genpro

Generate and build LaTeX papers.

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Contents

1 Concept

This is a literate programming file made to support the genpro project.

This section is reserved for a high-level abstract description of what the genpro is. In particular, the overview should walk through the program flow as much as possible, to ensure clarity of thought before coding begins.

1.1 Overview

This space intentionally left blank. Please fill it in with more details before You actually start coding.

2 Generic Project Files

These files exist in every repository, or should, anyway. As this is a literate programming file, however, they are also included here. While they can

mostly stand for themselves, I will add a sentence or two about each, as well as any deviations from the norm for this specific repo.

2.1 README

This is the all-important gateway into the repository. I follow Make a README's specification in all of my projects, as I think it is important to standardize such an outward-facing part of the documentation.

```
# genpro

One Line Description.

## Installation

There are a couple ways to install this package.

### GNU Guix

If You use [GNU Guix][a], this package is on [my channel][b]. Once You have it
set up, You can just run:

‘‘‘
guix pull
guix install genpro
‘‘‘

### Source

If You don’t want to use [GNU Guix][a], You can clone this repo and install it
Yourself.

## Usage

‘‘‘bash
genpro
‘‘‘

## Contributing
Pull Requests are welcome, as are bugfixes and extensions. Please open
```

```
issues as needed. If You contribute a feature, needs to be tests and
documentation.

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[AGPL-3.0][c]

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```

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```

2.3 Changelog

All updates to this repository should be logged here. I follow Keep a Changelog's recommendations here, because again, standardization is important for outward-facing documentation.

It's worth noting here that I will keep the links updated to the Sourcehut repository commits, as that is the main place I will be uploading the source to share.

```
# Changelog
All notable changes to this project will be documented in this file.

The format is based on [Keep a Changelog](https://keepachangelog.com/en/1.0.0/),
and this projectadheres to [Semantic Versioning](https://semver.org/spec/v2.0.0.html).

## [Unreleased]
### Added
-
### Changed
-
### Removed
-

[Unreleased]: https://git.sr.ht/~yewscion/genpro/log
```

2.4 AUTHORS

If You contribute to this repo, Your information belongs in this file. I will attempt to ensure this, but if You'd like to simply include Your information here in any pull requests, I am more than happy to accept that.

```
# This is the list of the genpro project's significant contributors.
#
# This does not necessarily list everyone who has contributed code.  To see the
# full list of contributors, see the revision history in source control.
Christopher Rodriguez <yewscion@gmail.com>
```

2.5 .gitignore

This is an important file for any git repository. I generate mine using gitignore.io right now, and add to it as needed during work on the project.

The default I normally use include emacs, linux, common lisp, scheme, latex, and autotools. Any other software used should have things added to this file, or in place of this file.

```
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Makefile.in
/ar-lib
/mdate-sh
/py-compile
/test-driver
/ylwrap
.deps/
.dirstamp

# http://www.gnu.org/software/autoconf

autom4te.cache
/autoscan.log
/autoscan-*.log
/aclocal.m4
/compile
/config.cache
/config.guess
/config.h.in
/config.log
/config.status
/config.sub
/configure
/configure.scan
/depcomp
/install-sh
```

```
/missing
/stamp-h1

# https://www.gnu.org/software/libtool/

/ltmain.sh

# http://www.gnu.org/software/texinfo

/texinfo.tex

# http://www.gnu.org/software/m4/

m4/libtool.m4
m4/ltoptions.m4
m4/ltsugar.m4
m4/ltversion.m4
m4/lt~obsolete.m4

# Generated Makefile
# (meta build system like autotools,
# can automatically generate from config.status script
# (which is called by configure script))
Makefile

### Autotools Patch ###

### CommonLisp ###
*.FASL
*.fasl
*.lisp-temp
*.dfsl
*.pfsl
*.d64fsl
*.p64fsl
*.lx64fsl
*.lx32fsl
*.dx64fsl
*.dx32fsl
*.fx64fsl
```

```
*.fx32fsl
*.sx64fsl
*.sx32fsl
*.wx64fsl
*.wx32fsl

### Emacs ###
# -*- mode: gitignore; -*-
*~
\#*\#
/.emacs.desktop
/.emacs.desktop.lock
*.elc
auto-save-list
tramp
.\#*

# Org-mode
.org-id-locations
*_archive

# flymake-mode
*_flymake.*

# eshell files
/eshell/history
/eshell/lastdir

# elpa packages
/elpa/

# reftex files
*.rel

# AUCTeX auto folder
/auto/

# cask packages
.cask/
dist/
```

```
# Flycheck
flycheck_*.el

# server auth directory
/server/

# projectiles files
.projectile

# directory configuration
.dir-locals.el

# network security
/network-security.data


### LaTeX ###
## Core latex/pdflatex auxiliary files:
*.aux
*.lof
*.log
*.lot
*.fls
*.out
*.toc
*.fmt
*.fot
*.cb
*.cb2
.*.lb

## Intermediate documents:
*.dvi
*.xdv
*-converted-to.*
# these rules might exclude image files for figures etc.
# *.ps
# *.eps
# *.pdf
```

```
## Generated if empty string is given at "Please type another file name for output:"
.pdf

## Bibliography auxiliary files (bibtex/biblatex/biber):
*.bbl
*.bcf
*.blg
*-blx.aux
*-blx.bib
*.run.xml

## Build tool auxiliary files:
*.fdb_latexmk
*.synctex
*.synctex(busy)
*.synctex.gz
*.synctex.gz(busy)
*.pdfsync

## Build tool directories for auxiliary files
# latexrun
latex.out/

## Auxiliary and intermediate files from other packages:
# algorithms
*.alg
*.loa

# achemso
acs-*.bib

# amsthm
*.thm

# beamer
*.nav
*.pre
*.snm
*.vrb
```

```
# changes
*.soc

# comment
*.cut

# cprotect
*.cpt

# elsarticle (documentclass of Elsevier journals)
*.spl

# endnotes
*.ent

# fixme
*.lox

# feynmf/feynmp
*.mf
*.mp
*.t[1-9]
*.t[1-9][0-9]
*.tfm

#(r)(e)ledmac/(r)(e)ledpar
*.end
*.?end
*.[1-9]
*.[1-9][0-9]
*.[1-9][0-9][0-9]
*.[1-9]R
*.[1-9][0-9]R
*.[1-9][0-9][0-9]R
*.eledsec[1-9]
*.eledsec[1-9]R
*.eledsec[1-9][0-9]
*.eledsec[1-9][0-9]R
*.eledsec[1-9][0-9][0-9]
```

```
*.eledsec[1-9][0-9][0-9]R

# glossaries
*.acn
*.acr
*.glg
*.glo
*.gls
*.glsdefs
*.lzo
*.lzs
*.slg
*.slo
*.sls

# uncomment this for glossaries-extra (will ignore makeindex's style files!)
# *.ist

# gnuplot
*.gnuplot
*.table

# gnuplottex
*-gnuplottex-*

# gregoriotex
*.gaux
*.glog
*.gtex

# htlatex
*.4ct
*.4tc
*.idv
*.lg
*.trc
*.xref

# hyperref
*.brf
```

```
# knitr
*-concordance.tex
# TODO Uncomment the next line if you use knitr and want to ignore its generated tikz i
# *.tikz
*-tikzDictionary

# listings
*.lol

# luatexja-ruby
*.ltjruby

# makeidx
*.idx
*.ilg
*.ind

# minitoc
*.maf
*.mlf
*.mlt
*.mtc[0-9]*
*.slf[0-9]*
*.slt[0-9]*
*.stc[0-9]*

# minted
_minted*
*.pyg

# morewrites
*.mw

# newpax
*.newpax

# nomencl
*.nlg
*.nlo
```

```
*.nls

# pax
*.pax

# pdfpcnotes
*.pdfpc

# sagetex
*.sagetex.sage
*.sagetex.py
*.sagetex.scmd

# scrwfile
*.wrt

# svg
svg-inkscape/

# sympy
*.sout
*.sympy
sympy-plots-for-*.tex/

# pdfcomment
*.upa
*.upb

# pythontex
*.pytxcode
pythontex-files-*/

# tcolorbox
*.listing

# thmtools
*.loe

# TikZ & PGF
*.dpth
```

```
*.md5
*.auxlock

# titletoc
*.ptc

# todonotes
*.tdo

# vhistory
*.hst
*.ver

# easy-todo
*.lod

# xcolor
*.xcp

# xmpincl
*.xmpi

# xindy
*.xdy

# xypic precompiled matrices and outlines
*.xyc
*.xyd

# endfloat
*.ttt
*.fff

# Latexian
TSWLatexianTemp*

## Editors:
# WinEdt
*.bak
*.sav
```

```
# Texpad
.texpadtmp

# LyX
*.lyx~

# Kile
*.backup

# gummi
.*.swp

# KBibTeX
*~[0-9]*

# TeXnicCenter
*.tps

# auto folder when using emacs and auctex
./auto/*
*.el

# expex forward references with \gathertags
*-tags.tex

# standalone packages
*.sta

# Makeindex log files
*.lpz

# xwatermark package
*.xwm

# REVTeX puts footnotes in the bibliography by default, unless the nofootinbib
# option is specified. Footnotes are the stored in a file with suffix Notes.bib.
# Uncomment the next line to have this generated file ignored.
#*Notes.bib
```

```
### LaTeX Patch ###
# LIPIcs / OASIcs
*.vtc

# glossaries
*.glstex

### Linux ###

# temporary files which can be created if a process still has a handle open of a delete
.fuse_hidden*

# KDE directory preferences
.directory

# Linux trash folder which might appear on any partition or disk
.Trash-*

# .nfs files are created when an open file is removed but is still being accessed
.nfs*

### Scheme ###
*.ss~
*.ss#*
.#*.ss

*.scm~
*.scm#*
.#*.scm

# End of https://www.toptal.com/developers/gitignore/api/emacs,linux,commonlisp,scheme

# Custom Add-ons

*~

# Add any binaries/preinstall files here.
```

3 Language Project Files

These files vary based on the programming languages used in a project. Otherwise, basically the same as above: Files that need to exist for the project, but don't include code outside of defining the project in some abstract way.

That said, Guile Scheme doesn't use a project file of any kind (outside of things like guile-hall).

Instead, I've opted to use GNU Autotools, as I already was familiar with this setup.

3.1 Bootstrap

First, we need to bootstrap our setup using `autoreconf`. I use a script to automate this process, but it is really just a single command that needs to be run.

```
echo "Bootstrapping Autotools...";
autoreconf --verbose --install --force;
```

3.2 Configure

That said, it's not much good if there is no `configure.ac` file for it to use as a guide.

3.2.1 Initialize

We'll initialize autotools with the following: the name of our project, the current version, a contact email for bug reports, an expected tarball name, and the homepage (which will be the sourcehut mirror of our repo).

```
dnl Process this file with autoconf
AC_INIT([genpro],
        [0.0.1],
        [yewscion@gmail.com],
        [genpro-0.0.1.tar.gz],
        [https://sr.ht/~yewscion/genpro])
```

3.2.2 Configure Options

Next, we need to set some `./configure` specific variables.

`AC_CONFIG_SRCDIR`: This is a file we expect to be in the directory that configure is being called in, used as a safety check.

`AC_CONFIG_AUX_DIR`: Commonly specified directory for auxillary scripts, in case it is needed.

`AM_INIT_AUTOMAKE`: Set Up Automake, with sane defaults for C.

```
AC_CONFIG_SRCDIR([genpro.org])
AC_CONFIG_AUX_DIR([build-aux])
AM_INIT_AUTOMAKE([-Wall -Werror foreign])
```

3.2.3 Guile Options

Now we'll set up Guile, in the same way as above.

`GUILE_PKG`: This specifies the version of Guile we are looking for with `pkg-config`.

`GUILE_PROGS`: This macro looks for programs guile and guild, setting variables GUILE and GUILD to their paths, respectively.

`GUILE_SITE_DIR`: This looks for Guile's "site" directories. The variable $\text{GUILE}_{\text{SITE}}$ will be set to Guile's "site" directory for Scheme source files (usually something like PREFIX/share/guile/site).

```
GUILE_PKG([3.0])
GUILE_PROGS
if test "x$GUILD" = "x"; then
   AC_MSG_ERROR(['guild' binary not found;
   please check Your guile installation.])
fi
GUILE_SITE_DIR
```

3.2.4 Wrap Up

Specify the files that need to be processed, and process them. Commit with `AC_OUTPUT`.

```
AC_CONFIG_FILES([Makefile])
AC_CONFIG_FILES([pre-inst-env], [chmod +x pre-inst-env])
AC_OUTPUT
```

3.3 Make

Now we can move on to configuring how the project is made.

3.3.1 Guile

There are some Guile-specific things that made sense to keep in their own file, and so we'll just include that file here.

```
include guile.am
```

3.3.2 Sources

These are the source files that will be installed as libraries.

```
SOURCES = \
cdr255/genpro.scm
```

3.3.3 Additional Dist Files

These files are the files that should be installed alongside the rest of the program, for documentation purposes. This includes the unaltered binary scripts, the `bootstrap` file and `pre-inst-env.in` files, and the `README.md` should be included here.

```
EXTRA_DIST = \
README.md \
bootstrap \
pre-inst-env.in \
bin/genpro.scm
```

3.3.4 Binaries

There aren't really guile binaries, but there are scripts I use as though they were binaries, the ones that actually use the functions I write that are installed as libraries.

```
bin_SCRIPTS = \
genpro
```

3.3.5 Tests

We can specify the tests we want run with `make test`.

```
TESTS=run-tests
```

3.3.6 Cleaning Targets

We also have to specify how make should clean up. Here is the set of heuristics that is often quoted for what should be removed where:

- If make built it, and it is commonly something that one would want to rebuild (for instance, a .o file), then **mostlyclean** should delete it.
- Otherwise, if make built it, then **clean** should delete it.
- If configure built it, then **distclean** should delete it.
- If the maintainer built it (for instance, a .info file), then **maintainer-clean** should delete it. However maintainer-clean should not delete anything that needs to exist in order to run './configure && make'.

The associated variables are `MOSTLYCLEANFILES`, `CLEANFILES`, `DISTCLEANFILES`, and `MAINTAINERCLEANFILES`.

```
#MOSTLYCLEANFILES +=

CLEANFILES +=                           \
genpro                          \
cdr255/genpro.scm     \
genpro

DISTCLEANFILES =                        \
config.status                           \
config.log                              \
Makefile                                \
run-tests                               \
basic-tests.log

#MAINTAINERCLEANFILES +=
```

3.3.7 Actual Work

1. Binaries We should replace the shebang that calls `/usr/bin/env` with the actual guile path on the target machine. That's the main process here, which is mostly accomplished with the following call to `sed`:

   ```
   sed -e 's,#!\/usr\/bin\/env -S guile -e main -s,\#!$(GUILE) \\,g'
   ```

   The main executable is included here to speed up single-program development, but the basic pattern is the same no matter how many executable scripts are in the repository.

   ```
   genpro: src/exe.scm
   sed -e 's,#!\/usr\/bin\/env -S guile -e main -s,\#!$(GUILE) \\,g' \
    < $(srcdir)/src/exe.scm > ./genpro
   chmod +x genpro
   ```

2. Libraries The libraries contain the bulk of the code that is part of this project. We'll do the same as above, include the main library as an example of the form.

   ```
   cdr255/genpro.scm:
   mkdir -pv cdr255/
   cat < $(srcdir)/src/main.scm \
   > cdr255/genpro.scm
   ```

3. Tests

   ```
   run-tests:
   sed -e 's,#!\/usr\/bin\/env -S guile -e main -s,\#!$(GUILE) \\,g' \
   < $(srcdir)/test/maintests.scm \
   > run-tests
   chmod +x run-tests
   guile -C ./ ./run-tests
   ```

3.3.8 Cleanup

3.4 guile.am

```
moddir = $(datadir)/guile/site/$(GUILE_EFFECTIVE_VERSION)
```

```
godir = $(libdir)/guile/$(GUILE_EFFECTIVE_VERSION)/site-ccache

GOBJECTS = $(SOURCES:%.scm=%.go)

nobase_dist_mod_DATA = $(SOURCES) $(NOCOMP_SOURCES)
nobase_go_DATA = $(GOBJECTS)

# Make sure source files are installed first, so that the mtime of
# installed compiled files is greater than that of installed source
# files.  See
# <http://lists.gnu.org/archive/html/guile-devel/2010-07/msg00125.html>
# for details.
guile_install_go_files = install-nobase_goDATA
$(guile_install_go_files): install-nobase_dist_modDATA

CLEANFILES = $(GOBJECTS)
GUILE_WARNINGS = -Wunbound-variable -Warity-mismatch -Wformat
SUFFIXES = .scm .go
.scm.go:
$(AM_V_GEN)$(top_builddir)/pre-inst-env $(GUILD) \
compile $(GUILE_WARNINGS) -o "$@" "$<"
```

3.5 pre-inst-env.in

```
#!/bin/sh

abs_top_srcdir="`cd "@abs_top_srcdir@" > /dev/null; pwd`"
abs_top_builddir="`cd "@abs_top_builddir@" > /dev/null; pwd`"

GUILE_LOAD_COMPILED_PATH="$abs_top_builddir${GUILE_LOAD_COMPILED_PATH:+:}$GUILE_LOAD_C
GUILE_LOAD_PATH="$abs_top_builddir:$abs_top_srcdir${GUILE_LOAD_PATH:+:}:$GUILE_LOAD_PA
export GUILE_LOAD_COMPILED_PATH GUILE_LOAD_PATH

PATH="$abs_top_builddir:$PATH"
export PATH

exec "$@"
```

4 Code

Finally, we've gotten to the actual code!

4.1 Library

Well, almost, anyway. First, let's declare the top of each file as defining a specific module, and add any top-of-the-file comments. I refer to these blocks as the *preamble* of each file.

4.1.1 Preamble

This is the top of that file.

```
(define-module (cdr255 genpro)
  :use-module (ice-9 ftw)           ; For Filesystem Access.
  :use-module (ice-9 textual-ports) ; For Writing to Files.
  :use-module (srfi srfi-19)        ; For Dates.
  :export (make-project
           compile-project
           hash-meta-info))
```

4.1.2 Data Structure

We'll need a function to create our data structure, which will be a 7 item hash table.

It will take the values we want to store, and return a hash table with those values tied to appropriate keys.

```
(define (hash-meta-info bib
                        pro
                        aut
                        sch
                        sec
                        prf
                        dat)
  "Takes the project's metadata and turns it into a seven-element hash table.

Arguments
=========
```

```
BIB <string>: Filepath to the biblatex bibliography You are using.
PRO <string>: Title of the project or paper.
AUT <string>: Name of the Author(s).
SCH <string>: Name of the School/Organization the paper was published under.
SEC <string>: The section, website, or journal that the paper was written for.
PRF <string>: Professor's Name (if Applicable).
DAT <string>: Canonical date of the paper in YYYY-MM-DD format (ISO8601 brief).

Returns
=======

A 7 Parameter <hash-table> with the following keys:

'bibliography <string>, from BIB.
'project <string>, from PRO. Stored in Title Case.
'author <string>, from AUT.
'school <string>, from SCH.
'section <string>, from SEC.
'professor <string>, from PRF.
'date <srfi-19 date>, from DAT. Time set to all zeros, offset to local timezone.

Side Effects
============

None. This is a purely functional function."
  (let ((table (make-hash-table 7)))
    (hashq-create-handle! table 'bibliography bib)
    (hashq-create-handle! table 'project pro)
    (hashq-create-handle! table 'author aut)
    (hashq-create-handle! table 'school sch)
    (hashq-create-handle! table 'section sec)
    (hashq-create-handle! table 'professor prf)
    (hashq-create-handle! table 'date (string->date dat "~Y-~m-~d"))
    table))
```

4.1.3 Sanitize Strings

Since we'll be making a file using input from the user, we should sanitize that input somewhat.

Right now I mostly need this for the filename given to the end result,

so it takes a few characters I don't like in filenames and substitutes them appropriately.

```
(define (sanitize-string string)
  "Cleans a string up, removing characters that may be undesirable or problematic.

Arguments
=========
STRING <string>: The string to be cleaned up, in its unaltered state.

Returns
=======
A <string> that has been transformed by replacing characters with safer
alternatives.


Side Effects
============
None; Purely Functional."
  (string-map (lambda (x) (cond ((or
                                  (eq? #\! x)
                                  (eq? #\: x)
                                  (eq? #\, x)
                                  (eq? #\; x)
                                  (eq? #\' x)
                                  (eq? #\[ x)
                                  (eq? #\{ x)
                                  (eq? #\] x)
                                  (eq? #\} x)
                                  (eq? #\= x))
                                  #\_)
                                 ((eq? #\space x)
                                  #\-)
                                 (else x))) string))
```

4.1.4 Build File Name

We'll actually build the filename in this function, assembling it from our meta-info data structure and applying a sanitization function to it before downcasing it.

There will be no extension, though, so that it can be useful in more places.

```
(define (build-file-name meta-info)
  "Builds a filename (sans extension) from our meta-info data structure.

Arguments
=========
META-INFO <hash-table>: A Seven-Parameter Hash table with the keys
                        'date <srfi-19 date>, 'section <string>,
                        and 'project <string>.

Returns
=======
A <string> of the format \"date.section.project-name\", with only
the part of the section before the colon included.

Side Effects
============
None; Purely Functional."
  (string-downcase
   (sanitize-string (string-append (date->string (cdr (hashq-get-handle meta-info 'date
                    "."
                    (car (string-split (cdr (hashq-get-handle meta-info 'section)) #\:))
                    "."
                    (cdr (hashq-get-handle meta-info 'project))))))
```

4.1.5 Build Meta File

The `meta.tex` is actually the most complex of the files to build, because it uses all of the info we've stored in our meta-info data structure. Because of this, I've split the build into two functions: One to build the string (`build-meta-file-content`) and one to extract the metadata (`build-meta-file`) that calls the first function internally.

For the first function, we are going to assume the inputs are strings, since extracting the metadata has been isolated to a separate function. And then, it's just a matter of building the string with those inputs.

```
(define (build-meta-file-content bibliography
                        title
```

```
                        author
                        school
                        section
                        professor
                        due-date)
  "Builds the actual content of the meta.tex file for a latex project.

Arguments
=========
BIBLIOGRAPHY <string>: The filepath to the project's bibliography.
TITLE <string>: The title of the paper.
AUTHOR <string>: The author(s) of the paper.
SCHOOL <string>: The school/organization for the paper.
SECTION <string>: The section/project/journal for the paper.
PROFESSOR <string>: The professor that assigned the paper (if applicable).
DUE-DATE <string: The canonical date of the paper, in YYYY-MM-DD format.

Returns
=======
A <string> that represents the contents of the meta.tex file for the project.

Side Effects
============
None; Purely Functional."
  (string-append "\\newcommand{\\localbibliography}{\\string"
                 bibliography
                 "}\n\\newcommand{\\localtitle}{"
                 title
                 "}\n\\newcommand{\\localauthor}{"
                 author
                 "}\n\\newcommand{\\localschool}{"
                 school
                 "}\n\\newcommand{\\localsection}{"
                 section
                 "}\n\\newcommand{\\localprofessor}{"
                 professor
                 "}\n\\newcommand{\\localduedate}{"
                 due-date
                 "}\n\n% Generated with the wrapper script.\n"))
```

The second function will actually extract the strings that the first function is going to use and call that function.

```
(define (build-meta-file meta-info)
  "Build the meta.tex file from the meta-info data structure.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

'bibliography <string>
'project <string>
'author <string>
'school <string>
'section <string>
'professor <string>
'date <srfi-19 date>.

Returns
=======
A <string> representing the contents of the meta.tex file for this project.

Side Effects
============
None; Purely Functional."
  (build-meta-file-content (cdr (hashq-get-handle
                                 meta-info 'bibliography))
                           (cdr (hashq-get-handle meta-info 'project))
                           (cdr (hashq-get-handle meta-info 'author))
                           (cdr (hashq-get-handle meta-info 'school))
                           (cdr (hashq-get-handle meta-info 'section))
                           (cdr (hashq-get-handle meta-info 'professor))
                           (date->string (cdr (hashq-get-handle meta-info 'date)) "~1"))
```

4.1.6 Other Build Functions

The other files we need are:

- `preamble.tex`: The preamble of our latex document.

- `main.tex`: The file that ties everything together.
- `title-page.tex`: The defined title page of our latex document.
- `content.tex`: The place where the actual text of our latex document will go, eventually.

We'll create `content.tex` when we populate the project, but the rest of them will have "templates" of their own. These functions really just take a long set of properly-formatted, hardcoded strings and build a long string out of them. Not much needs to be said about them, but they need to exist.

I may refactor these someday for more flexibility.

1. Preamble

```
(define (build-preamble-file meta-info)
  "Dumps my standard preamble.tex out as a <string>.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

                        'bibliography <string>
                        'project <string>
                        'author <string>
                        'school <string>
                        'section <string>
                        'professor <string>
                        'date <srfi-19 date>

Returns
=======
A <string> representing the contents of preamble.tex.

Side Effects
============
None; Purely Functional."
  (string-append
   "\\usepackage{geometry}\n"
   "\\geometry{\n"
   "  letterpaper,\n"
```

```
"  left=1in,\n"
"  right=1in,\n"
"  top=1in,\n"
"  bottom=1in}\n"
"\\usepackage{etoolbox}\n"
"\\patchcmd{\\titlepage}\n"
"  {\\thispagestyle{empty}}\n"
"  {\\thispagestyle{fancy}}\n"
"  {}\n"
"  {}\n"
"\\usepackage{fancyhdr}\n"
"\\pagestyle{fancy}\n"
"\\lhead{}\n"
"\\chead{}\n"
"\\rhead{\\thepage}\n"
"\\lfoot{}\n"
"\\cfoot{}\n"
"\\rfoot{}\n"
"\\renewcommand{\\headrulewidth}{0pt}\n"
"\\usepackage[utf8]{inputenc}\n"
"\\usepackage{babel,csquotes,xpatch}% recommended\n"
"\\selectlanguage{english}\n"
"\\usepackage[backend=biber,style=apa]{biblatex}\n"
"\\usepackage[doublespacing]{setspace}\n"
"\\usepackage{indentfirst}\n"
"\\usepackage{fontspec}\n"
"\\setmainfont{Nimbus Roman}\n"
"\\appto{\\bibsetup}{\\raggedright}\n"
"\\bibliography{\\localbibliography}\n"
"\\DeclareLanguageMapping{english}{american-apa}\n"
"\\setlength{\\parindent}{4em}\n"
"\\usepackage{titlesec}\n"
"\\titleformat{\\section}\n"
"  {\\centering\\normalfont\\normalsize\\bfseries}{\\thesection.}{1em}{}\n"
"\\titleformat{\\subsection}\n"
"  {\\normalfont\\normalsize\\itshape}{\\thesubsection.}{1em}{}\n"
"\\titleformat{\\subsubsection}\n"
"  {\\normalfont\\normalsize\\itshape}{\\thesubsubsection.}{1em}{}\n"
"\\usepackage{graphicx}\n"
"\\graphicspath{ {./images/} }\n"
```

```
   "\\usepackage[nomarkers]{endfloat}\n"
   "\\usepackage{fancyvrb}\n"
   "\\usepackage{color}\n"
   "\\usepackage{listings}\n"
   "\\usepackage{minted}\n"
   "\\usepackage{datetime2}\n"
   "\n% Generated with wrapper.scm\n"))
```

2. Main

```
(define (build-main-file meta-info)
  "Dumps my standard main.tex out as a <string>.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

                        'bibliography <string>
                        'project <string>
                        'author <string>
                        'school <string>
                        'section <string>
                        'professor <string>
                        'date <srfi-19 date>

Returns
=======
A <string> representing the contents of main.tex.

Side Effects
============
None; Purely Functional."
  (string-append
   "% This is main.tex\n"
   "\\documentclass[12pt, english]{article}\n"
   "\\input{meta}\n"
   "\\input{preamble}\n"
   "\\begin{document}\n"
   "\\input{title-page}\n"
   "\\section*{\\localtitle{}}\n"
```

```
   "\\input{content}\n"
   "\\newpage\n"
   "\\printbibliography\n"
   "\\end{document}"))
```

3. Title Page

```
(define (build-title-file meta-info)
  "Dumps my standard title-page.tex out as a <string>.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

                        'bibliography <string>
                        'project <string>
                        'author <string>
                        'school <string>
                        'section <string>
                        'professor <string>
                        'date <srfi-19 date>

Returns
=======
A <string> representing the contents of title-page.tex.

Side Effects
============
None; Purely Functional."
  (string-append
   "\\begin{titlepage}\n"
   "  \\begin{center}\n"
   "    \\vspace*{5cm}\n"
   "    \\textbf{\\localtitle}\\\\\n"
   "    \\vspace{\\baselineskip}\n"
   "    \\localauthor\\\\\n"
   "    \\localschool\\\\\n"
   "    \\localsection\\\\\n"
   "    \\localprofessor\\\\\n"
   "    \\localduedate\n"
```

```
"  \\end{center}\n"
"\\end{titlepage}\n"
"\\setcounter{page}{2}"))
```

4.1.7 Make File

Once things (really just strings) are build, we need to put them in files.

I was able to extract out the core of what needed to be done into a single function for this, which is `make-file`. It will take the meta-info structure, the file name, and a build function for the file's contents, and create a file in the current working directory.

```
(define (make-file meta-info file-name string-function)
  "Creates a file based on supplied arguments. Pre-existing files will be
overwritten.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

                        'bibliography <string>
                        'project <string>
                        'author <string>
                        'school <string>
                        'section <string>
                        'professor <string>
                        'date <srfi-19 date>
FILE-NAME <string>: The name of the file to create.
STRING-FUNCTION <function>: A generator function for the contents of the file.

Returns
=======
<undefined> on success. Errors on errors.

Side Effects
============
Creates the file FILE-NAME in the current directory and fills it with the output
of STRING-FUNCTION called with META-INFO as its only argument.
"
  (call-with-output-file file-name
```

```
    (lambda (port)
      (put-string port
                  (apply string-function
                         (list meta-info))))))
```

4.1.8 Make Project

This is the initialization function, that will take an empty directory and fill it with the files we need.

```
(define (make-project meta-info)
  "Creates the files needed for a latex project.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

                        'bibliography <string>
                        'project <string>
                        'author <string>
                        'school <string>
                        'section <string>
                        'professor <string>
                        'date <srfi-19 date>
Returns
=======
<undefined> on success, errors on errors.

Side Effects
============
Creates the following files in the current directory, overwriting them if they
exist:

main.tex
meta.tex
preamble.tex
title-page.tex
content.tex"
  (make-file meta-info "main.tex" build-main-file)
  (make-file meta-info "meta.tex" build-meta-file)
```

```
(make-file meta-info "preamble.tex" build-preamble-file)
(make-file meta-info "title-page.tex" build-title-file)
(system "touch content.tex"))
```

4.1.9 Compile Project

This project started because I wanted to be able to submit my papers with a custom filename without having to alter the way `lualatex` was called in `emacs`. These functions actually compile this project into a pdf.

1. Run Lualatex This function calls the system command `lualatex` on the `main.tex` file in the current directory to create a PDF with the correct name, and uses `--shell-escape` to allow `pygmentize` to do its thing.

```
(define (run-lualatex name)
  "Runs the lualatex program with some sensible defaults, specifying a jobname
based on the project.

Arguments
=========
NAME <string>: The jobname for lualatex.

Returns
=======
<undefined> on success, errors on errors.

Side Effects
============
Calls the program \"lualatex\" on the file \"main.tex\" in the current
directory, to create (among other intermediary files) a PDF document. Can be
UNSAFE if contents of \"main.tex\" are unknown: arbitrary code can be executed."
  (system (string-append "lualatex --output-format pdf --jobname="
                         name
                         " --shell-escape main.tex")))
```

2. Compile Project This is the function that actually compiles the project correctly, as multiple passes of `lualatex` and `biber` are needed to get citations and page references correct.

```
(define (compile-project meta-info)
  "Compiles the LaTeX project in the current directory, assuming the
\"main.tex\" file exists.

Arguments
=========
META-INFO <hash-table>: A 7 element data structure with the following keys:

                         'bibliography <string>
                         'project <string>
                         'author <string>
                         'school <string>
                         'section <string>
                         'professor <string>
                         'date <srfi-19 date>

Returns
=======
<undefined> on success, errors on errors.

Side Effects
============
Runs system commands in this order:

lualatex
biber
lualatex
lualatex

Which creates a large number of intermediary files, but ideally creates NAME.pdf
from main.tex."
  (let ((name (build-file-name meta-info)))
    (run-lualatex name)
    (system (string-append "biber " name))
    (run-lualatex name)
    (run-lualatex name)))
```

4.2 Executable

4.2.1 Preamble

This is the top of that file.

```
#!/usr/bin/env -S guile -e main -s
-e main -s
!#
(use-modules (cdr255 genpro)
             (ice-9 getopt-long))
```

4.2.2 Main Function

```
(define option-spec
  '((version (single-char #\v) (value #f))
    (generate (single-char #\g) (value #f))
    (publish (single-char #\p) (value #f))))

(define (main args)
  (let* ((options (getopt-long args option-spec))
         (version (option-ref options 'version #f))
         (generate (option-ref options 'generate #f))
         (publish (option-ref options 'publish #f)))
    (unless (file-exists? ".metadata")
      (call-with-output-file ".metadata"
        (lambda (port)
          (put-string port
                      ";;; -*- scheme -*-
;;; This is the metadata file for genpro projects.
;;;
;;; Replace the default values with the ones appropriate for Your
;;; project.
(define project-metadata-file-info
'((title \"Project Title\")
  (author \"Christopher Rodriguez\")
  (bibliography \"~/Documents/biblio/main.bib\")
  (school \"Colorado State University Global\")
  (section \"Some Class: Some Title of Class\")
  (professor \"Dr. Some Professor\")
  (date \"2022-03-08\")))")))
      (display
       (string-append "Created the .metadata file with defaults.\n\nPlease edit "
```

```
                    "those and then run the script again.\n"))
      (quit))
    (load "./.metadata")
    (define meta-info
      (hash-meta-info (cadr (assoc 'bibliography
                                   project-metadata-file-info))
                      (cadr (assoc 'title
                                   project-metadata-file-info))
                      (cadr (assoc 'author
                                   project-metadata-file-info))
                      (cadr (assoc 'school
                                   project-metadata-file-info))
                      (cadr (assoc 'section
                                   project-metadata-file-info))
                      (cadr (assoc 'professor
                                   project-metadata-file-info))
                      (cadr (assoc 'date
                                   project-metadata-file-info))))
    (cond (version (display "genpro v0.0.1\n"))
          (generate (display "Generate Flag!\n")
                    (make-project meta-info))
          (publish (display "Publish Flag!\n")
                   (compile-project meta-info))
          (else (display-help)))))

(define (display-help)
  (display (string-append
            "Usage: genpro -g || -p \n\n"

            "Explanation of Options:\n\n"

            "  -g: Generate a new set of latex files based on the\n"
            "      contents of the .metadata file.\n"
            "  -p: Publish the project (run lualatex and biber on\n"
            "      main.tex)\n\n"

            "This program is entirely written in GNU Guile Scheme,\n"
            "and You are welcome to change it how You see fit.\n\n"

            "Guile Online Help: <https://www.gnu.org/software/guile/>\n"
```

```
"Local Online Help: 'info guile'\n")))
```

5 Tests

It's important to me to use Unit Testing throughout my development process, oftentimes before I actually implement a specific feature. I guess I subscribe to the notion of TDD, whether through habit or preference.

5.1 Main Tests

Anyway, all related files will live under `test/`, and the main file should be called `maintests.scm`.

5.1.1 Preamble

We require the files defined above, as well as SRFI-64 for a testing framework.

```
#!/usr/bin/env -S guile -e main -s
-e main -s
!#
(use-modules ((srfi srfi-64))) ;; For Unit Testing
(load "genpro.scm")
```

Then we move on to the actual tests.

5.1.2 Basic Tests

```
(define (basic-tests)
  ;; Initialize and give a name to a simple testsuite.
  (test-begin "basic-tests")
  ;; Test our Hello World Function's Output to be as expected.
  (test-equal "Hello World!\n" (with-output-to-string say-hello))
  ;; End the test.
  (test-end "basic-tests"))
```

5.1.3 Main

```
(define (main args)
  (basic-tests))
```