



User Manual

Power Hardware-in-the-Loop database

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1 General Information

1.1 ¿What is the PHIL database?

The PHIL database is an organization and classification of the different Power Hardware in the Loop tests done in the literature. The aim of this database is to gather all the necessary information to help in finding the best PHIL elements to test every HUT. For that reason, it has been divided in several tables with the main elements and their characteristics.

It has been developed using Microsoft Access. The reason is that it is easy to manage the database with no programmer skills at all. Furthermore, it is a widely used software tool, which make possible to add new users to its management.

1.2 Resources

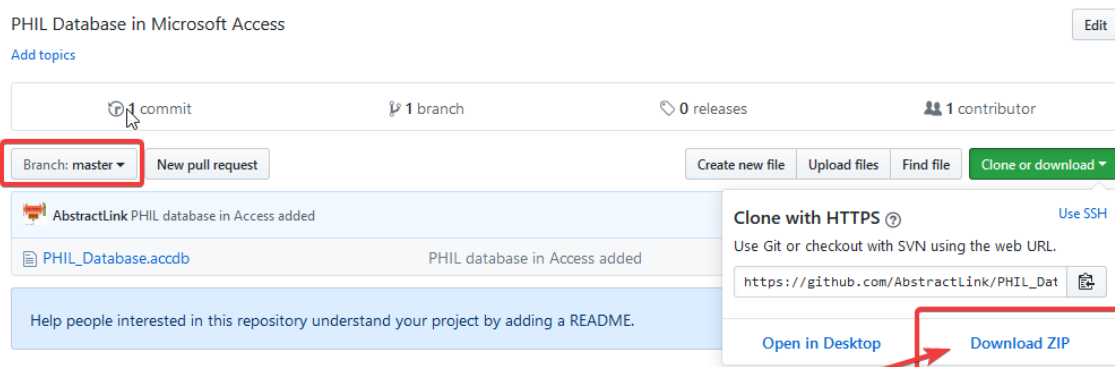
You will need to have Microsoft Access to manage the database. It has been developed using Microsoft Access 2013 and 2016, therefore other version of this software has not been tested and user could find some incompatibilities.

Furthermore, if you want to add or modify information, it is needed an account in GitHub and download “[GitHub desktop](#)” to commit your changes. If it is your first time using GitHub, you can find more information in <https://guides.github.com/>.

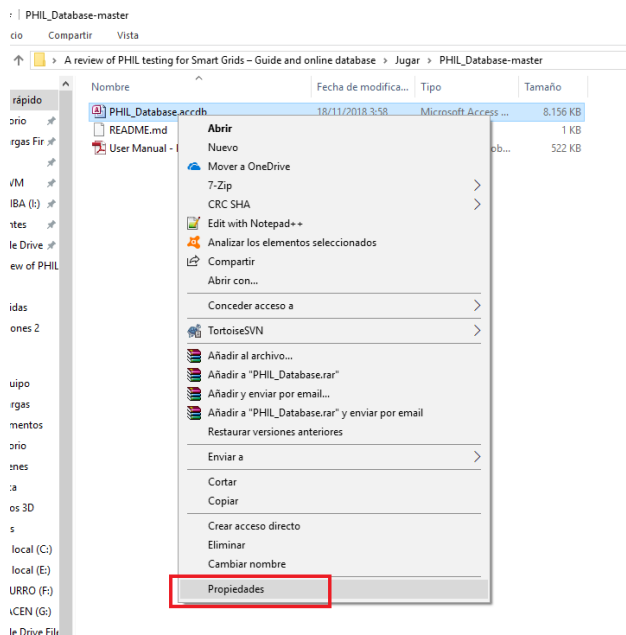
2 FAQs

2.1 It's my first time ¿How can I used the database?

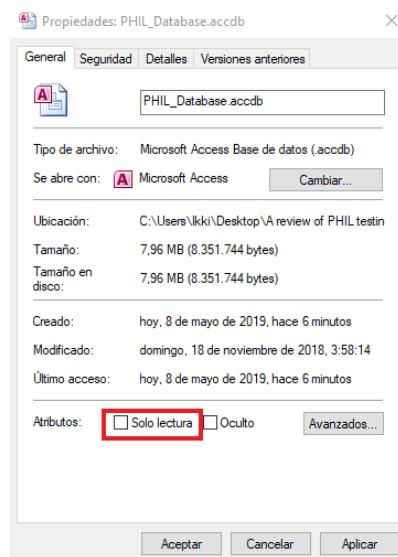
1. If you do not have your file yet:
 - a. Go to GitHub https://github.com/Egarcia-Circe/PHIL_Database
 - b. In branch master, download the last version of the database as a ZIP file



- c. Save it in your local repository with the same name and unzip the file.
2. Right-click to the “PHIL_Database.accdb” and go to properties:



3. Remove read-only attribute



4. Open your local file “PHIL_Database.accdb”. The first window of the database is:

Login

User:

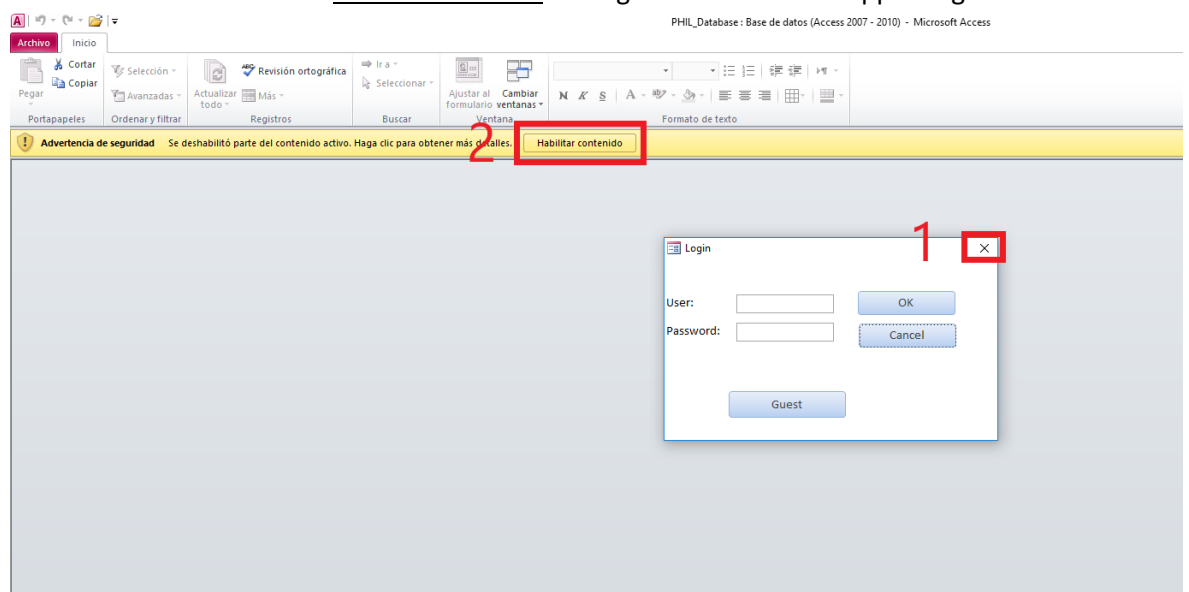
Password:

Aceptar

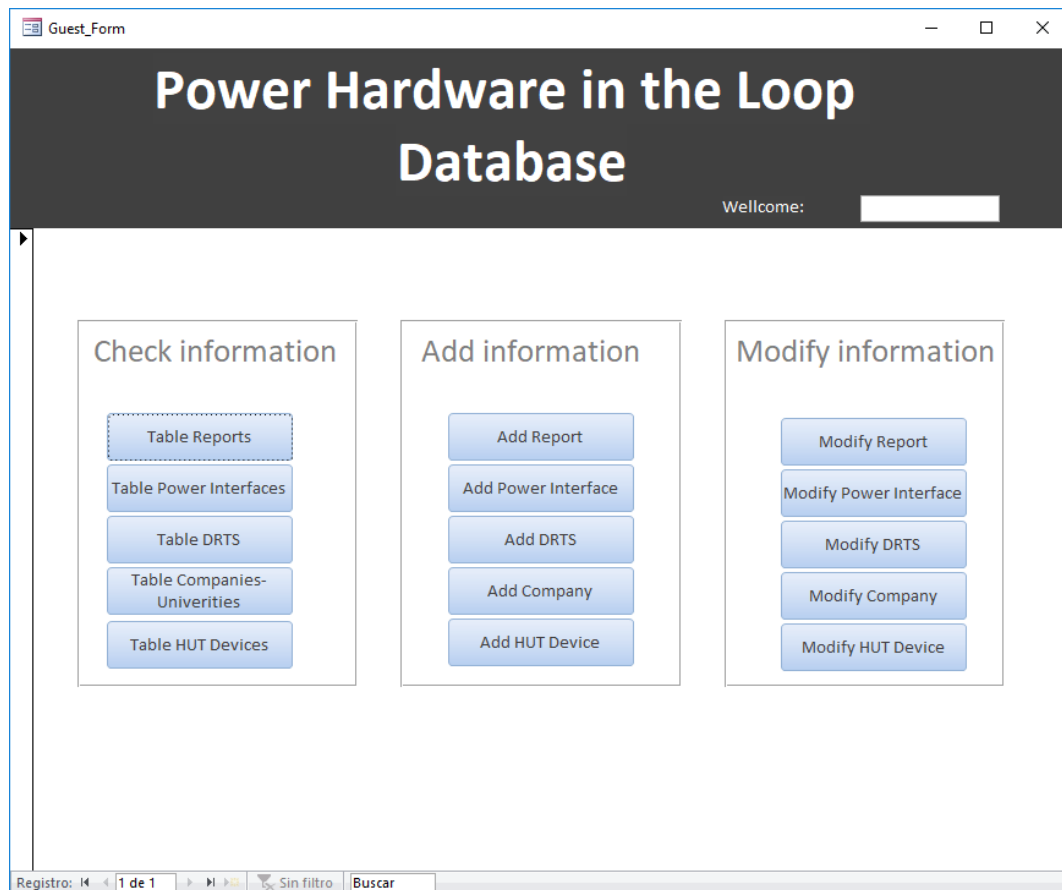
Cancelar

Guest

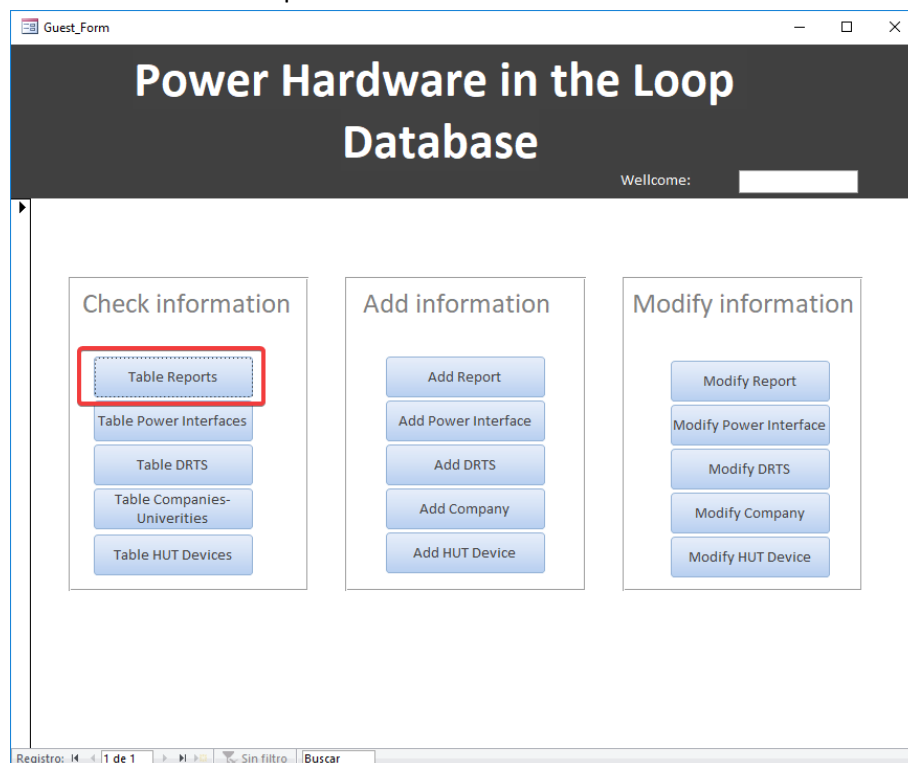
- a. If you have enable the [Trust Center Message Bar](#), first you have to close this login window and then click on “Enable Content”. The login window should appear again.



5. If you do not have an account, click in in “Guest” bottom which allow you to view the different information of the database. If you want to add or modify information, you need to create an account (2.2).
6. After clicking in the “Guest bottom”, the main window of the database is opened. In this window you can see main functionalities of the database, but you only have permissions to check the information of the database. If you want to add or modify information , you need to create an account (2.2)



7. For example, let's going to check the information about the different reports of the database. Click on the "Table Reports" bottom.



8. The table with the different reports of the database appears.

Papers_Visualization							
	Id	Year	Title	Authors	Universities-Comp	Summary	Why and what for
1	2014		Power hardware-in-the-loop im	Seitl, C.;Kathan, J.	Electr. Energy Syst.-E	PHIL simulation of a battery mo	To investigate the accuracy of Ph
2	2013		Hardware-in-the-loop simulatio	Octavian Crăciun	a Grenoble Electric	It test protection devices using	Nowadays the loads supplied by
3	2012		Implementation of a multi-rat	Lehuss, F.	Electr. Energy Syst.-	This paper presents a new inter	New interface topology called n
4	2007		Accuracy Evaluation of Power H	Wei Ren	Florida State Univers	PhD Thesis. A method is neede	PHIL simulation may result in er
5	2011		Evaluation of the Impact of Supr	Dione, M.	Ecole Polytech. de M	Overcurrent protectioni in supe	Due to the very non linear beha
6	2015		Stability and accuracy evaluatio	Onyinyechi Nzima	RTDS Technologies Ir	The paper shows the stability ar	It is a paper from RTDS, so it is a
7	2017		Power-Hardware-In-Loop Setup	Giovanni De Carne	University of Kiel, Ka	PHIL is applied to the Smart Trar	Evaluating the power electronic
8	2012		Examination of LV grid phenom	Lauss, G.	AIT Austrian Inst. of	A low voltage grid with differen	This work is giving an approach
9	2017		Frequency response services de	D.M.Greenwooda;	School of Electrical a		Energy Storage Systems (ESS)
10	2017		Design considerations and test	Mahsa Ghapandar	North Carolina State	This work provides an overview	Power Hardware in the Loop (PH
11	2012		Design, development and oper	Kotsampopoulos, I	Sch. of Electr. & Com	This paper firstly discusses inter	The challenges in achieving high
12	2017		Stability study of power hardwa	Mandip Pokharel	RIGA Lab, Electrical a	The stable operation of PHIL s	The Stability issues in PHIL simu
13	2010		Real-time simulation the missir	Ye Wang	Univ Lille Nord de Fr	This paper describes a design pr	To develop a full-scale experir
14	2012		Power hardware-in-the-loop te	Schoder, K.; Steur	Center for Adv. Powe	The testing of a 500 kW PV inver	The industry (utilities and powe
15	2012		A Power-Hardware-in-the-loop	Kotsampopoulos,	Department of Electr	A description of the facility at N	Power-Hardware-in-the-loop (F
16	2011		Real time simulation of a power	Karapanos, V	Faculty of Electrical E	It has been developed and teste	Investigating the interaction be
17	2009		Power Hardware-in-the-Loop Te	Schacherer, C.	Inst. for Tech. Phys.,	This paper presents results from	To test SCFCL modules under co
18	2012		Megawatt Scale Hardware-in-th	Yost, Kevin; Langs	Center of Advanced I	A megawatt scale test bed for p	Testing a new high speed gene
19	2015		Megawatt scale power hardwar	James Langston	Center for Advanced	This paper describes efforts to c	PHIL simulation offer solution

9. You can organized and filter the table information as you need. For example, let's going to classify it depending of the used step time step, from more to less time step. This order can give information about what kind of simulated system need less time step or what has been the evolution of this data during time.

Papers_Visualization							
	Id	Year	Step Time (useg)	DRTS	HUT Type	Simulated System	Test Objective
1	6	2007	60	RTDS	Nonlinear circuit; Linear Circuit	Grid Voltage; Electric Ship	Check PHIL Behaviour
2	17	2012	50	RTDS	PV Inverter	Complex electric grid; PV	Check PHIL Behaviour; Test HUT
3	10	2012	50	RTDS	PV Microinverter	Electric grid	Check PHIL Behaviour; Test HUT
4	11	2017	50	Opal-RT	Battery Energy Storage System	Complex electric grid	Test electric grid stability; New
5	16	2010	50	Opal-RT	Distributed Energy Storage Syst	Complex electric grid	Test HUT; Rapid Prototyping
6	18	2012	50	RTDS	PV Inverter	Complex electric grid; Electric g	Check PHIL Behaviour; Test Sim
7	19	2011	50	RTDS		Complex electric grid	Check PHIL Behaviour; Test HUT
8	22	2015	50	RTDS	AC/DC power conversion modul	Electric Ship; Electric grid	Test HUT
9	15	2017	50	RTDS	Resistance; PV Microinverter	Electric grid	Check PHIL Behaviour
10	9	2017	45	RTDS	Smart Transformer (ST)	Grid Voltage	Test HUT; Test Simulated System
11	2	2013	30	RT-LAB HIL Box 4U	Circuit Breaker	Short-Circuit	Validate new Circuit Breakers
12	21	2012	30	RTDS	High Speed Generator	Monitoring, control and primary	Check PHIL Behaviour; Test HUT
13	7	2011	30	Hypersim	SFCL (Superconducting Fault Cui	Short-Circuit	Validate new Circuit Breakers
14	20	2009	25	RTDS	SFCL (Superconducting Fault Cui	Electric grid	Test HUT
15	5	2012	10	eMEGAsim	Resistance	Grid Voltage	Check PHIL Behaviour
16	1	2014	10	eMEGAsim	Car: FTP-72 driving cycle	Lithium Battery	Check PHIL Behaviour
17	8	2015	10	RTDS	Linear Circuit; PV Microinverter	Grid Voltage	Check PHIL Behaviour
18	12	2017	---	RTDS	PV Microinverter	Complex electric grid	Check PHIL Behaviour

2.2 ¿How can I create an account?

If you want to add or modify the database information, you need to create an account. For that purpose, you will need to send an email to xxx with the following information:

- **Subject:** [PHIL database registration] - Full Name
 - Full Name:
 - User name:
 - Password:
 - Email:
 - Company, University and/or research centre:

- More information: the information that you want to share with us (it will not appear in the database): why are you interested in this database, your PHIL experience,

Once the logging information are checked and updated in GitHub, you will receive a confirmation email about your user account.

2.3 I don't want to show sensible information ¿Is this application safe?

This software has been developed trying to limit the access to the users to unwanted information. For example, only the administrator has access to the emails of the users. However, an expert user in Microsoft Access could find the way to get information that other users cannot take. For that reason, we advise that if you want to add sensible information, do not do that.

2.4 If I'm registered, ¿Can I modified all the information that I want?

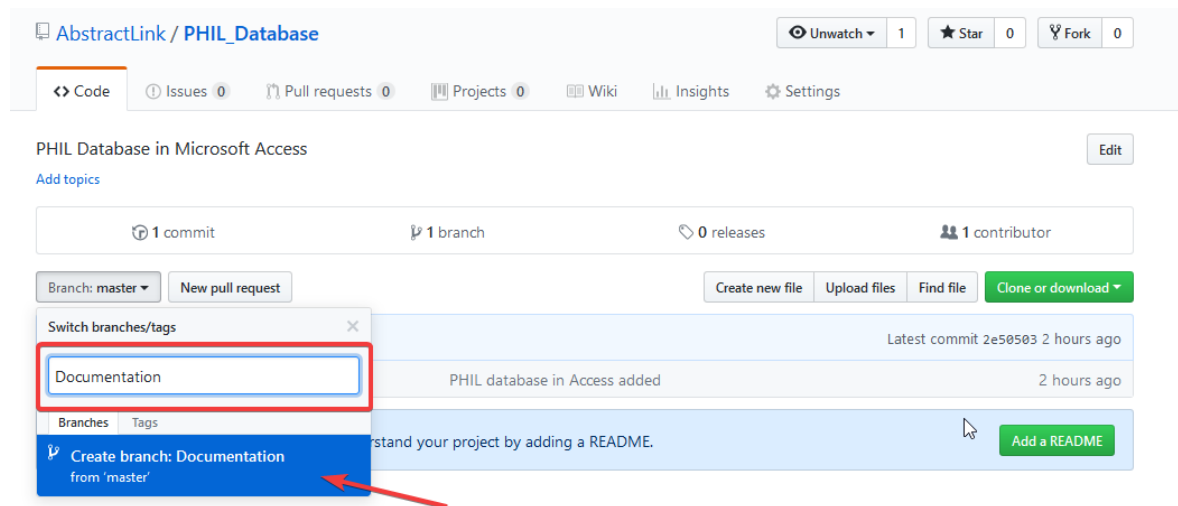
No, you only can modify the data that you have added before. Furthermore, once you have added the information, you need to commit the changes to GitHub (2.6).

2.5 ¿Is the data verified by others or everyone can add information?

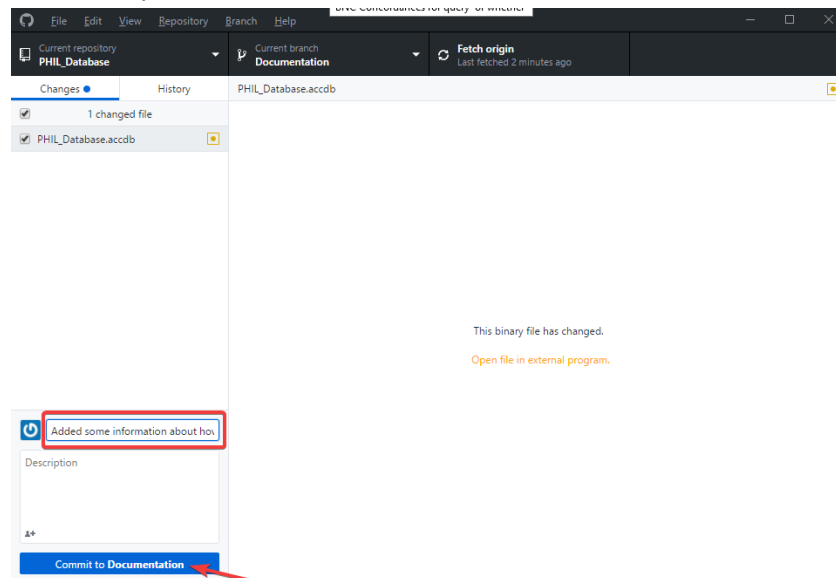
All the users which are registered in the database are working in a company, university or research center. Therefore, the information added in the database comes from verified institutions, and this is the main verification of the added data. Furthermore, the database administrators will be try to periodically revised the added information and guarantee that it is coherent.

2.6 I want to add or modify information ¿what are the steps that I need to do?

1. First, you need to create an account (2.2).
2. In addition, it is necessary to have the resources appears in section 1.2.
3. Once you have the resources and you have received the email, you need to create a new branch in GitHub, named with your main contribution. For example, create a branch with the name "Documentation".

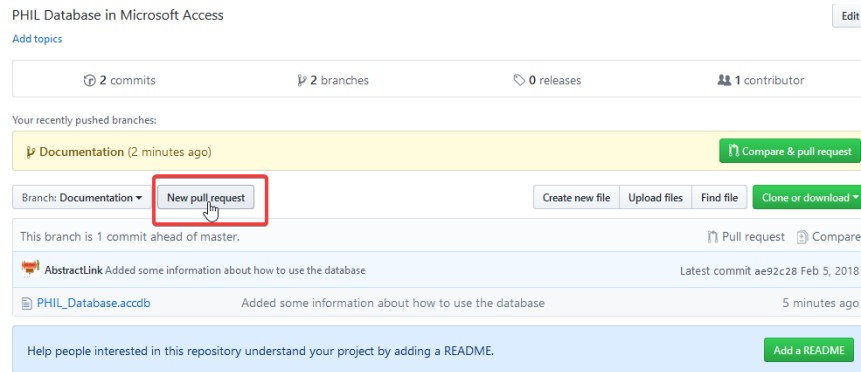


4. Open your local file “PHIL_Database.accdb” and make all the changes that you need to do.
5. Once you have finished, do a commit with your new changes using “[GitHub desktop](#)”. First, add a summary of the changes and click the bottom “Commit to ...”, in this case, “Commit to Documentation” and update it.



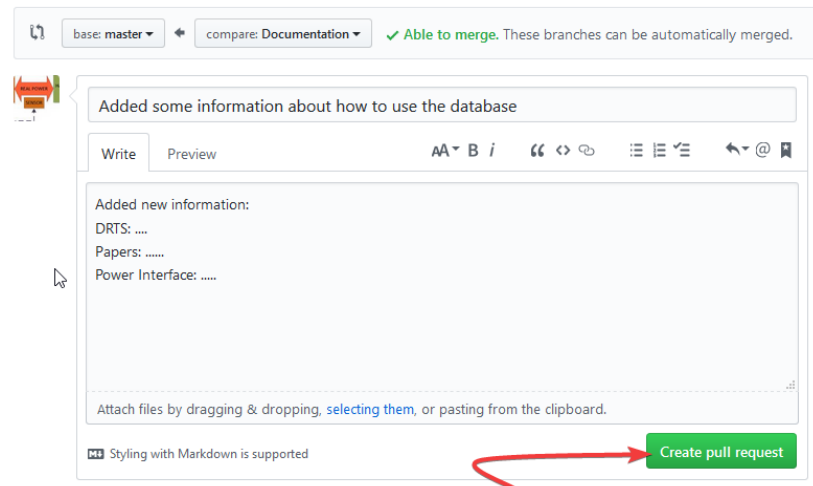
6. If you want to add this new information into “master” branch, which is the main branch, click in “New pull request”: “Pull requests let you tell others about changes you've pushed to a repository on GitHub. Once a pull request is opened, you can discuss and review the potential changes with collaborators and add follow-up commits before the changes are merged into the repository.”¹

¹ <https://help.github.com/articles/about-pull-requests/>



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](#).



7. If there are no problems with the new commit, administrators will merge pull request. This will add the new information into the master branch.