



GUT

GUT Installation Guide

Contents

1 Introduction.....	2
2 Installing GUT.....	2
2.1 Optional Extensions.....	2
2.2 Installation using the Installer package.....	3
2.2.1 Linux.....	3
2.2.2 Mac OS.....	4
2.2.3 Windows.....	4
2.3 Installing from source.....	5
2.3.1 Installing without the graphical user interface.....	5
2.3.2 Installing with the graphical user interface with system wide prerequisites.....	6
2.3.3 Installing with the graphical user interface with standalone prerequisites.....	7
3 Support.....	8

1 Introduction

This document describes the installation of the GOCE User Toolbox (GUT).

In the installation procedure that follows the use of *this font* indicates a shell command-line (*the % prefix indicates the shell prompt and should NOT be typed*), and uppercase tokens enclosed by angled brackets are <VARIABLES> that you must substitute with an appropriate value.

2 Installing GUT

In the installation procedure that follows the use of *this font* indicates a shell command-line (*the % prefix indicates the shell prompt and should NOT be typed*), and uppercase tokens enclosed by angled brackets are <VARIABLES> that you must substitute with an appropriate value.

GUT is comprised of a command-line tool, a graphical user interface, a suite of work-flows that describe typical processing tasks, a collection of input data sets and optionally a stand-alone display tool (BratDisplay). The command-line tool and the graphical user interface have been developed as an Open Source software project and the suite of work-flows are XML files that are incorporated as an integral part of the GUT source code package. On most platforms installation of the GUT is based on the installer package. The source package is available for all platforms and can be used if, for instance, the binary installation is not possible. For all platforms the input data sets are provided as a platform independent binary package that may be added to the basic GUT installation. The optional display tool is provided as a platform specific add-on binary package. The installation procedures for both source and binary packages is described in the following sections.

2.1 *Optional Extensions*

GUT has two extensions that are enabled by default, but may be disabled when building from the source package. These extensions are GeoTIFF and Fortran support.

The GeoTIFF extension allows gridded data sets to be exported to TIFF image files with special GeoTIFF tags used for recording geolocation meta data. These files are intended for quick-look usage only.

GUT can be extended by developing additional processing units in C/C++. In case a Fortran compiler is available extensions can also be developed with this programming language.

2.2 Installation using the Installer package

2.2.1 Linux

The GUT installer distribution for Linux 64-bit platform includes binary executables for GUT and GUT graphical user interface. To use the 'Visualizer' functionality of the graphical user interface on Linux, an external Visualizer capable of displaying *.nc files has to be installed and set.

The Linux installer packages have been compiled on a Debian Jessie and are using LIBC version 6. There might be a need to install additional runtime dependencies appropriate for your Linux distribution, to use the compiled binaries.

If these binary distributions of GUT are not suitable for your system you will need to build GUT from source.

By default, the GUT installer creates a single root directory into which the GUT folder structure is being copied. During the installation the user can choose to provide any location for this directory. Apart from copying over the files, the installer creates a Desktop item that points to the GUT graphical user interface, as well as adds the GUT command line utility and the graphical interface launcher to system path for the current user. Both of these installation features can be disabled during the installation.

The installation procedure is:

- Obtain the GUT Linux installer package (gut-<VERSION>-linux-<PLATFORM>-installer.run) and the data set package (gut-apriori.zip) into a directory of your choice (<GUT_DOWNLOAD_DIR>).
- Make the installer executable by editing the preferences of the downloaded file, or executing the following command

```
% chmod +x gut-<VERSION>-linux-<PLATFORM>-installer.run
```
- Run the installer by double clicking it, or executing the following command

```
% ./gut-<VERSION>-linux-<PLATFORM>-installer.run
```
- Follow the onscreen instructions.
- Install the data sets in the data package into the apriori subdirectory of the GUT installation.

```
% cd <GUT_INSTALL_DIR>/apriori
% unzip <GUT_DOWNLOAD_DIR>/gut-apriori.zip
```
- The installation is complete and you may now delete the downloaded files.

2.2.2 Mac OS

The GUT binary distribution for Mac OS X platforms include binary installers for

GUT and BratDisplay. The installer package is applicable for Mac OS X 10.13 64-bit and higher.

By default, the GUT installer creates a single root directory into which the GUT folder structure is being copied. During the installation the user can choose to provide any location for this directory. Apart from copying over the files, the installer creates a Desktop item that points to the GUT graphical user interface, as well as adds the GUT command line utility and the graphical interface launcher to system path for the current user. Both of these installation features can be disabled during the installation.

The installation procedure is:

- Obtain the GUT Mac OS X installer package (gut-<VERSION>-osx-installer.dmg) and the data set package (gut-apriori.zip) into a directory of your choice (<GUT_DOWNLOAD_DIR>).
- Mount the dmg image, by double clicking it.
- Navigate to the image using Finder, launch the installer by doing `ctrl+click`. Choose 'open'.
- Follow the onscreen instructions.
- Install the data sets in the data package into the apriori subdirectory of the GUT installation.

```
% cd <GUT_INSTALL_DIR>/apriori  
% unzip <GUT_DOWNLOAD_DIR>/gut-apriori.zip
```
- The installation is complete and you may now unmount the dmg image and delete the downloaded files.

2.2.3 Windows

The GUT binary distribution for Windows platforms include binary installers for GUT and BratDisplay. The installer package is applicable for Windows 7 64-bit and later.

By default, the GUT installer creates a single root directory into which the GUT folder structure is being copied. During the installation the user can choose to provide any location for this directory. Apart from copying over the files, the installer creates a Desktop item that points to the GUT graphical user interface, adds the GUT command line utility to system path for the current user as well as creates a Start Menu entry.

The installation procedure is:

- Download the GUT Windows installer package (gut-<VERSION>-windows-installer.exe) and the data set package (gut-apriori.zip) into a directory of your choice.
- Execute the installer by double clicking the downloaded *.exe file.
- Follow the onscreen instructions.

- Install the data sets in the data package by extracting them into the apriori subdirectory of the GUT installation.
- The installation is complete and you may now delete the downloaded files.

2.3 *Installing from source*

2.3.1 **Installing without the graphical user interface**

The GUT source package is applicable to any POSIX platform (i.e. UNIX, Linux, Mac OS X). To build and install the command-line tool you must have basic software development tools and libraries installed on your system. These are listed below, with optional components in parentheses.

- cmake
- tar
- gunzip
- C++ Compiler (g++/GCC version 4 or higher recommended)
- make
- unzip decompression utility
- (libtiff library and header files)
 - The GeoTIFF package is included in the GUT source package but LibTIFF development files must be installed on your system to enable this feature. The latest stable LibTIFF package can be obtained from <http://www.remotesensing.org/libtiff>.

The build and installation procedure is :

- Create a temporary directory on your system.

```
% mkdir <GUT_TMP_DIR>
```
- Obtain the GUT source package (gut-x.y.tar.gz) and the data set package (gut-apriori.zip) and place them in the <GUT_TMP_DIR> directory.
- cd to the <GUT_TMP_DIR> directory.
- Unpack the source package

```
% tar zxf gut-x.y.tar.gz
```

OR

```
% gunzip gut-x.y.tar.gz  
% tar xf gut-x.y.tar
```

- cd into the source package root directory

```
% cd gut-x.y
```
- Create a build subdirectory and cd into that directory

```
% mkdir build
% cd build
```
- Configure the source package. **You will need root privileges to install in the default location.** An alternative location can be specified with the '-DCMAKE_INSTALL_PREFIX:PATH' option.

```
% cmake -DBUILD_GUI=FALSE ..
```
- Run make to build the command-line tool.

```
% make
```
- If required, change to the superuser account (or use sudo), and run make to install GUT. This installs the executable, work-flow suite, gui and documentation. If a previous version of GUT is installed, this procedure will upgrade the current installation to the new version of the software.

```
% su
% make install
OR
% sudo make install
```
- It is recommended that you add the location of the GUT command-line tool to your PATH. Consult the documentation for your login shell for details. NOTE, the GUT command-line tool executable (gut) is located in the bin subdirectory of the GUT installation (unless an alternative prefix was supplied to the configure script this will be /usr/local/GUT/bin)
- Install the data sets in the data package into the apriori subdirectory of the GUT installation.

```
% cd /usr/local/GUT/apriori
% unzip <GUT_TMP_DIR>/gut-apriori.zip
```
- The base installation is complete and you may now delete the <GUT_TMP_DIR> and all its subdirectories.

2.3.2 Installing with the graphical user interface with system wide prerequisites

Apart from the build prerequisites mentioned in Section 2.3.1, there are additional build and runtime prerequisites if one desires to build GUT from source and use the graphical user interface.

Additional build prerequisites:

- swig (simplified wrapper and interface generator)

- libpython3.<x>m.so
- pyuic5, pyrcc5 (PyQt Development Tools)
- Python3

On Debian based systems these can be obtained from official repositories:

```
% apt-get install swig pyqt5-dev-tools libpython3-dev python3
```

Additional runtime prerequisites:

- PyQt5
- numpy
- (ncview) (or any other visualizer)
- Grandalf (graph building library)
- Pygut (Python-C++ GUT bridge utility)

On Debian based systems these can be obtained from official repositories:

```
% apt-get install python3-pyqt5 python3-numpy ncview
```

Grandalf package is distributed together with GUT source code and Pygut is built during the GUT build process. However, both have to be installed in a given Python environment using pip, which can be obtained from official repositories:

```
% apt-get install python3-pip
```

```
% pip3 install <gut_source>/external/grandalf
```

Once all the prerequisites are in place, one can largely follow the procedure described in Section 2.3.1, with one exception. There is no need to specify that gui should not be built during the configuration, so the configuration call becomes

```
% cmake -DCMAKE_INSTALL_PREFIX:PATH=</path/to/install> ..
```

Then Pygut must be installed using pip:

```
% pip3 install <path/to/install>/pygut
```

After the full installation as described in Section 2.3.1, one can launch the graphical user interface using the 'gutgui' executable found in the 'bin' folder of the install directory, as long as there is a 'python3' with the prerequisites installed on system path.

Additionally, when installing the GUT graphical user interface from source, one has to check that the preferences are correct in 'File-Preferences' and that the visualizer points to a valid visualizer executable if one wants to use the 'Visualize' functionality of the GUT graphical user interface.

2.3.3 Installing with the graphical user interface with standalone prerequisites

If one wants to build GUT and use it with the graphical user interface, but does not want to install any GUT graphical user interface dependencies system wide,

it is possible to create a standalone environment for GUT graphical user interface. This standalone environment includes all the additional dependencies (except swig) needed to build and run the graphical user interface – Python3 with development libraries, numpy, pyqt5 with development tools.

The build environment has a separate cmake configuration file found in the 'external' subdirectory of the GUT source package. This configuration creates a script that will download and install the prerequisites locally in a standalone manner. The environment package can be built the following way:

```
% mkdir pyenv
% cd pyenv
% cmake <GUT_SOURCE_DIR>/external
% make
```

Then the configuration of the GUT package itself can be called as such:

```
% export PATH=<PYENV>/bin:$PATH
% cmake -DCMAKE_INSTALL_PREFIX:PATH=<INSTALL_DIR> -
DPYTHON_LIBRARY:PATH=<PYENV>/lib/libpython3.6m.so -
DPYTHON_INCLUDE_DIR:PATH=<PYENV>/include/python3.6m/ -
DPYQT_BINARY_DIR:PATH=<PYENV>/bin <GUT_SOURCE_DIR>
```

Note that in order to use the GUT graphical user interface, the launcher has to always be executed using the Python version found in the pyenv standalone environment.

The caveats mentioned in section 2.3.2 regarding preferences and the visualizer still apply.

3 Support

For more information and support please check the GUT website:

<http://earth.esa.int/gut/>

or contact the GUT team at the following email address: **gut.info@esa.int**