

Installing Hdef

Matt Herman

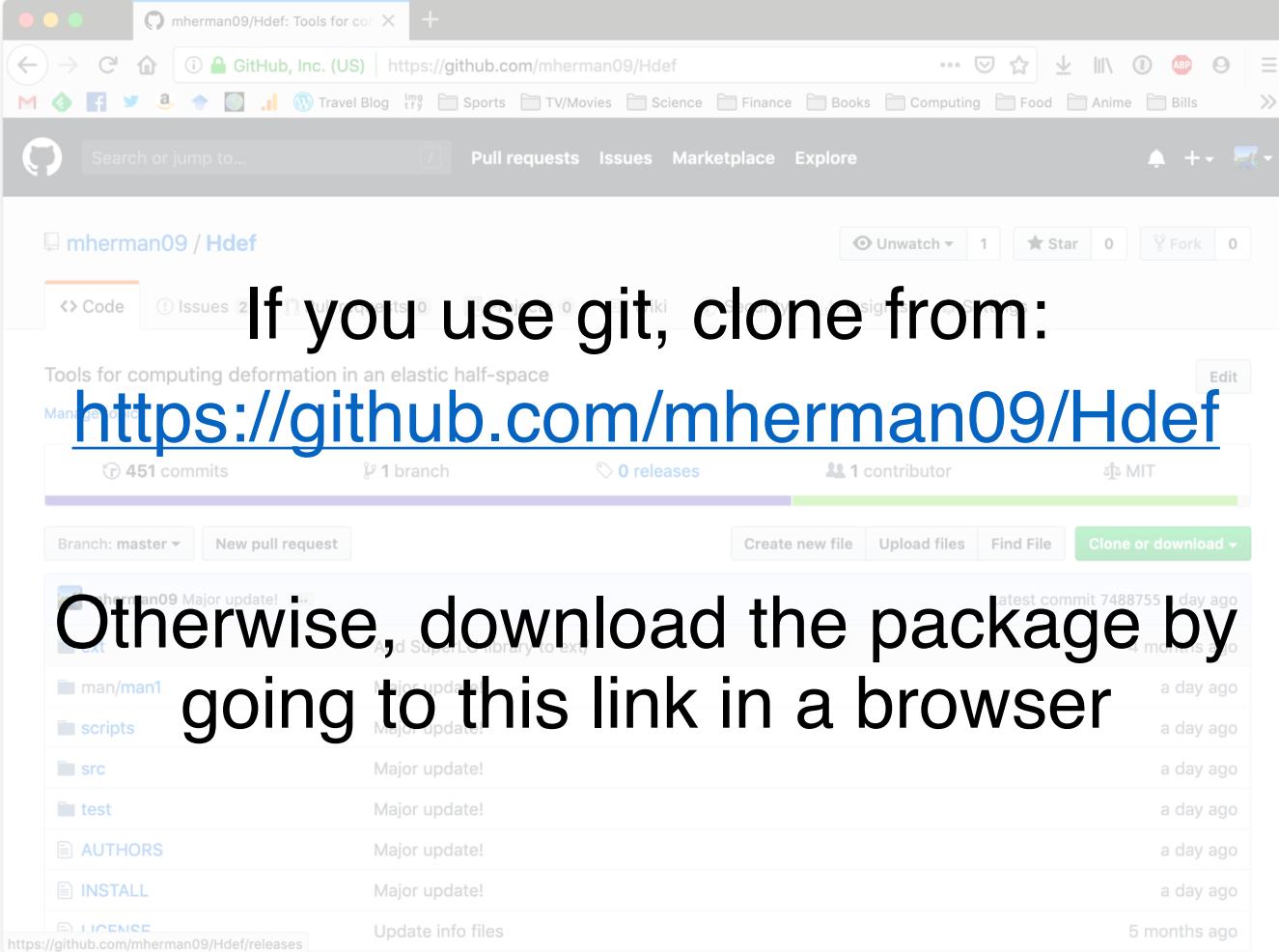
Last updated

30 May 2019

Requirements

- Unix-style operating system: Mac OS, Linux, or WSL
- GCC and Gfortran compilers (I cannot guarantee compilation will work with other compilers)
- LAPACK is required for some (not all) programs; for LAPACK installation instructions, see the *Installing LAPACK* tutorial

Downloading & Installing



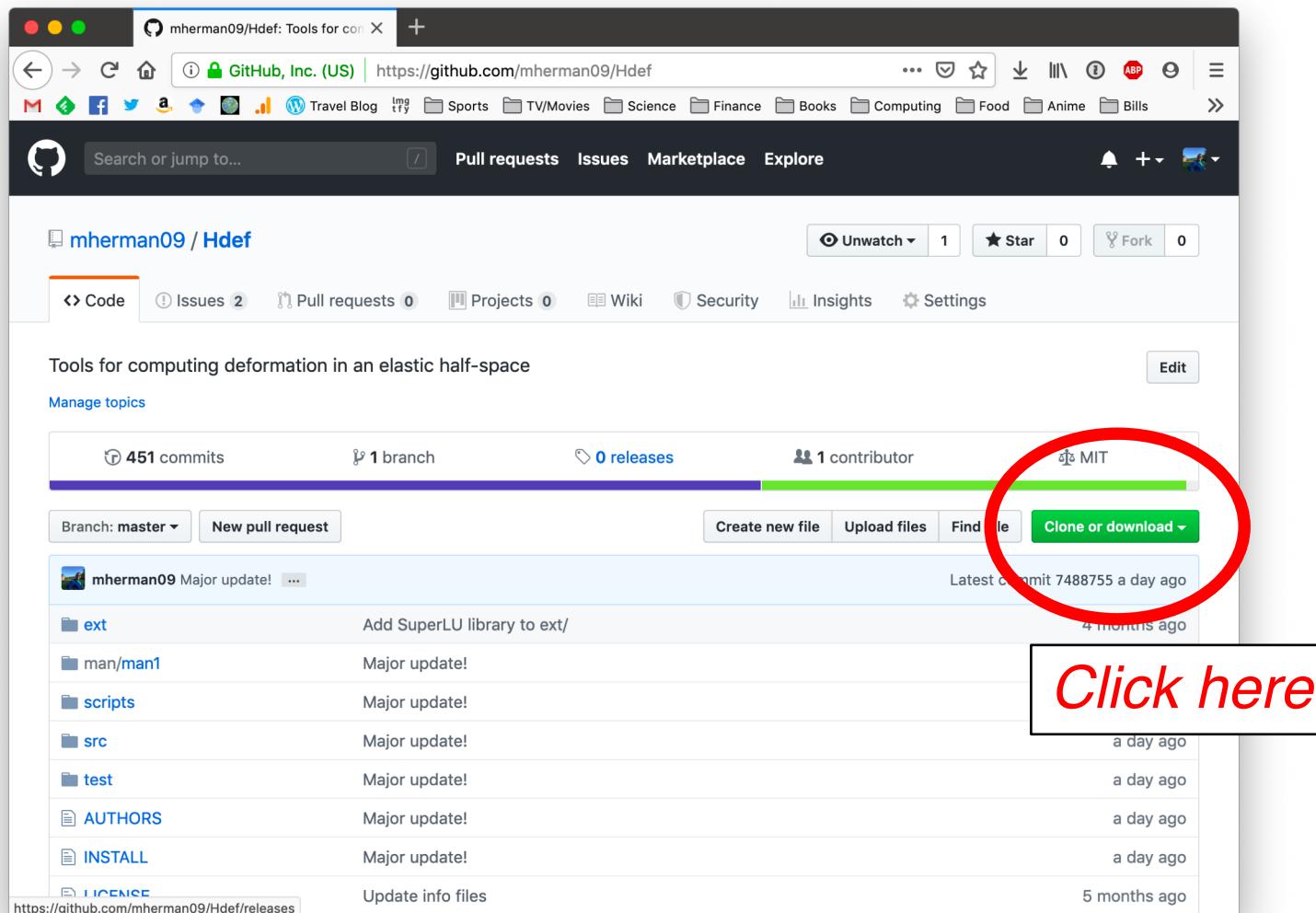
If you use git, clone from:

<https://github.com/mherman09/Hdef>

Otherwise, download the package by going to this link in a browser

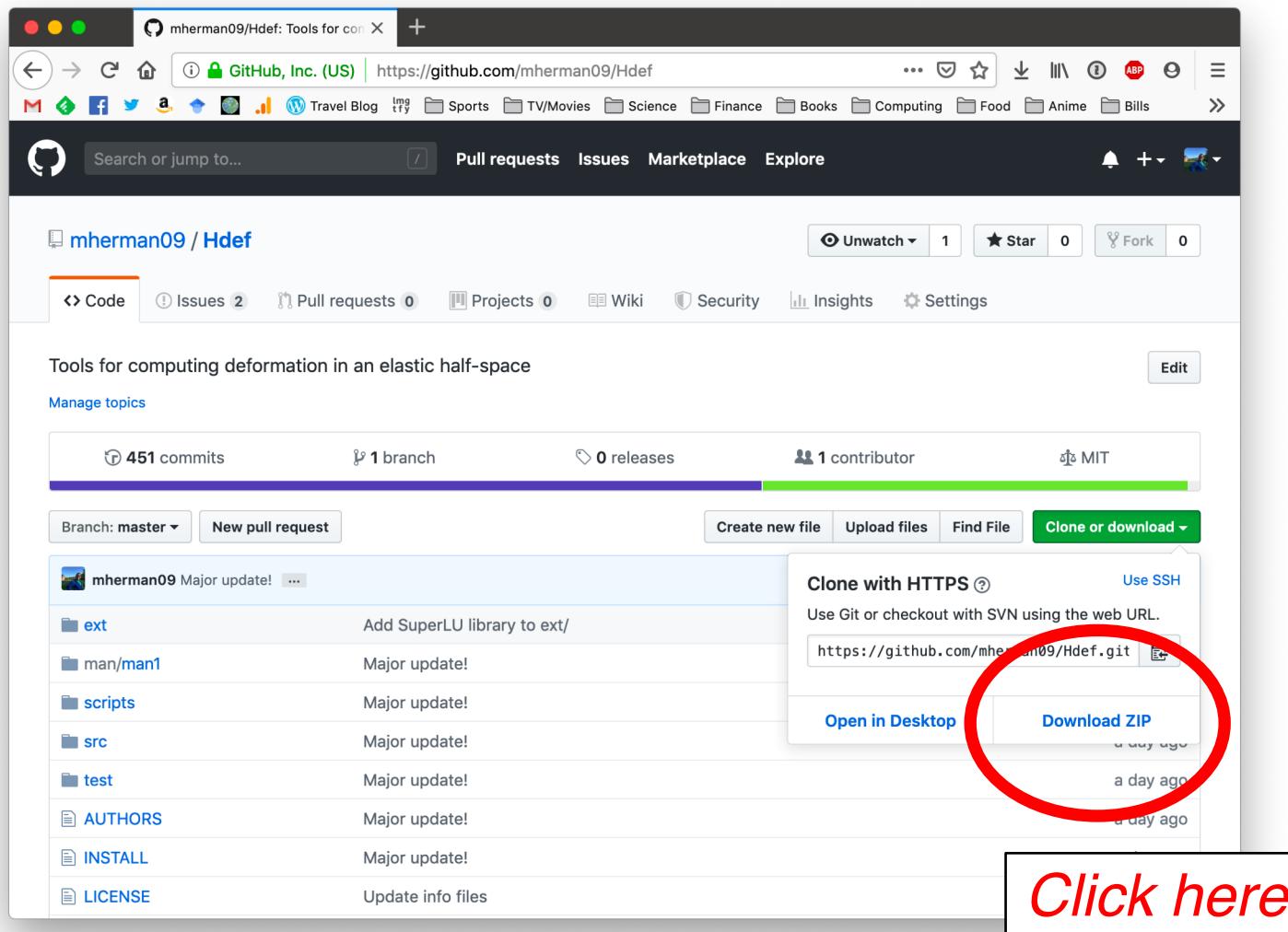
The screenshot shows a GitHub repository page for 'mherman09/Hdef'. The page includes a search bar, navigation links for Pull requests, Issues, Marketplace, and Explore, and a header with the repository name and statistics: 451 commits, 1 branch, 0 releases, 1 contributor, and MIT license. A large green button at the bottom right says 'Clone or download'. Below the repository details, there's a list of files and their commit history. The commits are all dated 'a day ago' and labeled 'Major update!'. The files listed are man/man1, scripts, src, test, AUTHORS, and INSTALL. At the bottom, there's a link to the LICENSE file and a note about updating info files.

Downloading & Installing



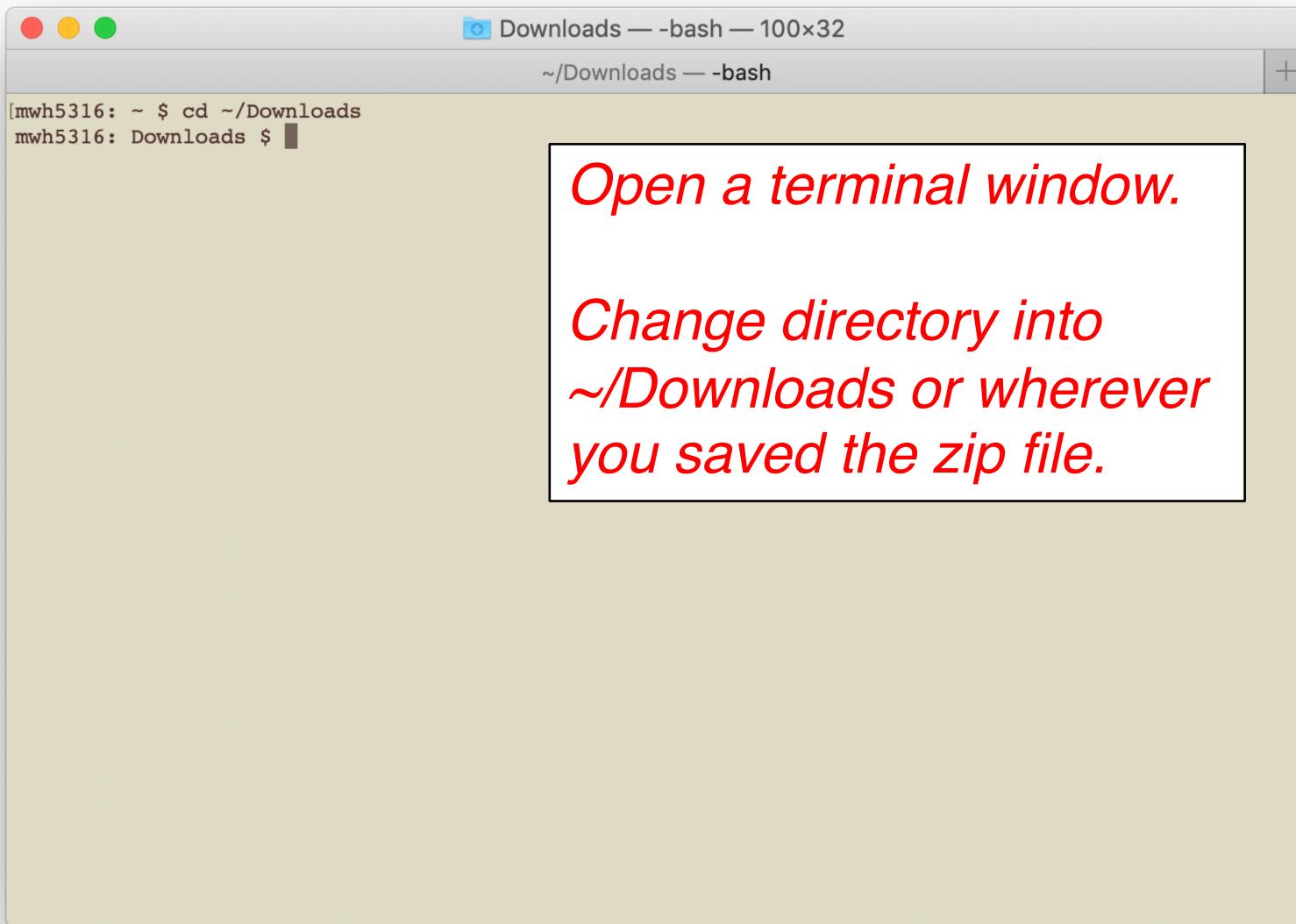
<https://github.com/mherman09/Hdef>

Downloading & Installing



<https://github.com/mherman09/Hdef>

Downloading & Installing



Downloading & Installing



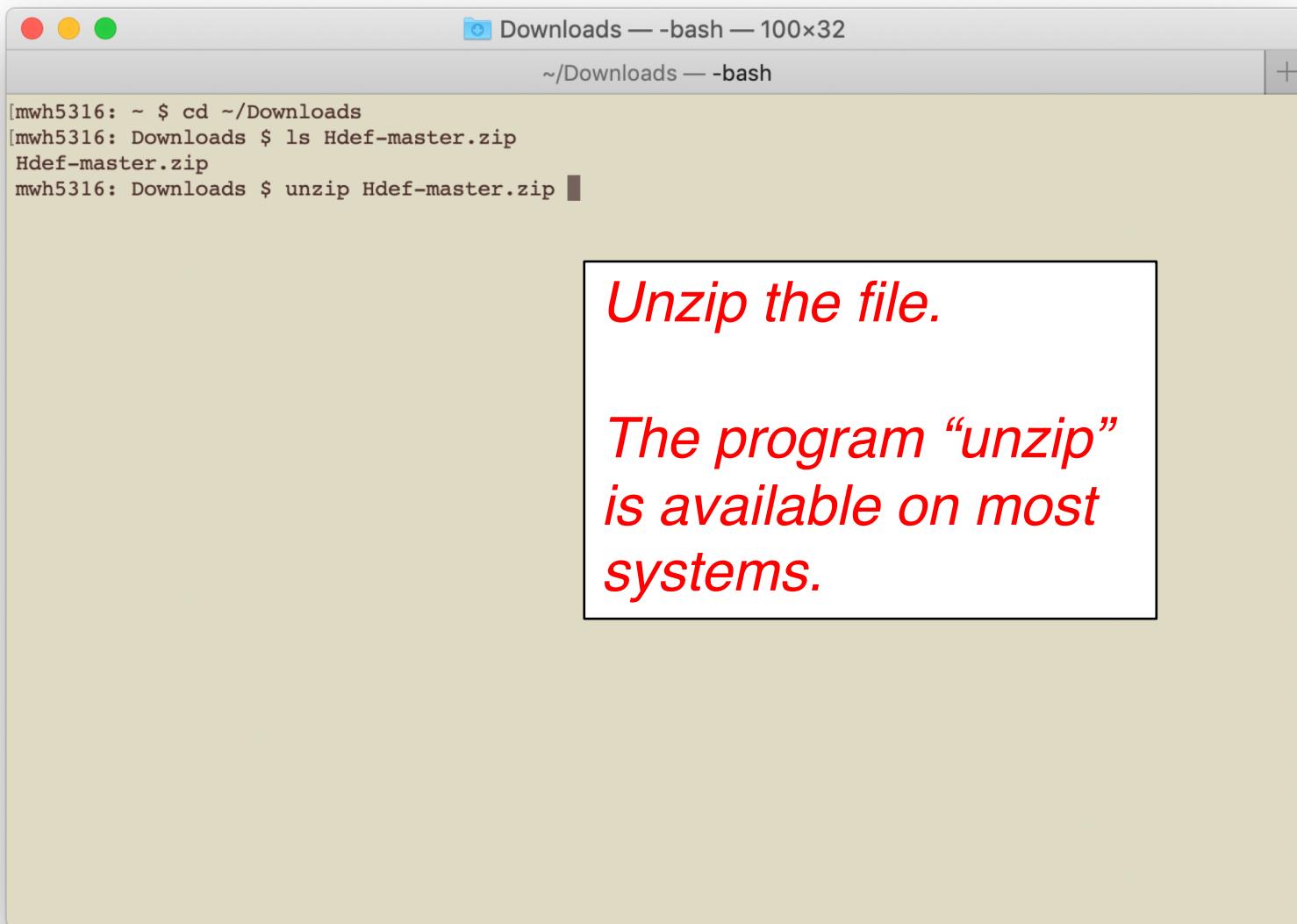
A screenshot of a terminal window titled "Downloads — bash — 100x32". The window shows the command line:

```
[mwh5316: ~ $ cd ~/Downloads  
[mwh5316: Downloads $ ls Hdef-master.zip  
Hdef-master.zip  
mwh5316: Downloads $ ]
```

A red arrow points from a callout box to the file name "Hdef-master.zip".

*The file name is
Hdef-master.zip*

Downloading & Installing



```
[mwh5316: ~ $ cd ~/Downloads
[mwh5316: Downloads $ ls Hdef-master.zip
Hdef-master.zip
mwh5316: Downloads $ unzip Hdef-master.zip ]]
```

Unzip the file.

*The program “unzip”
is available on most
systems.*

Downloading & Installing

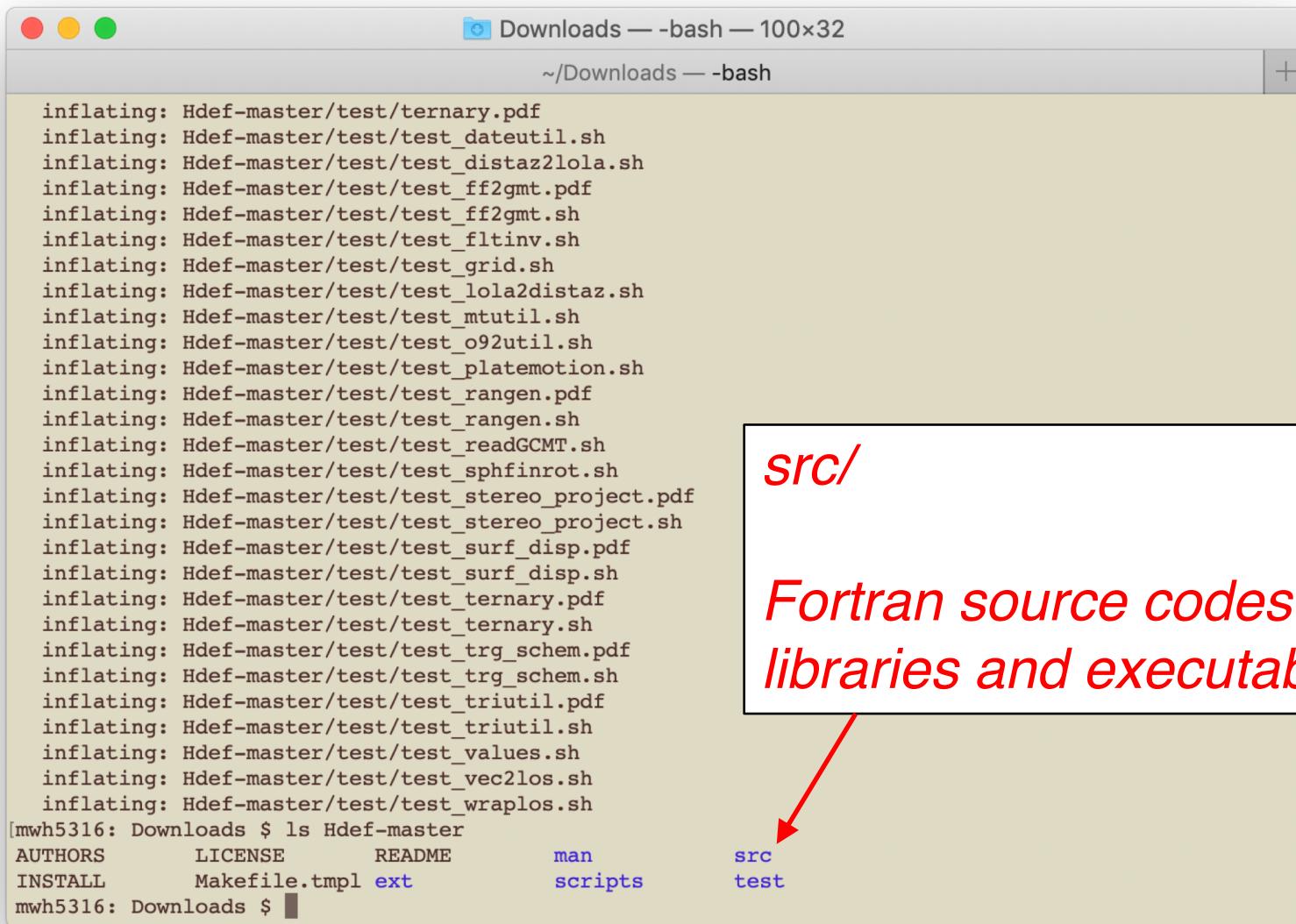
```
Downloads — bash — 100x32
~/Downloads — bash

inflating: Hdef-master/test/ternary.pdf
inflating: Hdef-master/test/test_dateutil.sh
inflating: Hdef-master/test/test_distaz2lola.sh
inflating: Hdef-master/test/test_ff2gmt.pdf
inflating: Hdef-master/test/test_ff2gmt.sh
inflating: Hdef-master/test/test_fltinv.sh
inflating: Hdef-master/test/test_grid.sh
inflating: Hdef-master/test/test_lola2distaz.sh
inflating: Hdef-master/test/test_mtutil.sh
inflating: Hdef-master/test/test_o92util.sh
inflating: Hdef-master/test/test_platemotion.sh
inflating: Hdef-master/test/test_rangen.pdf
inflating: Hdef-master/test/test_rangen.sh
inflating: Hdef-master/test/test_readGCMT.sh
inflating: Hdef-master/test/test_sphfinrot.sh
inflating: Hdef-master/test/test_stereo_project.pdf
inflating: Hdef-master/test/test_stereo_project.sh
inflating: Hdef-master/test/test_surf_disp.pdf
inflating: Hdef-master/test/test_surf_disp.sh
inflating: Hdef-master/test/test_ternary.pdf
inflating: Hdef-master/test/test_ternary.sh
inflating: Hdef-master/test/test_trg_schem.pdf
inflating: Hdef-master/test/test_trg_schem.sh
inflating: Hdef-master/test/test_triutil.pdf
inflating: Hdef-master/test/test_triutil.sh
inflating: Hdef-master/test/test_values.sh
inflating: Hdef-master/test/test_vec2los.sh
inflating: Hdef-master/test/test_wraplos.sh
[mwh5316: Downloads $ ls Hdef-master
AUTHORS      LICENSE      README      man      scripts
INSTALL      Makefile tmpl  ext        src      test
mwh5316: Downloads $ ]
```

*You now have the
directory Hdef-master/*

*Check what is inside.
It should contain these
files and directories.*

Downloading & Installing



```
Downloads — bash — 100x32
~/Downloads — bash

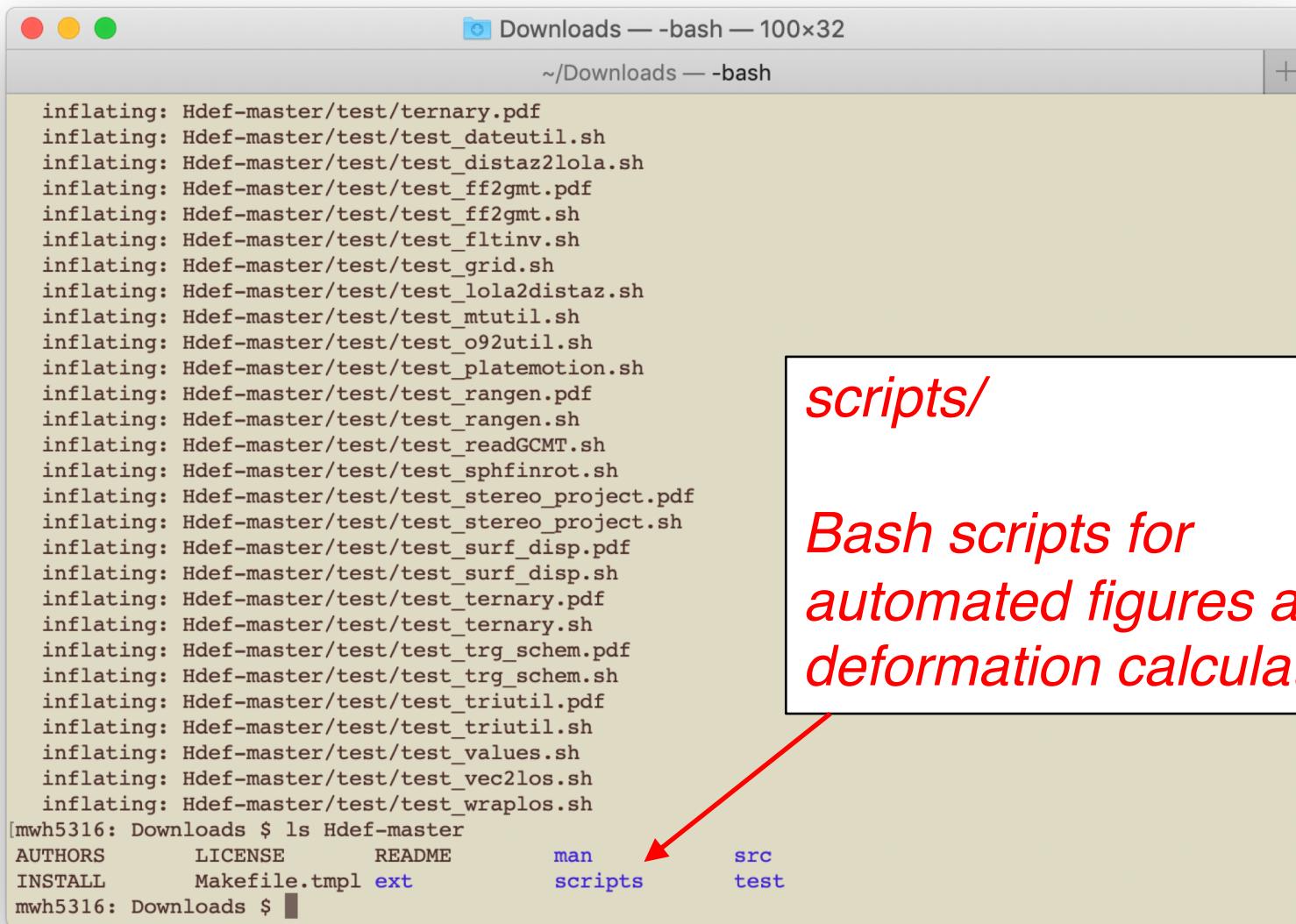
inflating: Hdef-master/test/ternary.pdf
inflating: Hdef-master/test/test_dateutil.sh
inflating: Hdef-master/test/test_distaz2lola.sh
inflating: Hdef-master/test/test_ff2gmt.pdf
inflating: Hdef-master/test/test_ff2gmt.sh
inflating: Hdef-master/test/test_fltinv.sh
inflating: Hdef-master/test/test_grid.sh
inflating: Hdef-master/test/test_lola2distaz.sh
inflating: Hdef-master/test/test_mtutil.sh
inflating: Hdef-master/test/test_o92util.sh
inflating: Hdef-master/test/test_platemotion.sh
inflating: Hdef-master/test/test_rangen.pdf
inflating: Hdef-master/test/test_rangen.sh
inflating: Hdef-master/test/test_readGCMT.sh
inflating: Hdef-master/test/test_sphfinrot.sh
inflating: Hdef-master/test/test_stereo_project.pdf
inflating: Hdef-master/test/test_stereo_project.sh
inflating: Hdef-master/test/test_surf_disp.pdf
inflating: Hdef-master/test/test_surf_disp.sh
inflating: Hdef-master/test/test_ternary.pdf
inflating: Hdef-master/test/test_ternary.sh
inflating: Hdef-master/test/test_trg_schem.pdf
inflating: Hdef-master/test/test_trg_schem.sh
inflating: Hdef-master/test/test_triutil.pdf
inflating: Hdef-master/test/test_triutil.sh
inflating: Hdef-master/test/test_values.sh
inflating: Hdef-master/test/test_vec2los.sh
inflating: Hdef-master/test/test_wraplos.sh
[mwh5316: Downloads $ ls Hdef-master
AUTHORS      LICENSE      README      man
INSTALL      Makefile tmpl ext      scripts
mwh5316: Downloads $ ]
```

src/

*Fortran source codes for
libraries and executables*

src
test

Downloading & Installing



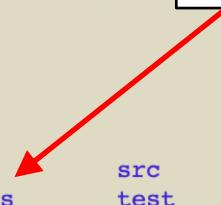
The terminal window shows the following output:

```
Downloads — -bash — 100x32
~/Downloads — -bash [+]

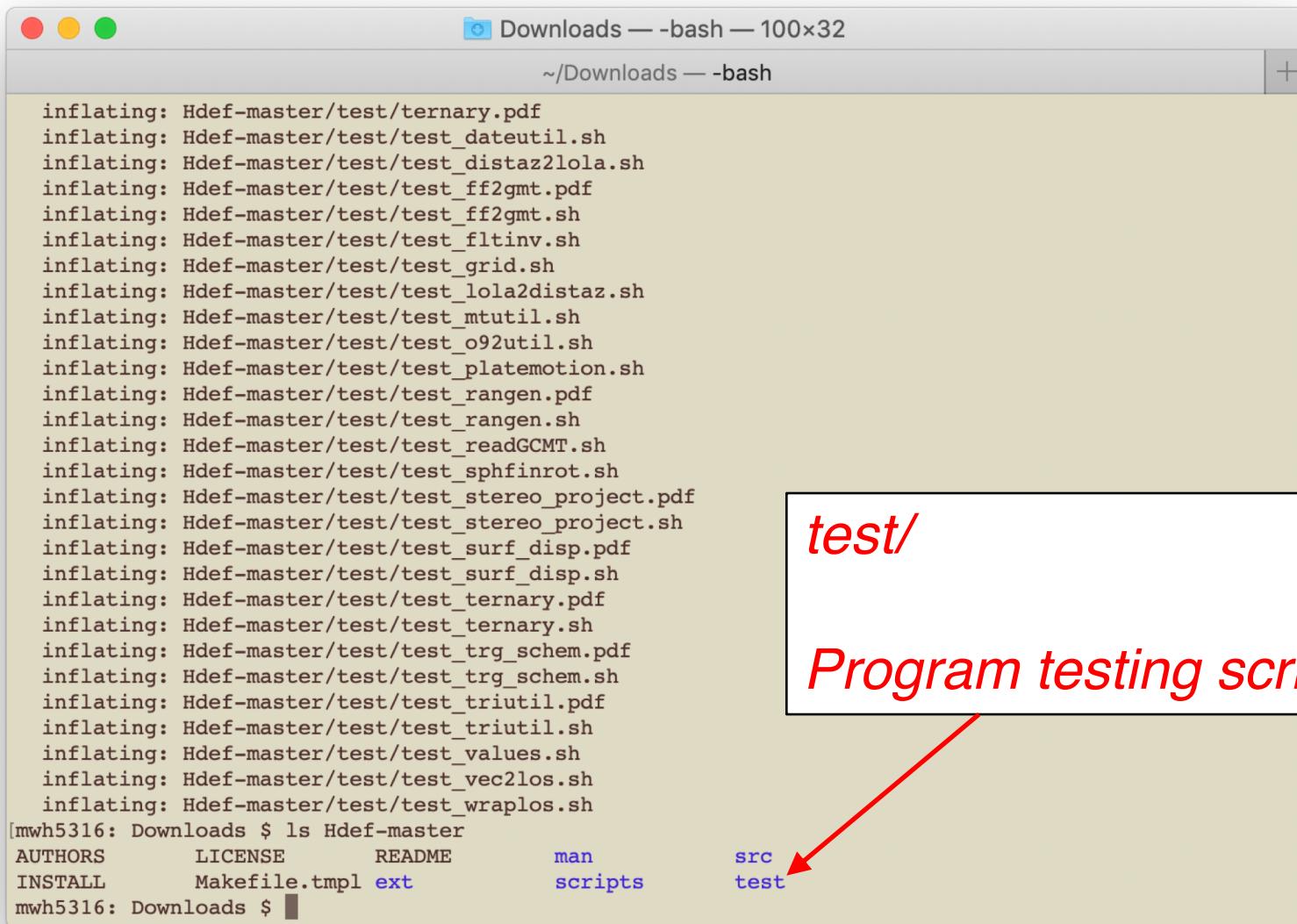
inflating: Hdef-master/test/ternary.pdf
inflating: Hdef-master/test/test_dateutil.sh
inflating: Hdef-master/test/test_distaz2lola.sh
inflating: Hdef-master/test/test_ff2gmt.pdf
inflating: Hdef-master/test/test_ff2gmt.sh
inflating: Hdef-master/test/test_fltinv.sh
inflating: Hdef-master/test/test_grid.sh
inflating: Hdef-master/test/test_lola2distaz.sh
inflating: Hdef-master/test/test_mtutil.sh
inflating: Hdef-master/test/test_o92util.sh
inflating: Hdef-master/test/test_platemotion.sh
inflating: Hdef-master/test/test_rangen.pdf
inflating: Hdef-master/test/test_rangen.sh
inflating: Hdef-master/test/test_readGCMT.sh
inflating: Hdef-master/test/test_sphfinrot.sh
inflating: Hdef-master/test/test_stereo_project.pdf
inflating: Hdef-master/test/test_stereo_project.sh
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inflating: Hdef-master/test/test_surf_disp.sh
inflating: Hdef-master/test/test_ternary.pdf
inflating: Hdef-master/test/test_ternary.sh
inflating: Hdef-master/test/test_trg_schem.pdf
inflating: Hdef-master/test/test_trg_schem.sh
inflating: Hdef-master/test/test_triutil.pdf
inflating: Hdef-master/test/test_triutil.sh
inflating: Hdef-master/test/test_values.sh
inflating: Hdef-master/test/test_vec2los.sh
inflating: Hdef-master/test/test_wraplos.sh
[mwh5316: Downloads $ ls Hdef-master
AUTHORS      LICENSE      README      man
INSTALL      Makefile tmpl ext      scripts
src          test
mwh5316: Downloads $ ]
```

scripts/

*Bash scripts for
automated figures and
deformation calculations*



Downloading & Installing



```
Downloads — bash — 100x32
~/Downloads — bash

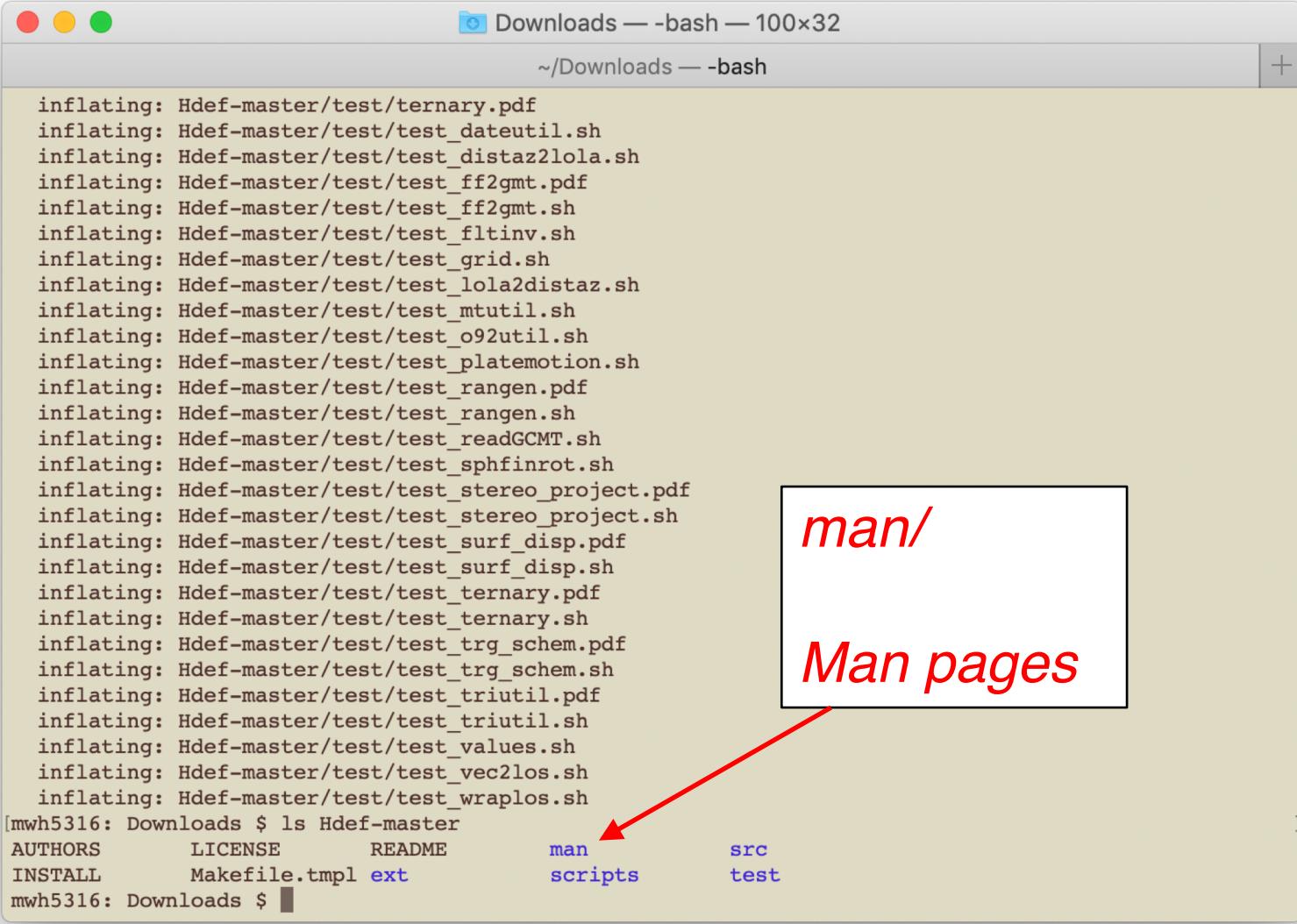
inflating: Hdef-master/test/ternary.pdf
inflating: Hdef-master/test/test_dateutil.sh
inflating: Hdef-master/test/test_distaz2lola.sh
inflating: Hdef-master/test/test_ff2gmt.pdf
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inflating: Hdef-master/test/test_fltinv.sh
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inflating: Hdef-master/test/test_mtutil.sh
inflating: Hdef-master/test/test_o92util.sh
inflating: Hdef-master/test/test_platemotion.sh
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inflating: Hdef-master/test/test_rangen.sh
inflating: Hdef-master/test/test_readGCMT.sh
inflating: Hdef-master/test/test_sphfinrot.sh
inflating: Hdef-master/test/test_stereo_project.pdf
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inflating: Hdef-master/test/test_ternary.sh
inflating: Hdef-master/test/test_trg_schem.pdf
inflating: Hdef-master/test/test_trg_schem.sh
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inflating: Hdef-master/test/test_triutil.sh
inflating: Hdef-master/test/test_values.sh
inflating: Hdef-master/test/test_vec2los.sh
inflating: Hdef-master/test/test_wraplos.sh
[mwh5316: Downloads $ ls Hdef-master
AUTHORS      LICENSE      README      man
INSTALL      Makefile tmpl ext      scripts
mwh5316: Downloads $ ]
```

test/

Program testing scripts

src
test

Downloading & Installing



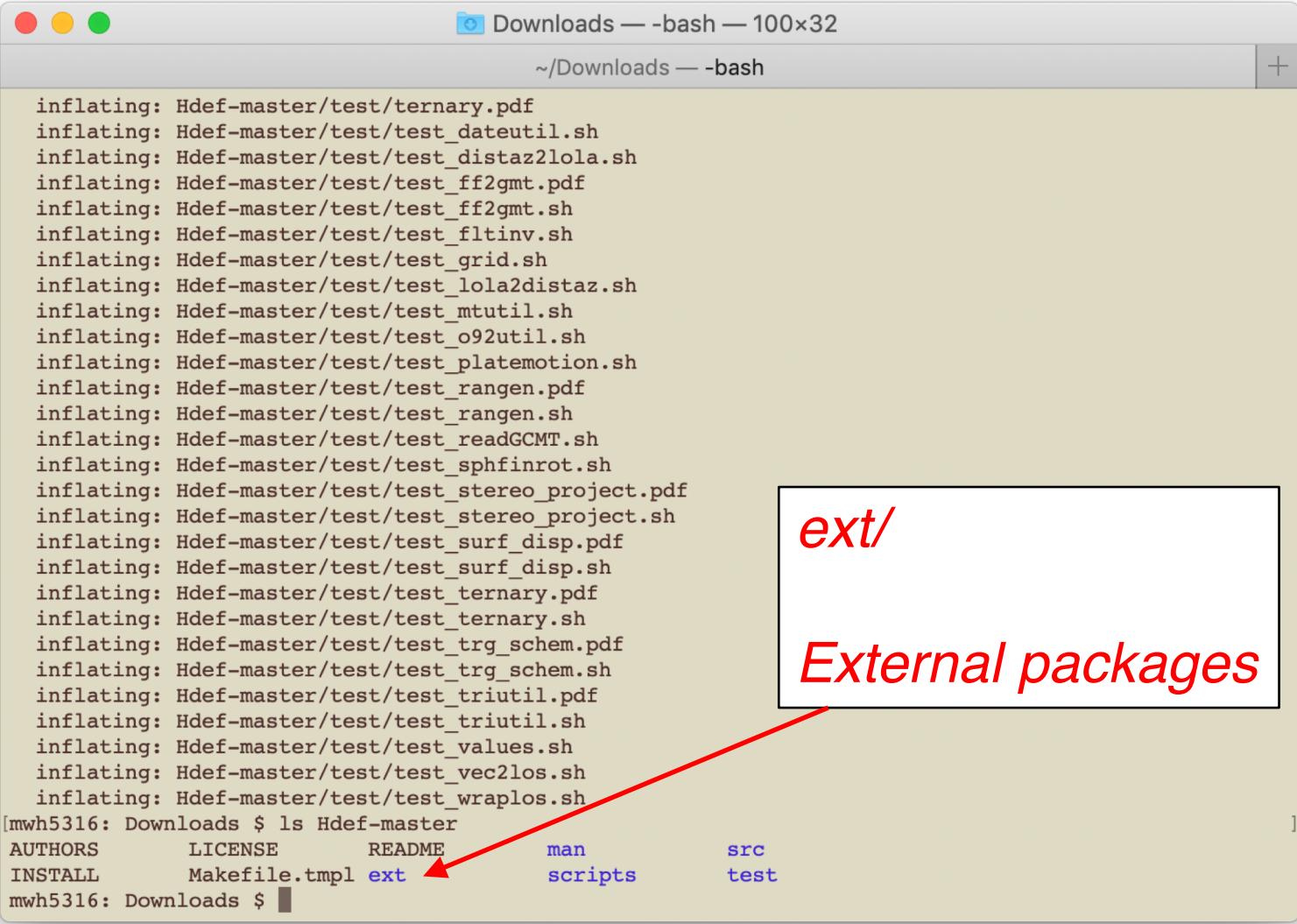
```
Downloads — bash — 100x32
~/Downloads — bash

inflating: Hdef-master/test/ternary.pdf
inflating: Hdef-master/test/test_dateutil.sh
inflating: Hdef-master/test/test_distaz2lola.sh
inflating: Hdef-master/test/test_ff2gmt.pdf
inflating: Hdef-master/test/test_ff2gmt.sh
inflating: Hdef-master/test/test_fltinv.sh
inflating: Hdef-master/test/test_grid.sh
inflating: Hdef-master/test/test_lola2distaz.sh
inflating: Hdef-master/test/test_mtutil.sh
inflating: Hdef-master/test/test_o92util.sh
inflating: Hdef-master/test/test_platemotion.sh
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inflating: Hdef-master/test/test_triutil.sh
inflating: Hdef-master/test/test_values.sh
inflating: Hdef-master/test/test_vec2los.sh
inflating: Hdef-master/test/test_wraplos.sh
[mwh5316: Downloads $ ls Hdef-master
AUTHORS      LICENSE      README      man      src
INSTALL      Makefile tmpl ext      scripts    test
mwh5316: Downloads $ ]
```

man/

Man pages

Downloading & Installing



The screenshot shows a terminal window titled "Downloads — bash — 100x32" with the command "ls" run in the directory "~/Downloads". The output lists several files being inflated from a tar archive named "Hdef-master". A red arrow points from the word "ext" in the terminal output to a red box containing the text "External packages".

```
inflating: Hdef-master/test/ternary.pdf
inflating: Hdef-master/test/test_dateutil.sh
inflating: Hdef-master/test/test_distaz2lola.sh
inflating: Hdef-master/test/test_ff2gmt.pdf
inflating: Hdef-master/test/test_ff2gmt.sh
inflating: Hdef-master/test/test_fltinv.sh
inflating: Hdef-master/test/test_grid.sh
inflating: Hdef-master/test/test_lola2distaz.sh
inflating: Hdef-master/test/test_mtutil.sh
inflating: Hdef-master/test/test_o92util.sh
inflating: Hdef-master/test/test_platemotion.sh
inflating: Hdef-master/test/test_rangen.pdf
inflating: Hdef-master/test/test_rangen.sh
inflating: Hdef-master/test/test_readGCMT.sh
inflating: Hdef-master/test/test_sphfinrot.sh
inflating: Hdef-master/test/test_stereo_project.pdf
inflating: Hdef-master/test/test_stereo_project.sh
inflating: Hdef-master/test/test_surf_disp.pdf
inflating: Hdef-master/test/test_surf_disp.sh
inflating: Hdef-master/test/test_ternary.pdf
inflating: Hdef-master/test/test_ternary.sh
inflating: Hdef-master/test/test_trg_schem.pdf
inflating: Hdef-master/test/test_trg_schem.sh
inflating: Hdef-master/test/test_triutil.pdf
inflating: Hdef-master/test/test_triutil.sh
inflating: Hdef-master/test/test_values.sh
inflating: Hdef-master/test/test_vec2los.sh
inflating: Hdef-master/test/test_wraplos.sh
[mwh5316: Downloads $ ls Hdef-master
AUTHORS      LICENSE      README      man      src
INSTALL      Makefile tmpl ext      scripts    test
mwh5316: Downloads $ ]
```

ext/

External packages

Downloading & Installing



```
[mwh5316: Hdef-master $ ls
AUTHORS      LICENSE      README      man      src
INSTALL      Makefile tmpl ext      scripts    test
[mwh5316: Hdef-master $ cp Makefile tmpl Makefile
mwh5316: Hdef-master $ ]
```

Copy the Makefile template to Makefile

Two Things to Think About Before Installing

1. (***REQUIRED***) Decide where you want to install the programs.
2. (***OPTIONAL***) If you want to fit curves, do inversions, or manipulate moment tensors, install LAPACK (Linear Algebra PACKage).
 - See *Installing LAPACK*
 - LAPACK is included with Hdef in the ext/ directory

Two Things to Think About Before Installing

1. (**REQUIRED**) Decide where you want to install the programs.
2. (**OPTIONAL**) If you want to fit curves, do inversions, or manipulate moment tensors, install LAPACK (Linear Algebra PACKage).
 - See *Installing LAPACK*
 - LAPACK is included with Hdef in the ext/ directory

If you want to use the LAPACK-dependent programs, stop this tutorial now and go install LAPACK. The following steps are the same whether you install LAPACK or not.

Two Things to Think About Before Installing

1. (**REQUIRED**) Decide where you want to install the programs.

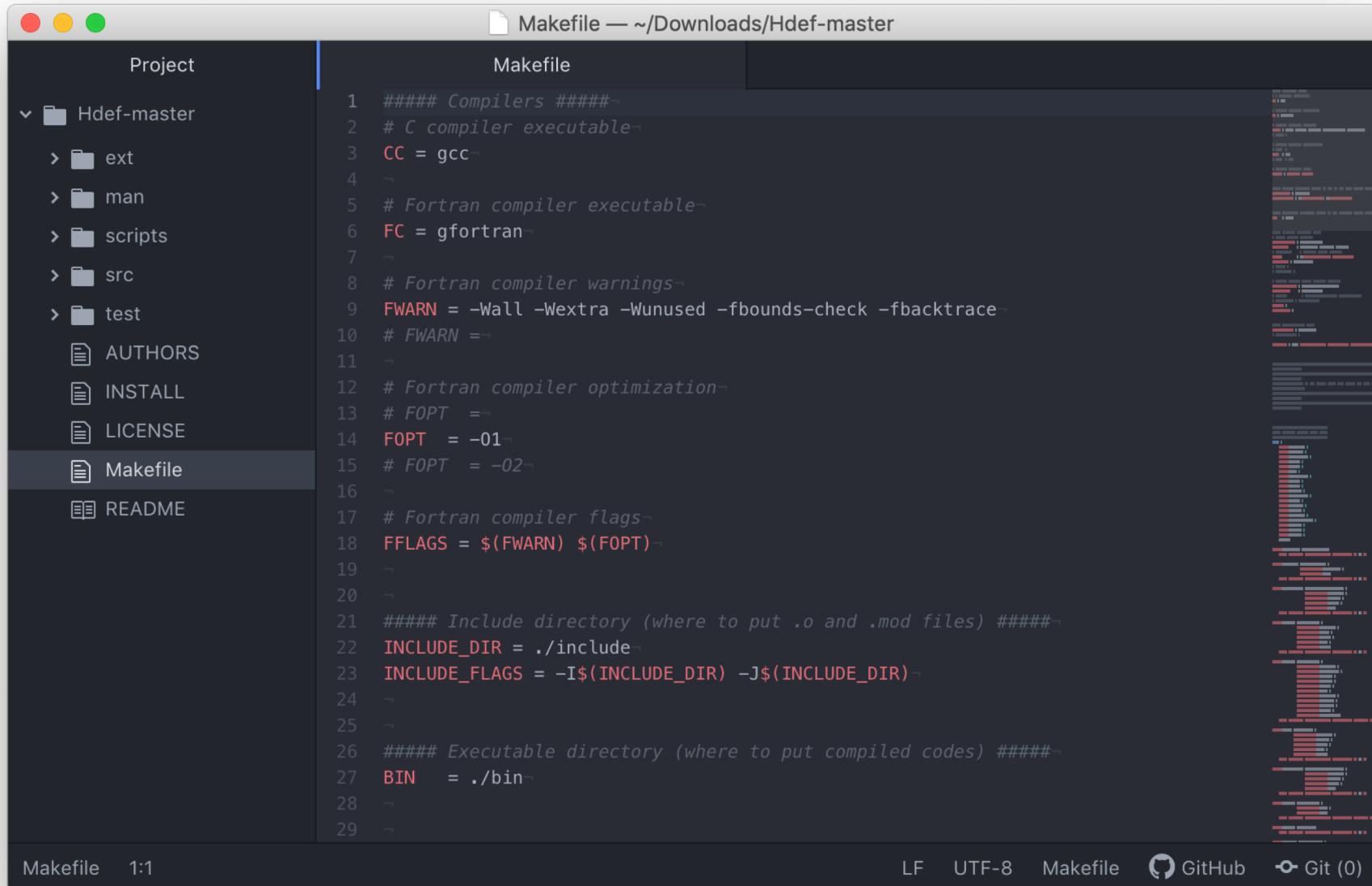
2. (**OPTIONAL**) If you want to fit curves, do simple inversions, calculate moments, do linear Algebra (with tensors, in PACKage)

- See *Install*
- LAPACK is

*Let's assume that
you want to install
the programs in ./bin/*

*Open the Makefile in
a text editor.*

Downloading & Installing

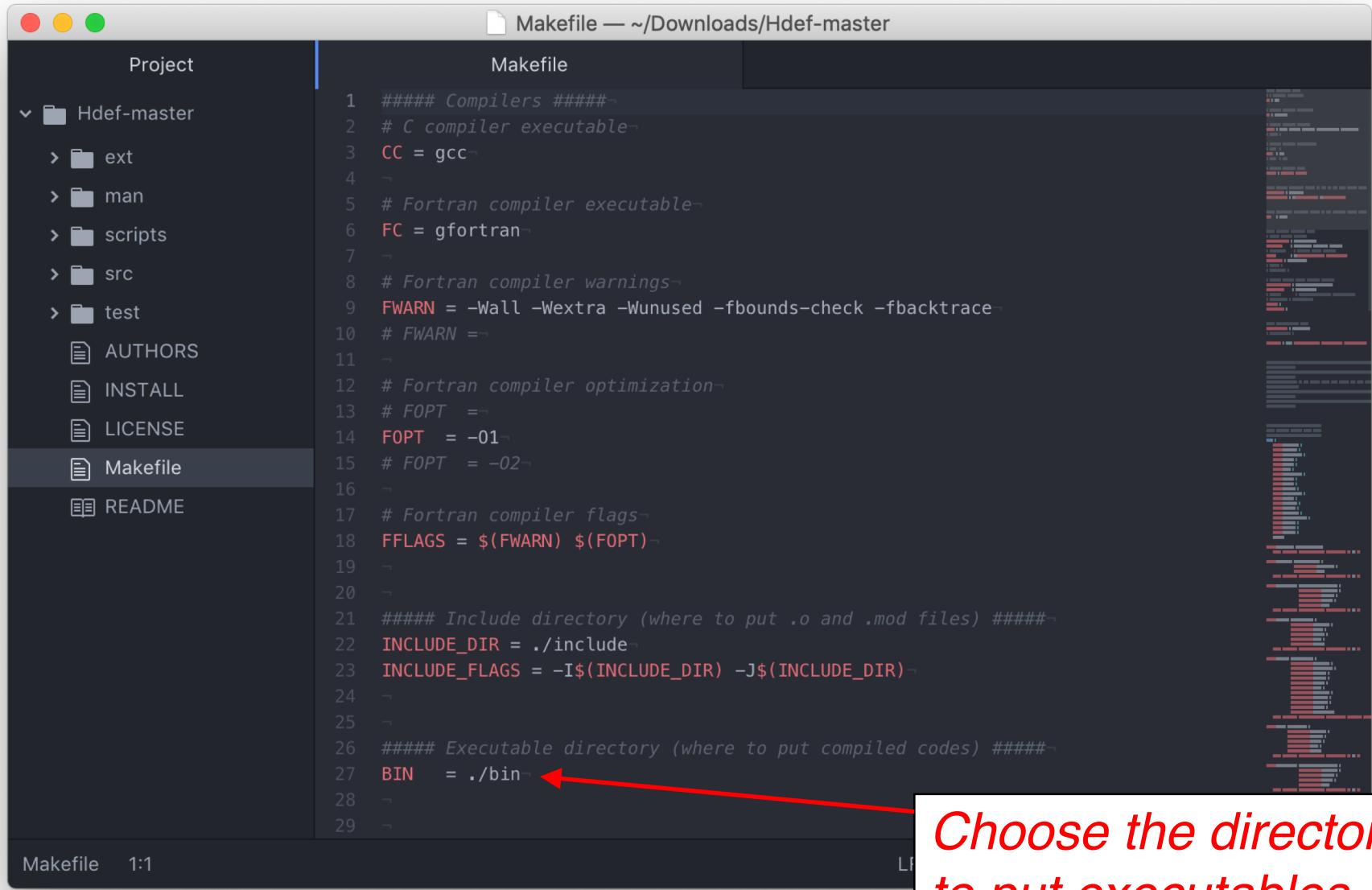


The screenshot shows a Mac OS X terminal window with a dark theme. The title bar reads "Makefile — ~/Downloads/Hdef-master". The left pane, titled "Project", lists the contents of the "Hdef-master" directory, including subfolders "ext", "man", "scripts", "src", and "test", and files "AUTHORS", "INSTALL", "LICENSE", "Makefile", and "README". The "Makefile" file is selected and highlighted in blue. The right pane displays the content of the "Makefile" file:

```
1 ##### Compilers #####
2 # C compiler executable-
3 CC = gcc-
4 -
5 # Fortran compiler executable-
6 FC = gfortran-
7 -
8 # Fortran compiler warnings-
9 FWARN = -Wall -Wextra -Wunused -fbounds-check -fbacktrace-
10 # FWARN =
11 -
12 # Fortran compiler optimization-
13 # FOPT =
14 FOPT = -O1-
15 # FOPT = -O2-
16 -
17 # Fortran compiler flags-
18 FFLAGS = $(FWARN) $(FOPT)-
19 -
20 -
21 ##### Include directory (where to put .o and .mod files) #####
22 INCLUDE_DIR = ./include-
23 INCLUDE_FLAGS = -I$(INCLUDE_DIR) -J$(INCLUDE_DIR)-
24 -
25 -
26 ##### Executable directory (where to put compiled codes) #####
27 BIN = ./bin-
```

At the bottom of the window, there are status indicators: "Makefile 1:1", "LF", "UTF-8", "Makefile", a GitHub icon, and "Git (0)".

Downloading & Installing



Project

- Hdef-master
 - ext
 - man
 - scripts
 - src
 - test
- AUTHORS
- INSTALL
- LICENSE
- Makefile
- README

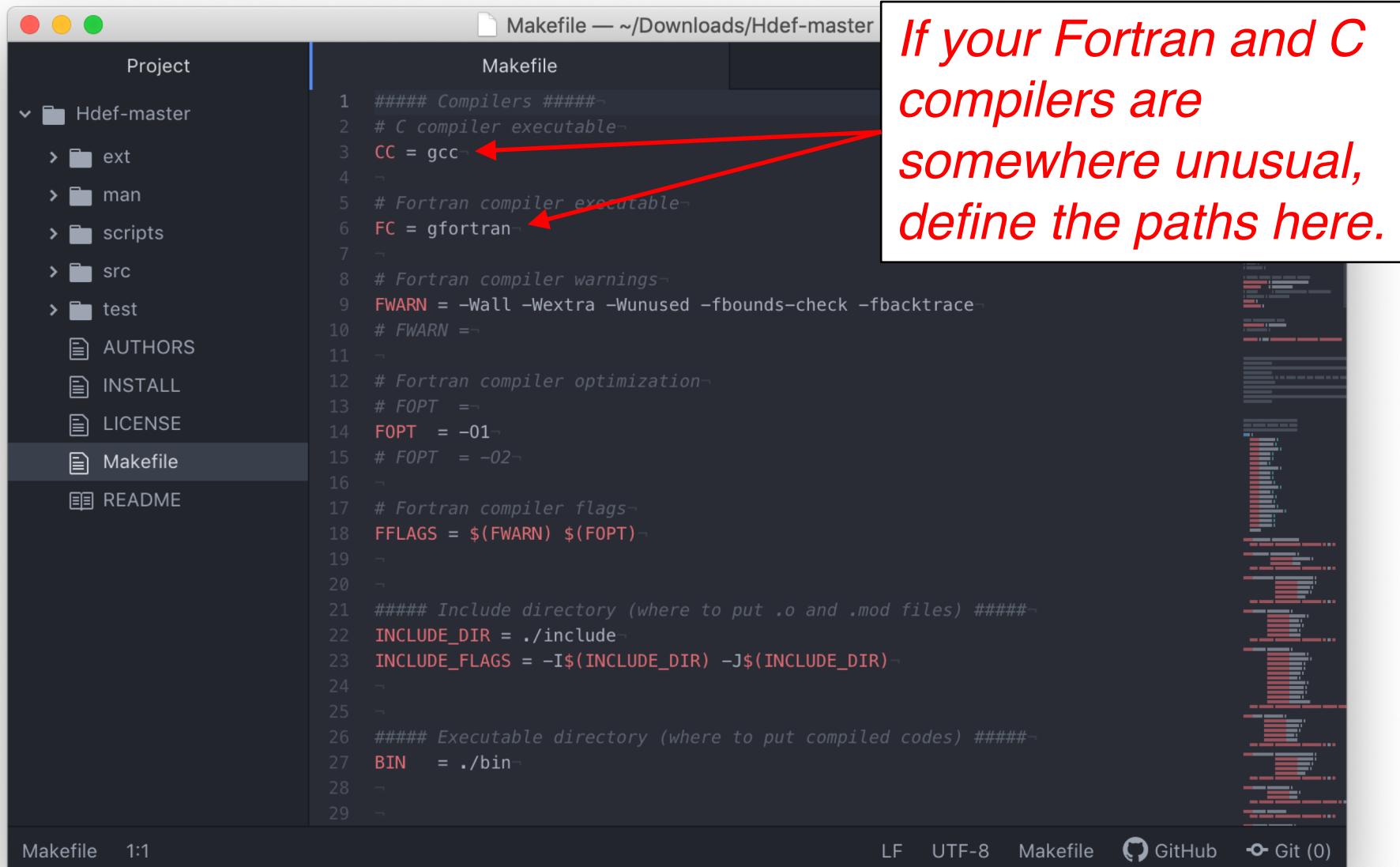
Makefile — ~/Downloads/Hdef-master

```
1 ##### Compilers #####
2 # C compiler executable-
3 CC = gcc-
4 -
5 # Fortran compiler executable-
6 FC = gfortran-
7 -
8 # Fortran compiler warnings-
9 FWARN = -Wall -Wextra -Wunused -fbounds-check -fbacktrace-
10 # FWARN =
11 -
12 # Fortran compiler optimization-
13 # FOPT =
14 FOPT = -O1-
15 # FOPT = -O2-
16 -
17 # Fortran compiler flags-
18 FFLAGS = $(FWARN) $(FOPT)-
19 -
20 -
21 ##### Include directory (where to put .o and .mod files) #####
22 INCLUDE_DIR = ./include-
23 INCLUDE_FLAGS = -I$(INCLUDE_DIR) -J$(INCLUDE_DIR)-
24 -
25 -
26 ##### Executable directory (where to put compiled codes) #####
27 BIN = ./bin-
```

Makefile 1:1

Choose the directory to put executables

Downloading & Installing



If your Fortran and C compilers are somewhere unusual, define the paths here.

```
Makefile — ~/Downloads/Hdef-master
Makefile
1 ##### Compilers #####
2 # C compiler executable
3 CC = gcc ←
4
5 # Fortran compiler executable
6 FC = gfortran ←
7
8 # Fortran compiler warnings
9 FWARN = -Wall -Wextra -Wunused -fbounds-check -fbacktrace
10 # FWARN =
11
12 # Fortran compiler optimization
13 # FOPT =
14 FOPT = -O1
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16
17 # Fortran compiler flags
18 FFLAGS = $(FWARN) $(FOPT)
19
20
21 ##### Include directory (where to put .o and .mod files) #####
22 INCLUDE_DIR = ./include
23 INCLUDE_FLAGS = -I$(INCLUDE_DIR) -J$(INCLUDE_DIR)
24
25
26 ##### Executable directory (where to put compiled codes) #####
27 BIN = ./bin
28
29
```

Project

- Hdef-master
 - ext
 - man
 - scripts
 - src
 - test
- AUTHORS
- INSTALL
- LICENSE
- Makefile
- README

Makefile 1:1 LF UTF-8 Makefile GitHub Git (0)

Downloading & Installing

The screenshot shows a terminal window with a dark theme. On the left is a file tree labeled "Project" showing a directory structure for "Hdef-master" containing "ext", "man", "scripts", "src", and "test" subfolders, along with "AUTHORS", "INSTALL", "LICENSE", "Makefile", and "README" files. The "Makefile" file is selected. The main pane displays the content of the "Makefile" file:

```
1 ##### Compilers #####
2 # C compiler executable-
3 CC = gcc-
4 -
5 # Fortran compiler executable-
6 FC = gfortran-
7 -
8 # Fortran compiler warnings-
9 FWARN = -Wall -Wextra -Wunused -fbounds-check -fbacktrace-
10 # FWARN =
11 -
12 # Fortran compiler optimization-
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16 -
17 # Fortran compiler flags-
18 FFLAGS = $(FWARN) $(FOPT)-
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20 -
21 ##### Include directory (where to put .o and .mod files) #####
22 INCLUDE_DIR = ./include-
23 INCLUDE_FLAGS = -I$(INCLUDE_DIR) -J$(INCLUDE_DIR)-
24 -
25 -
26 ##### Executable directory #####
27 BIN = ./bin-
28 -
29 -
```

A red callout box with the text "Scroll down a few lines..." is overlaid on the bottom right of the code area.

Makefile 1:1 LF UTF-8 Makefile GitHub Git (0)

Downloading & Installing

```
Makefile — ~/Downloads/Hdef-master
Makefile
19
20
21 ##### Include directory (where to put .o and .mod)
22 INCLUDE_DIR = ./include
23 INCLUDE_FLAGS = -I$(INCLUDE_DIR) -J$(INCLUDE_DIR)
24
25
26 ##### Executable directory (where to put compiled programs)
27 BIN    = ./bin
28
29
30 ##### External libraries #####
31 # LAPACK (linear algebra)
32 LAPACK_LIB_DIR = /sw/lib/lapack
33 LAPACK_LIB     = -lreflapack -lrefblas -ltmglib
34 # LAPACK_LIB     = -llapack -lblas -ltmglib
35 LAPACK         = -L$(LAPACK_LIB_DIR) $(LAPACK_LIB)
36 CPP_LAPACK = -DUSE_LAPACK
37 # LAPACK ==
38 # CPP_LAPACK ==
39
40 # SuperLU (sparse linear equation solvers)
41 SUPERLU_LIB_DIR = ./ext/SuperLU_5.2.1/lib
42 SUPERLU_LIB     = -lsuperlu_5.1
43 # SUPERLU        = -L$(SUPERLU_LIB_DIR) $(SUPERLU_LIB)
44 # CPP_SUPERLU = -DUSE_SUPERLU
45 SUPERLU =
46 CPP_SUPERLU =
47
```

Installing with LAPACK:

Define the location of the LAPACK library

The library names

LAPACK compiler pre-processor

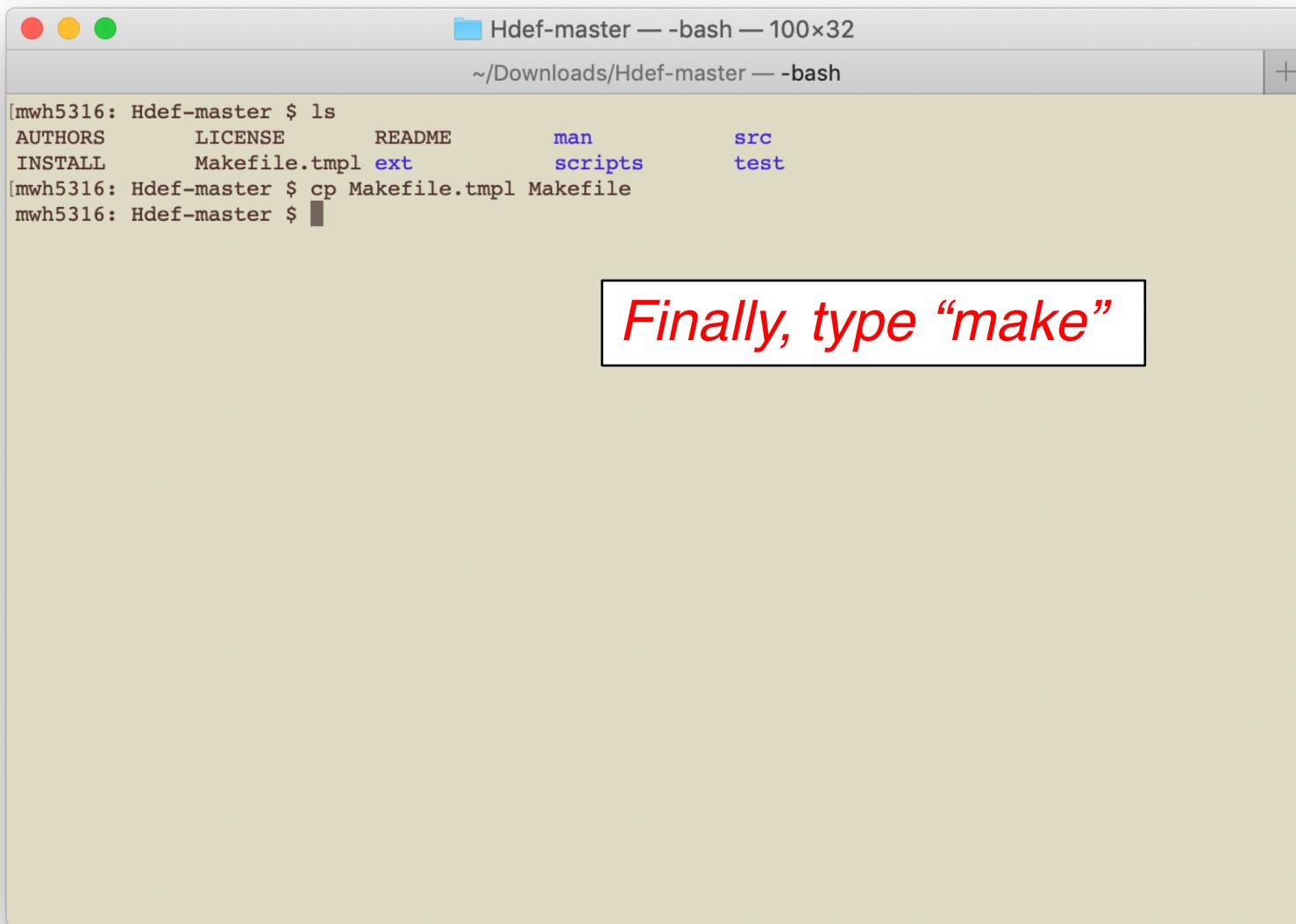
Downloading & Installing

```
Makefile — ~/Downloads/Hdef-master
Makefile
19
20
21 ##### Include directory (where to put .o and .mod)
22 INCLUDE_DIR = ./include
23 INCLUDE_FLAGS = -I$(INCLUDE_DIR) -J$(INCLUDE_DIR)
24
25
26 ##### Executable directory (where to put compiled
27 BIN    = ./bin
28
29
30 ##### External libraries #####
31 # LAPACK (linear algebra)
32 LAPACK_LIB_DIR = /sw/lib/lapack
33 LAPACK_LIB     = -lreflapack -lrefblas -ltmglib
34 # LAPACK_LIB     = -llapack -lblas -ltmglib
35 LAPACK         = -L$(LAPACK_LIB_DIR) $(LAPACK_LIB)
36 CPP_LAPACK = -DUSE_LAPACK
37 # LAPACK ==
38 # CPP_LAPACK ==
39
40 # SuperLU (sparse linear equation solvers)
41 SUPERLU_LIB_DIR = ./ext/SuperLU_5.2.1/lib
42 SUPERLU_LIB     = -lsuperlu_5.1
43 # SUPERLU        = -L$(SUPERLU_LIB_DIR) $(SUPERLU_LIB)
44 # CPP_SUPERLU = -DUSE_SUPERLU
45 SUPERLU =
46 CPP_SUPERLU =
```

*Installing without
LAPACK:*

*Uncomment these
blank lines*

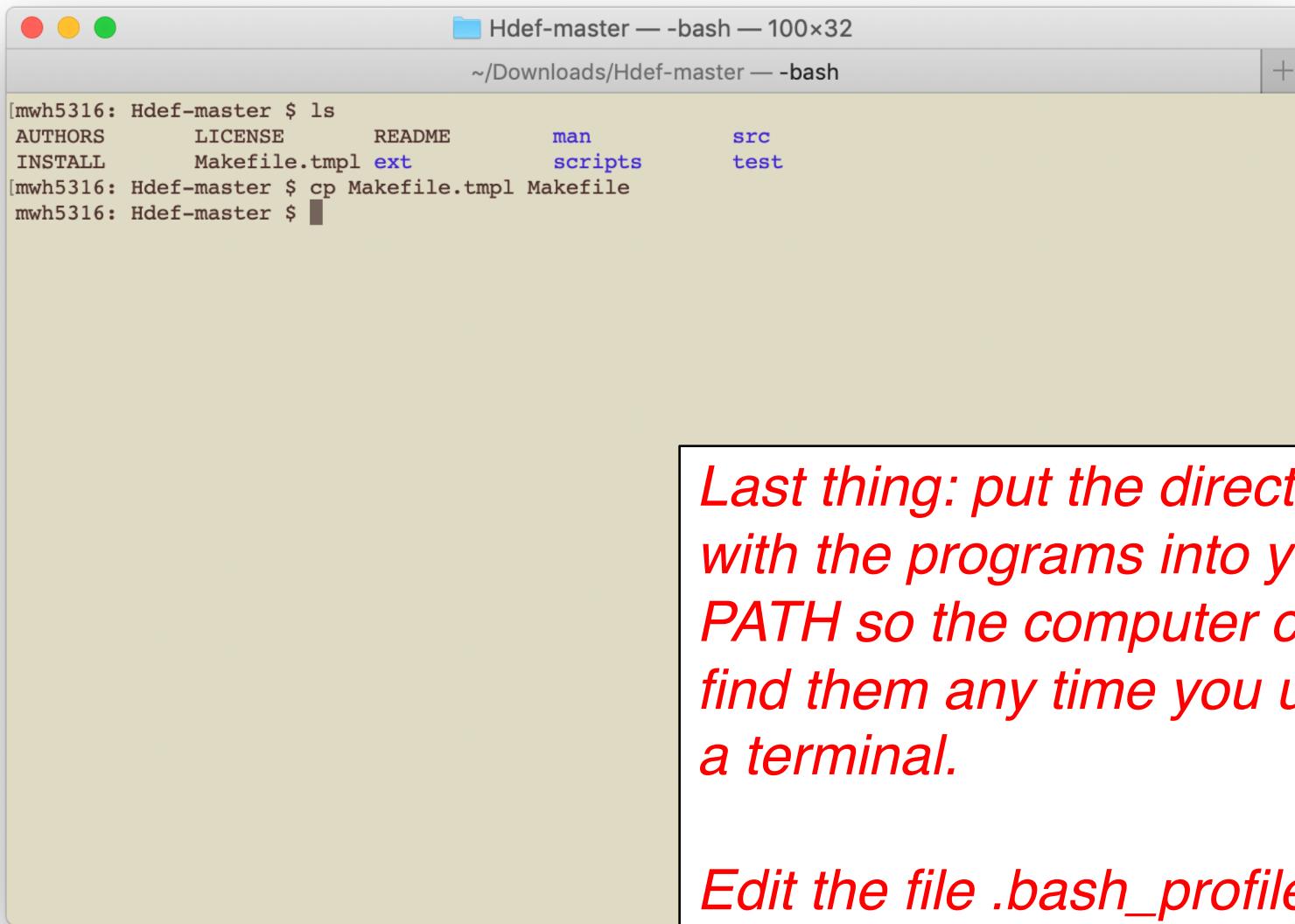
Downloading & Installing



```
[mwh5316: Hdef-master $ ls
AUTHORS      LICENSE      README      man      src
INSTALL      Makefile tmpl ext      scripts    test
[mwh5316: Hdef-master $ cp Makefile tmpl Makefile
mwh5316: Hdef-master $ ]
```

Finally, type “make”

Downloading & Installing



```
[mwh5316: Hdef-master $ ls
AUTHORS      LICENSE      README      man      src
INSTALL      Makefile tmpl ext      scripts    test
[mwh5316: Hdef-master $ cp Makefile tmpl Makefile
mwh5316: Hdef-master $ ]
```

Last thing: put the directory with the programs into your PATH so the computer can find them any time you use a terminal.

*Edit the file .bash_profile
(yes, that starts with a ".")*

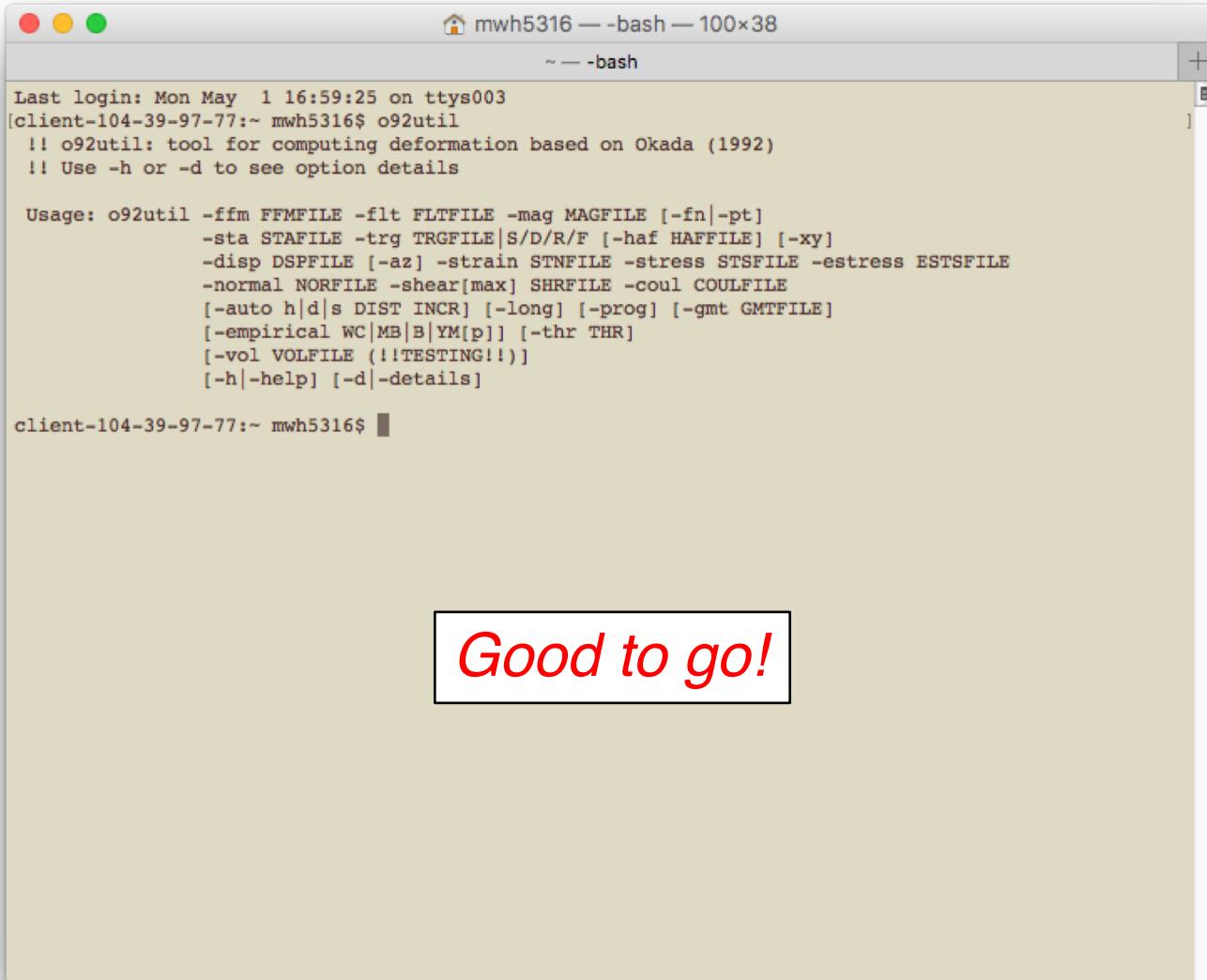
Downloading & Installing

If you installed the Hdef executables in ~/bin, you would add the line:

export PATH=\$PATH:~/bin

then close out of your terminal and reopen it.

Downloading & Installing



```
mwh5316 — bash — 100x38
~ — -bash

Last login: Mon May  1 16:59:25 on ttys003
[client-104-39-97-77:~ mwh5316$ o92util
!! o92util: tool for computing deformation based on Okada (1992)
!! Use -h or -d to see option details

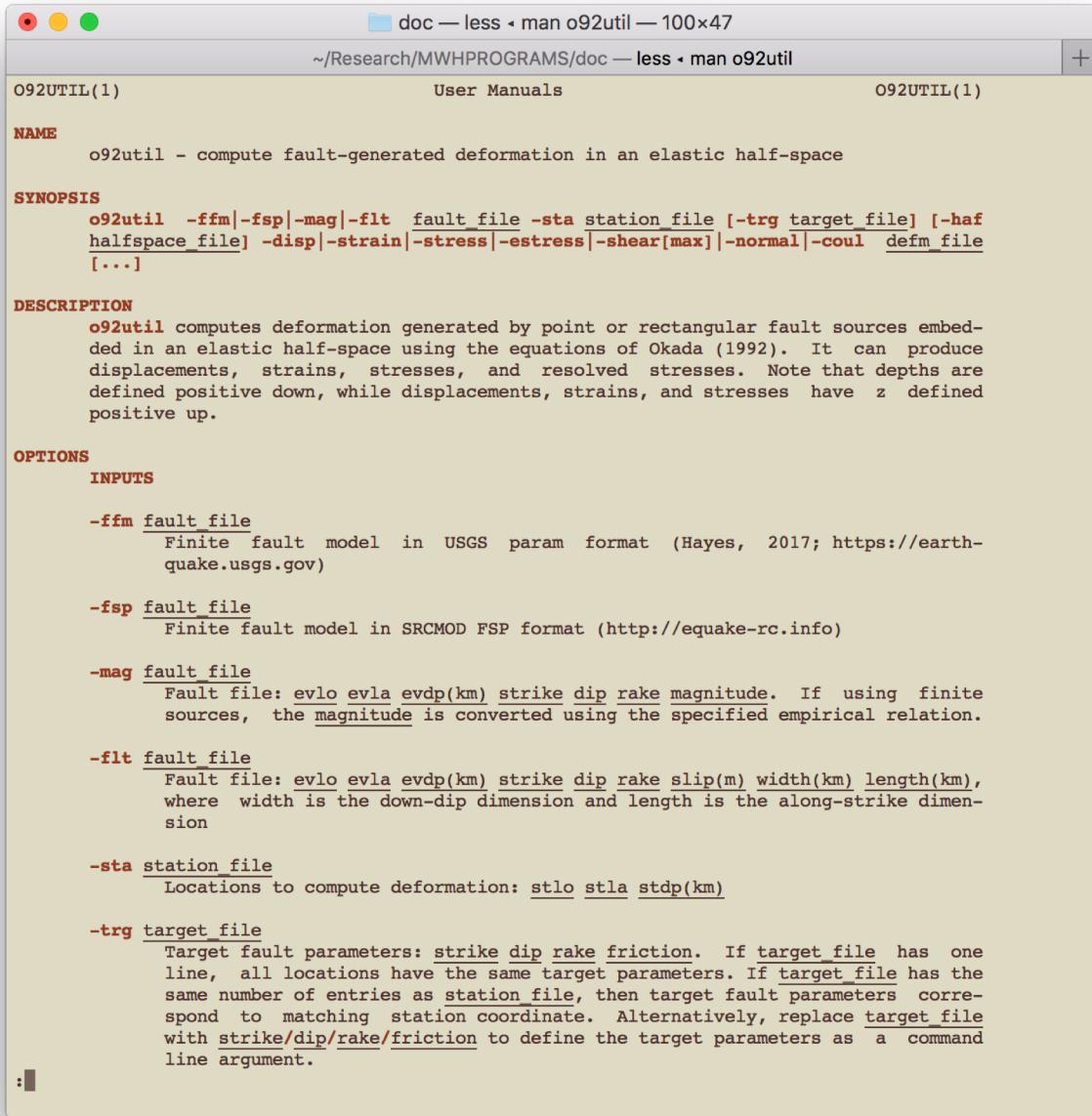
Usage: o92util -ffm FFMFILE -flt FLTFILE -mag MAGFILE [-fn|-pt]
      -sta STAFILE -trg TRGFILE[S/D/R/F [-haf HAFFILE] [-xy]
      -disp DSPFILE [-az] -strain STNFILE -stress STSFILE -estress ESTSFILE
      -normal NORFILE -shear[max] SHRFILE -coul COULFILE
      [-auto h|d|s DIST INCR] [-long] [-prog] [-gmt GMTFILE]
      [-empirical WC|MB|B|YM[p]] [-thr THR]
      [-vol VOLFILE (!!TESTING!!)]
      [-h|-help] [-d|-details]

client-104-39-97-77:~ mwh5316$
```

Good to go!

Hdef man pages...

Downloading & Installing



The screenshot shows a terminal window with the title bar "doc — less - man o92util — 100x47" and the path "~/Research/MWHPROGRAMS/doc — less - man o92util". The content is the man page for the o92util command. The page is divided into sections: NAME, SYNOPSIS, DESCRIPTION, and OPTIONS. The OPTIONS section is expanded, listing various command-line flags and their descriptions. The descriptions include URLs for finite fault models and empirical relations.

```
NAME
o92util - compute fault-generated deformation in an elastic half-space

SYNOPSIS
o92util [-ffm|-fsp|-mag|-flt] fault_file -sta station_file [-trg target_file] [-haf
halfspace_file] -disp|-strain|-stress|-estress|-shear[max]|-normal|-coul defm_file
[...]

DESCRIPTION
o92util computes deformation generated by point or rectangular fault sources embed-
ded in an elastic half-space using the equations of Okada (1992). It can produce
displacements, strains, stresses, and resolved stresses. Note that depths are
defined positive down, while displacements, strains, and stresses have z defined
positive up.

OPTIONS
INPUTS

-ffm fault_file
    Finite fault model in USGS param format (Hayes, 2017; https://earth-
    quake.usgs.gov)

-fsp fault_file
    Finite fault model in SRCMOD FSP format (http://equake-rc.info)

-mag fault_file
    Fault file: evlo evla evdp(km) strike dip rake magnitude. If using finite
    sources, the magnitude is converted using the specified empirical relation.

-flt fault_file
    Fault file: evlo evla evdp(km) strike dip rake slip(m) width(km) length(km),
    where width is the down-dip dimension and length is the along-strike dimen-
    sion

-sta station_file
    Locations to compute deformation: stlo stla stdp(km)

-trg target_file
    Target fault parameters: strike dip rake friction. If target_file has one
    line, all locations have the same target parameters. If target_file has the
    same number of entries as station_file, then target fault parameters corre-
    spond to matching station coordinate. Alternatively, replace target_file
    with strike/dip/rake/friction to define the target parameters as a command
    line argument.
```

There are man pages for several of the tools. These may be particularly useful for the larger programs with lots of options. These are in the directory:

Hdef-master/man
Add these to the MANPATH variable in your .bash_profile