

# my GIAC/C++ cheat sheet

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## 1 Introduction

This document describes how to install and write a C++ program using Giac computer algebra software. This assumes you already have C++ installed on your PC. I did this on a Linux OS.

Here is a post about the history of Giac.

The help pages that describes the giac commands are [HTML](#) and [PDF](#)

## 2 Installing Giac

### 2.1 download an extract software

1. Downloaded giac from here. The latest version is in a `tar.gz` at the bottom of the page. This document was written using `giac_1.9.0-35.tar.gz`
2. Copied the above file to an empty folder `~/TMP/GIAC/` folder and then `cd` to the above, and extracted the content using the commands

```
> cd ~/TMP/GIAC/
> ls -lrt

total 111092
-rwxrwxrwx 1 me me 113753631 Jan 12 18:13 giac_1.9.0-35.tar.gz

> gunzip giac_1.9.0-35.tar.gz
> tar -xvf giac_1.9.0-35.tar
```

The above creates a new folder `giac-1.9.0/`

### 2.2 check prerequisites

1. `cd` to the above folder created

```
> cd giac-1.9.0/
```

2. The file `INSTALL` contains more directions. This is what I did.
  - (a) edited as root the file `/etc/ld.so.conf` and added this new line at the top `/usr/local/lib` of the file and saved it.
  - (b) installed the extra software mentioned in the above file. I did all that using Linux Manjaro installation manager as it is easier.

```
>locate mpfr.h
/usr/include/mpfr.h

>locate gmp.h
/usr/include/gmp.h

>locate readline.h
/usr/include/readline/readline.h

>locate gsl_blas.h
/usr/include/gsl/gsl_blas.h

>pacman -Ql lapack
```

```

lapack /usr/
lapack /usr/lib/
lapack /usr/lib/cmake/
lapack /usr/lib/cmake/lapack-3.11.0/
lapack /usr/lib/cmake/lapack-3.11.0/lapack-config-version.cmake
lapack /usr/lib/cmake/lapack-3.11.0/lapack-config.cmake
lapack /usr/lib/cmake/lapack-3.11.0/lapack-targets-release.cmake
lapack /usr/lib/cmake/lapack-3.11.0/lapack-targets.cmake
lapack /usr/lib/liblapack.so
lapack /usr/lib/liblapack.so.3
lapack /usr/lib/liblapack.so.3.11.0
lapack /usr/lib/libtmglib.so
lapack /usr/lib/libtmglib.so.3
lapack /usr/lib/libtmglib.so.3.11.0
lapack /usr/lib/pkgconfig/
lapack /usr/lib/pkgconfig/lapack.pc

>pacman -Ql pari
etc..

```

- (c) run `ldconfig` command as root after installing all the extra packages mentioned in the `INSTALL` file.

## 2.3 run configure

Now that all needed extra software is installed, it is time to build and install `giac` itself. First configure the makefile as follows

```

>./configure
checking for a BSD-compatible install... /usr/bin/install -c
checking whether build environment is sane... yes
checking for a thread-safe mkdir -p... /usr/bin/mkdir -p
checking for gawk... gawk
checking whether make sets $(MAKE)... yes
checking for gcc... gcc
checking whether the C compiler works... yes
checking for C compiler default output file name... a.out
checking for suffix of executables...
checking whether we are cross compiling... no
checking for suffix of object files... o
checking whether we are using the GNU C compiler... yes
checking whether gcc accepts -g... yes
checking for gcc option to accept ISO C89... none needed
checking for style of include used by make... GNU
checking dependency style of gcc... gcc3
checking whether ln -s works... yes

```

```
checking for g++... g++
checking whether we are using the GNU C++ compiler... yes
checking whether g++ accepts -g... yes
checking dependency style of g++... gcc3
checking how to run the C++ preprocessor... g++ -E
checking build system type... x86_64-pc-linux-gnu
checking host system type... x86_64-pc-linux-gnu
checking for a sed that does not truncate output... /usr/bin/sed
checking for grep that handles long lines and -e... /usr/bin/grep
checking for egrep... /usr/bin/grep -E
checking for fgrep... /usr/bin/grep -F
checking for ld used by gcc... /usr/bin/ld
checking if the linker (/usr/bin/ld) is GNU ld... yes
checking for BSD- or MS-compatible name lister (nm)... /usr/bin/nm -B
checking the name lister (/usr/bin/nm -B) interface... BSD nm
checking the maximum length of command line arguments... 1572864
checking whether the shell understands some XSI constructs... yes
checking whether the shell understands "+="... yes
checking for /usr/bin/ld option to reload object files... -r
checking how to recognize dependent libraries... pass_all
checking for ar... ar
checking for strip... strip
checking for ranlib... ranlib
checking command to parse /usr/bin/nm -B output from gcc object... ok
checking how to run the C preprocessor... gcc -E
checking for ANSI C header files... yes
checking for sys/types.h... yes
checking for sys/stat.h... yes
checking for stdlib.h... yes
checking for string.h... yes
checking for memory.h... yes
checking for strings.h... yes
checking for inttypes.h... yes
checking for stdint.h... yes
checking for unistd.h... yes
checking for dlfcn.h... yes
checking whether we are using the GNU C++ compiler... (cached) yes
checking whether g++ accepts -g... (cached) yes
checking dependency style of g++... (cached) gcc3
checking how to run the C++ preprocessor... g++ -E
checking for objdir... .libs
checking if gcc supports -fno-rtti -fno-exceptions... no
checking for gcc option to produce PIC... -fPIC -DPIC
checking if gcc PIC flag -fPIC -DPIC works... yes
checking if gcc static flag -static works... yes
checking if gcc supports -c -o file.o... yes
checking if gcc supports -c -o file.o... (cached) yes
```

```
checking whether the gcc linker (/usr/bin/ld -m elf_x86_64) supports shared libraries... yes
checking whether -lc should be explicitly linked in... no
checking dynamic linker characteristics... GNU/Linux ld.so
checking how to hardcode library paths into programs... immediate
checking whether stripping libraries is possible... yes
checking if libtool supports shared libraries... yes
checking whether to build shared libraries... yes
checking whether to build static libraries... yes
checking for ld used by g++... /usr/bin/ld -m elf_x86_64
checking if the linker (/usr/bin/ld -m elf_x86_64) is GNU ld... yes
checking whether the g++ linker (/usr/bin/ld -m elf_x86_64) supports shared libraries... yes
checking for g++ option to produce PIC... -fPIC -DPIC
checking if g++ PIC flag -fPIC -DPIC works... yes
checking if g++ static flag -static works... yes
checking if g++ supports -c -o file.o... yes
checking if g++ supports -c -o file.o... (cached) yes
checking whether the g++ linker (/usr/bin/ld -m elf_x86_64) supports shared libraries... yes
checking dynamic linker characteristics... GNU/Linux ld.so
checking how to hardcode library paths into programs... immediate
checking for bison... bison -y
checking for flex... flex
checking lex output file root... lex.yy
checking lex library... none needed
checking whether yytext is a pointer... no
checking whether byte ordering is bigendian... no
checking for standard C++ header files... yes
checking gmp.h usability... yes
checking gmp.h presence... yes
checking for gmp.h... yes
checking for main in -lgmp... yes
checking mpfr.h usability... yes
checking mpfr.h presence... yes
checking for mpfr.h... yes
checking for main in -lmpfr... yes
checking for mpfr_set_str_raw... no
checking mpfi.h usability... yes
checking mpfi.h presence... yes
checking for mpfi.h... yes
checking for main in -lmpfi... yes
checking gmpxx.h usability... yes
checking gmpxx.h presence... yes
checking for gmpxx.h... yes
checking for main in -lgmpxx... yes
checking ecm.h usability... yes
checking ecm.h presence... yes
checking for ecm.h... yes
checking for main in -lecm... yes
```

```
checking bern_rat.h usability... no
checking bern_rat.h presence... no
checking for bern_rat.h... no
checking NTL/ZZ.h usability... yes
checking NTL/ZZ.h presence... yes
checking for NTL/ZZ.h... yes
checking for main in -lntl... yes
checking pari/pari.h usability... yes
checking pari/pari.h presence... yes
checking for pari/pari.h... yes
checking for main in -lpari... yes
checking for main in -lm... yes
checking png.h usability... yes
checking png.h presence... yes
checking for png.h... yes
checking for library containing png_sig_cmp... -lpng16
checking for dlopen in -ldl... yes
checking size of void *... 8
checking size of int... 4
checking size of long... 8
checking size of long long... 8
checking gsl/gsl_blas.h usability... yes
checking gsl/gsl_blas.h presence... yes
checking for gsl/gsl_blas.h... yes
checking gsl/gsl_eigen.h usability... yes
checking gsl/gsl_eigen.h presence... yes
checking for gsl/gsl_eigen.h... yes
checking for main in -lgslcblas... yes
checking for gsl_sf_gamma in -lgsl... yes
checking for main in -lgfortran... yes
checking for main in -lblas... yes
checking for main in -llapack... yes
checking CoCoA/io.H usability... no
checking CoCoA/io.H presence... no
checking for CoCoA/io.H... no
checking ao/ao.h usability... yes
checking ao/ao.h presence... yes
checking for ao/ao.h... yes
checking for main in -lao... yes
checking glpk.h usability... yes
checking glpk.h presence... yes
checking for glpk.h... yes
checking for main in -lglpk... yes
checking samplerate.h usability... yes
checking samplerate.h presence... yes
checking for samplerate.h... yes
checking for main in -lsamplerate... yes
```

```
checking curl/curl.h usability... yes
checking curl/curl.h presence... yes
checking for curl/curl.h... yes
checking for main in -lcurl... yes
checking for tgetent... no
checking for tgetent in -lncurses... yes
checking readline/readline.h usability... yes
checking readline/readline.h presence... yes
checking for readline/readline.h... yes
checking readline/history.h usability... yes
checking readline/history.h presence... yes
checking for readline/history.h... yes
checking for version of libreadline... yes
checking for readline in -lreadline... yes
checking for X... libraries , headers
checking for gethostbyname... yes
checking for connect... yes
checking for remove... yes
checking for shmattr... yes
checking for IceConnectionNumber in -lICE... yes
checking for main in -lGL... yes
checking FL/Fl.H usability... yes
checking FL/Fl.H presence... yes
checking for FL/Fl.H... yes
checking for main in -lX11... yes
checking for main in -lXcursor... yes
checking for main in -lXfixes... yes
checking for main in -lXinerama... yes
checking for main in -lfontconfig... yes
checking for main in -lXft... yes
checking for main in -lXext... yes
checking for main in -lXrender... yes
checking for main in -lfltk_gl... yes
checking for main in -lfltk... yes
checking for main in -lz... yes
checking for png.h... (cached) yes
checking for main in -lpng... yes
checking for main in -ljpeg... yes
checking for main in -lfltk_images... yes
checking dfu_lib.h usability... no
checking dfu_lib.h presence... no
checking for dfu_lib.h... no
checking for main in -lusb-1.0... yes
checking for dfu_main in -ldfu... no
checking for main in -lcliquer... no
checking for main in -lnauty... yes
checking nauty/naututil.h usability... yes
```

```
checking nauty/naututil.h presence... yes
checking for nauty/naututil.h... yes
checking vcl1/vectorclass.h usability... no
checking vcl1/vectorclass.h presence... no
checking for vcl1/vectorclass.h... no
checking for main in -lpthread... yes
checking pthread.h usability... yes
checking pthread.h presence... yes
checking for pthread.h... yes
checking malloc.h usability... yes
checking malloc.h presence... yes
checking for malloc.h... yes
checking for sysconf... yes
checking for clock_gettime in -lrt... yes
checking unordered_map usability... yes
checking unordered_map presence... yes
checking for unordered_map... yes
checking ext/hash_map usability... yes
checking ext/hash_map presence... yes
checking for ext/hash_map... yes
checking tr1/unordered_map usability... yes
checking tr1/unordered_map presence... yes
checking for tr1/unordered_map... yes
checking hash_map usability... yes
checking hash_map presence... yes
checking for hash_map... yes
checking pwd.h usability... yes
checking pwd.h presence... yes
checking for pwd.h... yes
checking locale.h usability... yes
checking locale.h presence... yes
checking for locale.h... yes
checking for unistd.h... (cached) yes
checking sys/time.h usability... yes
checking sys/time.h presence... yes
checking for sys/time.h... yes
checking sys/times.h usability... yes
checking sys/times.h presence... yes
checking for sys/times.h... yes
checking sys/resource.h usability... yes
checking sys/resource.h presence... yes
checking for sys/resource.h... yes
checking for sys/types.h... (cached) yes
checking signal.h usability... yes
checking signal.h presence... yes
checking for signal.h... yes
checking for getpid... yes
```

```
checking for getcwd... yes
checking for getpwuid... yes
checking for system... yes
checking whether NLS is requested... yes
checking for msgfmt... /usr/bin/msgfmt
checking for gmsgfmt... /usr/bin/msgfmt
checking for xgettext... /usr/bin/xgettext
checking for msgmerge... /usr/bin/msgmerge
checking whether we are using the GNU C Library 2 or newer... yes
checking for ranlib... (cached) ranlib
checking for strerror in -lcposix... no
checking for an ANSI C-conforming const... yes
checking for signed... yes
checking for inline... inline
checking for off_t... yes
checking for size_t... yes
checking for long long... yes
checking for long double... yes
checking for wchar_t... yes
checking for wint_t... yes
checking for inttypes.h... yes
checking for stdint.h... yes
checking for intmax_t... yes
checking whether printf() supports POSIX/XSI format strings... yes
checking for working alloca.h... yes
checking for alloca... yes
checking for stdlib.h... (cached) yes
checking for unistd.h... (cached) yes
checking for sys/param.h... yes
checking for getpagesize... yes
checking for working mmap... yes
checking whether we are using the GNU C Library 2.1 or newer... yes
checking whether integer division by zero raises SIGFPE... yes
checking for unsigned long long... yes
checking for inttypes.h... yes
checking whether the inttypes.h PRIxNN macros are broken... no
checking for stdint.h... (cached) yes
checking for SIZE_MAX... yes
checking for stdint.h... (cached) yes
checking for CFPreferencesCopyAppValue... no
checking for CFLocaleCopyCurrent... no
checking for ld used by GCC... /usr/bin/ld -m elf_x86_64
checking if the linker (/usr/bin/ld -m elf_x86_64) is GNU ld... yes
checking for shared library run path origin... done
checking for ptrdiff_t... yes
checking argz.h usability... yes
checking argz.h presence... yes
```

```
checking for argz.h... yes
checking limits.h usability... yes
checking limits.h presence... yes
checking for limits.h... yes
checking for locale.h... (cached) yes
checking nl_types.h usability... yes
checking nl_types.h presence... yes
checking for nl_types.h... yes
checking for malloc.h... (cached) yes
checking stddef.h usability... yes
checking stddef.h presence... yes
checking for stddef.h... yes
checking for stdlib.h... (cached) yes
checking for string.h... (cached) yes
checking for unistd.h... (cached) yes
checking for sys/param.h... (cached) yes
checking for asprintf... yes
checking for fwprintf... yes
checking for getcwd... (cached) yes
checking for getegid... yes
checking for geteuid... yes
checking for getgid... yes
checking for getuid... yes
checking for memcpy... yes
checking for mmap... yes
checking for putenv... yes
checking for setenv... yes
checking for setlocale... yes
checking for snprintf... yes
checking for stpcpy... yes
checking for strcasecmp... yes
checking for strdup... yes
checking for strtoul... yes
checking for tsearch... yes
checking for wcslen... yes
checking for __argz_count... yes
checking for __argz_stringify... yes
checking for __argz_next... yes
checking for __fsetlocking... yes
checking whether _snprintf is declared... no
checking whether _snwprintf is declared... no
checking whether feof_unlocked is declared... yes
checking whether fgets_unlocked is declared... yes
checking whether getc_unlocked is declared... yes
checking for iconv... yes
checking for iconv declaration...
extern size_t iconv (iconv_t cd, char * *inbuf, size_t *inbytesleft, char * *outbuf,
```

```
checking for nl_langinfo and CODESET... yes
checking for LC_MESSAGES... yes
checking for bison... bison
checking version of bison... 3.8.2, ok
checking for CFPReferencesCopyAppValue... (cached) no
checking for CFLocaleCopyCurrent... (cached) no
checking whether NLS is requested... yes
checking whether included gettext is requested... no
checking for GNU gettext in libc... yes
checking whether to use NLS... yes
checking where the gettext function comes from... libc
checking for egrep... (cached) /usr/bin/grep -E
checking for latex... /usr/local/texlive/2022/bin/x86_64-linux/latex
checking for makeindex... /usr/local/texlive/2022/bin/x86_64-linux/makeindex
checking for pdflatex... /usr/local/texlive/2022/bin/x86_64-linux/pdflatex
checking for dvips... /usr/local/texlive/2022/bin/x86_64-linux/dvips
checking sstream usability... yes
checking sstream presence... yes
checking for sstream... yes
configure: creating ./config.status
config.status: creating Makefile
config.status: creating src/Makefile
config.status: creating check/Makefile
config.status: creating doc/Makefile
config.status: creating doc/en/Makefile
config.status: creating doc/es/Makefile
config.status: creating doc/fr/Makefile
config.status: creating doc/el/Makefile
config.status: creating doc/el/tutoriel/Makefile
config.status: creating doc/el/casinter/Makefile
config.status: creating doc/local/Makefile
config.status: creating doc/pt/Makefile
config.status: creating doc/zh/Makefile
config.status: creating doc/de/Makefile
config.status: creating intl/Makefile
config.status: WARNING: 'intl/Makefile.in' seems to ignore the --datarootdir setting
config.status: creating po/Makefile.in
config.status: WARNING: 'po/Makefile.in.in' seems to ignore the --datarootdir setting
config.status: creating examples/Makefile
config.status: creating debianold/Makefile
config.status: creating debian/Makefile
config.status: creating micropython-1.12/Makefile
config.status: creating micropython-1.12/docs/Makefile
config.status: creating micropython-1.12/drivers/Makefile
config.status: creating micropython-1.12/examples/Makefile
config.status: creating micropython-1.12/extmod/Makefile
config.status: creating micropython-1.12/lib/Makefile
```

```

config.status: creating micropython-1.12/logo/Makefile
config.status: creating micropython-1.12/ports/Makefile
config.status: creating micropython-1.12/py/Makefile
config.status: creating micropython-1.12/tests/Makefile
config.status: creating micropython-1.12/tools/Makefile
config.status: creating micropython-1.12/unix/Makefile
config.status: creating micropython-1.12/ulab/Makefile
config.status: creating micropython-1.12/ulab/numpy/Makefile
config.status: creating micropython-1.12/ulab/numpy/fft/Makefile
config.status: creating micropython-1.12/ulab/numpy/ndarray/Makefile
config.status: creating micropython-1.12/ulab/numpy/linalg/Makefile
config.status: creating micropython-1.12/ulab/scipy/Makefile
config.status: creating micropython-1.12/ulab/scipy/linalg/Makefile
config.status: creating micropython-1.12/ulab/scipy/optimize/Makefile
config.status: creating micropython-1.12/ulab/scipy/signal/Makefile
config.status: creating micropython-1.12/ulab/scipy/special/Makefile
config.status: creating micropython-1.12/ulab/user/Makefile
config.status: creating micropython-1.12/ulab/utils/Makefile
config.status: creating config.h
config.status: executing depfiles commands
config.status: executing libtool commands
config.status: executing default-1 commands
config.status: creating po/POTFILES
config.status: creating po/Makefile
Adding link . to giac in src
>

```

## 2.4 run make

```

>make

make all-recursive
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0'
Making all in micropython-1.12
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
Making all in xcas
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12/xcas'
Use make V=1 or set BUILD_VERBOSE in your environment to increase build verbosity.
../py/mkrules.mk:176: warning: overriding recipe for target 'libmicropython.a'
../py/mkrules.mk:145: warning: ignoring old recipe for target 'libmicropython.a'
mkdir -p build/genhdr
GEN build/genhdr/mpversion.h
GEN build/genhdr/moduledefs.h
GEN build/genhdr/qstr.i.last
GEN build/genhdr/qstr.split
GEN build/genhdr/qstrdefs.collected.h

```

```
QSTR updated
GEN build/genhdr/qstrdefs.generated.h
mkdir -p build/extmod/
mkdir -p build/lib/embed/
mkdir -p build/lib/utls/
mkdir -p build/py/
mkdir -p build/ulab/
mkdir -p build/ulab/numpy/
mkdir -p build/ulab/numpy/fft/
mkdir -p build/ulab/numpy/linalg/
mkdir -p build/ulab/numpy/ndarray/
mkdir -p build/ulab/scipy/
mkdir -p build/ulab/scipy/linalg/
mkdir -p build/ulab/scipy/optimize/
mkdir -p build/ulab/scipy/signal/
mkdir -p build/ulab/scipy/special/
mkdir -p build/ulab/user/
mkdir -p build/ulab/utls/
CC ../py/mpstate.c
CC ../py/nlr.c
CC ../py/nlrx86.c
CC ../py/nlrx64.c
CC ../py/nlrthumb.c
CC ../py/nlrpowerpc.c
CC ../py/nlrxtena.c
CC ../py/nlrsetjmp.c
CC ../py/malloc.c
CC ../py/gc.c
CC ../py/pystack.c
CC ../py/qstr.c
CC ../py/vstr.c
CC ../py/mpprint.c
CC ../py/unicode.c
CC ../py/mpz.c
CC ../py/reader.c
CC ../py/lexer.c
CC ../py/parse.c
CC ../py/scope.c
CC ../py/compile.c
CC ../py/emitcommon.c
CC ../py/emitbc.c
CC ../py/asmbase.c
CC ../py/asmx64.c
CC ../py/emitnx64.c
CC ../py/asmx86.c
CC ../py/emitnx86.c
CC ../py/asmthumb.c
```

```
CC ../py/emitnthumb.c
CC ../py/emitinlinethumb.c
CC ../py/asmarm.c
CC ../py/emitnarm.c
CC ../py/asmxtensa.c
CC ../py/emitnxtensa.c
CC ../py/emitinlinextensa.c
CC ../py/emitnxtensawin.c
CC ../py/formatfloat.c
CC ../py/parsenumbase.c
CC ../py/parsenum.c
CC ../py/emitglue.c
CC ../py/persistentcode.c
CC ../py/runtime.c
CC ../py/runtime_utils.c
CC ../py/scheduler.c
CC ../py/nativeglue.c
CC ../py/ringbuf.c
CC ../py/stackctrl.c
CC ../py/argcheck.c
CC ../py/warning.c
CC ../py/profile.c
CC ../py/map.c
CC ../py/obj.c
CC ../py/objarray.c
CC ../py/objattrtuple.c
CC ../py/objbool.c
CC ../py/objboundmeth.c
CC ../py/objcell.c
CC ../py/objclosure.c
CC ../py/objcomplex.c
CC ../py/objdeque.c
CC ../py/objdict.c
CC ../py/objenumerate.c
CC ../py/objexcept.c
CC ../py/objfilter.c
CC ../py/objfloat.c
CC ../py/objfun.c
....
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0'
```

## 2.5 install

Now that make is finished, time to install Giac.

```
>sudo make install
[sudo] password for me:
Making install in micropython-1.12
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
Making install in xcas
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12/xcas'
Use make V=1 or set BUILD_VERBOSE in your environment to increase build verbosity.
../py/mkrules.mk:176: warning: overriding recipe for target 'libmicropython.a'
../py/mkrules.mk:145: warning: ignoring old recipe for target 'libmicropython.a'
/bin/cp libmicropython.a ../..
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12/xcas'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
make[3]: Nothing to be done for 'install-exec-am'.
make[3]: Nothing to be done for 'install-data-am'.
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/micropython-1.12'
Making install in src
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/src'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/src'
  /usr/bin/mkdir -p '/usr/local/lib'
  /bin/sh ../libtool --mode=install /usr/bin/install -c libgiac.la '/usr/local/lib'
libtool: install: /usr/bin/install -c .libs/libgiac.so.0.0.0 /usr/local/lib/libgiac.so.0.0.0
libtool: install: (cd /usr/local/lib && { ln -s -f libgiac.so.0.0.0 libgiac.so.0 || { rm -f lib
libtool: install: (cd /usr/local/lib && { ln -s -f libgiac.so.0.0.0 libgiac.so || { rm -f lib
libtool: install: /usr/bin/install -c .libs/libgiac.lai /usr/local/lib/libgiac.la
libtool: install: /usr/bin/install -c .libs/libgiac.a /usr/local/lib/libgiac.a
libtool: install: chmod 644 /usr/local/lib/libgiac.a
libtool: install: ranlib /usr/local/lib/libgiac.a
libtool: finish: PATH="/usr/local/texlive/2022/bin/x86_64-linux:/mnt/g/public_html/scripts:/u
-----
Libraries have been installed in:
  /usr/local/lib
```

If you ever happen to want to link against installed libraries in a given directory, LIBDIR, you must either use libtool, and specify the full pathname of the library, or use the `-LLIBDIR` flag during linking and do at least one of the following:

- add LIBDIR to the ``LD_LIBRARY_PATH'` environment variable during execution
- add LIBDIR to the ``LD_RUN_PATH'` environment variable during linking
- use the ``-Wl,-rpath -Wl,LIBDIR'` linker flag

- have your system administrator add LIBDIR to `~/etc/ld.so.conf`'

See any operating system documentation about shared libraries for more information, such as the `ld(1)` and `ld.so(8)` manual pages.

```
-----
/usr/bin/mkdir -p '/usr/local/bin'
/bin/sh ../libtool --mode=install /usr/bin/install -c icas xcas aide hevea2mml '/usr/local/bin'
libtool: install: /usr/bin/install -c .libs/icas /usr/local/bin/icas
libtool: install: /usr/bin/install -c .libs/xcas /usr/local/bin/xcas
libtool: install: /usr/bin/install -c .libs/aide /usr/local/bin/aide
libtool: install: /usr/bin/install -c hevea2mml /usr/local/bin/hevea2mml
/usr/bin/mkdir -p '/usr/local/bin'
/usr/bin/install -c pgjac '/usr/local/bin'
make install-exec-hook
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/src'
rm -f /usr/local/bin/cas_help
mv /usr/local/bin/aide /usr/local/bin/cas_help
ln -sf cas_help /usr/local/bin/en_cas_help
ln -sf cas_help /usr/local/bin/es_cas_help
ln -sf cas_help /usr/local/bin/fr_cas_help
ln -sf icas /usr/local/bin/giac
ln -sf xcas /usr/local/bin/xcasnew
mkdir -p /usr/local/include/giac
cp -f config.h /usr/local/include/giac
cp -f input_lexer.h /usr/local/include/giac
cp -f input_parser.h /usr/local/include/giac
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/src'
/usr/bin/mkdir -p '/usr/local/include/giac'
/usr/bin/install -c -m 644 dispatch.h fraction.h gen.h desolve.h misc.h ti89.h mathml.h iden
/usr/bin/install -c -m 644 isom.h plot.h plot3d.h rpn.h prog.h pari.h cocoa.h giac.h first.h
/usr/bin/install -c -m 644 cutils.h qjsgiac.h quickjs.h js.h quickjs-atom.h quickjs-libc.h q
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/src'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/src'
Making install in check
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/check'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/check'
make[2]: Nothing to be done for 'install-exec-am'.
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/check'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/check'
Making install in intl
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/intl'
if { test "giac" = "gettext-runtime" || test "giac" = "gettext-tools"; } \
  && test 'no' = yes; then \
  /bin/sh ../config/mkinstalldirs /usr/local/lib /usr/local/include; \
  /usr/bin/install -c -m 644 libintl.h /usr/local/include/libintl.h; \
  /bin/sh ../libtool --mode=install \
```

```

/usr/bin/install -c -m 644 libintl.a /usr/local/lib/libintl.a; \
if test "@RELOCATABLE@" = yes; then \
  dependencies=`sed -n -e 's,^dependency_libs=(.*)\,1,p' < /usr/local/lib/libintl.a | se
  if test -n "$dependencies"; then \
    rm -f /usr/local/lib/libintl.a; \
  fi; \
fi; \
else \
  : ; \
fi
if test "giac" = "gettext-tools" \
  && test 'no' = no \
  && test yes != no; then \
  /bin/sh ../config/mkinstalldirs /usr/local/lib; \
  /bin/sh ../libtool --mode=install \
    /usr/bin/install -c -m 644 libguintl.a /usr/local/lib/libguintl.a; \
  rm -f /usr/local/lib/preloadable_libintl.so; \
  /usr/bin/install -c -m 644 /usr/local/lib/libguintl.so /usr/local/lib/preloadable_libintl.
  /bin/sh ../libtool --mode=uninstall \
    rm -f /usr/local/lib/libguintl.a; \
else \
  : ; \
fi
if test 'no' = yes; then \
  test yes != no || /bin/sh ../config/mkinstalldirs /usr/local/lib; \
  temp=/usr/local/lib/t-charset.alias; \
  dest=/usr/local/lib/charset.alias; \
  if test -f /usr/local/lib/charset.alias; then \
    orig=/usr/local/lib/charset.alias; \
    sed -f ref-add.sed $orig > $temp; \
    /usr/bin/install -c -m 644 $temp $dest; \
    rm -f $temp; \
  else \
    if test yes = no; then \
      orig=charset.alias; \
      sed -f ref-add.sed $orig > $temp; \
      /usr/bin/install -c -m 644 $temp $dest; \
      rm -f $temp; \
    fi; \
  fi; \
/bin/sh ../config/mkinstalldirs /usr/local/share/locale; \
test -f /usr/local/share/locale/locale.alias \
  && orig=/usr/local/share/locale/locale.alias \
  || orig=./locale.alias; \
temp=/usr/local/share/locale/t-locale.alias; \
dest=/usr/local/share/locale/locale.alias; \
sed -f ref-add.sed $orig > $temp; \

```

```

/usr/bin/install -c -m 644 $temp $dest; \
rm -f $temp; \
else \
: ; \
fi
if test "giac" = "gettext-tools"; then \
/bin/sh ../config/mkinstalldirs /usr/local/share/gettext/intl; \
/usr/bin/install -c -m 644 VERSION /usr/local/share/gettext/intl/VERSION; \
/usr/bin/install -c -m 644 ChangeLog.inst /usr/local/share/gettext/intl/ChangeLog; \
dists="COPYING.LIB-2.0 COPYING.LIB-2.1 Makefile.in config.charset locale.alias ref-add.sin
for file in $dists; do \
/usr/bin/install -c -m 644 ./file \
/usr/local/share/gettext/intl/file; \
done; \
chmod a+x /usr/local/share/gettext/intl/config.charset; \
dists="plural.c"; \
for file in $dists; do \
if test -f $file; then dir=.; else dir=.; fi; \
/usr/bin/install -c -m 644 $dir/file \
/usr/local/share/gettext/intl/file; \
done; \
dists="xopen-msg.sed linux-msg.sed po2tbl.sed.in cat-compat.c COPYING.LIB-2 gettext.h libge
for file in $dists; do \
rm -f /usr/local/share/gettext/intl/file; \
done; \
else \
: ; \
fi
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/intl'
Making install in po
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/po'
/bin/sh ../mkinstalldirs /usr/local/share
mkdir /usr/local/share/locale
mkdir /usr/local/share/locale/es
mkdir /usr/local/share/locale/es/LC_MESSAGES
installing es.gmo as /usr/local/share/locale/es/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/fr
mkdir /usr/local/share/locale/fr/LC_MESSAGES
installing fr.gmo as /usr/local/share/locale/fr/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/el
mkdir /usr/local/share/locale/el/LC_MESSAGES
installing el.gmo as /usr/local/share/locale/el/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/pt
mkdir /usr/local/share/locale/pt/LC_MESSAGES
installing pt.gmo as /usr/local/share/locale/pt/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/it
mkdir /usr/local/share/locale/it/LC_MESSAGES

```

```

installing it.gmo as /usr/local/share/locale/it/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/en
mkdir /usr/local/share/locale/en/LC_MESSAGES
installing en.gmo as /usr/local/share/locale/en/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/zh
mkdir /usr/local/share/locale/zh/LC_MESSAGES
installing zh.gmo as /usr/local/share/locale/zh/LC_MESSAGES/giac.mo
mkdir /usr/local/share/locale/de
mkdir /usr/local/share/locale/de/LC_MESSAGES
installing de.gmo as /usr/local/share/locale/de/LC_MESSAGES/giac.mo
if test "giac" = "gettext-tools"; then \
  /bin/sh ../mkinstalldirs /usr/local/share/gettext/po; \
  for file in Makefile.in.in remove-potcdate.sin quot.sed boldquot.sed en@quot.header en@bold
    /usr/bin/install -c -m 644 ./file \
      /usr/local/share/gettext/po/file; \
  done; \
  for file in Makevars; do \
    rm -f /usr/local/share/gettext/po/file; \
  done; \
else \
  : ; \
fi
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/po'
Making install in debianold
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/debianold'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/debianold'
make[2]: Nothing to be done for 'install-exec-am'.
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/debianold'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/debianold'
Making install in debian
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/debian'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/debian'
make[2]: Nothing to be done for 'install-exec-am'.
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/debian'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/debian'
Making install in doc
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
Making install in en
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/en'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/en'
make[3]: Nothing to be done for 'install-exec-am'.
/bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/en
/usr/bin/install -c -m 644 trousse-survie_en.pdf /usr/local/share/giac/doc/en
for dd in casinter cascmd_en tutorial; do \
  /bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/e

```

```

done
for dd in casinter cascmd_en tutoriel; do \
    /usr/bin/install -c -m 644 ./\$dd/* /usr/local/share/giac/doc/en/\$dd ; \
done
/usr/bin/install -c -m 644 html_mall html_mtt html_vall xcasmenu xcasex keywords /usr/local/
/usr/bin/mkdir -p '/usr/local/share/doc/giac/en'
/usr/bin/install -c -m 644 html_mall html_mtt html_vall xcasmenu xcasex keywords '/usr/local
/usr/bin/mkdir -p '/usr/local/share/info'
/usr/bin/install -c -m 644 ./giac_us.info '/usr/local/share/info'
install-info --info-dir='/usr/local/share/info' '/usr/local/share/info/giac_us.info'
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/en'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/en'
Making install in es
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/es'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/es'
make[3]: Nothing to be done for 'install-exec-am'.
/bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/es
/usr/bin/install -c -m 644 xcasmenu xcasex keywords /usr/local/share/giac/doc/es
/usr/bin/mkdir -p '/usr/local/share/doc/giac/es'
/usr/bin/install -c -m 644 xcasmenu xcasex keywords '/usr/local/share/doc/giac/es'
/usr/bin/mkdir -p '/usr/local/share/info'
/usr/bin/install -c -m 644 ./giac_es.info '/usr/local/share/info'
install-info --info-dir='/usr/local/share/info' '/usr/local/share/info/giac_es.info'
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/es'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/es'
Making install in fr
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/fr'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/fr'
make install-exec-hook
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/fr'
mkdir -p /usr/local/share/giac/doc/fr/
/bin/cp -f aide_cas /usr/local/share/giac/doc/fr
ln -sf ../giac.js /usr/local/share/giac/doc/fr/giac.js
ln -sf ../giacwasm.js /usr/local/share/giac/doc/fr/
ln -sf ../giacwasm.wasm /usr/local/share/giac/doc/fr/
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/fr'
/bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/fr
/usr/bin/install -c -m 644 tutoriel.pdf algo.pdf trousse-survie_fr.pdf /usr/local/share/giac/
/usr/bin/install -c -m 644 algo.html algo*png tutoriel.html tutoriel*png /usr/local/share/gia
for dd in casrouge castor cascmd_fr casgeo cassim casinter casexo cascas; do \
    /bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/f
done
for dd in casrouge castor cascmd_fr casgeo cassim casinter casexo cascas; do \
    /usr/bin/install -c -m 644 ./\$dd/* /usr/local/share/giac/doc/fr/\$dd ; \
done
/usr/bin/install -c -m 644 html_mall html_mtt html_vall xcasmenu xcasex keywords /usr/local/s
/usr/bin/mkdir -p '/usr/local/share/doc/giac/fr'

```

```

/usr/bin/install -c -m 644 html_mall html_mtt html_vall xcasmenu xcasex keywords /usr/local
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/fr'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/fr'
Making install in el
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el'
Making install in tutorial
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/tutorial'
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/tutorial'
make install-exec-hook
make[5]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/tutorial'
../../../../mkinstalldirs /usr/local/share/giac/doc/el/
mkdir /usr/local/share/giac/doc/el
../../../../mkinstalldirs /usr/local/share/giac/doc/el/tutorial
mkdir /usr/local/share/giac/doc/el/tutorial
cp -f * /usr/local/share/giac/doc/el/tutorial
make[5]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/tutorial'
make[4]: Nothing to be done for 'install-data-am'.
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/tutorial'
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/tutorial'
Making install in casinter
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/casinter'
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/casinter'
make install-exec-hook
make[5]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/casinter'
../../../../mkinstalldirs /usr/local/share/giac/doc/el/
../../../../mkinstalldirs /usr/local/share/giac/doc/el/casinter
mkdir /usr/local/share/giac/doc/el/casinter
cp -f * /usr/local/share/giac/doc/el/casinter
make[5]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/casinter'
make[4]: Nothing to be done for 'install-data-am'.
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/casinter'
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el/casinter'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el'
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el'
make[4]: Nothing to be done for 'install-exec-am'.
/bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/el
for dd in cascmd_el; do \
    /bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/e
done
for dd in cascmd_el; do \
    /usr/bin/install -c -m 644 ./$dd/* /usr/local/share/giac/doc/el/$dd ; \
done
/usr/bin/install -c -m 644 html_mall html_mtt html_vall xcasmenu xcasex keywords /usr/local/
/usr/bin/mkdir -p /usr/local/share/doc/giac/el'
/usr/bin/install -c -m 644 html_mall html_mtt html_vall xcasmenu xcasex keywords /usr/local
/usr/bin/mkdir -p /usr/local/share/info'
install-info --info-dir='/usr/local/share/info' '/usr/local/share/info/giac_es.info'

```

```

make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el'
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/el'
Making install in local
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/local'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/local'
make[3]: Nothing to be done for 'install-exec-am'.
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/local'
  /usr/bin/install -c -m 644 xcasmenu xcasex keywords html_mall html_mtt html_vall '/usr/local
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/local'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/local'
Making install in pt
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/pt'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/pt'
make install-exec-hook
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/pt'
  ../../mkinstalldirs /usr/local/share/giac/doc/pt
mkdir /usr/local/share/giac/doc/pt
/bin/cp -f xcasmenu xcasex keywords /usr/local/share/giac/doc/pt
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/pt'
make[3]: Nothing to be done for 'install-data-am'.
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/pt'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/pt'
Making install in zh
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/zh'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/zh'
make install-exec-hook
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/zh'
  ../../mkinstalldirs /usr/local/share/giac/doc/zh
mkdir /usr/local/share/giac/doc/zh
/bin/cp -f aide_cas xcasmenu xcasex keywords /usr/local/share/giac/doc/zh
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/zh'
make[3]: Nothing to be done for 'install-data-am'.
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/zh'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/zh'
Making install in de
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/de'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/de'
make install-exec-hook
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc/de'
  ../../mkinstalldirs /usr/local/share/giac/doc/de
mkdir /usr/local/share/giac/doc/de
/bin/cp -f aide_cas xcasmenu xcasex keywords /usr/local/share/giac/doc/de
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/de'
make[3]: Nothing to be done for 'install-data-am'.
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/de'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc/de'

```

```

make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
make install-exec-hook
make[4]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
/bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/dxcas
/bin/sh /home/me/TMP/GIAC/giac-1.9.0/config/install-sh -d /usr/local/share/giac/doc/pari
for dd in xcasfr.html xcasen.html *.css *.js giacwasm.wasm logo.png giac.tex giacfr.tex test.
  /usr/bin/install -c -m 644 ../doc/$dd /usr/local/share/giac/doc/ ; \
done
/usr/bin/install: omitting directory '../doc/magnets'
/usr/bin/install -c -m 644 ../doc/dxcas/* /usr/local/share/giac/doc/dxcas
/usr/bin/install -c -m 644 ../doc/pari/* /usr/local/share/giac/doc/pari
/usr/bin/install -c -m 644 ../doc/index.html /usr/local/share/giac/doc/
/usr/bin/install -c -m 644 ../doc/README /usr/local/share/giac/doc/
ln -sf ../aide_cas /usr/local/share/giac/doc/aide_cas
cp -f 50-numworks-calculator.rules /usr/local/share/giac/doc/
make[4]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
  /usr/bin/mkdir -p '/usr/local/share/doc/giac'
  /usr/bin/install -c -m 644 README index.html '/usr/local/share/doc/giac'
  /usr/bin/mkdir -p '/usr/local/share/giac'
  /usr/bin/install -c -m 644 aide_cas '/usr/local/share/giac'
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/doc'
Making install in examples
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
make install-exec-hook
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
../mkinstalldirs /usr/local/share/giac/
../mkinstalldirs /usr/local/share/giac/examples
mkdir /usr/local/share/giac/examples
cp -Rf * /usr/local/share/giac/examples
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
  /usr/bin/mkdir -p '/usr/local/share/doc/giac'
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/geo'
  /usr/bin/install -c -m 644 geo/geo1 geo/geo2 geo/geo3 geo/geo4 geo/geo5 geo/geo6 geo/geo7 g
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/groebner'
  /usr/bin/install -c -m 644 groebner/alea6 groebner/bayes148 groebner/cyclic3 groebner/cycli
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/crypto'
  /usr/bin/install -c -m 644 Exemples/crypto/rsa.xws Exemples/crypto/codage.xws Exemples/cryp
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/climat'
  /usr/bin/install -c -m 644 Exemples/climat/soleil.xws Exemples/climat/edc.xws Exemples/clim
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/arit'
  /usr/bin/install -c -m 644 arit/numeration arit/rsa.cxx arit/horner arit/estpremier arit/co
  /usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/geometrie'
  /usr/bin/install -c -m 644 Exemples/geometrie/caustique.xws Exemples/geometrie/astroide.xws

```

```

/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/arit'
/usr/bin/install -c -m 644 Exemples/arit/estprem.xws Exemples/arit/bezout.xws Exemples/arit
/usr/bin/mkdir -p '/usr/local/share/doc/giac/polyfact'
/usr/bin/install -c -m 644 polyfact/zimmer1 polyfact/zimmer2 polyfact/zimmer3 polyfact/zimm
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/opengl'
/usr/bin/install -c -m 644 Exemples/opengl/surface.xws Exemples/opengl/sphere.xws '/usr/loc
/usr/bin/mkdir -p '/usr/local/share/doc/giac/lewisw'
/usr/bin/install -c -m 644 lewisw/lw4 lewisw/lwA lewisw/lwB lewisw/lwC lewisw/lwD lewisw/lw
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/analyse'
/usr/bin/install -c -m 644 Exemples/analyse/newton.xws Exemples/analyse/toile.xws Exemples/
/usr/bin/mkdir -p '/usr/local/share/doc/giac/groebner'
/usr/bin/install -c -m 644 groebner/mayr42 groebner/noon7r groebner/noon9 groebner/Reco12 g
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/prog'
/usr/bin/install -c -m 644 Exemples/prog/gauss_jordan.xws Exemples/prog/conformal.xws Exemp
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/poly'
/usr/bin/install -c -m 644 Exemples/poly/pgcd.xws Exemples/poly/racine.xws Exemples/poly/ho
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/demo'
/usr/bin/install -c -m 644 Exemples/demo/calcform.xws Exemples/demo/dft.xws Exemples/demo/g
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/capes2006'
/usr/bin/install -c -m 644 Exemples/capes2006/2107.xws Exemples/capes2006/0307.xws Exemples
/usr/bin/install -c -m 644 Makefile.am '/usr/local/share/doc/giac/.'
/usr/bin/mkdir -p '/usr/local/share/doc/giac/codage'
/usr/bin/install -c -m 644 codage/rsa codage/group2lettres codage/julescesar codage/chiffre
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/geo3d'
/usr/bin/install -c -m 644 Exemples/geo3d/cone.xws Exemples/geo3d/circon3d.xws Exemples/geo
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/logo'
/usr/bin/install -c -m 644 Exemples/logo/fleur.xws Exemples/logo/sapin.xws Exemples/logo/tu
/usr/bin/mkdir -p '/usr/local/share/doc/giac/demo'
/usr/bin/install -c -m 644 demo/pgcd.cpp demo/random.tab demo/algos_integrale.cxx demo/bezo
/usr/bin/mkdir -p '/usr/local/share/doc/giac/tortue'
/usr/bin/install -c -m 644 tortue/koch.cxx tortue/arbre.cxx tortue/sapin.cxx tortue/hilbert
/usr/bin/mkdir -p '/usr/local/share/doc/giac/morley'
/usr/bin/install -c -m 644 morley/equimore morley/morleypara morley/trisectfig morley/figur
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/proba'
/usr/bin/install -c -m 644 Exemples/proba/moivre_laplace.xws Exemples/proba/montecarlo.xws
/usr/bin/mkdir -p '/usr/local/share/doc/giac/recur'
/usr/bin/install -c -m 644 recur/sphinx.cxx recur/plantes.cxx recur/sphynx.cxx recur/trisie
/usr/bin/mkdir -p '/usr/local/share/doc/giac/linalg'
/usr/bin/install -c -m 644 linalg/gaussjordan_noyau.cas linalg/gaussjordan_noyau1.cas '/usr
/usr/bin/mkdir -p '/usr/local/share/doc/giac/simulation'
/usr/bin/install -c -m 644 simulation/pains simulation/deplacement '/usr/local/share/doc/gi
/usr/bin/mkdir -p '/usr/local/share/doc/giac/Exemples/spects'
/usr/bin/install -c -m 644 Exemples/spects/pagerank.xws Exemples/spects/spec_proie.xws Exem
/usr/bin/mkdir -p '/usr/local/share/doc/giac/geo'
/usr/bin/install -c -m 644 geo/morleylem geo/orbite.cas geo/envelopl geo/envelopp geo/envel
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/examples'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0/examples'

```

```
make[1]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0'
make[2]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0'
make install-exec-hook
make[3]: Entering directory '/home/me/TMP/GIAC/giac-1.9.0'
cp config.h /usr/local/include/giac
./mkinstalldirs /usr/local/share/
./mkinstalldirs /usr/local/share/pixmaps
cp xcas.xpm /usr/local/share/pixmaps/xcas.xpm
./mkinstalldirs /usr/local/share/applications
cp xcas.desktop /usr/local/share/applications/xcas.desktop
./mkinstalldirs /usr/local/share/metainfo
cp xcas.metainfo.xml /usr/local/share/metainfo/
./mkinstalldirs /usr/local/share/application-registry
mkdir /usr/local/share/application-registry
cp xcas.applications /usr/local/share/application-registry/xcas.applications
./mkinstalldirs /usr/local/share/icons/
mkdir /usr/local/share/icons
./mkinstalldirs /usr/local/share/icons/hicolor
mkdir /usr/local/share/icons/hicolor
for SIZE in 256 128 64 32 16; do ./mkinstalldirs /usr/local/share/icons/hicolor/${SIZE}x${SIZE}
mkdir /usr/local/share/icons/hicolor/256x256
mkdir /usr/local/share/icons/hicolor/256x256/apps
mkdir /usr/local/share/icons/hicolor/128x128
mkdir /usr/local/share/icons/hicolor/128x128/apps
mkdir /usr/local/share/icons/hicolor/64x64
mkdir /usr/local/share/icons/hicolor/64x64/apps
mkdir /usr/local/share/icons/hicolor/32x32
mkdir /usr/local/share/icons/hicolor/32x32/apps
mkdir /usr/local/share/icons/hicolor/16x16
mkdir /usr/local/share/icons/hicolor/16x16/apps
for SIZE in 256 128 64 32 16; do ./mkinstalldirs /usr/local/share/icons/hicolor/${SIZE}x${SIZE}
mkdir /usr/local/share/icons/hicolor/256x256/mimetypes
mkdir /usr/local/share/icons/hicolor/128x128/mimetypes
mkdir /usr/local/share/icons/hicolor/64x64/mimetypes
mkdir /usr/local/share/icons/hicolor/32x32/mimetypes
mkdir /usr/local/share/icons/hicolor/16x16/mimetypes
make[3]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0'
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0'
make[1]: Leaving directory '/home/me/TMP/GIAC/giac-1.9.0'
>
```

## 2.6 post installation

1. final step

```
sudo ldconfig
```

2. changes to .bashrc. To use sagemath with the current installed giac, I had to edit my .bashrc file and add this line

```
export GIAC=/usr/local/bin/giac
```

This tells sagemath where giac is installed, else it will not find it. This is because I wanted to use this version of giac from sagemath and not have sagemath build giac itself as that will be an older version.

```
>which giac
/usr/local/bin/giac
>giac --version
// Using locale /usr/share/locale/
// en_US.utf8
// /usr/share/locale/
// giac
// UTF-8
// Maximum number of parallel threads 8
// (c) 2001, 2021 B. Parisse & others
1.9.0
>
```

Note the above version just says 1.9 and not 1.9-35. This is unfortunate as it is not possible to obtain the full version number. see this post about complaining about this.

## 3 Verify installation

Type giac

```
>giac
// Using locale /usr/local/share/locale/
// en_US.utf8
// /usr/local/share/locale/
// giac
// UTF-8
// Maximum number of parallel threads 8
Added 26 synonyms
// Read 1205 entries from cache /usr/share/giac/doc/en/html_mtt
// Read 1481 entries from cache /usr/share/giac/doc/en/html_mall
```

```
// Read 1043 entries from cache /usr/share/giac/doc/en/html_vall
Welcome to giac readline interface, version 1.9.0
(c) 2002,2022 B. Parisse & others
Homepage http://www-fourier.ujf-grenoble.fr/~parisse/giac.html
Released under the GPL license 3.0 or above
See http://www.gnu.org for license details
May contain BSD licensed software parts (lapack, atlas, tinymt)
-----
Press CTRL and D simultaneously to finish session
Type ?commandname for help
*** Type xcas to launch a light version of Xcas ***

0>> int(sin(x),x)
-cos(x)
// Time 0
1>>
```

## 4 Writing a C++ program to call giac

Now we are going to write a number of C++ programs, which calls Giac directly to do different math operations. All these programs are compiled using this makefile

### 4.1 Makefile

```
all:: main

main: main.cc Makefile
    -rm -f *.o
    g++ -g main.cc -lgiac -lgmp -Wall -Wextra -Winit-self -Wold-style-cast\
    -Wuninitialized -Wmissing-declarations -pedantic\
    -fno-elide-constructors -pedantic-errors -Woverloaded-virtual\
    -Wstrict-aliasing -std=c++17 -o main

.PHONY: clean
clean ::
    -rm -f main.o
```



```

#include <string>

#include <giac/config.h>
#include <giac/giac.h>

using namespace std;

int main()
{

    giac::context ct;
    std::string command="integrate(sin(x),x)";
    giac::gen e(command,&ct);
    e = giac::eval(e,1,&ct);
    cout<<"inside try BEFORE calling "<< command <<endl;
    cout<<"result of integrate: "<< e <<endl;

    return 0;
}

```

Compile and run, it will give the same exact result. In the above `giac::eval` did all the work. The above might be simpler way to do things.

### 4.3 example 2. C++ program to solve for roots of equation

This program calls `giac` to solve  $x^4 - 1 = 3$  for  $x$ . Create this `main.cc` C++ file

```

#include <iostream>
#include <fstream>
#include <sstream>
#include <string>

#include <giac/config.h>
#include <giac/giac.h>

using namespace std;

int main()
{

    giac::context ct;

    giac::eval( giac::gen("eq=x^4-1=3",&ct) , 1, &ct);
    giac::gen e = giac::eval( giac::gen("solve(eq,x",&ct) , 1, &ct);

```

```

    cout<<"The solution is " << e <<endl;

    return 0;
}

```

Compile and run

```

>make -I$HOME all
>./main
The solution is list[-4^(1/4),4^(1/4)]

```

In the above program , the equation eq was saved inside giac memory and remains there so when solve is called next, it can refer to it by name. Just like when using Giac interactively.

To obtain all 4 roots, need to use cSolve like this

```

#include <iostream>
#include <fstream>
#include <sstream>
#include <string>

#include <giac/config.h>
#include <giac/giac.h>

using namespace std;

int main()
{

    giac::context ct;

    giac::eval( giac::gen("eq:=x^4-1=3",&ct) , 1, &ct);
    giac::gen e = giac::eval( giac::gen("cSolve(eq,x)",&ct) , 1, &ct);

    cout<<"The solution is " << e <<endl;

    return 0;
}

```

Compile and run

```

>make -I$HOME all
>./main
The solution is list[-sqrt(2),sqrt(2),-sqrt(2)*i,-sqrt(2)*(-i)]

```

#### 4.4 example 3. C++ program to solve an ode

This program calls giac to solve  $y'' + 2y' + y = 0$  with ic  $y(0) = 1, y'(0) = 0$ . Create this main.cc C++ file

```
#include <iostream>
#include <fstream>
#include <sstream>
#include <string>

#include <giac/config.h>
#include <giac/giac.h>

using namespace std;

int main()
{
    giac::context ct;
    giac::gen e("desolve([diff(y(t),t$2)+2*diff(y(t),t)+y(t)=0,y(0)=1,y'(0)=0],y(t))",&ct);
    e = giac::eval( e , 1, &ct);

    cout<<"The solution to y''+2 y'+y=0 with ic y(0)=1,y'(0)=0 is " << e <<endl;

    return 0;
}
```

Compile and run

```
>make -I$HOME all
>./main
The solution to y''+2 y'+y=0 with ic y(0)=1,y'(0)=0 is exp(-t)*(t+1)
```