# Overview

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To facilitate the DAFoam optimization, we developed a suite of Paraview-based Graphical User Interface (GUI) plugins called pvOptGUI. You can use the plugins to generate mesh, setup and run optimization, and visualize the optimization progress in Paraview. You can also use the plugins to generate the optimization configuration files, e.g., runScript.py, and then run it on an HPC. This GUI is currently in the beta version and has only one plugin (pvOptAirfoil) for airfoil aerodynamic optimization.

The installation guide for Windows, MacOS, and Linux is as follows. The pvOptGUI package is essential and Docker is optional.

## pvOptGUI

Windows 10 (64bit)

Download the [pvOptGUI\_Windows10\_64bit package](https://github.com/DAFoam/files/releases/download/pvOptGUI/pvOptGUI_Windows10_64bit.zip) and extract it to a desired location.

To load ParaView, open the shortcut *paraview.exe* located in the bin folder of your installation

To load one of the sources contained in the pvOptGUI plugin, click the source tab at the top of the toolbar, then select one of the choices listed in the *PvOptGUI* tab.

Linux

First, download [pvOptGUI\_Linux](https://github.com/DAFoam/files/releases/download/pvOptGUI/pvOptGUI_Linux.tar.gz) and the airfoil aerodynamic optimization plugin [pvOptAirfoil\_Linux\_Latest.tar.gz](https://github.com/DAFoam/files/releases/download/pvOptGUI/pvOptAirfoil_Linux_Latest.tar.gz) (链接没有?)。

Decompress both files to a convenient location. Then install the official release of [Paraview v5.9.0](https://www.paraview.org/paraview-downloads/download.php?submit=Download&version=v5.9&type=binary&os=Linux&downloadFile=ParaView-5.9.0-MPI-Linux-Python3.8-64bit.tar.gz) and untar it inside of the pvOptGUI folder you previously extracted.

Also download [Miniconda](https://repo.anaconda.com/miniconda/Miniconda3-py38_4.10.3-Linux-x86_64.sh), run the .sh file using the default settings. When prompted for the install location, create a directory titled *miniconda3* inside the pvOptGUI folder.

After Miniconda has been installed, traverse to the pvOptGUI directory and run *minicondaSetup.sh* using the below command to obtain the required packages. When prompted for installation permissions, enter yes.

./minicondaSetup.sh

**NOTE:** If a different location is preferred or the directories are renamed, editing file paths in the script may be necessary.

Finally, open Paraview by traversing to the pvOptGUI directory and running:

./loadOptGUI.sh

A console window should appear briefly, then ParaView should open a few seconds later.

**NOTE:** You may need to adjust file paths if you renamed/relocated the Miniconda3 or Paraview folders

To load pvOptAirfoil into Paraview, locate the toolbar at the top of the screen, then click

* Tools»Manage Plugins…»load new…»
* Then navigate to your copy of pvOptAirfoil.so and load the shared image

If you do not have OpenGL on your system, the plugin will not run. Download it with the below command:

sudo apt install libopengl0

Refer to  [this page](https://dafoam.github.io/mydoc_gui_pvoptairfoil.html)[Airfoil-aerodynamic-optimization GUI] for detailed instructions on how to use the pvOptAirfoil plugin.

## Docker (optional)

Docker is not required to generate the DAFoam run script. However, Docker is needed if you want to do mesh generation, transformation, and running the aerodynamic optimization through the GUI.

Windows 10

Download [Docker Desktop](https://docs.docker.com/docker-for-windows/install/) for Windows

After installation, run Docker Desktop. Wait for the notification that says Docker is running.

In your Windows hidden icons on the bottom right of your taskbar, one should see the Docker icon. Right click and open the *Dashboard* Verify that you are signed in to your Docker account at the top right of the dashboard. You can close the dashboard but keep Docker running.

Open the command prompt and verify docker installation by running:

docker -v

The major version should be a minimum of 19 to run pvOptGUI docker commands with pvOptAirfoil. Once the Docker is installed and verified, run this command from the terminal to download the DAFoam image:

docker pull dafoam/opt-packages:v2.2.7

**NOTE:** Docker must be running and *you must be signed in to your Docker account* when launching Paraview to run Docker commands through pvOptGUI plugins. The user can log in at any point while running the plugins

Ubuntu

To install Docker, open your terminal, copy and run the following command. This will uninstall any previous docker versions and install the latest version:

sudo apt-get remove docker docker-engine docker.io containerd runc && sudo apt-get update && sudo apt-get install apt-transport-https ca-certificates curl gnupg-agent software-properties-common -y && curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add - && sudo add-apt-repository "deb [arch=amd64] https:// download. docker.com/linux/ubuntu $(lsb\_release -cs) stable" && sudo apt-get update && sudo apt-get install docker docker.io -y

Next, add your user name to the docker group:

sudo usermod -aG docker $USER

Log out and log back in to your user account for the command to take effect. Then, verify docker installation by running:

docker -v

The major version should be a minimum of 19 to run pvOptGUI docker commands with pvOptAirfoil. Once the Docker is installed and verified, run this command from the terminal to download the DAFoam image:

docker pull dafoam/opt-packages:v2.2.9

If the docker image is not pulled, it will be pulled automatically when the first docker command is attempted.

Full Docker installation guide is located [here](https://docs.docker.com/engine/install/ubuntu/)