



# GATE

Simulations of Preclinical and Clinical Scans in Emission Tomography, Transmission Tomography and Radiation Therapy

## The OpenGATE Collaboration

### Contributing to GATE developments using GitHub

*GATE Workshop, IEEE MIC 2016, Strasbourg*

*Albertine Dubois*

*CNRS - IMNC*

[dubois@imnc.in2p3.fr](mailto:dubois@imnc.in2p3.fr)

# Outline

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- ▶ Basics of GitHub
- ▶ Step-by-step tutorial to
  - ▶ Fork Gate repository
  - ▶ Keep your fork synced
  - ▶ Submit changes with pull requests

# Outline

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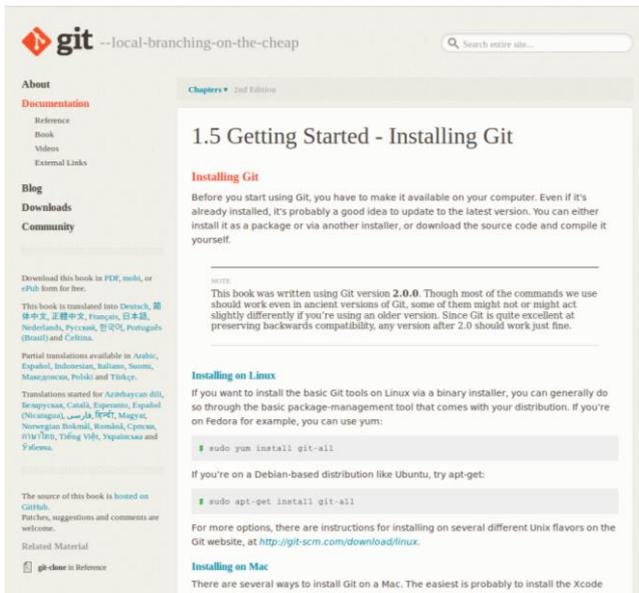
- ▶ Basics of GitHub
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  - ▶ Fork Gate repository
  - ▶ Keep your fork synced
  - ▶ Submit changes with pull requests

# Install Git and create a GitHub account

## ► Install Git

- Follow the instructions at <https://git-scm.com/book/en/v2/Getting-Started-Installing-Git>
- Prefer using git on the command line

## ► Create a GitHub account at <https://github.com/>



The screenshot shows the Git website's documentation page for '1.5 Getting Started - Installing Git'. The page includes a sidebar with navigation links like 'About', 'Documentation', 'Blog', 'Downloads', and 'Community'. The main content area features a 'NOTE' section stating that the book was written using Git version 2.0.0 and that older versions might not work as well. Below this, there are instructions for installing Git on Linux using either a binary installer or the package manager (yum or apt-get). The Linux installation instructions are as follows:

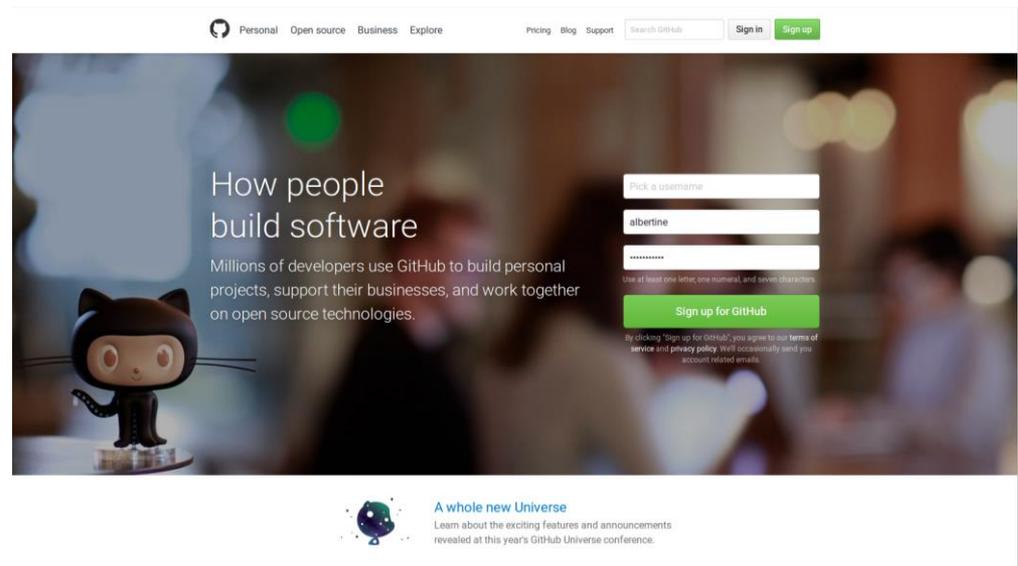
```
# sudo yum install git-all
```

If you're on a Debian-based distribution like Ubuntu, try apt-get:

```
# sudo apt-get install git-all
```

For more options, there are instructions for installing on several different Unix flavors on the Git website, at <http://git-scm.com/download/linux>.

There are several ways to install Git on a Mac. The easiest is probably to install the Xcode Command Line Tools (in Mac OS X 10.5 or above you can do this simply by trying to run



The screenshot shows the GitHub website's sign-up page. The page features a large heading 'How people build software' and a sub-heading 'Millions of developers use GitHub to build personal projects, support their businesses, and work together on open source technologies.' Below this, there is a sign-up form with fields for 'Pick a username', 'albertine', and a password field. A green 'Sign up for GitHub' button is prominently displayed. At the bottom of the page, there is a section titled 'A whole new Universe' with a small globe icon and text encouraging users to learn about the exciting features and announcements revealed at the year's GitHub Universe conference.

# Using GitHub

GATE project's homepage available at <https://github.com/OpenGATE/Gate>

Project name

1

4

2

3

Key navigation options

Branch picker

How many people are watching it

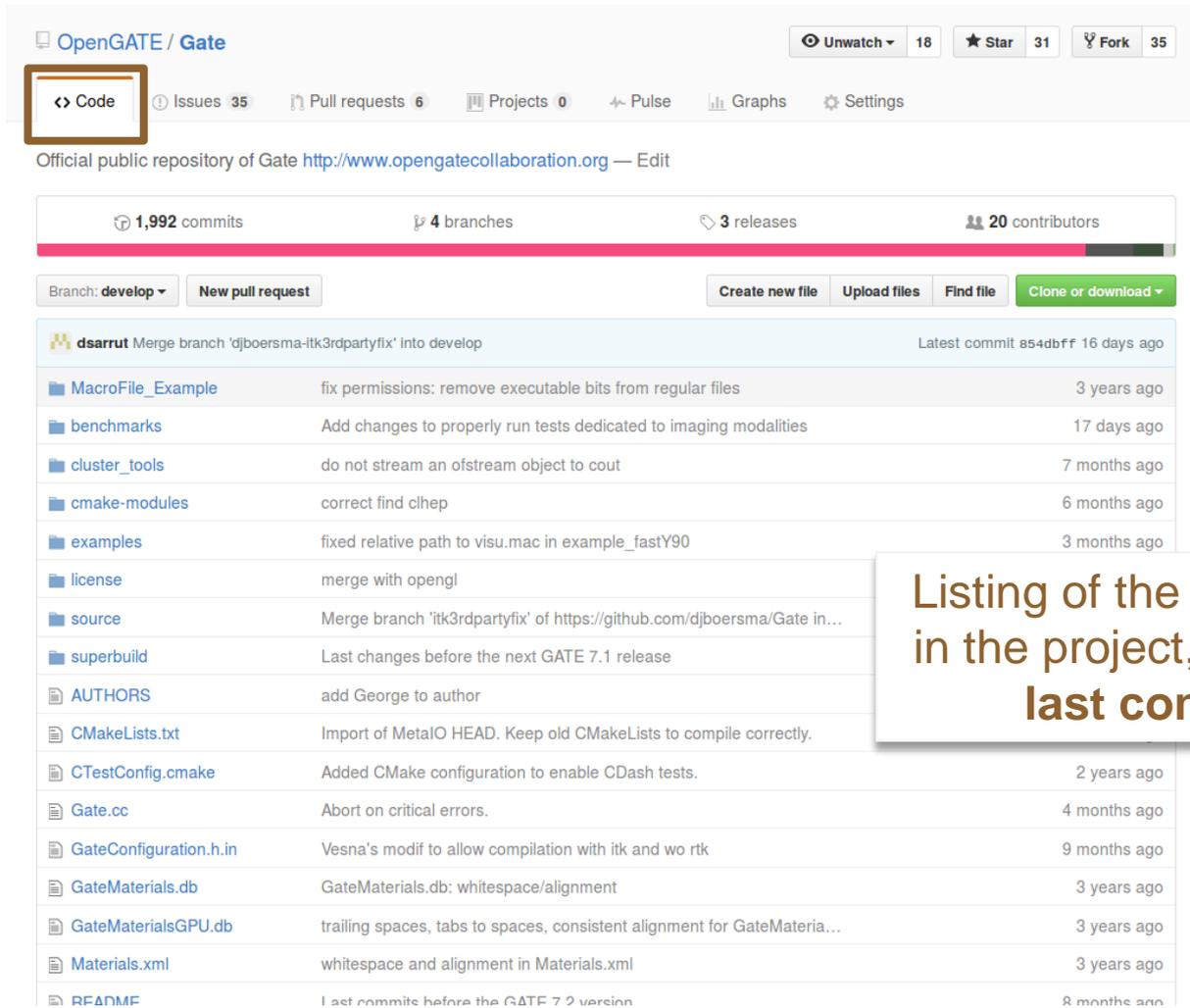
How many people have forked it to make changes and contribute to it

- ✓ Number of commits to the current branch
- ✓ Number of branches
- ✓ Number of releases
- ✓ Number of contributors

benchmarks	Add changes	
cluster_tools	do not stream	
cmake-modules	correct find cl	
examples	fixed relative path to visu.mac in example_fastY90	3 months ago
license	merge with opengl	3 years ago
source	Merge branch 'itk3rdpartyfix' of https://github.com/djboersma/Gate in...	16 days ago
superbuild	Last changes before the next GATE 7.1 release	2 years ago
AUTHORS	add George to author	6 months ago
CMakeLists.txt	Import of MetaIO HEAD. Keep old CMakeLists to compile correctly.	4 months ago
CTestConfig.cmake	Added CMake configuration to enable CDash tests.	2 years ago
Gate.cc	Abort on critical errors.	4 months ago
GateConfiguration.h.in	Vesna's modif to allow compilation with itk and wo rtk	9 months ago
GateMaterials.db	GateMaterials.db: whitespace/alignment	3 years ago
GateMaterialsGPU.db	trailing spaces, tabs to spaces, consistent alignment for GateMateria...	3 years ago
Materials.xml	whitespace and alignment in Materials.xml	3 years ago
README	Last commits before the GATE 7.2 version	8 months ago

# Using GitHub

**Code:** the view you're on by default, showing the **files in the project**



The screenshot shows the GitHub repository page for 'OpenGATE / Gate'. The 'Code' tab is selected and highlighted with a red box. The repository is the official public repository of Gate, with 1,992 commits, 4 branches, 3 releases, and 20 contributors. The current branch is 'develop'. A list of files is displayed, including folders like 'MacroFile\_Example', 'benchmarks', 'cluster\_tools', 'cmake-modules', 'examples', 'license', 'source', 'superbuild' and files like 'AUTHORS', 'CMakeLists.txt', 'CTestConfig.cmake', 'Gate.cc', 'GateConfiguration.h.in', 'GateMaterials.db', 'GateMaterialsGPU.db', 'Materials.xml', and 'README'. Each file entry shows the commit message and the time since the last commit.

File/Folder	Commit Message	Last Commit
MacroFile_Example	fix permissions: remove executable bits from regular files	3 years ago
benchmarks	Add changes to properly run tests dedicated to imaging modalities	17 days ago
cluster_tools	do not stream an ofstream object to cout	7 months ago
cmake-modules	correct find clhep	6 months ago
examples	fixed relative path to visu.mac in example_fastY90	3 months ago
license	merge with opengl	
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README	Last commits before the GATE 7.2 version	8 months ago

**Listing of the top-level files in the project, and when the last commit was**

# Using GitHub

**Issues:** a simple but effective **issue tracker** to report **bugs** and **problems** or make **request** for new features

The screenshot shows the GitHub interface for the OpenGATE / Gate repository. The 'Issues 35' link is highlighted with a red box. Below the navigation bar, there are filters and a search bar. The main content area displays a list of issues, including:

- 35 Open ✓ 14 Closed
- Gjs parsing issue with multiple, same aliases per line** #94 opened 13 days ago by canonnergio
- Creation of ParameterisedCollimator** #93 opened 15 days ago by martijn-d
- How long will we keep C++11 optional?** #90 opened 16 days ago by djboersma
- Wrong neutron behavior in GATE develop** #89 opened 17 days ago by TomThePhysicist
- Use sparse matrices for dose actor?** #85 opened on Sep 1 by djboersma
- Number of Compton scatterings** #81 opened on Jul 20 by Alvares
- FastY90 positron spectrum issue** #80 opened on Jul 12 by canonnergio
- Compile issues due to implicit ROOT dependencies in 7.2** #76 opened on Jun 29 by dfreese
- policy for the install directory** #75 opened on Jun 6 by djboersma
- dose actor attached to patient CT data (ImageNestedParametrisedVolume)** #74 opened on Jun 6 by djboersma

Any people identified as a GATE contributor can **create**, **assign** and **close** an issue

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# Fork Gate repository (1/2)

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- ▶ A fork is a **copy** of a repository
  - ▶ It lets you make changes to a project **without affecting** the original repository
  - ▶ It can be used to **fetch updates** from or **propose changes** to the original repository
  
- ▶ Rather than logging an issue for a bug you can
  - ▶ **Fork** Gate repository
  - ▶ Make the **fix**
  - ▶ Submit a **pull request** to the OpenGATE collaborators so that they pull your work into the original Gate repository

# Fork GATE repository (2/2)

Forking Gate repository is a two-step process

- 1 On GitHub, navigate to the **OpenGATE/Gate** repository
- 2 In the top-right corner of the page, click **Fork**

## Fork's name



The screenshot shows the GitHub interface for a forked repository. The repository name is 'albertine / Gate', with a note 'forked from OpenGATE/Gate'. In the top right corner, there are buttons for 'Unwatch' (1), 'Star' (0), and 'Fork' (36). Below the repository name, there are navigation tabs for 'Code', 'Pull requests' (0), 'Projects' (0), 'Pulse', 'Graphs', and 'Settings'.

Official public repository of Gate <http://www.opengatecollaboration.org> — Edit

1,992 commits    4 branches    3 releases    20 contributors

Branch: **develop** ▾

[New pull request](#)

[Create new file](#)

[Upload files](#)

[Find file](#)

[Clone or download](#) ▾

This branch is even with OpenGATE:develop.

[Pull request](#) [Compare](#)

[dsarrut](#) Merge branch 'tjboersma-itk3rdpartyfix' into develop

Latest commit [854dbff](#) 16 days ago

<a href="#">MacroFile_Example</a>	fix permissions: remove executable bits from regular files	3 years ago
<a href="#">benchmarks</a>	Add changes to properly run tests dedicated to imaging modalities	17 days ago
<a href="#">cluster_tools</a>	do not stream an ofstream object to cout	7 months ago
<a href="#">cmake-modules</a>	correct find clhep	6 months ago
<a href="#">examples</a>	fixed relative path to visu.mac in example_fastY90	3 months ago
<a href="#">license</a>	merge with opengl	3 years ago

Now you have a  
fork of the original  
**OpenGATE/Gate**  
repository

# Keep your fork synced (1/4)

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## ► Step 1: Set Up Git

1 | Open Terminal

2 | Tell Git **your name** so your commits will be properly labeled

```
$ git config --global user.name "YOUR NAME"
```

3 | Tell Git the **email address** that will be associated with your Git commits. The email you specify should be the same one found in your email settings.

```
$ git config --global user.email "YOUR EMAIL ADDRESS"
```

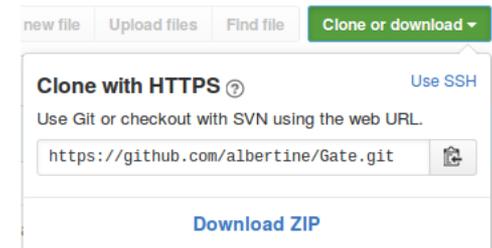
# Keep your fork synced (2/4)

## ► Step 2: Create a **local clone** of your fork

1 On GitHub, navigate to **your fork** of the OpenGATE/Gate repository

2 Under your repository name, click **Clone or download**

3 In the **Clone with HTTPS** section, click  to copy the clone URL for the repository



4 Open Terminal, type **git clone**, and then paste the URL you copied in 3

```
$ git clone https://github.com/YOUR-USERNAME/Gate.git
Cloning into 'Gate'...
remote: Counting objects: 20182, done.    !! YOUR-USERNAME = Your GitHub username !!
remote: Total 20182 (delta 0), reused 0 (delta 0), pack-reused 20182
Receiving objects: 100% (20182/20182), 13.83 MiB | 3.24 MiB/s, done.
Resolving deltas: 100% (13674/13674), done.
```

Now you have a **local copy** of your fork of the Gate repository

# Keep your fork synced (3/4)

## ► Step 3: Configure Git to **sync** your fork with the original Gate repository

1 Change directories to the location of the fork you cloned in Step 2

Type **git remote -v**

Current configured remote repository for your fork

```
$ git remote -v
origin https://github.com/YOUR_USERNAME/Gate.git (fetch)
origin https://github.com/YOUR_USERNAME/Gate.git (pus)
```

2 Type **git remote add upstream**, and then paste the URL of the OpenGATE/Gate repository

```
$ git remote add upstream https://github.com/OpenGATE/Gate.git
```

3 To verify the new upstream repository you've specified for your fork, type **git remote -v** again

URL for your fork as **origin**

```
$ git remote -v
origin https://github.com/YOUR_USERNAME/Gate.git (fetch)
origin https://github.com/YOUR_USERNAME/Gate.git (push)
upstream https://github.com/OpenGATE/Gate.git (fetch)
upstream https://github.com/OpenGATE/Gate.git (push)
```

URL for the original repository as **upstream**

# Keep your fork synced (4/4)

Now, you can sync your fork with the upstream repository

- 1 Fetch the branches and their respective commits from the upstream repository

```
$ git fetch upstream
remote: Counting objects: 75, done.
remote: Compressing objects: 100% (53/53), done.
remote: Total 62 (delta 27), reused 44 (delta 9)
Unpacking objects: 100% (62/62), done.
From https://github.com/OpenGATE/Gate.git
* [new branch]      develop      -> upstream/develop
```

- 2 Check out **your fork's local** develop branch

```
$ git checkout develop
Switched to branch 'develop'
```

- 3 Merge the changes from **upstream/develop** into your **local develop** branch

```
$ git merge upstream/develop
Updating a422352..5fdff0f
Fast-forward
 README          | 9 -----
 README.md       | 7 ++++++
 2 files changed, 7 insertions(+), 9 deletions(-)
 delete mode 100644 README
 create mode 100644 README.md
```

# Submit changes with pull requests (1/3)

To contribute back to the original Gate repository, we recommend creating branches **locally**, on your computer

## 1 Create a **new branch** within your repository

```
$ git checkout -b branch mynewbranch  
Switched to a new branch "mynewbranch"
```

## 2 Create or edit a file in your repository

## 3 Push your changes on GitHub

```
$ git push origin mynewbranch  
Username for 'https://github.com': albertine  
Password for 'https://albertine@github.com':  
Counting objects: 3, done.  
Writing objects: 100% (3/3), 216 bytes | 0 bytes/s, done.  
Total 3 (delta 0), reused 0 (delta 0)  
To https://github.com/albertine/Gate.git  
 * [new branch] mynewbranch -> mynewbranch  
Branch mynewbranch set up to track remote branch mynewbranch from origin.
```

# Submit changes with pull requests (2/3)

Create a **pull request** so that OpenGATE collaborators can review the changes in your branch

1 Navigate to the **OpenGATE/Gate** repository

2 To the right of the branch picker, click **New pull request**



3 On the Compare changes page, click **compare across forks**

4 Select **OpenGATE/Gate** as the **base fork**. Use the base branch drop-down menu to select the branch you'd like to merge changes into.

## Comparing changes

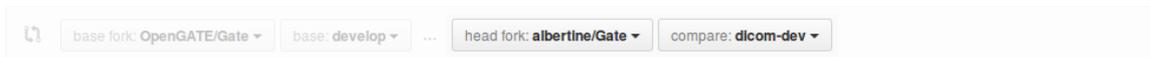
Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#).



5 Use the **head fork** drop-down menu to select **your fork**, then use the compare branch drop-down menu to select the branch you made your changes in.

## Comparing changes

Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#).



# Submit changes with pull requests (3/3)

Create a **pull request** so that OpenGATE collaborators can review the changes in your branch

6 | Type a **title** and **description** for your pull request

7 | Click **Create pull request**

## Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also compare across forks.

base fork: OpenGATE/Gate base: develop head fork: albertine/Gate compare: dicom-dev

✓ Able to merge. These branches can be automatically merged.

Dicom dev

Write Preview AA B i ↺ ↻ ↶ ↷ ⋮ ⋮ ⋮ ↶ ↷ ⋮ ⋮ ⋮

Leave a comment

Attach files by dragging & dropping or selecting them.

Allow edits from maintainers. [Learn more](#) [Create pull request](#)

19 commits 10 files changed 0 commit comments 1 contributor

Commits on Apr 29, 2016

TomThePhysicist Initial commit of GateDICOMImage 2d77956

After your pull request has been reviewed, your proposed changes can be merged into the OpenGATE/Gate repository

# Summary

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## ▶ For you

- ▶ The easiest way to contribute to Gate source code
- ▶ Even if you are external to the OpenGATE collaboration

## ▶ For us

- ▶ A good way (and maybe the only one) to manage the Gate source code by benefiting from contributions of developers all around the world