

Composer CMS: Content Make System

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Chapter 1

Composer CMS



“Creating Made Simple.”

Composer CMS v3.1	License: GPL
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– Formats: webpage / html / pdf / epub / revealjs.html / docx

1.1 Overview

Composer is a simple but powerful CMS based on Pandoc, Bootstrap and GNU Make. It is a document and website build system that processes directories or individual files in Markdown format.

Traditionally, CMS stands for Content Management System. Composer is designed to be a Content **M**ake System. Written content is vastly easier to manage as plain text, which can be crafted with simple editors and tracked with revision control. However, professional documentation, publications, and websites require formatting that is dynamic and feature-rich.

Pandoc is an extremely powerful document conversion tool, and is a widely used standard for processing Markdown into other formats. While it has reasonable defaults, there are a large number of options, and additional tools are required for some formats and features.

Composer consolidates all the necessary components, simplifies the options, and prettifies the output formats, all in one place. It also serves as a build system, so that large repositories can be managed as documentation archives or published as Static Websites.

```
#####
$ >> Composer CMS v3.0 :: ../composer
#####
$ MAKEFILE_LIST      [../composer/Makefile]
$ COMPOSER_INCLUDES [../composer/_composer.mk]
$ CURDIR             [../composer]
$ MAKECMDGOALS       [all] (all)
$ MAKELEVEL          [1]
#####
I >> Creating      ../composer :: Composer-v3.0_Manual.pdf
I >> Creating      ../composer :: README.html
I >> Creating      ../composer :: README.pdf
I >> Creating      ../composer :: README.epub
I >> Creating      ../composer :: README_revealjs.html
I >> Creating      ../composer :: README.docx
```

1.2 Quick Start

Use make help to get started:

```
make [-f .../ Makefile] [ variables ] <filename>.<extension>
```

```
make [-f .../Makefile] [variables] <target>
```

Create documents from source Markdown files (see Formatting Variables):

```
make README.html
make Composer-v3.1.Manual.html c_list="README.md LICENSE.md"
```

Save a persistent configuration (see Recommended Workflow and Configuration Settings):

```
make template >.composer.mk
$EDITOR .composer.mk
    override COMPOSER_TARGETS := .targets Composer-v3.1.Manual.html
    override Composer-v3.1.Manual.html := README.md LICENSE.md
make clean
make all
```

Recursively install and build an entire directory tree (see Recommended Workflow):

```
cd .../documents
mv .../composer .Composer
make -f .Composer/Makefile install-all
make all-all
```

See help-all for full details and additional targets.

1.3 Principles

The guiding principles of Composer:

- All source files in readable plain text
- Professional output, suitable for publication
- Minimal dependencies, and entirely command-line driven
- Separate content and formatting; writing and publishing are independent
- Inheritance and dependencies; global, tree, directory and file overrides
- Fast; both to initiate commands and for processing to complete

Direct support for key document types (see Document Formatting):

- Static Websites
- HTML
- PDF
- EPUB
- Reveal.js Presentations
- Microsoft Word & PowerPoint

1.4 Requirements

Composer has almost no external dependencies. All needed components are integrated directly into the repository, including Pandoc and YQ. Composer does require a minimal command-line environment based on GNU tools, particularly GNU Make, which is standard for all GNU/Linux systems. The Windows Subsystem for Linux for Windows and MacPorts for macOS both provide suitable environments.

The one large external requirement is TeX Live, and it can be installed using the package managers of each of the above systems. It is only necessary for creating PDF files.

Below are the versions of the components in the repository, and the tested versions of external tools for this iteration of Composer. Use check to validate your system.

Repository	Commit	License
Pandoc	2.18	GPL
YQ	v4.24.2	MIT
Bootstrap	v5.1.3	MIT
Bootlint	v1.1.0	MIT
Bootswatch	v5.1.3	MIT
Font Awesome	6.1.2	MIT / CC-BY
Water.css	d950cbc9f8607521587f	MIT
Markdown Viewer	3bd40d84c071379440b3	MIT
Markdown Themes	6b3643d0f703727d8472	None
Reveal.js	4.3.1	MIT
Google Firebase	v12.4.7	MIT

Project	Composer Version
GNU Bash	5.1.16
– GNU Coreutils	8.32
– GNU Findutils	4.9.0
– GNU Sed	4.8
GNU Make	4.3
– Pandoc	2.18
– YQ	4.24.2
– TeX Live PDF	2021 3.141592653-2.6-1.40.22
Supporting Tools:	–
– Git SCM	2.37.4
– GNU Diffutils	3.8
– Rsync	3.2.4

Markdown Viewer is included both for its CSS stylesheets, and for real-time rendering of Markdown files as they are being written. To install, follow the instructions in the README.md.

Google Firebase is only necessary for uploading via the export-all and export-force targets. Binaries are included in the repository, but do not seem to work with all versions of their respective operating systems. If the included binary fails, use `+update–firebase–tools` to build a local version (see `+update-*`).

The versions of the integrated repositories can be changed, if desired (see Repository Versions).

Chapter 2

Composer Operation

2.1 Recommended Workflow

2.1.1 Directory Tree

The ideal workflow is to put Composer in a top-level `.Composer` for each directory tree you want to manage, creating a structure similar to this:

```
.../.Composer
.../
.../tld/
.../tld/sub/
```

To save on disk space, using a central Composer install for multiple directory trees, the `init` target can be used to create a linked `.Composer` directory:

```
make -f .../Makefile init
```

The directory tree can then be converted to a Composer documentation archive (Quick Start example):

```
make -f .Composer/Makefile install-all
make all-all
```

2.1.2 Customization

If specific settings need to be used, either globally or per-directory, `.composer.mk` and `.composer.yml` files can be created (see Configuration Settings, Quick Start example):

```
make template >.composer.mk          && $EDITOR .composer.mk
make template.yml >.composer.yml     && $EDITOR .composer.yml
```

Custom targets can also be defined, using standard GNU Make syntax (see Custom Targets).

2.1.3 Important Notes

GNU Make does not support file and directory names with spaces in them, and neither does Composer. Documentation archives which have such files or directories will produce unexpected results.

It is fully supported for input files to be symbolic links to files that reside outside the documentation archive:

```
cd .../tld
ln -rs .../README.md ./
make README.html
```

Similarly to source code, GNU Make is meant to only run one instance within the directory at a time, and Composer shares this requirement. It should be run as a single user, to avoid duplication and conflicts. Concurrent runs will produce unexpected results. It is highly recommended to set MAKEJOBS to a value greater than the default, to speed up processing.

It is best practice to install-force after every Composer upgrade, in case there are any changes to the Makefile template (see Templates). Everything in Composer sources from the main Makefile, so that is the only file which requires review to see what changes have been made between versions.

2.1.4 Next Steps

The archive is ready, and each directory is both a part of the collective and its own individual instance. Targets can be run per-file, per-directory, or recursively through an entire directory tree. The most commonly used targets are in Primary Targets.

Welcome to Composer. *Happy Making!*

2.2 Document Formatting

```
#WORKING:DOCS#####  
... / artifacts / pandoc / template.*  
... / artifacts / pandoc / reference.*  
... / artifacts / composer / composer-site.css  
... / artifacts / composer / composer-html.css
```

As outlined in Overview and Principles, a primary goal of Composer is to produce beautiful and professional output. Pandoc does reasonably well at this, and yet its primary focus is document conversion, not document formatting. Composer fills this gap by specifically tuning a select list of the most commonly used document formats.

The input Markdown format used by Composer is the Pandoc default. However, the Pandoc Extensions list has been modified slightly. See that section and the Pandoc Markdown documentation for the exact list and details for each.

Further options for each document type are in Formatting Variables. All improvements not exposed as variables will apply to all documents created with a given instance of Composer.

Note that all the files referenced below are embedded in the ‘Embedded Files’ section of the Makefile. They are exported by the +release target (using +setup), and will be overwritten whenever it is run.

2.2.1 Static Websites

Bootstrap is a leading web development framework, capable of building static webpages that behave dynamically. Static sites are very easy and inexpensive to host, and are extremely responsive compared to truly dynamic webpages.

Composer uses this framework to transform an archive of simple text files into a modern website, with the appearance and behavior of dynamically indexed pages.

```
#WORKING:DOCS#####  
... / artifacts / bootstrap / bootstrap.js  
... / artifacts / bootstrap / bootstrap.css  
... / artifacts / composer / composer.site.css  
... / artifacts / composer / composer.site.overlay.light.css  
... / artifacts / composer / composer.site.overlay.dark.css  
... / artifacts / images / logo.img  
... / artifacts / images / icon.img
```

Bootlint Bootswatch

```
... / bootswatch / docs / index.html
```

– Examples: Example Website / README.site.html

2.2.2 HTML

In addition to being a helpful real-time rendering tool, Markdown Viewer includes several CSS stylesheets that are much more visually appealing than the Pandoc default, and which behave like normal webpages, so Composer uses them for all HTML-based document types, including EPUB.

Information on installing Markdown Viewer for use as a Markdown rendering tool is in Requirements.

– Example: README.html

2.2.3 PDF

The default formatting for PDF is geared towards academic papers and the typesetting of printed books, instead of documents that are intended to be purely digital.

Internally, Pandoc first converts to LaTeX, and then uses TeX Live to convert into the final PDF. Composer inserts customized LaTeX to modify the final output:

```
.../artifacts/composer/composer-pdf.header
```

```
#WORK # .../artifacts/composer/composer.pdf.latex
```

– Example: README.pdf

2.2.4 EPUB

The EPUB format is essentially packaged HTML, so Composer uses the same Markdown Viewer CSS stylesheets for it.

– Example: README.epub

2.2.5 Reveal.js Presentations

The CSS for Reveal.js presentations has been modified to create a more traditional and readable end result. The customized version is at:

```
.../artifacts/composer/composer-revealjs.css
```

```
#WORK # .../artifacts/composer/composer.revealjs.css
```

```
#WORK # rework this
```

It links in a default theme from the `.../reveal.js/dist/theme` directory. Edit the location in the file, or use `c_css` to select a different theme.

It is set up so that a logo can be placed in the upper right hand corner on each slide, for presentations that need to be branded. Simply copy an image file to the logo location:

```
.../artifacts/images/logo.img
```

To have different logos for different directories (using Recommended Workflow, Configuration Settings and Precedence Rules):

```
#WORK # no longer the best way to do this... cd .../presentations cp .../logo.img ./ ln -rs
.../.Composer/artifacts/composer/composer.revealjs.css ./composer-revealjs.css echo 'override c_type :=
revealjs' »./composer.mk make all
```

– Example: README.revealjs.html

2.2.6 Microsoft Word & PowerPoint

The internal Pandoc templates for these are exported by Composer, so they are available for customization:

```
.../artifacts/pandoc/reference.docx
.../artifacts/pandoc/reference.pptx
```

They are not currently modified by Composer.

– Example: README.docx

2.2.7 Plain Text

This output format is still parsable by Pandoc as valid Markdown, but is formatted to read as pure plain text that is only 80 columns wide. There are cases where this conversion is desirable, such as technical documentation, where it is easier to write and format as Pandoc Markdown but the output needs to be in a universally accepted text layout and presentation.

Composer currently does not modify this format, other than using the `--columns=80` and `--wrap=auto` options to Pandoc.

2.2.8 Pandoc Markdown

Output Markdown that is specific to Pandoc. This is for linting or creating standardized versions of source files for shared archives.

Due to the expressed purposes of this format, Composer will never modify it.

2.3 Configuration Settings

```
#WORKING:DOCS#####
```

2.3.1 GNU Make (.composer.mk)

2.3.2 Pandoc & Bootstrap (.composer.yml)

Composer uses `.composer.mk` files for persistent settings and definition of Custom Targets. By default, they are chained together across their Makefile tree (see `COMPOSER_INCLUDE` in Control Variables). A `.composer.mk` in the main Composer directory will be global to all directories. The targets and settings in the most local file override all others (see Precedence Rules).

The easiest way to create new `.composer.mk` and `.composer.yml` files is with the `template` and `template.yml` targets (Quick Start example):

```
make template >.composer.mk      && $EDITOR .composer.mk
make template.yml >.composer.yml  && $EDITOR .composer.yml
```

All variable definitions must be in the override `[variable] := [value]` format from the `template` target. Doing otherwise will result in unexpected behavior, and is not supported. The regular expression that is used to detect them:

```
override [[: space:]]+([\^[[: space:]]+)[[: space:]]+[:][=]
```

Variables can also be specified per-target, using GNU Make syntax:

```
README.%.%: override c_toc := 0
README.revealjs.html: override c_toc :=
```

In this case, there are multiple definitions that could apply to `README.revealjs.html`, due to the `%` wildcard. Since the most specific target match is used, the final value for `c_toc` would be empty.

Example configuration files:

```
.../.composer.mk
.../artifacts/.composer.yml
```

```
#WORK .../artifacts/README.site.yml .../README.site.html.yml
```

2.4 Precedence Rules

All processing in Composer is done in global-to-local order, so that the most local file or value always takes precedence.

2.4.1 Configuration Files

Both `.composer.mk` and `.composer.yml` files follow the model illustrated in `COMPOSER_INCLUDE` under Control Variables. This means that the values in the most local file override all others.

```
#WORKING:DOCS#####
```

All values in `.composer.mk` take precedence over everything else, including environment variables.

2.4.2 Header & CSS Files

```
#WORK # the same for all...
```

```
.../artifacts/composer/composer-pdf.header
.../.composer-pdf.header
./README.pdf.header
```

```
#WORK # the same for all...
```

```
.../artifacts/composer/composer-html.css
.../.composer-html.css
./README.html.css
```

```
#WORK # the c_css layering...
```

1. `c_site` » Bootstrap
2. `c_css` #WORK # comment 1. `COMPOSER_DIR/artifacts/composer/composer-c_type.css`
3. `COMPOSER_ART/composer/composer-c_type.css`
4. `COMPOSER_INCLUDE` » `.../.composer-c_type.css`
5. `CURDIR/c_base.<extension>.css`
6. `c_site` » `.composer.yml :: [site-config].[css_overlay]`

The first four are core to Composer, and are always included. `COMPOSER_INCLUDE` and `CURDIR` files are optional, and only used if they exist.

2.4.3 Variables & Aliases

Variable aliases, such as `COMPOSER_DEBUGIT/c_debug/V` are prioritized in the order shown, with `COMPOSER_*` taking precedence over `c_*`, over the short alias.

Full `COMPOSER_*` variable names should always be used in `.composer.mk` files, to avoid being overwritten by recursive environment persistence.

2.4.4 Pandoc Options

```
#WORK # does not seem to be documented anywhere... test it, with examples here, regardless... # seems to be:
yaml_metadata, -defaults, -metadata*, etc.
```

2.5 Specifying Dependencies

If there are files or directories that have dependencies on other files or directories being processed first, this can be done simply using GNU Make syntax in `.composer.mk`:

```
LICENSE.html: README.html
subdirs-all-artifacts: subdirs-all-pandoc
```

This would require `README.html` to be completed before `LICENSE.html`, and for `pandoc` to be processed before `artifacts`. Directories need to be specified with the `subdirs-all-*` syntax in order to avoid conflicts with target names (see Custom Targets).

Chaining of dependencies can be as complex and layered as GNU Make will support. Note that if a file or directory is set to depend on a target, that target will be run whenever the file or directory is called.

2.6 Custom Targets

If needed, custom targets can be defined inside a `.composer.mk` file (see Configuration Settings), using standard GNU Make syntax. Naming them as `*-export`, `*-clean` or `*-all` will include them in runs of the respective targets. Targets with any other names will need to be run manually, or included in `COMPOSER_TARGETS`.

`#WORK # ...` or, via Specifying Dependencies

There are a few limitations when naming custom targets. Targets starting with the regular expression `[.+]` are hidden, and are skipped by auto-detection. Additionally, there is a list of reserved targets in `Reserved`, along with a list of reserved variables.

Any included `.composer.mk` files are sourced early in the main Composer Makefile, so matching targets and most variables will be overridden. In the case of conflicting targets, GNU Make will produce warning messages. Variables will have their values changed silently. Changing the values of internal Composer variables is not recommended or supported.

A final note is that `*-export`, `*-clean` and `*-all` targets are stripped from `COMPOSER_TARGETS`. In cases where this results in an empty `COMPOSER_TARGETS`, there will be a message and no actions will be taken.

2.7 Repository Versions

There are a few internal variables used by `+update` to select the repository and binary versions of integrated components (see Requirements). These are exposed for configuration, but only within `.composer.mk`:

- `PANDOC_VER` (must be a binary version number)
- `PANDOC_CMT` (defaults to `PANDOC_VER`)
- `YQ_VER` (must be a binary version number)
- `YQ_CMT` (defaults to `YQ_VER`)
- `BOOTSTRAP_CMT`
- `BOOTLINT_CMT`
- `BOOTSWATCH_CMT`
- `FONTAWES_CMT`
- `WATERCSS_CMT`
- `MDVIEWER_CMT`
- `MDTHEMES_CMT`
- `REVEALJS_CMT`
- `FIREBASE_VER` (must be a binary version number)
- `FIREBASE_CMT` (defaults to `FIREBASE_VER`)

Binaries for Pandoc, YQ and Google Firebase are installed in their respective directories. By moving or removing them, or changing the version numbers and foregoing all relevant variations of `+update`, the system versions will be used instead. This will work as long as the commit versions match, so that supporting files are in alignment, particularly for Pandoc.

It is possible that changing the versions will introduce incompatibilities with Composer, which are usually impacts to the prettification of output files (see Document Formatting). There may also be upstream changes to the command-line options for these tools.

Chapter 3

Composer Variables

3.1 Formatting Variables

Variable	Purpose	Value
<code>c_site</code> ~ S	Enable Static Websites	
<code>c_type</code> ~ T	Desired output format	html
<code>c_base</code> ~ B	Base of output file	
<code>c_list</code> ~ L	List of input files(s)	
<code>c_lang</code> ~ a	Language for document headers	en-US
<code>c_logo</code> ~ g	Logo image (HTML formats)	logo.img
<code>c_icon</code> ~ i	Icon image (HTML formats)	icon.img
<code>c_css</code> ~ c	Location of CSS file	theme.html-default.css
<code>c_toc</code> ~ t	Table of contents depth	
<code>c_level</code> ~ l	Chapter/slide header level	2
<code>c_margin</code> ~ m	Size of margins (PDF)	0.8in
<code>c_options</code> ~ o	Custom Pandoc options	

Values (<code>c_type</code>)	Format	Extension
html	HyperText Markup Language	*.html
pdf	Portable Document Format	*.pdf
epub	Electronic Publication	*.epub
revealjs	Reveal.js Presentation	*.revealjs.html
docx	Microsoft Word	*.docx
pptx	Microsoft PowerPoint	*.pptx
text	Plain Text (well-formatted)	*.txt
markdown	Markdown (for testing)	*.md.txt

- *Other `c_type` values will be passed directly to Pandoc*
- *Special `c_css` values:*
 - `css_alt` = Use the alternate default stylesheet
 - `0` = Revert to the Pandoc default
- *Special `c_toc` value: `0` = List all headers, and number sections*
- *Special `c_level` value: `0` = Varies by `c_type` (see `c_level`)*
- *An empty `c_margin` value enables individual margins:*
 - `c_margin_top` ~ `mt`
 - `c_margin_bottom` ~ `mb`
 - `c_margin_left` ~ `ml`

– `c_margin_right` ~ `mr`

3.1.1 `c_site`

#WORK

3.1.2 `c_type` / `c_base` / `c_list`

The compose target uses these variables to decide what to build and how. The output file is `[c_base].<extension>`, and is constructed from the `c_list` input files, in order. The `<extension>` is selected based on the `c_type` table above. Generally, it is not required to use the compose target directly for supported `c_type` files, since it is run automatically based on what output file `<extension>` is specified.

The automatic input file detection works by matching one of the following (Quick Start example):

```
make README.html           ~ README (empty [COMPOSER_EXT])
make README.html           ~ README.md
make README.md.html        ~ README.md
make Composer-v3.1.Manual.html  c_list="README.md LICENSE.md"
```

Other values for `c_type`, such as `json` or `man`, for example, can be passed through to Pandoc manually:

```
make compose c_type="json" c_base="README" c_list="README.md"
make compose c_type="man" c_base="Composer-v3.1.Manual" c_list="README.md"
```

Any of the file types supported by Pandoc can be created this way. The only limitation is that the input files must be in Markdown format.

Finally, note that `c_list` has alternate meanings for these targets:

- `commit`
- `site-list`

3.1.3 `c_lang`

- Primarily for PDF, this specifies the language that the table of contents (`c_toc`) and chapter headings (`c_level`) will use.

3.1.4 `c_logo`

#WORK # # revealjs

#WORK # document /g/_data/zactive/coding/composer/artifacts/images

.../artifacts/images

3.1.5 `c_icon`

#WORK # html # revealjs

3.1.6 `c_css`

#WORK # document /g/_data/zactive/coding/composer/artifacts/theme

.../artifacts/themes

- By default, a CSS stylesheet from Markdown Viewer is used for HTML and EPUB, and one of the Reveal.js themes is used for Reveal.js Presentations. This variable allows for selection of a different file in all cases.
- The special value `css_alt` selects the alternate default stylesheet. Using 0 reverts to the Pandoc default.
- Composer includes several different CSS files, depending on the `c_type` of the file being built. See Header & CSS Files under Precedence Rules for details on how they are layered together.

3.1.7 `c_toc`

- Setting this to a value of [1–6] creates a table of contents at the beginning of the document. The numerical value is how many header levels deep the table should go. A value of 6 lists all header levels.
- Using a value of 0 lists all header levels, and additionally numbers all the sections, for reference.

3.1.8 `c_level`

- This value has different effects, depending on the `c_type` of the output document.
- For HTML, any value enables `section-divs`, which wraps headings and their section content in `<section>` tags and attaches identifiers to them instead of the headings themselves. This is for CSS styling, and is generally desired.
- For PDF, there are 3 top-level division types: `part`, `chapter`, and `section`. This sets the top-level header to the specified type, which changes the way the document is presented. Using `part` divides the document into “Parts”, each starting with a stand-alone title page. With this division type, each second-level heading starts a new “Chapter”. A chapter simply starts a new section on a new page, and lower-level headings continue as running portions within it. Finally, `section` creates one long running document with no blank pages or section breaks (like a HTML page). To set the desired value:
 - `part` ~ 0
 - `chapter` ~ 2
 - `section` ~ Any other value
- For EPUB, this creates chapter breaks at the specified level, starting the section on a new page. The special 0 simply sets it to the default value of 2.
- For Reveal.js Presentations, the top-level headings can persist on the screen when moving through slides in their sections, or they can rotate out as their own individual slides. Setting to 0 enables persistent headings, and all other values use the default.
- An empty value defers to the Pandoc defaults in all cases.

3.1.9 `c_margin`

- The default margins for PDF are formatted for typesetting of printed books, where there is a large amount of open space around the edges and the text on each page is shifted away from where the binding would be. This is generally not what is desired in a purely digital PDF document.
- This is one value for all the margins. Setting it to an empty value exposes variables for each of the individual margins: `c_margin_top`, `c_margin_bottom`, `c_margin_left` and `c_margin_right`.

3.1.10 `c_options`

- In some cases, it may be desirable to add additional Pandoc options. Anything put in this variable will be passed directly to Pandoc as additional command-line arguments.

3.2 Control Variables

Variable	Purpose	Value
<code>MAKEJOBS</code>	Parallel processing threads	1 (makejobs)
<code>COMPOSER_DEBUGIT</code>	Use verbose output	(debugit)
<code>COMPOSER_DOCOLOR</code>	Enable title/color sequences	(boolean)
<code>COMPOSER_INCLUDE</code>	Include all: <code>.composer.mk</code>	1 (boolean)
<code>COMPOSER_DEPENDS</code>	Sub-directories first: all	(boolean)
<code>COMPOSER_KEEPING</code>	Log entries / cache files	100 (keeping)
<code>COMPOSER_LOG</code>	Timestamped command log	<code>.composer.log</code>
<code>COMPOSER_EXT</code>	Markdown file extension	<code>.md</code>
<code>COMPOSER_TARGETS</code>	See: <code>all/clean</code>	<code>config/targets</code>
<code>COMPOSER_SUBDIRS</code>	See: <code>all/clean/install</code>	<code>config/targets</code>
<code>COMPOSER_EXPORTS</code>	See: <code>c_site/export</code>	<code>config</code>
<code>COMPOSER_IGNORES</code>	See: <code>c_site/export</code>	<code>config</code>

- `MAKEJOBS` ~ `c_jobs` ~ `J`
- `COMPOSER_DEBUGIT` ~ `c_debug` ~ `V`
- `COMPOSER_DOCOLOR` ~ `c_color` ~ `C`
- *(makejobs) = empty is disabled / number of threads / 0 is no limit*
- *(debugit) = empty is disabled / any value enables / 0 is full tracing*
- *(keeping) = empty is none / number to keep / 0 is no limit*
- *(boolean) = empty is disabled / any value enables*

3.2.1 MAKEJOBS

`#WORK` # a small number of large directories will process faster than a large number of small ones, especially with site # windows subsystem for linux (increase memory...): `/mnt/c/Users/*/wslconfig` # `[wsl2]` # `processors=2` # `memory=2GB` # `swap=0`

- By default, Composer progresses linearly, doing one task at a time. If there are dependencies between items, this can be beneficial, since it ensures things will happen in a particular order. The downside, however, is that it is very slow.
- Composer supports GNU Make parallel execution, where multiple threads can be working through tasks independently. Experiment with lower values first. When recursing through large directories, each make that instantiates into a sub-directory has it's own jobs server, so the total number of threads running can proliferate rapidly.
- This can drastically speed up execution, processing thousands of files and directories in minutes. However, values that are too high can exhaust system resources. With great power comes great responsibility.
- A value of 0 does parallel execution with no thread limit.

3.2.2 COMPOSER_DEBUGIT

- Provides more explicit details about what is happening at each step. It generates a lot more output, and can be slower. It will also be hard to read unless `MAKEJOBS` is set to 1.
- Full tracing using 0 outputs complete GNU Make and GNU Bash debugging information. This is extraordinarily verbose, and it is recommended to pipe it to a file for review.
- This variable is repurposed in `+debug` to pass a list of targets to test.

3.2.3 COMPOSER_DOCOLOR

- Composer uses colors to make all output and help text easier to read. The escape sequences used to accomplish this can create mixed results when reading in an output file or a `$PAGER`, or just make it harder to read for some.
- This is also used internally for targets like `+debug-file`, `+test-file` and `template`, where plain text is required.

3.2.4 COMPOSER_INCLUDE

- On every run, Composer walks through the `MAKEFILE_LIST`, all the way back to the main Makefile, looking for `.composer.mk` files in each directory. By default, it reads all of them in order starting from the main Composer directory. When this option is disabled, only Composer and the current directory will be used.
- In the example directory tree below, it will read all of them in order from top to bottom: `.Composer/.composer.mk`, `.composer.mk`, `tld/.composer.mk`, and finally `tld/sub/.composer.mk`. With this disabled, only `.Composer/.composer.mk` and `tld/sub/.composer.mk` are read.
- This is why it is best practice to have a `.Composer` directory at the top level for each documentation archive (see Recommended Workflow). Not only does it allow for strict version control of Composer per-archive, it also provides a mechanism for setting Composer Variables globally.
- This option is enabled by default, so care should be taken with variables that are generally specific to a particular directory or file, and are not meant to be applicable globally. They will be propagated down the tree, which is generally not desired except in very specific cases. Using `COMPOSER_CURDIR` to limit their scope is highly recommended, similar to `template` (see Templates).
- This setting also causes `.composer.yml` and `.composer-*` files to be processed in an identical manner (see Configuration Files and Header & CSS Files under Precedence Rules).

Example directory tree (see Recommended Workflow):

```
.../. Composer/Makefile
.../. Composer/.composer.mk
.../Makefile
.../.composer.mk
.../tld/Makefile
.../tld/.composer.mk
.../tld/sub/Makefile
.../tld/sub/.composer.mk
```

3.2.5 COMPOSER_DEPENDS

- When doing all-all, Composer will process the current directory before recursing into sub-directories. This reverses that, and sub-directories will be processed first.
- In the example directory tree in `COMPOSER_INCLUDE` above, the default would be: `.../`, `.../tld`, and then `.../tld/sub`. If the higher-level directories have dependencies on the sub-directories being run first, this will support that by doing them in reverse order, processing them from bottom to top.
- This has no effect on any other targets, such as `install` or `clean`.

3.2.6 COMPOSER_KEEPING

```
#WORK # 0 deletes all... # COMPOSER_KEEPING test & document # clean-clean test & document #
clean-clean only runs on all, so single files could go forever...?
```

3.2.7 COMPOSER_LOG

- Composer appends to a `.composer.log` log file in the current directory whenever it executes Pandoc. This provides some accounting, and is used by `list` to determine which `*.md` files have been updated since the last time Composer was run.
- This setting can change the name of the log file, or disable it completely (empty value).
- It is removed each time `clean` is run.

3.2.8 COMPOSER_EXT

- The Markdown file extension Composer uses: `*.md`. This is for auto-detection of files to add to `COMPOSER_TARGETS`, files to output for `list`, and other tasks. This is a widely used standard, including GitHub. Another commonly used extension is: `*.markdown`.
- In some cases, they do not have any extension, such as `README` and `LICENSE` in source code directories. Setting this to an empty value causes them to be detected and output. It also causes all other files to be processed, because it becomes the wildcard `*`, so use with care. It is likely best to use `COMPOSER_TARGETS` to explicitly set the targets list in these situations.

```
#WORK # add a note that a per-target "override README.html := " is probably best... # come to think of it,
probably should just go back to not allowing an empty value...
```

```
#WORK # document! # .targets # COMPOSER_TARGETS # COMPOSER_SUBDIRS # COM-
POSER_EXPORTS # COMPOSER_IGNORES
```

3.2.9 COMPOSER_TARGETS

```
#WORK # does not pick up .* files/directories # these are actually excluded in COMPOSER_IGNORES now...
# wildcard '*' is taken literally
```

- The list of output files to create or delete with `clean` and `all`. Composer does auto-detection using `c_type` and `COMPOSER_EXT`, so this does not usually need to be set. Hidden files that start with `.` are skipped.
- Setting this manually disables auto-detection. It can also include non-file targets added into a `.composer.mk` file (see Custom Targets).

- The `.null` target is special, and when used as a value for `COMPOSER_TARGETS` or `COMPOSER_SUBDIRS` it will display a message and do nothing. A side-effect of this target is that an actual file or directory named `.null` will never be created or removed by Composer.
- An empty value triggers auto-detection.
- Use `config` or `targets` to check the current value.

3.2.10 COMPOSER_SUBDIRS

`#WORK # wildcard '*' is taken literally`

- The list of sub-directories to recurse into with `install`, `clean`, and `all`. The behavior and configuration is identical to `COMPOSER_TARGETS` above, including auto-detection and the `.null` target. Hidden directories that start with `.` are skipped.
- An empty value triggers auto-detection.
- Use `config` or `targets` to check the current value.

3.2.11 COMPOSER_EXPORTS

`#WORK # this one will be complicated... maybe? # has, effectively, the same .null behavior as above... # also overridden by COMPOSER_IGNORES # document .targets token... # .null has no special meaning and is removed if present # hidden variables... # /g/_data/zactive/coding/composer/+Composer # # # # # wildcard '*' globs`

3.2.12 COMPOSER_IGNORES

`#WORK # either remove site here, or add it to the ones above... # also, there are also implications for site-library... # .targets has no special meaning and is removed if present # .null has no special meaning and is removed if present # hard-coded +Composer .* +* / .* + # . +* should also be documented in the "Operation" section somewhere... # wildcard '*' globs`

- The list of `COMPOSER_TARGETS`, `COMPOSER_SUBDIRS` and `COMPOSER_EXPORTS` to skip with `export`, `site`, `install`, `clean`, and `all`. This allows for selective auto-detection, when the list of items to process is larger than those to leave alone.
- Use `config` to check the current value.

3.3 Helper Variables

Variable	Purpose	Value
<code>CURDIR</code>	GNU Make current directory	<code>\$PWD :: make</code>
<code>COMPOSER_CURDIR</code>	Detects <code>COMPOSER_INCLUDE</code>	<code>CURDIR :: .composer.mk</code>
<code>COMPOSER_DIR</code>	Location of Composer	<code>.../composer</code>
<code>COMPOSER_ROOT</code>	Topmost level of current tree	<code>.../composer</code>
<code>COMPOSER_EXPORT</code>	Target: export	<code>COMPOSER_ROOT/+Composer (mk)</code>
<code>COMPOSER_LIBRARY</code>	Target: site/site-library	<code>(yaml)</code>
<code>COMPOSER_SRC</code>	Repositories and downloads	<code>COMPOSER_DIR/.sources</code>
<code>COMPOSER_ART</code>	Composer supporting files	<code>COMPOSER_DIR/artifacts</code>
<code>COMPOSER_DAT</code>	Pandoc supporting files	<code>COMPOSER_ART/pandoc</code>
<code>COMPOSER_TMP</code>	Cache and working directory	<code>CURDIR/.composer.tmp</code>

- *(mk)* = configurable in `.composer.mk`
- *(yaml)* = configurable in `.composer.yaml`

These are internal variables only exposed within `.composer.mk` files. See Configuration Settings and Custom Targets for more details.

3.3.1 CURDIR

#WORK

3.3.2 COMPOSER_CURDIR

#WORK # can also be used to detect first pass, using “ifeq”, to prevent “warning: overriding recipe for target” warnings...

- This is set to CURDIR when reading in a .composer.mk file in the GNU Make running directory, and is empty otherwise. This provides a way to limit particular portions of the file to the local directory, regardless of whether COMPOSER_INCLUDE is set or not.
- Uses for this are to limit the availability of targets to the local directory, or to prevent variable values from recursing down to sub-directories.
- Generally speaking, it is best practice to completely encapsulate all .composer.mk files with this, except for the specific portions that need to be passed down, similar to template (see Templates).

Example usage in a .composer.mk file:

```
ifeq ($(COMPOSER_CURDIR),)
    ...
endif
```

3.3.3 COMPOSER_DIR

#WORK

3.3.4 COMPOSER_ROOT

#WORK

3.3.5 COMPOSER_EXPORT

#WORK # hidden variables...

- [_EXPORT_DIRECTORY]
- [_EXPORT_GIT_REPO]
- [_EXPORT_GIT_BNCH]
- [_EXPORT_FIRE_ACCT]
- [_EXPORT_FIRE_PROJ]

3.3.6 COMPOSER_LIBRARY

#WORK

3.3.7 COMPOSER_SRC

#WORK

3.3.8 COMPOSER_ART

#WORK

3.3.9 COMPOSER_DAT

#WORK

3.3.10 COMPOSER_TMP

#WORK

Chapter 4

Composer Targets

4.1 Primary Targets

Target	Purpose
help	Basic help overview (default)
help-all	Console version of README.md (no reference sections)
template	Print settings template: .composer.mk
template.yml	Print settings template: .composer.yml
template.md	Print markdown file template
compose	Document creation engine (see <code>c_type</code>)
site	Build HTML files as Static Websites (see <code>c_site</code>)
site-all	Do site recursively: <code>COMPOSER_SUBDIRS</code>
site-force	Do site recursively: including <code>COMPOSER_LIBRARY</code>
site-clean	Remove <code>c_site</code> only: <code>COMPOSER_LIBRARY/COMPOSER_TMP</code>
install	Current directory initialization: Makefile
install-all	Do install recursively (no overwrite)
install-force	Recursively force overwrite of Makefile files
clean	Remove output files: <code>COMPOSER_TARGETS :: *-clean</code>
clean-all	Do clean recursively: <code>COMPOSER_SUBDIRS</code>
*-clean	Any targets named this way will also be run by clean
all	Create output files: <code>COMPOSER_TARGETS :: *-all</code>
all-all	Do all recursively: <code>COMPOSER_SUBDIRS</code>
*-all	Any targets named this way will also be run by all
list	Show updated files: <code>*COMPOSER_EXT » COMPOSER_LOG</code>

4.1.1 help / help-all

- Outputs all of the documentation for Composer. The README.md has a few extra sections covering internal targets, along with reserved target and variable names, but is otherwise identical to the help-all output.

4.1.2 template / template.yml / template.md

- Prints useful templates for creating new files (see Templates):
 - Composer .composer.mk (see Configuration Settings)
 - Composer `c_site` and Pandoc .composer.yml (see Static Websites and Configuration Settings)
 - Pandoc markdown

4.1.3 compose

- This is the very core of Composer, and does the actual work of the Pandoc conversion. Details are in the `c_type / c_base / c_list` section of Formatting Variables.

4.1.4 site / site-all / site-force

#WORK # site rebuilds indexes, force recursively

4.1.5 site-clean

#WORK

4.1.6 install / install-all / install-force

- Creates the necessary Makefile files to set up a directory or a directory tree as a Composer archive. By default, it will not overwrite any existing files.
- Doing a simple install will only create a file in the current directory, whereas `install-all` will recurse through the entire directory tree. A full `install-force` is the same as `install-all`, with the exception that it will overwrite all Makefile files.
- The topmost directory will have the Makefile created for it modified to point to Composer.

4.1.7 clean / clean-all / *-clean

- Deletes all `COMPOSER_TARGETS` output files in the current directory, and then runs all `*-clean` targets.
- Doing `clean-all` does the same thing recursively, through all the `COMPOSER_SUBDIRS`.

4.1.8 all / all-all / *-all

- Creates all `COMPOSER_TARGETS` output files in the current directory, and then runs all `*-all` targets.
- Doing `all-all` does the same thing recursively, through all the `COMPOSER_SUBDIRS`.

4.1.9 list

- Outputs all the `COMPOSER_EXT` files that have been modified since `COMPOSER_LOG` was last updated. Acts as a quick reference to see if anything has changed.
- Since the `COMPOSER_LOG` file is updated whenever Pandoc is executed, this target will primarily be useful when `all` is the only target used to create files in the directory.

4.2 Additional Targets

Target	Purpose
+release	Upgrade all tools and supporting files to next versions
+release-all	Also make README.* files and Static Websites
+update	Update all included components (see Requirements)
+update-all	Additionally perform all source code builds
+update-list	Show changes made to each (see Repository Versions)
+update-*	Complete fetch and build for a specific component
+debug	Diagnostics, tests targets list in <code>COMPOSER_DEBUGIT</code>
+debug-file	Export +debug results to a plain text file
check	List system packages and versions (see Requirements)
check-all	Complete check package list, and system information
config	Show values of all Composer Variables
config-all	Complete config, including environment variables
config.*	Export individual Composer Variables values
config.yml	JSON export of <code>.composer.yml</code> configuration

Target	Purpose
targets	List all available targets for the current directory
init	Create and link a <code>.Composer</code> in current directory
init-force	Completely reset and relink an existing <code>.Composer</code>
commit	Git commit of current directory tree or <code>c_list</code>
commit-all	Automatic commit, without <code>\$EDITOR</code> step
export	Synchronize <code>+Composer</code> export of <code>COMPOSER_ROOT</code>
export-all	Also publish to upstream hosting providers
export-force	Publish only, without synchronizing first
*-export	Any targets named this way will also be run by export
site-library	Build or update the <code>COMPOSER_LIBRARY</code>
site-list	<code>COMPOSER_LIBRARY</code> for current directory or <code>c_list</code>
site-list-all	Do site-list for current directory tree
site-list-list	All metadata fields and values, sorted by most used
site-list-null	List files which are missing metadata fields
site-list.*	Direct export of metadata or index, <code>c_list</code> searchable

4.2.1 `+release` / `+release-all` / `+update` / `+update-all` / `+update-list` / `+update-*`

`#WORK` break this up into two sections...

- Using the repository configuration (see Repository Versions), these fetch and build all external components.
- Simply doing `+update` will fetch all source repositories and pre-built binaries.
- The `+update-all` target additionally performs all relevant source code builds. For some repositories, this is necessary to create the final output files used by Composer, and in other cases this builds local binaries which replace the included ones. Additional external tools may be required to perform these steps (see `check-all`).
- To review the resulting differences between upstream sources and the local directories, use `+update-list`.
- Each component directory has a corresponding `+update-*` target which performs the equivalent of `+update-all` for only that component.
- Finally, `+release` runs `+update-all` and `+setup`, which together turn the current directory into a functional clone of Composer, including overwriting all supporting files.
- Beyond this, `+release-all` also uses `+setup-all` and `site-template` to build the `README.*` files and create an example Static Websites in the `_site` directory.
- One of the unique features of Composer is that everything needed to compose itself is embedded in the Makefile, so it is fully self-contained.

Creating a development clone:

```
#WORK # should create a “development/contributing/support” section, and reference this... # also:  
https://github.com/garybenett/gary-os/blob/main/.vimrc
```

```
mkdir .../composer  
cd .../composer  
make -f .../.Composer/Makefile +release
```

Note that some additional external tools may be required to perform the builds, such as `npm` (see `check-all`).

4.2.2 `+debug` / `+debug-file`

- This is the tool to use for any support issues. Submit the output file to: `composer@garybenett.net`
- Internally, it also runs:
 - `+test`
 - `check-all`
 - `config-all`
 - `targets`
- If issues are occurring when running a particular set of targets, list them in `COMPOSER_DEBUGIT`.
- For general issues, run in the top-level directory (see Recommended Workflow). For specific issues, run in the directory where the issue is occurring.

For example:

```
make COMPOSER_DEBUGIT="README.html Composer-v3.1.Manual.html" +debug-file
```

4.2.3 check / check-all

- Use check to see the minimum list of required external components and their versions, in relation to the system installed versions.
- Doing check-all will show the complete list of tools that are used by Composer, along with which targets they are needed by.

4.2.4 config / config-all / config.* / config.yml / targets

#WORK break this up into two sections...

- The current values of all Composer Variables is output by config, and config-all will additionally output all environment variables.
- Individual Composer Variables can be exported with config.*. This is useful for scripting in .composer.mk (see Custom Targets).
- A JSON version of the .composer.yml configuration is exported with config.yml. This is available for any external scripting, such as in .composer.mk (see Custom Targets), and is parsable with YQ.
- A structured list of detected targets, *-export, *-clean and *-all targets, COMPOSER_TARGETS, and COMPOSER_SUBDIRS is printed by targets.
- Together, config and targets reveal the entire internal state of Composer.

4.2.5 init / init-force

#WORK

4.2.6 commit / commit-all

- Using the directory structure in Recommended Workflow, .../ is considered the top-level directory. Meaning, it is the last directory before linking to Composer.
- If the top-level directory is a Git repository (it has <directory>.git or <directory>/git), this target creates a commit of the current directory tree with the title format below.
- For example, if it is run in the .../ tld directory, that entire tree would be in the commit, including .../ tld/sub. The purpose of this is to create quick and easy checkpoints when working on documentation that does not necessarily fit in a process where there are specific atomic steps being accomplished.
- When this target is run in a Composer directory, it uses itself as the top-level directory. When calling Composer directly using -f, the current directory is used.
- Using commit-all automatically does the commit instead of opening the text editor in the \$EDITOR variable.
- In the context of commit, the c_list variable is repurposed to select the limited list of directories and/or files that should be committed. All selected directories and files must exist in the current directory tree.

Commit title format:

```
[Composer CMS v3.1 :: 2024-07-03T06:52:35-07:00]
```

Example using c_list:

```
make commit c_list="Makefile artifacts"
```

4.2.7 export / export-all / export-force / *-export

```
#WORK # ... and then runs all *-export targets. # hidden variables... # /.g/_data/zactive/coding/composer/+Composer  
# # # #
```

4.2.8 site-library

#WORK

4.2.9 site-list / site-list-all / site-list-list / site-list-null / site-list.*

#WORK # use site-list-list first, to track down, then site-list-all for details, because it can be expensive to run...
.metadata and .index

- In the context of site-list, the c_list variable is repurposed to #WORK

4.3 Internal Targets

Target	Purpose
help-help	Complete README.md content (similar to help-all)
.headers	Series of targets that handle all informational output
.headers-template	For testing default .headers output
.headers-template-all	For testing complete .headers output
.make	Complete contents of GNU Make internal state
.targets	Extracted list of all targets from .make
.null	Placeholder to specify or detect empty values
+setup	Extracts embedded files from Makefile
+setup-all	Also builds all README.* output files
+test	Test suite, validates all supported features
+test-file	Export +test results to a plain text file
+test-dir	Only create directory structure, and do +release
+test-list	Output available test cases, for running directly
check-help	Minimized check output (used for Requirements)
site-.composer.mk	COMPOSER_LIBRARY configured template: .composer.mk
site-.composer.yml	COMPOSER_LIBRARY configured template: .composer.yml
site-template	Static Websites example _site in COMPOSER_DIR
site-template+test	Version configured to test specific variations
site-template-config	Only create directory structure and source files
subdirs	Expands COMPOSER_SUBDIRS into subdirs--* targets
list-list	Same as list, but only lists the files (no headers)

None of these are intended to be run directly during normal use. They are only listed here for completeness.

Chapter 5

Reference

5.1 Configuration

5.1.1 Pandoc Extensions

Composer uses the markdown input format, with these extensions:

```
ascii_identifiers
auto_identifiers
emoji
fancy_lists
fenced_divs
footnotes
gfm_auto_identifiers
header_attributes
implicit_figures
implicit_header_references
inline_notes
intraword_underscores
line_blocks
link_attributes
markdown_in_html_blocks
pandoc_title_block
pipe_tables
raw_html
raw_tex
shortcut_reference_links
smart
strikeout
superscript
task_lists
yaml_metadata_block
```

5.1.2 Templates

The install target Makefile template (for reference only):

```
override COMPOSER_MY_PATH := $(abspath $(dir $(lastword $(MAKEFILE_LIST))))
override COMPOSER_TEACHER := $(abspath $(dir $(COMPOSER_MY_PATH)))/Makefile
include $(COMPOSER_TEACHER)
```

Use the template target to create .composer.mk files:

```
# override MAKEJOBS := 1
# override COMPOSER_DEBUGIT :=
# override COMPOSER_DOCOLOR :=
# override COMPOSER_INCLUDE := 1
# override COMPOSER_DEPENDS :=
# override COMPOSER_KEEPING := 100
# override COMPOSER_LOG := .composer.log
# override COMPOSER_EXT := .md
# override c_site :=
# override c_type := html
# override c_lang := en-US
# override c_logo := $(COMPOSER_DIR)/artifacts/images/logo.img
# override c_icon := $(COMPOSER_DIR)/artifacts/images/icon.img
# override c_css := $(COMPOSER_DIR)/artifacts/themes/theme.html-default.css

ifneq ($(COMPOSER_CURDIR),)

# override COMPOSER_TARGETS := README.site.html README.html README.pdf README.epub README.
# override COMPOSER_SUBDIRS := .null
# override COMPOSER_EXPORTS := *.html *.pdf *.epub *.revealjs.html *.docx *.pptx *.txt *.m
# override COMPOSER_IGNORES := +Composer .* +*
# override c_base :=
# override c_list :=
# override c_toc :=
# override c_level := 2
# override c_margin := 0.8in
# override c_margin_top :=
# override c_margin_bottom :=
# override c_margin_left :=
# override c_margin_right :=
# override c_options :=

endif
```

Use the `template.yml` target to create `.composer.yml` files:

```
variables:
  title-prefix: null
# site-config:
#   brand: null
#   homepage: null
#   search:
#     name: null
#     site: null
#     call: null
#     form: null
#   copyright: null
#   composer: 1
#   header: null
#   footer: null
#   css_overlay: dark
#   copy_protect: null
#   cols_break: lg
#   cols_scroll: 1
#   cols_order:
#     - 1
#     - 2
```

```
#      - 3
#      cols_reorder:
#      - 1
#      - 3
#      - 2
#      cols_size:
#      - 3
#      - 7
#      - 2
#      cols_resize:
#      - 6
#      - 12
#      - 6
#      metainfo: '<date> :: <title ><|> — <author |; >|>'
#      metainfo_null: '*(none)*'
#      metalist:
#      author:
#      title: Author
#      display: '*Authors: <|>, <|>*'
#      tags:
#      title: Tag
#      display: '*Tags: <|>, <|>*'
#      readtime: '*Reading time: <word> words, <time> minutes*'
#      readtime_wpm: 220
#      site-library:
#      folder: null
#      auto_update: null
#      append: null
#      digest_title: Latest Updates
#      digest_continue: '[...]'
#      digest_permalink: '*(permalink to full text)*'
#      digest_chars: 1024
#      digest_count: 10
#      digest_expanded: 0
#      digest_spacer: 1
#      lists_expanded: 0
#      lists_spacer: 1
#      sitemap_title: Site Map
#      sitemap_expanded: 0
#      sitemap_spacer: 1
#      site-nav-top: null
#      site-nav-bottom: null
#      site-nav-left: null
#      site-nav-right: null
#      site-info-top: null
#      site-info-bottom: null
```

Use the template.md target to create new markdown files:

```
———
title: "Composer CMS: Content Make System"
date: 2024-07-03
author:
  - Gary B. Genett
tags:
  - Composer
———
```

Happy Making!

5.1.3 Defaults

The default `.composer.mk` in the Composer directory:

```
#####
# Composer CMS :: GNU Make Configuration
#####
ifneq ($(COMPOSER_CURDIR),)
#####

#####
# Settings

override COMPOSER_TARGETS := \
    README.site.html \
    README.html \
    README.pdf \
    README.epub \
    README.revealjs.html \
    README.docx \
    LICENSE.html

#>> README.pptx \
#>> README.txt \
#>> README.md.txt \

override COMPOSER_SUBDIRS := .null

#####
# Defaults

README.% LICENSE.%%: override c_logo := artifacts/images/logo-v1.0.png
README.% LICENSE.%%: override c_icon := artifacts/images/icon-v1.0.png
README.% LICENSE.%%: override c_toc := 0

#####
# Files

override README.site.html := artifacts/README.site.md
README.site.html: override c_site := 1
README.site.html: override c_toc :=

override README.pdf := README.md LICENSE.md

override README.revealjs.html := artifacts/README.revealjs.md
README.revealjs.html: override c_toc :=

LICENSE.html: override c_site := 1
LICENSE.html: override c_toc :=

#####
endif
#####
# End Of File
#####
```

The template `.composer.yml` in the `artifacts` directory:

```
#####
# Composer CMS :: YAML Configuration
#####

variables:

#####
# site

  title-prefix: EXAMPLE SITE

#####
  site-config:

    brand: LOGO / BRAND
    homepage: http://www.garybgenett.net/projects/composer
    search:
#>>  name: SEARCH
      name: |
        <!-- composer >> icon search -->
      site: https://duckduckgo.com
      call: q
      form: |
        <!-- composer >> form sites garybgenett.net -->
        <!-- composer >> form ia web -->
        <!-- composer >> form kae d -->
        <!-- composer >> form ko 1 -->
        <!-- composer >> form kp -1 -->
        <!-- composer >> form kv 1 -->
        <!-- composer >> form kz -1 -->
#>>  copyright: COPYRIGHT
      copyright: |
        <!-- composer >> icon gpl -->
        <!-- composer >> icon cc-by-nc-nd -->
        <!-- composer >> icon copyright -->
        COPYRIGHT
#>>  composer: 1

#>>  header: null
#>>  footer: null

#>>  css_overlay: dark
#>>  copy_protect: null

#>>  cols_break: lg
#>>  cols_scroll: 1
#>>  cols_order: [ 1, 2, 3 ]
#>>  cols_reorder: [ 1, 3, 2 ]
#>>  cols_size: [ 3, 7, 2 ]
#>>  cols_resize: [ 6, 12, 6 ]

#>>  metainfo: "<date> :: <title ><|> — <author |; >"
#>>  metainfo_null: "*(none)*"
#>>  metalist:
#>>    author:
```

```
#>> title: "Author"
#>> display: "*Authors: <|>, <|>*"
#>> tags:
#>> title: "Tag"
#>> display: "*Tags: <|>, <|>*"

#>> readtime: "*Reading time: <word> words, <time> minutes*"
#>> readtime_wpm: 220

#####
site-library:

    folder: #>> null
#>> auto_update: null

#>> append: null

#>> digest_title: "Latest Updates"
#>> digest_continue: "[...]"
#>> digest_permalink: "*(permalink to full text)*"
#>> digest_chars: 1024
#>> digest_count: 10
#>> digest_expanded: 0
#>> digest_spacer: 1

#>> lists_expanded: 0
#>> lists_spacer: 1

#>> sitemap_title: "Site Map"
#>> sitemap_expanded: 0
#>> sitemap_spacer: 1

#####
site-nav-top:

MENU:
- MAIN: <composer_root>/index.html
- PAGES:
- Composer README: <composer_root>/../index.html
- spacer
- Introduction:
- _: <composer_root>/index.html
- Default Site: <composer_root>/null/index.html
- Configured Site: <composer_root>/config/index.html
- Pandoc Markdown: <composer_root>/pandoc/MANUAL.html
- Bootstrap Default: <composer_root>/bootstrap/site/content/docs/5.1/getting-started.html
- Layout & Elements:
- _: <composer_root>/examples.html
- Metainfo Page: <composer_root>/config/pages.html
- Metainfo File: <composer_root>/config/pages/2022-01-01+template_00.html
- Themes & Overlays: <composer_root>/themes/index.html
- Default Library Page:
- _: <composer_root>/_library/index.html
- Configured Library Page: <composer_root>/config/_library-config/index.html
#>> - Default Digest Page: <composer_root>/index-digest.html
#>> - Configured Digest Page: <composer_root>/config/index-digest.html
```

```
CONTENTS:
  - CONTENTS:
    - contents
#>>  - contents 6
#>>  - contents 0
SPACE:
  - spacer
LIBRARY:
  - DATES:
    - library date
  - AUTHORS:
    - library author
  - TAGS:
    - library tags

#####
site-nav-bottom:

PATH:
  - SITEMAP: <composer_root>/_library/sitemap.html
INFO:
  - metalist author
  - metalist tags

#####
site-nav-left:

BEGIN:
MENU:
  - fold-begin 0 . 0 LEFT FOLD
  - _: |
    * ITEM 1
    * ITEM 2
    * ITEM 3
  - fold-end
MIDDLE:
  - spacer
TEXT:
  - box-begin 0 LEFT BOX
  - _: |
    LEFT TEXT
  - box-end
SPACE:
  - spacer
CONTENTS:
  - box-begin 0 CONTENTS
  - metainfo
  - contents
#>>  - contents 6
#>>  - contents 0
  - metalist author
  - metalist tags
  - readtime
  - box-end
END:
```

```
#####
site-nav-right:

BEGIN:
MENU:
  - fold-begin 0 . 0 RIGHT FOLD
  - _: |
    * ITEM 1
    * ITEM 2
    * ITEM 3
  - fold-end
MIDDLE:
  - spacer
TEXT:
  - box-begin 0 RIGHT BOX
  - _: |
    RIGHT TEXT
  - box-end
SPACE:
  - spacer
LIBRARY:
  - fold-begin group library
  - fold-begin 0 0 library DATES
  - library date
  - fold-end
  - fold-begin 0 0 library AUTHORS
  - library author
  - fold-end
  - fold-begin 0 . library TAGS
  - library tags
  - fold-end
  - fold-end group
END:

#####
site-info-top:

TEXT:
  - _: |
    TOP TEXT
INFO:
#>> - metainfo
#>> - metalist author
#>> - metalist tags
#>> - readtime
ICON:
  - icon github https://github.com/garybgenett/composer Composer CMS
#>> - _: |
#>> <!-- composer >> icon gpl -->
#>> <!-- composer >> icon cc-by-nc-nd -->
#>> <!-- composer >> icon copyright -->

#####
site-info-bottom:

TEXT:
```



```
    - _: |
        BOTTOM TEXT
INFO:
#>> - metainfo
#>> - metalist author
#>> - metalist tags
    - readtime
ICON:

#####
# End Of File
#####
```

5.2 Reserved

5.2.1 Target Names

Do not create targets which match these, or use them as prefixes:

```
+debug
+release
+setup
+test
+update
.headers
.make
.null
.targets
all
check
clean
commit
compose
config
export
help
init
install
list
site
subdirs
targets
template
```

5.2.2 Variable Names

Do not create variables which match these, and avoid similar names:

```
+debug-output
+setup-targets
+test -.headers
+test -COMPOSER_INCLUDE-.composer-html.css
+test -COMPOSER_INCLUDE-.composer.mk
+test -COMPOSER_INCLUDE-.composer.mk-/
+test -COMPOSER_INCLUDE-.composer.yml
+test -COMPOSER_INCLUDE-init
```

```
+test -COMPOSER_INCLUDE-init -run
+test -count
+test -done
+test -fail
+test -find
+test -hold
+test -init
+test -load
+test -log
+test -make
+test -mark
+test -name
+test -pwd
+test -run
+test -speed-init
+test -speed-init -site
+update -. null
+update -all
+update -bin
+update -bin -os
+update -bld
+update -bld -list
+update -commands
+update -src
+update -targets
.
.headers
.headers -action
.headers -compose
.headers -compose -options
.headers -dir
.headers -file
.headers -line
.headers -list -make
.headers -list -path
.headers -note
.headers -options
.headers -options -files
.headers -options -out
.headers -rm
.headers -skip
.headers -subdirs
.headers -table
/
7Z
7Z_VER
ASPELL
ASPELL_DIR
BASE64
BASH
BASH_VER
BOOTLINT_CMT
BOOTLINT_DIR
BOOTLINT_HOME
BOOTLINT_LIC
BOOTLINT_NAME
```

BOOTLINT_SRC
BOOTSTRAP_ART_CSS
BOOTSTRAP_ART_JS
BOOTSTRAP_CMT
BOOTSTRAP_DEF_CSS
BOOTSTRAP_DEF_JS
BOOTSTRAP_DIR
BOOTSTRAP_DIR_CSS
BOOTSTRAP_DIR_JS
BOOTSTRAP_DOC_VER
BOOTSTRAP_HOME
BOOTSTRAP_LIC
BOOTSTRAP_NAME
BOOTSTRAP_SRC
BOOTSWATCH_CMT
BOOTSWATCH_CSS_ALT
BOOTSWATCH_CSS_DARK
BOOTSWATCH_CSS_LIGHT
BOOTSWATCH_CSS_SOLAR_DARK
BOOTSWATCH_CSS_SOLAR_LIGHT
BOOTSWATCH_DIR
BOOTSWATCH_HOME
BOOTSWATCH_LIC
BOOTSWATCH_NAME
BOOTSWATCH_SRC
CAT
CHECKIT
CHMOD
CLEANER
CODEBLOCK
COLUMNS
COLUMN_2
COMMA
COMMENTED
COMPOSER
COMPOSER_ART
COMPOSER_BASENAME
COMPOSER_BIN
COMPOSER_CLOSING
COMPOSER_CMS
COMPOSER_COLOR
COMPOSER_COMPOSER
COMPOSER_CONTACT
COMPOSER_CONTENTS
COMPOSER_CONTENTS_DIRS
COMPOSER_CONTENTS_EXT
COMPOSER_CONTENTS_FILES
COMPOSER_CONV
COMPOSER_CSS
COMPOSER_CSS_PUBLISH
COMPOSER_CURDIR
COMPOSER_CUSTOM
COMPOSER_DAT
COMPOSER_DEBUGIT
COMPOSER_DEBUGIT_ALL
COMPOSER_DEPENDS

COMPOSER_DIR
COMPOSER_DOCOLOR
COMPOSER_DOMAIN
COMPOSER_EXPORT
COMPOSER_EXPORTS
COMPOSER_EXPORTS_DEFAULT
COMPOSER_EXPORTS_EXT
COMPOSER_EXPORTS_LIST
COMPOSER_EXPORT_DEFAULT
COMPOSER_EXPORT_REGEX
COMPOSER_EXT
COMPOSER_EXT_DEFAULT
COMPOSER_EXT_SPECIAL
COMPOSER_FILENAME
COMPOSER_FIND
COMPOSER_FULLNAME
COMPOSER_HEADLINE
COMPOSER_HIDDEN_FILES
COMPOSER_HOMEPAGE
COMPOSER_ICON
COMPOSER_ICON_VER
COMPOSER_IGNORES
COMPOSER_IGNORES_DEFAULT
COMPOSER_IGNORES_EXT
COMPOSER_IGNORES_LIST
COMPOSER_IMAGES
COMPOSER_INCLUDE
COMPOSER_INCLUDES
COMPOSER_INCLUDES_DIRS
COMPOSER_KEEPING
COMPOSER_LIBRARY
COMPOSER_LIBRARY_AUTO_UPDATE
COMPOSER_LIBRARY_DIR
COMPOSER_LIBRARY_PATH
COMPOSER_LIBRARY_ROOT
COMPOSER_LIBRARY_ROOT_REGEX
COMPOSER_LICENSE
COMPOSER_LICENSE_HEADLINE
COMPOSER_LOG
COMPOSER_LOGO
COMPOSER_LOGO_VER
COMPOSER_LOG_DEFAULT
COMPOSER_MY_PATH
COMPOSER_NOCOLOR
COMPOSER_OPTIONS
COMPOSER_OPTIONS_EXPORT
COMPOSER_OPTIONS_GLOBAL
COMPOSER_OPTIONS_LOCAL
COMPOSER_OPTIONS_MAKE
COMPOSER_OPTIONS_PANDOC
COMPOSER_OPTIONS_PUBLISH
COMPOSER_PANDOC
COMPOSER_REGEX
COMPOSER_REGEX_DEFINE
COMPOSER_REGEX_OVERRIDE
COMPOSER_REGEX_PREFIX

COMPOSER_RELEASE
COMPOSER_REPOPAGE
COMPOSER_RESERVED
COMPOSER_RESERVED_DOITALL
COMPOSER_RESERVED_DOITALL_ENV
COMPOSER_RESERVED_SKIP
COMPOSER_ROOT
COMPOSER_ROOT_PATH
COMPOSER_ROOT_REGEX
COMPOSER_SELF
COMPOSER_SETTINGS
COMPOSER_SRC
COMPOSER_SUBDIRS
COMPOSER_SUBDIRS_DEFAULT
COMPOSER_SUBDIRS_LIST
COMPOSER_TAGLINE
COMPOSER_TARGETS
COMPOSER_TARGETS_DEFAULT
COMPOSER_TARGETS_LIST
COMPOSER_TEACHER
COMPOSER_TECHNAME
COMPOSER_TIMESTAMP
COMPOSER_TINYNAME
COMPOSER_TMP
COMPOSER_TMP_FILE
COMPOSER_VERSION
COMPOSER_YML
COMPOSER_YML_DATA
COMPOSER_YML_DATA_METALIST
COMPOSER_YML_DATA_PARSE
COMPOSER_YML_DATA_SKEL
COMPOSER_YML_DATA_SKEL_COMMENT
COMPOSER_YML_DATA_SKEL_METALIST
COMPOSER_YML_DATA_VAL
COMPOSER_YML_LIST
COMPOSER_YML_LIST_FILE
CONFIGS
CONVICT
COPYRIGHT_FULL
COPYRIGHT_SHORT
COREUTILS_VER
CP
CREATED_TAGLINE
CREATOR
CSS_ALT
CSS_ICONS
CSS_ICON_ARROW_D
CSS_ICON_ARROW_L
CSS_ICON_ARROW_R
CSS_ICON_ARROW_U
CSS_ICON_COPYRIGHT
CSS_ICON_GITHUB
CSS_ICON_MENU
CSS_ICON_SEARCH
CSS_THEME
CSS_THEMES

CURL
CURL_VER
CUSTOM_HTML_CSS
CUSTOM_LPDF_LATEX
CUSTOM_PRES_CSS
CUSTOM_PUBLISH_CSS
CUSTOM_PUBLISH_CSS_OVERLAY
CUSTOM_PUBLISH_SH
DATE
DATEMARK
DATENOW
DATESTAMP
DATESTRING
DEBUGIT
DEPTH_DEFAULT
DEPTH_MAX
DESC_DOCX
DESC_EPUB
DESC_HTML
DESC_LINT
DESC_LPDF
DESC_PPTX
DESC_PRES
DESC_TEXT
DIFF
DIFFUTILS_VER
DISTRIB
DIST_ICON_v1.0
DIST_LOGO_v1.0
DIST_SCREENSHOT_v1.0
DIST_SCREENSHOT_v3.0
DIST_SCREENSHOT_v4.0
DIVIDE
DOFORCE
DOITALL
DOMAKE
DONOIDO
DOSETUP
DO_HEREEDOC
ECHO
ENDOLINE
ENV
ENV_MAKE
EOL
EXAMPLE
EXPAND
EXPORTS
EXPR
EXTN_DEFAULT
EXTN_DOCX
EXTN_EPUB
EXTN_HTML
EXTN_LINT
EXTN_LPDF
EXTN_OUTPUT
EXTN_PPTX

EXTN_PRES
EXTN_TEXT
EXT_ICON_CC
EXT_ICON_GPL
FIND
FINDUTILS_VER
FIND_ALL
FIREBASE
FIREBASE_BIN
FIREBASE_BIN_BLD
FIREBASE_CMT
FIREBASE_DIR
FIREBASE_HOME
FIREBASE_LIC
FIREBASE_LNX_BIN
FIREBASE_LNX_DST
FIREBASE_LNX_SRC
FIREBASE_LNX_ZIP
FIREBASE_MAC_BIN
FIREBASE_MAC_DST
FIREBASE_MAC_SRC
FIREBASE_MAC_ZIP
FIREBASE_NAME
FIREBASE_RUN
FIREBASE_SRC
FIREBASE_URL
FIREBASE_VER
FIREBASE_VER_COMPOSER
FIREBASE_WIN_BIN
FIREBASE_WIN_DST
FIREBASE_WIN_SRC
FIREBASE_WIN_ZIP
FONTAWES_CMT
FONTAWES_DIR
FONTAWES_HOME
FONTAWES_LIC
FONTAWES_NAME
FONTAWES_SRC
GIT
GITIGNORE_FIREBASE
GITIGNORE_GIT
GITIGNORE_LIST
GITIGNORE_NPM
GITIGNORE_WGET
GIT_LOG_COUNT
GIT_LOG_FORMAT
GIT_OPTS_CONVICT
GIT_REPO
GIT_REPO_DO
GIT_RUN
GIT_RUN_COMPOSER
GIT_RUN_REPO
GIT_VER
GZIP_BIN
GZIP_VER
HEAD

HEADERS
HEADER_L
HEAD_MAIN
HELPOUT
HEREDOC_COMPOSER_MK
HEREDOC_COMPOSER_MK_PUBLISH
HEREDOC_COMPOSER_MK_PUBLISH_BOOTSTRAP_DIR
HEREDOC_COMPOSER_MK_PUBLISH_BOOTSTRAP_TREE
HEREDOC_COMPOSER_MK_PUBLISH_CONFIGS
HEREDOC_COMPOSER_MK_PUBLISH_EXAMPLE
HEREDOC_COMPOSER_MK_PUBLISH_NOTHING
HEREDOC_COMPOSER_MK_PUBLISH_PAGEDIR
HEREDOC_COMPOSER_MK_PUBLISH_PANDOC_DIR
HEREDOC_COMPOSER_MK_PUBLISH_SHOWDIR
HEREDOC_COMPOSER_MK_PUBLISH_SHOWDIR_TARGET
HEREDOC_COMPOSER_YML
HEREDOC_COMPOSER_YML_PUBLISH_BOOTSTRAP_DIR
HEREDOC_COMPOSER_YML_PUBLISH_BOOTSTRAP_TREE
HEREDOC_COMPOSER_YML_PUBLISH_CONFIGS
HEREDOC_COMPOSER_YML_PUBLISH_EXAMPLE
HEREDOC_COMPOSER_YML_PUBLISH_LIBRARY
HEREDOC_COMPOSER_YML_PUBLISH_NOTHING
HEREDOC_COMPOSER_YML_PUBLISH_PAGEDIR
HEREDOC_COMPOSER_YML_PUBLISH_PANDOC_DIR
HEREDOC_COMPOSER_YML_PUBLISH_SHOWDIR
HEREDOC_COMPOSER_YML_PUBLISH_TESTING
HEREDOC_COMPOSER_YML_README
HEREDOC_COMPOSER_YML_README_HACK
HEREDOC_CUSTOM_HTML_CSS
HEREDOC_CUSTOM_HTML_CSS_SOLARIZED
HEREDOC_CUSTOM_HTML_CSS_WATER_CSS_HACK
HEREDOC_CUSTOM_HTML_CSS_WATER_SRC_SOLAR
HEREDOC_CUSTOM_HTML_CSS_WATER_VAR_OVERLAY
HEREDOC_CUSTOM_HTML_CSS_WATER_VAR_SOLAR
HEREDOC_CUSTOM_HTML_PANDOC_HACK
HEREDOC_CUSTOM_HTML_TEMPLATE_HACK
HEREDOC_CUSTOM_LPDF_LATEX
HEREDOC_CUSTOM_PRES_CSS
HEREDOC_CUSTOM_PRES_CSS_HACK
HEREDOC_CUSTOM_PUBLISH_CSS
HEREDOC_CUSTOM_PUBLISH_CSS_HACK
HEREDOC_CUSTOM_PUBLISH_CSS_OVERLAY
HEREDOC_CUSTOM_PUBLISH_CSS_POST
HEREDOC_CUSTOM_PUBLISH_CSS_PRE
HEREDOC_CUSTOM_PUBLISH_CSS_TESTING
HEREDOC_CUSTOM_PUBLISH_CSS_THEME
HEREDOC_CUSTOM_PUBLISH_JS_POST
HEREDOC_CUSTOM_PUBLISH_JS_PRE
HEREDOC_CUSTOM_PUBLISH_SH
HEREDOC_GITATTRIBUTES
HEREDOC_GITCONFIG
HEREDOC_GITIGNORE
HEREDOC_LICENSE
HEREDOC_SPELL_WORDLIST
HTML_BREAK
HTML_HIDE

HTML_SPACE
INCLUDE_FILE_APPEND
INCLUDE_FILE_FOOTER
INCLUDE_FILE_HEADER
INPUT
INSTALL
KEY_FILEPATH
KEY_UPDATED
LIBRARY_APPEND
LIBRARY_APPEND_ALT
LIBRARY_APPEND_MOD
LIBRARY_AUTO_UPDATE
LIBRARY_AUTO_UPDATE_ALT
LIBRARY_DIGEST_CHARS
LIBRARY_DIGEST_CHARS_ALT
LIBRARY_DIGEST_CONTINUE
LIBRARY_DIGEST_CONTINUE_ALT
LIBRARY_DIGEST_COUNT
LIBRARY_DIGEST_COUNT_ALT
LIBRARY_DIGEST_EXPANDED
LIBRARY_DIGEST_EXPANDED_ALT
LIBRARY_DIGEST_EXPANDED_MOD
LIBRARY_DIGEST_PERMALINK
LIBRARY_DIGEST_PERMALINK_ALT
LIBRARY_DIGEST_SPACER
LIBRARY_DIGEST_SPACER_ALT
LIBRARY_DIGEST_TITLE
LIBRARY_DIGEST_TITLE_ALT
LIBRARY_DIGEST_TITLE_MOD
LIBRARY_FOLDER
LIBRARY_FOLDER_ALT
LIBRARY_LISTS_EXPANDED
LIBRARY_LISTS_EXPANDED_ALT
LIBRARY_LISTS_EXPANDED_MOD
LIBRARY_LISTS_SPACER
LIBRARY_LISTS_SPACER_ALT
LIBRARY_SITEMAP_EXPANDED
LIBRARY_SITEMAP_EXPANDED_ALT
LIBRARY_SITEMAP_EXPANDED_MOD
LIBRARY_SITEMAP_SPACER
LIBRARY_SITEMAP_SPACER_ALT
LIBRARY_SITEMAP_TITLE
LIBRARY_SITEMAP_TITLE_ALT
LIBRARY_SITEMAP_TITLE_MOD
LINERULE
LISTING
LN
LS
LS_TIME
MAKEFILE
MAKEFILE_LIST
MAKEFLAGS
MAKEFLAGS_DOFAIL
MAKEFLAGS_END
MAKEFLAGS_ENV
MAKEFLAGS_NOFAIL

MAKEJOBS
MAKEJOBS_DEFAULT
MAKEJOBS_OPTS
MAKE_DB
MAKE_VER
MARKER
MDTHEMES_CMT
MDTHEMES_DIR
MDTHEMES_HOME
MDTHEMES_LIC
MDTHEMES_NAME
MDTHEMES_SRC
MDVIEWER_CMT
MDVIEWER_CSS_ALT
MDVIEWER_CSS_DARK
MDVIEWER_CSS_DIR
MDVIEWER_CSS_LIGHT
MDVIEWER_CSS_SOLAR_DARK
MDVIEWER_CSS_SOLAR_LIGHT
MDVIEWER_DIR
MDVIEWER_HOME
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Happy Making!

Chapter 6

Composer CMS: License

6.1 Copyright

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Chapter 7

GNU GPL

Source: <https://www.gnu.org/licenses/gpl-3.0.html>

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Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

7.2 TERMS AND CONDITIONS

7.2.1 0. Definitions.

“This License” refers to version 3 of the GNU General Public License.

“Copyright” also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

“The Program” refers to any copyrightable work licensed under this License. Each licensee is addressed as “you”. “Licensees” and “recipients” may be individuals or organizations.

To “modify” a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a “modified version” of the earlier work or a work “based on” the earlier work.

A “covered work” means either the unmodified Program or a work based on the Program.

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To “convey” a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays “Appropriate Legal Notices” to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

7.2.2 1. Source Code.

The “source code” for a work means the preferred form of the work for making modifications to it. “Object code” means any non-source form of a work.

A “Standard Interface” means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The “System Libraries” of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A “Major Component”, in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The “Corresponding Source” for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work’s System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

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You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7.
7. This requirement modifies the requirement in section 4 to "keep intact all notices".
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- d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an “aggregate” if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation’s users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

7.2.7 6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

- a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.
- b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.
- c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.
- d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.
- e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A “User Product” is either (1) a “consumer product”, which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, “normally used” refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

“Installation Information” for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and

the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

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