be read at runtime by the licensed application.

ionCube Loader

The ionCube Loader handles execution of encoded PHP files, encrypting or decrypting non-PHP files, validating licenses, and so on. This component is easily installed into a `php.ini` file, and a free tool called the Loader Wizard is available to assist installation by end-users. Loaders are available for a wide range of common and less-common platforms, and a service is also available for producing Loaders on platforms outside of the standard range.

Windows GUI

For Windows users, a powerful GUI makes setting up projects simple. As well as encoding features, integration with Explorer adds usability features such as dynamic icons to distinguish between encoded and non-encoded files at a glance, and quick right click encoding with a cut-down GUI. Source files can also be launched in a user's preferred editor straight from the GUI, and also at a specific line if supported by the editor; this is great for quickly squashing syntax errors! Additional features are available in a Special Edition GUI upgrade, such as automatic archive creation, FTP, and a unique *dynamic fields* feature that dramatically simplifies data entry for custom encoding and license creation through a dynamically created custom interface. Together with other features, the GUI helps to maximise productivity.

1.1 Encoder Outline

The Encoder is driven by a command line interface allowing for easy automation and integration into project build, test and release environments, and for calling from UNIX shell scripts or Windows batch files. Encoding is quick, making it practical to perform “just in time” (JIT) encoding if required.

Key features include:

- Encoding of PHP 4, 5, 5.3 and 5.4 source languages.
- Maximum protection and performance with bytecode encoding of PHP, combined PHP/HTML files and PHP shell scripts.
- File encryption feature plus Loader API support for reading/writing encrypted data, ideal for encrypting templates and XML documents.
- Choice of an ASCII encoded file format for reliable cross platform transfers with FTP or binary file format.
- Optional compiled-code obfuscation of class, method, function and local variable names.
- Recognition of `<?php` and `<?` tags.
- Single file or recursive directory encoding.
- Replication of source file attributes, i.e. times and permissions.
- Full control over the project items to be encoded, encrypted, copied or ignored.
- Custom text such as copyright details may be added to encoded files.
- Optional *include-attack* protection to block interaction with unauthorised files.
- Associating key/value *properties* with files.
- Projects feature to encode projects with pre-configured options.
- Custom Loader event messages or error handler callback.
- Automatic syntax checking and error reporting of encoded files.
- Syntax-check only operation.
- Exceptionally fast encoding performance.

Features of the Pro Encoder include Basic Encoder features plus:

- Generating files to expire after a time period or on a specific date.
- Generating files restricted by IP addresses and/or domain names.
- Generating files to work only with a valid license file.
- License generator program for creating license files with time expiry, machine restrictions and custom key/value properties.
- License generator for Linux included with the Windows Encoder.

Features of the Cerberus Encoder include Pro Encoder features plus:

- Generating files restricted to Ethernet (MAC) addresses.
- Creating license files with MAC address restrictions.

1.2 Using Encoded Files / the ionCube Loader

ionCube Encoded files contain compiled code with various layers of encoding, and a special component must be available to process encoded files when required. The component for this task is called the ionCube Loader, which is an engine extension to PHP. Loaders for common platforms and architectures are provided as standard, and a porting service for producing bespoke Loaders to target less common platforms is also available.

ionCube is the most widely used and recognised encoding technology, and Loaders are often already installed by hosting providers, however a Loader Wizard PHP script is also available that greatly assists with installation guidance when necessary.

See chapter 8 for more detailed information about Loader installation.

1.3 User Guide Notation

1.3.1 Command Examples

Command or program related text in the user guide is printed in `monospace` type. Command examples are printed in the form:

```
ioncube_encoder source.php -o target.php
```

or to illustrate command usage and output, as

```
$ ioncube_encoder54 -V

ionCube PHP Encoder Version 8.2
Language Support: PHP 4, 5, 5.3, 5.4
Copyright (c) 2002-2014 ionCube Software LLP
```

Shell input is shown in **`bold`**, and program output is `plain`. **`$`** is an example shell prompt for command entry and may be different on your own system.

1.3.2 PHP 4, 5, 5.3 and 5.4 Encoders

In this document we shall refer to the Encoder command line program as `ioncube_encoder`, however there is a choice of four Encoder programs.

`ioncube_encoder` is the PHP 4 Encoder, and should be used if encoding a project using the PHP 4 language that is required to run on servers using PHP 4.0.6 or higher.

`ioncube_encoder5` is the Encoder for the first PHP 5 language, and should be used when a project uses language features added to PHP 5, and none from the PHP 5.3 and 5.4 or subsequent languages. Files can run on PHP 5.0.3 or higher.

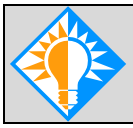
`ioncube_encoder53` is the PHP 5.3 Encoder, and should be used for encoding projects that make use of PHP 5.3 language features. Files can run on PHP 5.3 or higher.

`ioncube_encoder54` is the PHP 5.4 Encoder, and should be used for encoding projects that make use of PHP 5.4 language features. Files can run on PHP 5.4 or higher.

Note that even if a project only uses PHP 4 or PHP 5 syntax, encoding as PHP 5.3 or 5.4 should give superior runtime performance and is recommended if the target server is known to use that version of PHP or higher.

1.3.3 Hints and Tips

Look out for hints and tips in the guide, for example:



You can use the bookmark feature in Adobe Acrobat to quickly navigate the user guide, or click on items in the contents section.

1.3.4 Unix Platforms

The ionCube Encoder software is available for Microsoft Windows and a variety of Unix derived operating systems, currently Linux, FreeBSD and OS X. This User Guide uses Unix to refer collectively to the Linux, FreeBSD and OS X versions.

2 GETTING STARTED

This chapter introduces some of the most common features of the ionCube command line Encoder, with quick-start examples for typical scenarios. For Windows users, an additional document describes the Windows GUI. Chapter 3 describes all command line options in detail, and will be a useful reference guide to features even if using the Windows GUI. The License generation program that comes with the Pro and Cerberus editions is described in chapter 4, and chapter 5 describes the Loader API, including features for reading and writing encrypted files.

If reading this guide using Acrobat, you can also use the Acrobat bookmarks feature to quickly jump to different sections, and in the document you can click on hyperlinks, entries in the contents section, and on any section references.

2.1 Running the Encoder

When attempting to run the Encoder software, ensure that the installation location for the ionCube Encoder software has first been added to the user environment (Windows) or shell (Unix) `PATH` variable, or specify the location of the program with an appropriate path.

For example, if the Encoder software has been installed on a Unix system in `/usr/local/ioncube`, the `ioncube_encoder54` program could be run as follows:

From any location as:

```
/usr/local/ioncube/ioncube_encoder54
```

Within the current directory of `/usr/local/ioncube` as:

```
./ioncube_encoder54
```

If the `PATH` variable contains `/usr/local/ioncube` as:

```
ioncube_encoder54
```

Unless otherwise stated, command examples in this User Guide omit any path prefix and assume that the `PATH` variable has been set correctly. If there is a failure to launch the software, check/use an appropriate path to the program, and see chapter 7 for troubleshooting information if necessary.

2.2 Differences in the Evaluation Version

The Evaluation version includes all features of the Cerberus edition, allowing the license file creation facilities to be fully tried. The standard evaluation period is 14 days. Encoded files are fully functional but will expire after 36 hours, and also contain text indicating that they were produced by the evaluation version. This does not affect operation of the files, and the text is not present in files produced by the licensed product. With the Windows evaluation, the upgraded Special Edition GUI is provided.

2.3 Command Line Basics

2.3.1 Command Line Format

The general form for running the Encoder to encode is either

```
ioncube_encoder [options] source -o target
```

or

```
ioncube_encoder [options] sources --into target
```

The `-o` option encodes `source` as `target`, where `source` and `target` are both either single files or directories. Using `--into` the Encoder sources can be one or more files or directories that are encoded into the target with the same name. See sections 2.4 and 3.1 for more details.

To syntax check use `-S` and specify one or more files or directories.

```
ioncube_encoder [options] -S files_and_directories
```

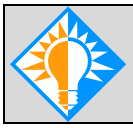
2.3.2 Passing Command Line Options

Most Encoder options use descriptive names, starting with `--`. Options requiring a value may use either an = character or white space to separate the option from its value.

Examples:

```
--add-comment="Encoded by ionCube"
```

```
--add-comment "Encoded by ionCube"
```



Encoder options may be abbreviated to the shortest string that makes them unique. The Encoder will report an error if there are multiple choices.

2.3.3 Filename, Directory and Wildcard Pattern Matching

For options related to files, e.g. `--encode` and `--encrypt`, the Encoder provides flexible pattern processing to match files and directories by name or wildcard patterns.

Matching Files

Names with no trailing path separator are considered to be filenames.

Examples:

Encode all files with default extensions and any files named `x.inc`

```
--encode x.inc
```

Encode all files with default extensions and any files named `config/config.inc`

```
--encode config/config.inc
```

Directories

Appending a file separator specifies directories.

Examples:

Ignore files in directory `config` *and subdirectories*

```
--ignore config/
```

Encrypt all files in any directories named `templates`

```
--encrypt templates/
```

Wildcard Matching

The Encoder also supports wildcard matching using the wildcard characters `*`, `?` and `[]`.

Wildcards are interpreted as follows:

Wildcard Character	*Matches*
`*`	Zero or more characters, e.g. `*.inc`
`?`	Any single character, e.g. `*.php?`
`[]`	Any character from a set, e.g. `*.php[34]`
`[!]`	Any character not in the set, e.g. *.php[!3]
`@`	Substitute with the source directory for the project

Examples:

Encode files with default extensions and any files ending in `.inc`

```
--encode "*.inc"
```

Encode all files inside any directories named `config`

```
--encode "config/*"
```

Ignore all directories inside any directories named `config`

```
--ignore "config/*/"
```

Encode any files named `config` *having one character after the name*

```
--encode "config?"
```

Encode any files named `doc0`, `doc1`, `doc2`, … `doc7`

```
--encode "doc[0-7]"
```

Encode any files named `configx`, `configy` *and* `configz`

```
--encode "config[xyz].php"
```

2.3.4 Using Wildcard Characters on UNIX

When specifying an option value containing a wildcard character, be sure to use quotes or to escape the wildcard to prevent unintended shell expansion. Remember too that the Encoder can process entire directories. It is generally not necessary to use wildcards to select multiple files to be processed, and the containing directory can be named instead.

Examples:

Use:

```
--encode "*.ini"
```

```
--encode \*.ini
```

Instead of:

```
--encode *.ini
```

2.3.5 Source directory substitution using @

An @ character appearing at the front of a pattern will be replaced by the first source directory specified on the Encoder command line. This ensures that a pattern has an absolute path, avoiding any possible undesired matching.

For example, given a project structure containing directories `/project/config/config.php` and `/project/live/config/config.php`, using the option

```
--ignore config/config.php
```

would ignore both of `config.php` files when encoding, whereas

```
--ignore @/config/config.php
```

would ignore only `/project/config/config.php`. The benefit over hard coding the full path is a shorter command line with no dependency on the source.

2.4 Quick-Start Encoding Examples

This section provides examples of how to use the Encoder to handle some common encoding requirements. Filenames and directory paths are examples only.

2.4.1 Encoding Single Files

Examples:

Files can be encoded as another by specifying the file as the source and using `-o` to name the target file. The target can be any filename.

Encode `/project/file1.php` *as* `/encoded-project/file1.php`

```
ioncube_encoder /project/file1.php -o /encoded-project/file1.php
```

Files can also be encoded *into* a directory using `--into` to name the target directory. The encoded file is will be given the same name as the source file.

Encode `/project/file1.php` *into directory* `/encoded-project`

```
ioncube_encoder /project/file1.php --into /encoded-project
```

More than one source item can be specified when using `--into` but giving a directory as the source is usually more convenient.

Encode `/project/file1.php` *and* `/extra/file2.php` *into* `/encoded-project`

```
ioncube_encoder /project/file1.php /extra/file2.php --into /encoded-project
```

2.4.2 Encoding Directories

Entire directory hierarchies can be recursively encoded by specifying a directory as the source. Files are either encoded or copied into the target. File attributes are also copied if possible, and on UNIX, any symbolic links will be replicated.

Examples:

Recursively encode `/project` *as* `/encoded-project`

```
ioncube_encoder /project -o /encoded-project
```

or

```
ioncube_encoder /project --into /encoded-projects
```

If the target directory already exists then you must specify how the Encoder should proceed. The available choices are:

Encoder Option	*Action*
`--replace-target`	Replace the target directory.
`--merge-target`	Merge files into the target directory.
`--rename-target`	Rename the existing target by appending a unique number.
`--update-target`	Similar to merge but only process the source file if its modified time is later than the target's modified time.

The `--replace` option is most commonly used.

2.4.3 Encoding Files with non-default File Extensions

By default the Encoder will encode files matching the pattern `*.php`, `*.php3`, `*.php4`, `*.php5` (ioncube_encoder5 only) or `*.phtml`, however files and directories matching any pattern or name can be encoded by using `--encode`. This option may be used as many times as required.

Example:

Encode files with default extensions and also any ending in `.inc`

```
ioncube_encoder --encode "*.inc" /project --into /encoded-projects
```

2.4.4 Encoding PHP Shell Scripts

The Encoder will encode shell scripts having PHP as their interpreter unless explicitly directed otherwise with `--copy` or `--ignore`. By default, the first line of the source shell script will be copied to the target, but a custom line can be used with the following option

```
--shell-script-line '#!/usr/bin/php -q'
```

where the text inside the quotes is an example shell script line. Any encoded script can be used as a shell script by manually adding a shell script line to the encoded file after the encoding process is complete, and similarly an encoded PHP shell script will remain a valid encoded PHP script if the shell script line is removed. On UNIX it is important to enclose the option argument in single quotes as the '!' character has a special meaning for most shells.

2.4.5 Encrypting Templates and other Files

As well as protecting PHP files, the Encoder can encrypt other files too, such as templates and images. Using the Loader API, encrypted files can then be decrypted only by an encoded file that was encoded by the same Encoder.

As an example of working with encrypted templates, a simple patch to the popular Smarty template engine is available on the ionCube website, allowing the Smarty engine to process both plain text and encrypted templates.

Example:

Encode PHP files with default extensions and encrypt files ending in `.tpl`

```
ioncube_encoder --encrypt "*.tpl" /project --into /encoded-projects
```

2.4.6 Leaving Files non-encoded

Files that would normally be encoded can be left non-encoded and just copied by using `--copy`. This option may be used as many times as required.

Examples:

Encode `/project` into `/encoded-projects` leaving `config/config.inc.php` non-encoded

```
ioncube_encoder --copy config/config.inc.php  /project --into /encoded-projects
```

Exclude all files matching `*_config.php` from being encoded

```
ioncube_encoder --copy "*_config.php"  /project --into /encoded-projects
```

Exclude files in `config` and subdirectories from being encoded

```
ioncube_encoder --copy config/ /project --into /encoded-projects
```

Exclude files in `config` from being encoded but not subdirectories

```
ioncube_encoder --copy "config/*" /project --into /encoded-projects
```

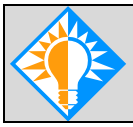
2.4.7 Omitting Files from the Encoding Target

When encoding a directory the Encoder will usually fully replicate the directory hierarchy. It can sometimes be necessary to ignore some items from the source tree and this is handled with the `--ignore` option. This option may be used as many times as required.

Example:

Ignore `.svn` files and backup files

```
ioncube_encoder --ignore .svn/ --ignore "*~" /project --into /encoded-projects
```



Use the `-v` option to see which files are being encoded, encrypted, copied, or ignored when using `--encode`, `--encrypt`, `--copy`, `--ignore` and `--keep`.

2.4.8 Adding Copyright and License Details to Encoded Files

Custom text can be added to the start of encoded PHP files, and this is useful for incorporating your own license or copyright messages. Files are protected so that any changes to an encoded file would prevent it from functioning, and so this text cannot be successfully removed.

Example:

```
ioncube_encoder --add-comment "Software written by FooSystems" --add-comment
       "Licensed to SomeCompany Inc." /project --into /encoded-projects
```

3 ENCODER COMMAND LINE OPTIONS

This chapter describes all available command line options, grouped by their purpose.

3.1 Specifying the Source and Target

3.1.1 Source Items

The Encoder can be used to either encode single files or to recursively encode directories. Items to encode are passed to the Encoder without any associated option.

3.1.2 The Encoder Target [`-o`, `--into`]

The Encoder target may be specified in two ways. The `-o` option encodes a single source file or directory as a new name, and the `--into` option encodes one or more items into an existing directory.

Examples:

Encode file `hello.php` *as* `hello-encoded.php`

```
ioncube_encoder hello.php -o hello-encoded.php
```

Encode directory `/projects/test` *as* `/encoded-projects/test`

```
ioncube_encoder /projects/test -o /encoded-projects/test
```

Encode project `/projects/test` *into* `/encoded-projects`

```
ioncube_encoder /projects/test --into /encoded-projects
```

Encode projects `project1` *and* `project2` *into* `/encoded-projects`

```
ioncube_encoder /projects/project1 /projects/project2 --into /encoded-projects
```

Encode `file1.php` *and* `file2.php` *into* `/home/encoded-files`

```
ioncube_encoder file1.php file2.php --into /home/encoded-files
```

To protect against accidental error and possible loss of source files, the Encoder checks for being asked to encode directories that lie within the target tree or encoding into a directory that lies within the source tree. If encoding into the source tree is required then the option `--allow-encoding-into-source` may be used, see 3.14.2 below.

3.2 Encoded File Format

The Encoder can produce files in both binary and ASCII format. These formats are discussed below.

3.2.1 ASCII Format [`--ascii`]

By default, the Encoder produces encoded files in ASCII format. These files contain only printable characters, and may be safely transferred using FTP clients operating in either ASCII or binary mode without being corrupted.

3.2.2 Binary Format [`--binary`]

Binary format files are marginally more efficient than files produced with the default ASCII format. The advantages can be slightly improved runtime performance and a smaller file size, however a significant *disadvantage* is that some file transfer and archive programs, particularly on Windows, may corrupt binary encoded files during processing. Corruption can occur due to different characters being used to represent line breaks on different operating systems, and programs trying to convert these characters when crossing different operating systems. Examples are the CuteFTP file transfer program, WinZip if the *TAR smart cr/lf conversion* option is enabled (which it is by default), and FTP programs transferring in ASCII mode. Some PHP IDE's with FTP features only offer ASCII file transfers, and so guarantee problems.

Using Binary format files if installation of files is performed correctly using tools that will not corrupt the files should be fine. However if this cannot be guaranteed, the default ASCII format is recommended as it still offers excellent performance, and will greatly reduce the chance of users accidentally corrupting files during installation.

3.3 Encoding to an Existing Directory Target

When an encoding target directory already exists, one of the following options must be used to tell the Encoder what you want it to do. There are four choices, to replace the target, update the target with changed files, merge files into the target, or to rename the target.

3.3.1 Replacing the Target [`--replace-target`]

This option replaces an existing target, ensuring that the target contains no files from a previous encoding. This is the most common option to use when the target already exists.

3.3.2 Merging into the Target [`--merge-target`]

This will preserve the existing target, and all files processed from the source will either be created in the target or overwrite any existing files. Note that any files already part of the target but not present in the source project are preserved.

3.3.3 Renaming the Target [`--rename-target`]

This will rename the target directory by appending a number to it. The number used will be the smallest number to produce a directory name that does not already exist. It is effectively a backup option.

3.3.4 Updating the Target [`--update-target`]

This option is similar to `--merge-target` except that files are only processed if the modified time of the source file is greater than the modified time of the existing target file, or if the target file does not exist.

3.4 Selecting Files to be Encoded, Encrypted, Copied or Ignored

By default, the Encoder will encode files having names ending with `.php`, `.php3`, `.php4`, `.php5` or `.phtml`, and encrypt any files specified with `--encrypt`. All other files will be copied. This section explains how to encode and encrypt files with other extensions, how to prevent files from being encoded, and how to exclude files from being part of the encoding target. For more examples, please see section 2.4. Note that you can use the options described here multiple times and in any order to describe precisely how you require the Encoder to process your project.

3.4.1 Encoding Specific PHP Files [`--encode`]

Use `--encode` to specify additional file patterns, files or directories to encode, or to reverse the effect of `--copy` (see 3.4.2 below).

Examples:

Encode all files ending in `.inc` as well as the default extensions

```
--encode "*.inc"
```

Also encode the file `licenses/license.key`

```
--encode licenses/license.key
```

Encode files in directory `tests/encoded`

```
--encode tests/encoded/
```

This last example would be useful if you had used `--copy tests` to tell the Encoder to copy the directory tests, but where you want the subdirectory `encoded` to be encoded. Note that this does not request *all* files to be encoded, but ensures that any files matching the default extensions or other file patterns will be.

Encode all files in directory `tests/encoded` but not subdirectories

```
--encode "tests/encoded/*"
```

3.4.2 Encrypting Files [`--encrypt`]

Use `--encrypt` to specify files or directories that are to be encrypted. Encrypted files can be decrypted by the Loader API `ioncube_read_file()` function, see section 5.4.1, and only when called from a file encoded by the same purchased Encoder installation. Typical examples would be encoding template or XML files.

Examples:

Encrypt files ending in `.tpl` or `.xml`

```
--encrypt "*.tpl" --encrypt "*.xml"
```

3.4.3 Excluding Files from being Encoded or Encrypted [--copy]

Use `--copy` to exclude files from being encoded or encrypted and to copy them to the target directory.

Examples:

Copy `user_config.php` instead of encoding it

```
--copy user_config.php
```

Copy files in directory `config` and subdirectories

```
--copy config/
```

Copy files in directory `config` but still encode files in any subdirectories

```
--copy "config/*"
```

3.4.4 Excluding Files from the Target [--ignore]

Use `--ignore` to ignore files and directories and exclude them from the target directory.

Example:

Ignore `.svn` directories and emacs backup files

```
--ignore .svn/ --ignore "*~"
```

3.4.5 Including Ignored Files [--keep]

The effect of `--ignore` can be reversed by using `--keep`.

Example:

Ignore all files in directory `docs` except for `README`

```
--ignore docs/ --keep docs/README
```

The Encoder applies the options above in the order that they appear. Combining them can achieve precise control over which files are to be encoded, encrypted, copied, or excluded. The `-v` option is useful to see the effect of these options and will show how files were processed.

3.4.6 Including only Encoded Files into the Target [--only-include-encoded-files]

This option will produce a target containing only encoded files. Files that would otherwise be copied are ignored.

3.5 Bytecode Obfuscation

The ionCube PHP Encoder achieves a high level of protection by compiling PHP source code into PHP bytecode, storing this in a proprietary format, and executing code inside the Loader component. This is an analogous operation to compiling a C program into native machine code. Although the entire source code is eliminated during this process, as with compiled C programs, some symbols must remain. As a further level of protection, the ionCube Encoder can apply a *one-way binary transformation* to obfuscate certain data, and elements such as function names will then not be exposed in their original form by PHP features such as `get_defined_functions()` and `get_declared_classes()`. This is different to simple source code obfuscation that tends to be easily reversible, and in addition to user controlled obfuscation, further obfuscations are automatically applied during compilation and at runtime.

3.5.1 Obfuscating Compiled Bytecode Symbols [`--obfuscate`]

The Encoder can obfuscate the names of global functions, local variables, class names, method names, and line numbers. Note that class related obfuscation is not available with the PHP 4 Encoder.

The easiest way to use this option is shown in the following example of enabling all features:

Obfuscate fully

```
--obfuscate all
```

This option can also be used with any combination of the tokens `classes`, `methods`, `functions`, `locals`, `linenos` to allow the obfuscation of class/method/function names, local variable names and line numbers. Separate tokens with a comma and no whitespace. Note that *variable variable assignment* (e.g. `$$keyName = $value`) may not work as expected if local variable obfuscation is used.

Example:

Obfuscate line numbers, class names and function names, but not local variables or method names

```
--obfuscate linenos,functions,classes
```

3.5.2 Specifying an Obfuscation Key [`--obfuscation-key`]

Even though the obfuscation uses a one-way, non reversible algorithm, a custom obfuscation key prevents the possibility of reversal by chance. The obfuscation key must be supplied, and the Encoder will generate an error if it is missing.

Example:

```
--obfuscate all  --obfuscation-key "the 5 claw red dragon"
```

3.5.3 Specifying Obfuscation Exclusions [`--obfuscation-exclusion-file`]

While it is desirable to obfuscate an application, it is sometimes necessary to prevent certain program elements from being obfuscated. For example, functions and methods external to the application and called by the application should not be obfuscated. Similarly, application interface functions called by external scripts should not be obfuscated.

To provide these exceptions, a text file can be used to specify any functions, classes and methods whose names should not be obfuscated. The option `--obfuscation-exclusion-file` should be used to pass the name of the file to the Encoder, and the file should have sections `[functions]` `[classes]` and `[methods]`, followed by the names of the items to be excluded. The sections may appear in any order, and may be used more than once. A # character can be used to introduce a comment.

As an example, the following file contents would exclude the class name `GlobalModule`, the class name `Module` within the namespace `Provider`, the method `getName()`, and the global functions `fn1()` and `fn2()`.

```
[classes]
# Exclude our GlobalModule class for introspection purposes
GlobalModule
Provider\Module
[methods]
getName
[functions]
fn1 # used with preg_replace so we mustn't obfuscate
fn2
```

For backwards compatibility, any names appearing before the first section name will be interpreted as function names.

Note 1: excluding a function will also disable obfuscation of any local variables within that function.

Note 2: excluding a class name will exclude just the name of the class from being obfuscated and not any *contents* of the class, such as methods.

Note 3: for security reasons, excluding a method name will exclude it from being obfuscated in all classes having a method of the same name, which avoids needing a reversible obfuscation technique.

Note 4: variable variable assignment (e.g. `$$keyName = $value`) may not work as expected if local variable obfuscation is used. Excluding the function from being obfuscated where such assignments are used will handle this case.

3.6 File Based Server Restrictions (Pro and Cerberus Editions)

The Pro and Cerberus Encoders can optionally encode files with server restrictions such that the files will stop functioning beyond some point in time, and can also restrict the machines on which files can be run. The options for restricting files are described below. As an alternative, files can be restricted to require a license file containing time and server restrictions. The License file approach is recommended and generally preferable, and is described in section 3.7 below.

3.6.1 Expiring Files after a Period [`--expire-in`]

Files can be set to expire after a given number of seconds, minutes, hours or days by using:

```
--expire-in <period>
```

where `<period>` is a number followed by either `s`, `m`, `h` or `d` to denote a period in seconds, minutes, hours or days.

Examples:

Expire files in 7 days

```
--expire-in 7d
```

Expire files in 8 hours

```
--expire-in 8h
```

Note that the expiry period is relative to the time that files are encoded.

3.6.2 Expiring Files from a Date [`--expire-on`]

Files can be set to expire from a specific date by using:

```
--expire-on <yyyy-mm-dd>
```

Example:

Expire files from 2014-07-27

```
--expire-on 2014-07-27
```

3.6.3 Locking Files to Specific Domains and Servers [`--allowed-server`]

Encoded files can be restricted to load only on machines with specific IP addresses and/or domain names. The domain name is also referred to as the server name[1]. Using the Cerberus version, encoded files can also be restricted by MAC (Ethernet) address.

The complete syntax for server restricting files is:

```
--allowed-server [<domain names>][@[<IP addresses>]][{<MAC address>}]
```

Each server specification can contain as many domain names and IP addresses as desired. If using Cerberus, a MAC address restriction may also be given. At least one type of restriction must be specified, but items are optional. The option may also be used more than once to specify multiple restrictions. **Note:** There is a limit of 250 file based restrictions for an encoded file.

[1] The server name is an attribute set by the web server for each domain or virtual host, and is the value accessed in PHP as `$_SERVER['SERVER_NAME']`.

Restricting by Domain Name

Specify domain names separated by commas and optionally ending the list with an @ character.

Examples:

Restrict files to `www.foo.com`

```
--allowed-server www.foo.com
```

Restrict files to `www.foo.com` *and* `www.bar.com`

```
--allowed-server www.foo.com,www.bar.com
```

Restrict files to name `1.2.3.4`

```
--allowed-server 1.2.3.4@
```

Note the trailing @ after the name in this example. An @ after a list of domain names indicates that all items before should be treated as domain names, even if they look like IP addresses. Although rare, some domain names can look like the start of an IP address, and if writing a script to automatically process domain names, it is recommended always to add an @ to the end of the server names to avoid any misinterpretation.

Wildcard Domain Names

Domain name restrictions may contain wildcard characters. The wildcard characters have the following interpretations:

Wildcard Character	*Matches*
*	Zero or more characters, e.g. `*.foo.com`
?	Any single character, e.g. `site?.foo.com`
[]	Any character from a set, e.g. `site[123].foo.com`
[!]	Any character not in the set, e.g. `site[!89].foo.com`

Restricting by IP Address

IP addresses may be specified as a single address, a range of addresses or a subnet. Multiple addresses should be specified separated by commas.

Note:

1) When files are accessed via a web server, IP address restrictions are tested against the server IP addressed reported by the web server. When accessed directly, IP restrictions are tested only against the primary IP address of network interfaces. For security reasons, interface aliases are not tested.

2) For security reasons it is not possible to lock the loopback, 127.0.0.1 localhost address.

Examples:

Restrict files to `192.168.1.4`

```
--allowed-server 192.168.1.4
```

Restrict files to `192.168.1.4` and `192.168.1.20`

```
--allowed-server 192.168.1.4,192.168.1.20
```

Restrict files to `192.168.1.20` through `192.168.1.25`

```
--allowed-server 192.168.1.20-192.168.1.25
```

or

```
--allowed-server 192.168.1.20-25
```

Restrict files to `192.168.1` subnet

```
--allowed-server 192.168.1
```

Restrict files to subnet with 28 significant bits

```
--allowed-server 192.168.1.255/28
```

Restricting by MAC Address

MAC addresses are composed of 6 bytes and should be specified using hex notation as follows.

Example:

Restrict to MAC `00:01:02:06:DA:5B`

```
--allowed-server '{00:01:02:06:DA:5B}'
```

Combining Restrictions

Examples:

Restricting files to a domain name and an IP address

```
--allowed-server www.foo.com@192.168.1.2
```

Restricting files to a domain name and specific MAC address

```
--allowed-server 'www.foo.com{00:02:08:02:e0:c8}'
```

Restricting to either of two domains on either of two IP addresses

```
--allowed-server www.foo.com,www.bar.com@192.168.1.1,192.168.1.3
```

Restricting to a domain name, IP address and MAC address

```
--allowed-server 'www.foo.com@192.168.1.1{00:02:08:02:e0:c8}'
```

3.6.4 Using domain restricted scripts with PHP CLI [`--trust-unnamed-servers`]

By default, scripts restricted by domain will only run via a webserver, and fail with `php-cli` because there is no domain name. Encoding files with the `--trust-unnamed-servers` option will cause the Loader to *ignore* domain restrictions if run with `php-cli` (`php-cgi` still enforces domain checks).
Note: domain name checks with license files are always ignored by `php-cli`.

3.7 License Based Server Restrictions (Pro and Cerberus Editions)

A flexible alternative to file based restrictions are license based restrictions. With this mechanism, files are encoded to need a license file, and it is the license file that contains time and server based restrictions rather than the encoded files themselves. A major advantage compared to file based restrictions is that the encoded files may be encoded just once, with a license file containing custom restrictions created for each installation. This is especially beneficial when producing software updates as a single encoded update may be made available to all users, whose existing license files will continue to control the updated encoded files. With file based restrictions, it would be necessary to produce an update encoded for each installation with the same restrictions as the original installation.

Note: License file restrictions override file based restrictions. To avoid accidentally setting file based restrictions when files are encoded to use a license file, the Encoder will generate an error if both file restrictions and license files are used.

3.7.1 Specifying a License File [`--with-license`]

To restrict files to require a license file, use the option

```
--with-license <path>
```

to specify the path of the license file that should be used to restrict the execution of the encoded script. At runtime, the Loader will search for the license file relative to the location of the encoded script, so a relative path should be used when specifying the license. The path will often be just the name of the license file, e.g. `license.txt`

Typically an application will have a single top level directory. In this case the license file could be saved into this top level directory, and the filename of the license could be used on the command line instead of a more complicated relative path. If the Loader cannot locate the license file relative to the PHP script that needs it, the Loader will search parent directories until either the License file is found or there are no further parent directories.

3.7.2 Specifying a Passphrase [`--passphrase`]

License files are encrypted using industry proven algorithms, and with the encryption keyed with a passphrase. Use the command line option

```
--passphrase <key>
```

to specify a passphrase. The passphrase used when encoding files must match the passphrase used to generate the corresponding license file in order for the Loader to successfully decrypt the license file when the script is executed. See section 4.2.2 below for more details. If the Loader cannot decrypt the license file it will prevent execution of the script.

3.7.3 License Check Mode [`--license-check`]

When an encoded file restricted by a license is read by the Loader, there are two methods by which the license restrictions can be enforced.

Automatic License Checking

With automatic checking, the Loader will ensure that all server restrictions are matched, that the license has not expired, and that all enforced properties are matched in the license file (see section 4.2.8 below). This is the default method, but it can also be specified by encoding with the option

```
--license-check auto
```

Script Based License Checking

Script based checking is an alternative that encodes files so that they will still run even if their license file has expired or is not matched to their server. A script can then use the Loader API to validate properties, server restrictions, and any expiry date contained in the license. In order to implement a manual license check, and so prevent the Loader from automatically validating the license, encode files with the option

```
--license-check script
```

Several Loader API functions useful when implementing a manual license check are described in chapter 5. Be careful to ensure code security when implementing a license validator in PHP. In particular if a validator is contained in a file which will be included in each top-level script, then it is necessary to use Include File Protection to ensure that a hostile user cannot replace the validator with a different file.

3.8 Target File Attributes

3.8.1 Copying with Hard Links [`--use-hard-links`]

The Encoder will normally copy any files into the target that are neither encoded nor encrypted. This is fast, but performance can be improved and disc space saved by using the `--use-hard-links` option to replicate by using hard links. This feature is only available with UNIX Encoders, and only if the source and target files are on the same filesystem.

3.8.2 Using Default File Permissions [`--without-keeping-file-perms`]

This option applies the default file permissions to target files instead of copying permissions of the corresponding source file.

3.8.3 Updating File Times [`--without-keeping-file-times`]

This option creates target files with a current timestamp instead of copying times from the corresponding source file.

3.8.4 File Ownership [`--without-keeping-file-owner`]

When running as root on UNIX the Encoder will usually copy file ownership from source files and directories. This option will create target items as the user running the Encoder.

3.8.5 Setting File Ownership [`--apply-file-user, --apply-file-group`]

When running the Encoder as root on UNIX, different user and group IDs can be set for target files with:

```
--apply-file-user <user id/name>

--apply-file-group <group id/name>
```

The `id` or `name` may be either a numeric id or a name.

3.9 Language Options

3.9.1 Ignoring Short Open Tags [`--no-short-open-tags`]

Use this option to only recognise PHP files that use `<?php ?>` style tags. By default the Encoder recognises both `<?php ?>` and `<? ?>` style.

3.9.2 Ignoring Strict Language Warnings [`--ignore-strict-warnings`]

This option ignores warnings generated by the compiler from the use of language features that go against strict language usage rules. Resolving source code issues rather than using this option to hide them is recommended in the long term.

3.9.3 Ignoring Deprecated Feature Warnings [`--ignore-deprecated-warnings`]

This option ignores warnings generated by the compiler from the use of deprecated language features. Resolving source code issues rather than using this option to hide them is recommended in the long term.

3.9.4 Register Custom Auto Globals [`--register-autoglobal`]

Specify the names of custom variables that are to be treated as if they were *autoglobals* (also known as *superglobals*).

For example:

```
--register-autoglobal MYAUTO
```

would encode access to `$MYAUTO` as if it were a global even if not explicitly made global with the `global` keyword. It is not necessary to use this option for standard autoglobals, but this feature may be useful if encoding files containing references to variables that are declared as autoglobals by a PHP module that will be used in the target system but that is unknown to the Encoder.

3.10 Encoded File Header Customisation

Encoded files contain a PHP header (the *preamble*) that, if required, will perform the run-time installation of the Loader. It will also produce an error message if no Loader could be installed or in some cases of file corruption. The default header is ideal for most cases, however Encoder options support customising parts of the header and for setting an entirely new header.

Files may also have custom comments added. This feature offers the addition of plain text such as copyright messages, a product version number, contact details, and so on. Embedded digital signatures protect encoded files from tampering, and any modifications to an encoded file will render it useless so that such messages cannot be successfully changed or removed.

3.10.1 Removing Run-Time Loader Support [`--without-runtime-loader-support`]

This option shortens the header by removing support for run-time install of the Loader. This is useful if your encoded files will be installed on a system where you know that run-time installation of the Loader is not required. The header will still contain code to generate an error if no Loader is installed.

3.10.2 Generating Files with no PHP Header [`--without-loader-check`]

This option produces files with no PHP header and only the encoded file data. When running files without a header there will be no error produced if there is no Loader installed and the Loader must be installed in the `php.ini` file.

3.10.3 Customising the 'no Loader installed' Message [`--message-if-no-loader`]

To customise the message produced if no Loader is installed, use:

```
--message-if-no-loader <text>
```

`<text>` must be a valid PHP expression and is passed to the PHP `die()` function.

Example:

```
--message-if-no-loader "'No Loader is installed. Please contact support.'"
```

Note the use of single quotes around the message because a string is being passed to the `die()` function.

3.10.4 Customising the 'no Loader installed' Action [`--action-if-no-loader`]

To customise the action when no Loader is installed, use:

```
--action-if-no-loader <php code>
```

3.10.5 Setting the Run-Time Loader Path [`--loader-path`]

To change the run-time Loader path, use:

```
--loader-path <path>
```

The current default setting performs selection of the Loader based on operating system type and PHP version, and is:

```
'/ioncube/ioncube_loader_'.$__oc.'_'.substr(phpversion(),0,3).(($__oc=='win')?'.dll':'.so')
```

`$__oc` is predefined in the header as:

```
strtolower(substr(php_uname(),0,3))
```

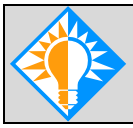
Changing the Loader path may be useful if you wish to distribute Loaders with your application but in a different directory, or if you wish to use run-time Loading but do not need to use the dynamic selection of the Loader.

3.10.6 Setting the Header Code [`--preamble-file`]

The entire PHP header may be set by using:

```
--preamble-file <file>
```

`<file>` should be the path to a file containing PHP code to place at the start of the encoded files.



Download the current PHP header as a starting point from either
www.ioncube.com/resources/rtl_php_header.tar.gz or
www.ioncube.com/resources/rtl_php_header.zip

3.10.7 Header Comments [`--add-comment, --add-comments`]

To add text to appear as comments at the start of encoded files, use:

```
--add-comment <text>
```

The option may be used as many times as required.

To add comments from a file, use:

```
--add-comments <file>
```

Examples:

```
--add-comment "Copyright New FooBar Inc. 2013" --add-comment "All Rights Reserved"

--add-comments custom/comments.txt
```

3.11 Customising Loader Behaviour

3.11.1 Loader Event Messages [`--loader-event`]

Loader messages generated by run-time events can be customised at encoding time to those of your own choice.

For each web request, Loader messages customised by an encoded file will take effect for all other encoded files unless a later included file provides a different message.

To customise an event message, use:

```
--loader-event "<event>=<message>"
```

`<event>` should be the event type to customise and `<message>` the text to associate with the event.

Event types are:

Event Type	*Triggered When…*
`corrupt-file`	An encoded file has been corrupted.
`expired-file`	An encoded file has reached its expiry time.
`no-permissions`	An encoded file has a server restriction and is used on a non-authorised system.
`clock-skew`	An encoded file is used on a system where the clock is set more than 24 hours before the file was encoded.
`license-not-found`	The license file required by an encoded script could not be found.
`license-corrupt`	The license file has been altered or the passphrase used to decrypt the license was incorrect.
`license-expired`	The license file has reached its expiry time.
`license-property-invalid`	A property marked as ‘enforced’ in the license file was not matched by a property contained in the encoded file.
`license-header-invalid`	The header block of the license file has been altered.
`license-server-invalid`	The license has a server restriction and is used on a non-authorised system.
`unauth-including-file`	The encoded file has been included by a file which is either non-encoded or has incorrect properties.
`unauth-included-file`	The encoded file has included a file which is either non-encoded or has incorrect properties.
`unauth-append-prepend-file`	The `php.ini` has either the `--auto-append-file` or `--auto-prepend-file` setting enabled.

Example:

```
--loader-event "expired-file=This software has expired."
```

Custom messages may also contain display formats. Each format is replaced with specific text as follows.

Format	*Replaced With*
`%f`	The path of the file generating the event.
`%i`	Server IP address (‘no-permissions’ event only).
`%h`	Server name (‘no-permissions’ event only).
`%n`	The path of the unauthorised including or included file.

3.11.2 Callback Files [`--callback-file`]

To implement a more elaborate error handling mechanism than with Loader Events, a *callback file* can be specified to handle Loader error cases. Use the option

```
--callback-file <relative-path>
```

to specify a callback file. The path should be relative to the top-level directory of the PHP application. In particular, if the callback file is contained in the top-level directory, then specify the filename rather than a full path.

The callback file should contain a function with the signature:

```
function ioncube_event_handler($err_code, $params)
```

The error code will be passed as the first argument, and an associative array of context-dependent values will be passed as the second argument. The error code is an integer, and for convenience the Loader defines constants for all event error codes. See section 3.11.3 for a list of all constants.

The name of the file that caused the error is always passed as a parameter with key `current_file`, and for server restriction errors parameters are passed with keys `domain_name` and `ip_address`. The path to the expected license file is passed with key `license_file`, and for errors related to include file restrictions, the file that included the encoded file, or was included by the encoded file, is passed with key `include_file`.

3.11.3 Loader Event Constants

The Loader defines PHP constants corresponding to the supported error codes. These codes correspond to the Loader events described in the previous section follow:

Value	*PHP constant*	*Loader Event*
1	ION_CORRUPT_FILE	corrupt-file
2	ION_EXPIRED_FILE	expired-file
3	ION_NO_PERMISSIONS	no-permissions
4	ION_CLOCK_SKEW	clock-skew
5	(constant intentionally unused)	
6	ION_LICENSE_NOT_FOUND	license-not-found
7	ION_LICENSE_CORRUPT	license-corrupt
8	ION_LICENSE_EXPIRED	license-expired
9	ION_LICENSE_PROPERTY_INVALID	license-property-invalid
10	ION_LICENSE_HEADER_INVALID	license-header-invalid
11	ION_LICENSE_SERVER_INVALID	license-server-invalid
12	ION_UNAUTH_INCLUDING_FILE	unauth-including-file
13	ION_UNAUTH_INCLUDED_FILE	unauth-included-file
14	ION_UNAUTH_APPEND_PREPEND_FILE	unauth-append-prepend-file

3.12 File Properties and Include Attack Prevention

File *properties* are key-value pair data items that are securely stored as metadata in encoded files, separate to the PHP code. Properties can be read by a Loader API function, and also used with the *include attack* prevention system. Include attacks are where program scripts are replaced by unauthorised ones in an attempt to change program behaviour. To guard against this, encoded files can be protected so that they can only be included by a file with specific properties defined, and so that they can only include a file if it has certain properties. This powerful feature can also help prevent unauthorised use of libraries by allowing your included files to only be included by your own application, and not by someone else's program.

3.12.1 Setting Properties [`--property, --properties`]

To define one or more properties, use:

```
--property "<name>[=<value>]"

--properties "<name>[=<value>][, ...]"
```

`name` is the name of the property to be defined and `value` is the property value. Use a comma to separate multiple properties.

Values can be numeric, a string that is optionally delimited by `' '` or `" "`, or an array delimited by `{ }`. Array elements may optionally have keys.

Examples:

Define a property `version` *with integer value* `5`

```
--property version=5
```

Define a property `version` *with string value* `"2.0"`

```
--property "version='2.0'"
```

Define several properties

```
--properties "version=1,company='Foo Technologies'"
```

Define an array

```
--property "features={options=>{'save','load'},licensed_to=>'Foo Tech Inc.'}"
```

3.12.2 Include Attack Prevention [`--include-if-property`]

To restrict which files can be included by a file and also the files that can include a file, use:

```
--include-if-property "<name>=[<value>][, ...]"
```

Property `name` and `value` are as defined in section 3.12.1 above.

This option may be used more than once to define multiple sets of required properties.

Examples:

Include files if property `program_name` has value `"my app"`

```
--include-if-property "program_name='my app'"
```

Include files if property `pname` is either `"app1"` or `"app2"`

```
--include-if-property "pname='app1'" --include-if-property "pname='app2'"
```

3.12.3 Preventing Prepend and Append File Usage [`--disable-auto-prepend-append`]

By utilising the `auto_prepend_file` and `auto_append_file` php.ini settings it is possible to specify a PHP file which should run before or after any other scripts. This may undermine the security of encoded PHP scripts, and can be disabled using the option

```
--disable-auto-prepend-append
```

If this option is used and a server has either the append or prepend `php.ini` setting enabled, the encoded scripts will not run. Some servers may have a legitimate reason for enabling these settings, so this Encoder option is not enabled by default.

3.13 Project Handling

Setting up the Encoder for single-command repeat encoding of projects can easily be performed using UNIX shell scripts or Windows batch files, however the Encoder also has a built-in projects handling feature that may usefully be used as well or instead.

The projects feature uses a project file to store and provide command line options. Project file options are merged with any additional options passed to the Encoder, and the project file may be updated or recreated when required. As the project file is a plain text file, it can also be edited if necessary.

3.13.1 Specifying the Project File [`--project-file`]

The project file to use is set with:

```
--project-file <file>
```

Once a project file has been created, to encode with the given project options, only this option need be used.

3.13.2 Creating the Project File [`--create-project`]

This option creates the project file named with `--project-file`. The file is created or overwritten, and is set with whatever other options are used to the Encoder.

Examples:

Create and initialise project file `p1`

```
ioncube_encoder --project-file p1 --create-project /project1 --into /encoded-apps
```

Repeat encoding based on project file `p1`

```
ioncube_encoder --project-file p1
```

Repeat encoding based on project file `p1` but with verbose mode enabled

```
ioncube_encoder --project-file p1 --verbose
```

3.13.3 Update a Project File [`--update-project`]

This option updates a project file by merging in any new options.

Example:

Repeat encoding based on project file `p1` but permanently add the `--replace` option

```
ioncube_encoder --project-file p1 --replace --update-project
```

3.14 Miscellany

3.14.1 Encoding and Bytecode Optimisation [`--optimise, --optimize`]

By default, the Encoder uses an encoding format that encodes with the best Encoder performance and good run-time performance. At the expense of increased encoding time, smaller files with possibly marginally better run-time performance may be obtained by increasing the optimisation level.

The options:

```
--optimise more

--optimise max
```

increase optimisation to either an intermediate or a maximum level.

The option `--optimize` is an alias for `--optimise`

3.14.2 Allowing Encoding into the Source Tree [`--allow-encoding-into-source`]

By default, the Encoder prevents a target directory to be within the source tree or for the source directory to be within the target tree. This is to prevent accidental overwriting of source files or unexpected results. The `--allow-encoding-into-source` option allows this. To avoid the target being treated as part of the source tree use the `--ignore` option to ignore the target.

Examples:

In these examples we have a simple project in a directory called `test`. The project contains the file `helloworld.php`

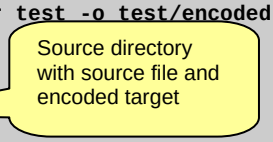
Encoding with the default safety check

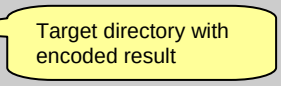
```
$ ioncube_encoder test -o test/encoded

Error: Can't encode to a directory within the source tree
```

The Encoder safety check prevented encoding because the target is within the source tree.

Encoding with the default safety check disabled

```
$ ioncube_encoder test -o test/encoded --allow-encoding-into-source --ignore encoded/
$ ls -R test
test:
encoded/  helloworld.php
test/encoded:
helloworld.php
```





3.14.3 Omitting Documentation Comments [--no-doc-comments]

Documentation comments are comments with the following syntax:

```
/**
My code comment
*/
```

These comments are exposed by the PHP 5 reflection API, and are preserved by the PHP 5 Encoder by default. In order to omit these documentation comments from encoded files specify the `--no-doc-comments` option.

3.14.4 Setting an alternate Shell Script Line [--shell-script-line]

The Encoder will encode shell scripts having PHP as their interpreter unless explicitly directed otherwise with `--copy` or `--ignore.` By default, the first line of the source shell script will be copied to the target, but a custom line can be used with the following option

```
--shell-script-line '#!/usr/bin/php -q'
```

where the text inside the quotes is an example shell script line. Any encoded script can be used as a shell script by manually adding a shell script line to the encoded file after the encoding process is complete, and similarly an encoded PHP shell script will remain a valid encoded PHP script if the shell script line is removed. On UNIX it is important to enclose the option argument in single quotes as the '!' character has a special meaning for most shells.

3.14.5 Enforce Minimum Loader Version [--min-loader-version]

This option encodes files with a requirement that the Loader version is of the specified version or greater. This can be useful to ensure that a particular feature of the Loader is supported. The option should be specified as a version string in the format `major[.minor[.revision]]`.

Examples:

```
--min-loader-version 4.2.2
```

3.14.6 Check for Program Updates [--check-version]

Check for the availability of a program update.

3.14.7 Program Version [-V, --version]

To display the program version, use:

```
-V or --version
```

3.14.8 Verbose Mode [-v, --verbose]

Verbose mode will produce details of Encoder operations and progress.

3.14.9 File Verify [--verify]

If run-time loading is to be used then files must be able to be read and parsed by the PHP engine as valid PHP files. This will increase encoding time, and is a legacy option that would only be necessary if you had customised the PHP header and wish to check it.

3.14.10 Help [-h, `--help`]

This option displays a summary of Encoder options.

4 LICENSE FILE GENERATION (Pro and Cerberus Editions)

4.1 Introduction to License Files

The Pro and Cerberus editions of the ionCube Encoder offer flexible license file creation features, with restrictions that can be enforced automatically by the ionCube Loader at runtime, or by your own scripts using functions in the Loader API. A license generator program is also included for generating license files. As a *bonus*, with the Windows edition a license generator for Linux is also included, allowing license files to be created from a Linux server. The license generator is located in a folder called Linux within the program installation folder.

Scripts can be restricted to run only in the presence of a license file, properties can be set in the license file that must match properties set in the encoded files, and license files can be used to restrict encoded files to a particular machine. Licenses can also be set to expire at some point in the future.

Benefits of License Files

A benefit of using license files as an alternative to setting restrictions in the encoded files themselves is that projects will not need to be encoded for each installation, which takes time and may require source files to be kept on an internet connected server. A further benefit comes when producing software updates to existing customers, as by using license files, a single encoded update can be provided to all installations that will work with existing licenses. If restrictions are instead associated with each encoded file, a product update would need to be encoded for each existing customer, complicating the process of issuing a product update.

Server Restrictions

License file server restrictions can be supplied to the license generator in one of two ways. If the details of the server to be licensed are known, such as IP address, then these can be used explicitly. Often, however, details are unknown, and the goal is simply to restrict to a server without knowing the actual parameters. To support this, a Loader API function can be used to generate server data containing information about the target server, and after being received via a method such as email or a web form, the data can be passed to the license generator to create a license file for that server. This can be ideal for automating license generation based on information supplied from the installed PHP scripts during a licensing procedure. The server data can also be decoded by the license generator into an easily parsed format, allowing a script to pick what server details are licensed.

Custom Properties

Custom key/value data called *properties* can also be added to license files and read via the Loader API at runtime. This feature might be used to customise product behaviour based on information read from the license file.

License File Contents

A license file consists of a header in plain text followed by an encrypted data block. Any properties or restrictions in the license data can be optionally exposed so that they also appear as plain text, e.g. the expiry time. Additional text can be added to the header if desired. Finally, license files are protected by signatures to prevent removal or changing of the plain text.

Locating License Files

Each encoded file contains the expected name or path to its associated license file. Typically this will be just the filename, e.g. license.txt. When accessing a license protected encoded file, the Loader first looks for the license file path relative to the same directory as the encoded script. If not found, parent directories will be searched until the license file is found or until the directory root is reached. This allows for easy installation and management of license files for both shared and dedicated servers.

4.2 Creating License Files

4.2.1 Command Line Usage

The general form for running the command line license generation tool is

```
make_license --passphrase <key> -o <output-path>
```

When encoding files that require a license it is also necessary to specify a passphrase. The passphrase is part of an encryption key and should agree with the passphrase specified when generating the corresponding license. It is advisable that this be different for each project/product. The output path is the path to where the new license file will be saved.

4.2.2 Using Passphrases to Differentiate Products [`--passphrase`]

As mentioned previously, it is recommended that a unique passphrase be used for each product or product variant that is encoded. This ensures that a license for one product will not unlock a second product. As an additional layer of security, a license created with one Encoder installation cannot unlock files encoded with a different Encoder installation, even if the passphrases were the same. The option `--passphrase` should be used to specify the passphrase.

4.2.3 Setting License Restrictions [`--allowed-server, --expose-server-restrictions`]

The `--allowed-server` option allows explicit setting of license file restrictions when target server details such as domain name or IP address are already known. The specification syntax is the same as for the similar option of the Encoder. Please see section 3.6.3 above for details of the syntax, examples and noteworthy points. This option may be used more than once if multiple restrictions are required.

Server restrictions are stored in the encoded part of the license file, but can also be exposed in the header block by using the `--expose-server-restrictions.`

Note: There is a limit of 250 server restrictions for a license file.

4.2.4 Setting License Restrictions from Server Data [`--use-server-file`]

An alternative to setting license restrictions explicitly is to use server data from the target server that was collected by the application being licensed. Server data is obtained by calling the Loader API function `ioncube_server_data()`, which would then be passed back to the license provider be used for licensing. See section 5.2.3 for more details on this API function.

Once server data has been received, such as in an email or through a web form, and then written to a temporary file, the `--use-server-file` option can be used as follows

```
--use-server-file <path>
```

where *path* refers to the location of the server data file. As the machine may contain multiple network adaptors, it is also necessary to use either the option `--select-server-adapter` or `--select-adapters` to select which details to license to. These options are described in the next section.

4.2.5 Selecting Adapters [`--select-server-adapter, --select-adapters`]

Server data generated using the API function `ioncube_server_data()` includes all network interfaces. In addition, if the API function is called from a script via the web server, both the domain name and server IP address for the request will be stored if that information

was available. This is the usual case, and it will generally be desirable to license to the information associated with the web request as this would usually be the same when accessing the main parts of the licensed product. In other cases, licensing to one or more adapters explicitly may be preferred. Both of these cases are catered for.

To license to the server information associated with the web request that called the server data API function, use the option

```
--select-server-adapter
```

Provided that the server data was requested from a page under the same domain as the application to be licensed, errors from mistaken domain names or IP addresses should not arise. When using this option, if no IP address or domain name was reported the `make_license` program will exit with code 2 to allow handling of this case.

To license one or more specific adapters, the option

```
--select-adapters <adapter list>
```

can be used to select the adapters. Here *adapter list* is either a comma separated list of numbers that refer to the position of the adapter in the server data file, or the `*` character. The first adapter is identified as `1`, and using `*` selects all adapters to be licensed.

4.2.6 License Expiry [`--expire-in, --expire-on, --expose-expiry`]

These options support the creation of time expiring licenses. Expiry information is stored in the encoded part of the license file, but can also be exposed in the header block by using the `--expose-expiry` option.

These options take arguments of the same format as the options in sections 3.6.1 and 3.6.2 for setting expiry time on files, and examples are included in those sections.

4.2.7 License Properties [`--property, --expose-property`]

Custom key/value pair property data can be stored in a license file in the same way that properties can be stored in encoded files. Use the option syntax

```
--property "<name>[=<value>]"
```

to specify a property. Multiple properties can be specified in this way. See section 3.12.1 for more details on the supported syntax. Properties can also be exposed as plain text in the license header block by using the option

```
--expose-property <name>
```

4.2.8 License Property Checking [`--enforce-property`]

Properties may be included in a license either as a convenient mechanism for securely accessing custom data from an encoded script, or in order to lock a license to an encoded file. If a property is to be used for the latter purpose, the following option should be used

```
--enforce-property <name>
```

By default, encoded files secured by such a license must have a property with a matching key and value. If the property is not found then the Loader will exit before execution of the script begins. See section 3.7.3 for details on how to customise this behaviour.

4.2.9 Customising the Header Block [`--header-line`]

The text that occurs before the encrypted license data is called the *header block*. The header block is protected from tampering, so it is important that this text is not edited after the license has been generated otherwise the license will become corrupted. The header block content is determined by those properties which have been exposed, whether there is an exposed expiry date, and any custom header lines. To add custom lines to the header block, for each line use the command line option

```
--header-line <text>
```

4.2.10 Viewing Server Data Files [`--decode-server-file`]

Once saved to a file, the contents of data generated by `ioncube_server_data()` can be viewed with the `make_license` program option

```
--decode-server-file <path>
```

where `path` is the path to a file containing server data. The domain name and server IP address that were reported by the web server for the request calling the API function are output first, followed by the name, IP address, and MAC address of each adapter installed on the server. To be both human readable and easily parsed, each line has a field name and value separated by a `:` character. If there was no domain name or IP address stored for the request, the field value will be the token `none`.

4.2.11 Troubleshooting License Problems

If an encoded script that requires a license fails, the particular error message displayed can give a clue as to the cause of the issue. For security reasons the error messages are general rather than specific.

If the license is reported to be *invalid* then a license property set in the license has not been matched in the encoded file. If the license is *corrupt* then either the contents of the license file have been altered, or the passphrase in the encoded file does not match the passphrase used to generate the license file. If the license is *not valid for this server* then a server restriction in the license has not been met.

If it is necessary to determine the contents of a license file the Loader API can be used. Encode a script with the options

```
--with-license license.txt --license-check auto
```

and use the Loader API from the script to output the server restrictions, expiry date, and any properties contained in the license.

5 LOADER API

The ionCube Loader contains an API providing various functions and constants that may be useful in PHP scripts. Most functions return results dependent on whether or not the calling script was encoded.

5.1 File Information and Execution

5.1.1 Checking for an Encoded File [ioncube_file_is_encoded]

This function returns TRUE if the file containing the function call is encoded and FALSE otherwise.

5.1.2 General Encoded File Information [ioncube_file_info]

This function returns FALSE if the file is not encoded. Otherwise it returns an associative array. The contents of the array are as follows:

Key	*Value*
FILE_EXPIRY	Either the file expiry time, or the license expiry time if a license file is present. The time is an integer in UNIX timestamp format: the number of seconds elapsed since midnight (00:00:00), January 1, 1970.
ENCODING_TIME	UNIX timestamp representing the time the file was encoded.
DEMO	TRUE if the file was encoded with an evaluation Encoder, otherwise FALSE.

5.1.3 Retrieving Properties Stored in an Encoded File [ioncube_file_properties]

This function returns an associative array consisting of file properties that were added to the encoded file with the Encoder `--property` or `--properties` options. Only properties defined in the calling script are returned.

5.1.4 Retrieving the Loader String Version [ioncube_loader_version]

This function returns the Loader version as a string.

5.1.5 Retrieving the Loader Integer Version [ioncube_loader_iversion]

This function returns the Loader version as an integer, e.g. 40202 for version 4.2.2.

5.2 License and Server Information

5.2.1 Retrieving Properties Stored in a License [ioncube_license_properties]

This function returns an associative array consisting of license properties. Properties are added to a license by specifying the `--property` command line option to the `make_license` program. Each value in the associative array retrieved by this API function is itself an array with two values: the license property value itself, and a boolean value to indicate whether the property is enforced.

Recall that an *enforced* property is one that the Loader will attempt to match with an encoded file property if the `--license-check auto` option is passed to the Encoder on the command line.

The return value of this function is FALSE if the calling file is not encoded or has no license file.

5.2.2 Retrieving the List of Permissioned Servers [ioncube_licensed_servers]

This function returns an array of server restriction specifications. These are the same strings specified on the command line when the license was created.

5.2.3 Creating a Server Data Block [ioncube_server_data]

When generating a license for an end user it will usually be necessary to retrieve information about the target server. This API function generates a *server data block* containing information about the network adapters installed on the server and the server's domain name. The data block can then be used in conjunction with the `make_license` program to generate a license restricted to the user's domain and server.

This function can be called from either an encoded or non-encoded script.

5.3 License Validation

5.3.1 Validating License Properties [ioncube_check_license_properties]

This API function returns TRUE if all enforced license properties are matched in the encoded file. Otherwise an array is returned consisting of all unmatched enforced properties.

5.3.2 Validating Licensed Servers [ioncube_license_matches_server]

This function returns FALSE if the calling file is encoded, requires a license, and if the license has a server restriction that is not met by the current server. In all other cases the function returns TRUE.

Note that in the case that an encoded script requires a license but no license could be found, the Loader will prevent execution of the script. The case of a missing license therefore cannot occur when calling the `ioncube_license_matches_server()` API function.

5.3.3 Validating License Expiry [ioncube_license_has_expired]

This function returns TRUE if the calling file is encoded and has a license with an expiry time that has passed. In all other cases the function returns FALSE.

5.4 Encrypted File Support

5.4.1 Reading Encrypted Files [ioncube_read_file]

```
mixed ioncube_read_file(string path
          [,bool &was_encrypted [,string passphrase] ] ] )
```

This API function can be used to read files encrypted by the Encoder with the `--encrypt` command-line option. If a file is read successfully the contents are returned as a binary-safe string. An integer is returned in the case of an error condition, which can be tested for by calling the PHP function `is_int()`. The error codes are described in section 5.5 below.

Both plain text and encrypted files can be read by this function, allowing the function to be used in cases where it is not known whether a file will be encrypted. For example, a template engine could be designed that would accept both encrypted and non-encrypted template files. If it is necessary to know whether the file read was encrypted, the second optional argument (passed by reference) can be examined.

If an encrypted file has been written with a custom passphrase (i.e. a non-empty passphrase argument was passed to the i`oncube_write_file()` API function), the same passphrase should be specified as the third argument.

Files encrypted by one Encoder can only be read by PHP scripts encoded by the same Encoder, and encrypted files cannot be read by non-encoded scripts.

5.4.2 Writing Encrypted Files [ioncube_write_file]

```
integer ioncube_write_file(string path, string content
          [,bool encrypt [,string passphrase] ] ] )
```

Encoded PHP scripts can write encrypted files using this API function. Files written in this way can be read with the `ioncube_read_file()` function.

The first argument is the path of the output file.

The second argument is a binary-safe string containing the content to encrypt.

The optional third argument can be set to `FALSE` to write a plain text file.

The optional fourth argument can be used to specify a custom passphrase to replace the default installation-specific passphrase. If a custom passphrase is used then files encrypted with one installation can be read by a different installation's encoded files, if the correct custom passphrase is passed to the `ioncube_read_file()` function.

5.5 Error codes

The following table lists the error codes that can be returned from the API functions detailed in this section.

Code	*Meaning*
`0`	The file was successfully written.
`1`	The file could not be opened.
`2`	The file is corrupt.
`3`	An updated Loader should be installed to read the file.
`4`	An error occurred while reading the source file.
`5`	An error occurred while writing an encrypted file.
`6`	An error occurred while encrypting the file contents.
`7`	An encrypted file cannot be read by an non-encoded PHP script.
`8`	The wrong passphrase was specified, or the wrong Encoder installation was used to encrypt the file.
`9`	`ioncube_write_file()` must be called from an encoded file to produce an encrypted file without a custom passphrase.

6 ERROR REPORTING

The Encoder reports syntax errors in the format of

```
filename:line number:message
```

This offers possible integration with emacs/xemacs and direct access to the point of error in source files. For example, given a directory of PHP files called `myproject`, running the xemacs `compile` command and specifying the compiler as

```
ioncube_encoder -S myproject
```

would syntax check all PHP files and report errors in a buffer. With the default xemacs key bindings, simply hitting `ctrl-X` would visit each file reported as containing an error and place the cursor at the line containing the error.

7 TROUBLESHOOTING

7.1 Unable to Start the Encoder

7.1.1 On UNIX (Linux, FreeBSD, OS X)

Error: Command not found

On UNIX, an error similar to

```
$ ioncube_encoder

bash: ioncube_encoder: command not found
```

would most often be because the directory where the Encoder is installed is not listed in the shell PATH variable. It is recommended to use either a relative or absolute path to the Encoder rather than adding the Encoder directory to the PATH environment variable as this may create product license related problems on some systems.

Examples:

Run from the current directory

```
./ioncube_encoder
```

Run the Encoder installed in `/usr/local/ioncube`

```
/usr/local/ioncube/ioncube_encoder
```

Error: No such file or directory

An error of "No such file or directory", even when the Encoder is launched with a correct absolute or relative path, suggests that the target platform may be 64 bit and that the operating system cannot execute the program. The Encoder will run without any problem on 64 bit systems, but as it is a 32 bit compiled program, 32 bit system libraries must be installed on the machine.

7.1.2 Using a 64 bit system

The ionCube Encoder software is a 32 bit compiled program, and can be used on 64 bit systems provided that 32 bit support is available in the operating system. Most often it is, however if there is a problem launching the software, simply installing the system 32 bit libraries should resolve. For popular Linux distributions, only a single package need be installed.

7.1.3 On Windows

On Windows, you can edit the PATH environment variable for the logged in user by going to the control panel, selecting the System item and clicking on the Environment tab.

8 LOADER INSTALLATION

The ionCube Loader is an engine extension to PHP that performs processing and execution of encoded files, as well as other important operations such as license validation. If a Loader is not pre-installed on a target system, a *Loader Wizard* PHP script is available to indicate which Loader is required, where to download it from our website, and also what installation options are available. The Loader Wizard is available at http://www.ioncube.com/lw/

There are two possible installation methods for the Loader, and the following sections give some specific details about this.

8.1 Loader Naming

Loaders are named with the following conventions, dependent on the operating system and whether or not the PHP build has thread safety enabled.

Operating System	*Thread Safety Enabled*	*Loader Name*
Unix (Linux, FreeBSD etc.)	No	`ioncube_loader_<os>_<PHP version>.so` e.g. `ioncube_loader_lin_5.4.so`
Unix (Linux, FreeBSD etc.)	Yes	`ioncube_loader_<os>_<PHP version>_ts.so` e.g. `ioncube_loader_fre_5.4_ts.so`
Windows	Yes / No	`ioncube_loader_win_<PHP version>.dll` e.g. `ioncube_loader_win_5.4.dll`

In the table above, `<os>` is the first 3 letters of the operating system, e.g. `lin` for Linux, `fre` for FreeBSD etc., and PHP version are the first two numbers from the PHP version. Different Loader packages are available for various architectures, i.e. dependent on whether a platform is 32 or 64 bit and the processor type, but note that Loader naming is independent of architecture.

8.2 Installation in a php.ini File

The recommended method for installation is via a `php.ini` file, requiring the addition of one line to reference the location of the Loader. Example lines to add are shown below, where we will assume that the Loader is located in `/usr/local/ioncube` on Unix and `C:/PHP/ext` on Windows, but this need not be the case. Our example also assumes PHP 5.4 except where noted.

On Linux with thread safety disabled (PHP 5.4)

```
zend_extension = /usr/local/ioncube/ioncube_loader_lin_5.4.so
```

On Linux with thread safety enabled (PHP 5.4)

```
zend_extension = /usr/local/ioncube/ioncube_loader_lin_5.4_ts.so
```

On Linux with thread safety enabled (PHP 5.2)

```
zend_extension_ts = /usr/local/ioncube/ioncube_loader_lin_5.2.so
```

Note: Prior to PHP 5.3, `zend_extension_ts` should be used if PHP has thread safety enabled.

On Windows with thread safety disabled or enabled (PHP 5.4)

```
zend_extension = "c:/PHP/ext/ioncube_loader_win_5.4.dll"
```

Following any change to the php.ini file, the web server software should be restarted unless PHP is being used as CGI, where a fresh PHP process is launched to handle each new request.

8.3 Run-time Installation (legacy)

An alternative install mechanism is called runtime installation. With this method, the first encoded file to be processed for a request will search for a Loader and install it automatically if the server configuration supports this. This technique uses the PHP `dl()` function, which if enabled and PHP is before PHP 5.2.5, would usually be possible if Loaders are installed in a directory called `ioncube` in the root (top level) web directory or above. Due to changes with the PHP `dl()` function, from PHP 5.2.5 onwards the required Loader should be installed in the PHP extensions directory for this method to be possible. As of PHP 5.3, most SAPI's have removed `dl()`, so runtime install is not in general feasible.