

OpenMod Africa



plan4res installation

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Installing plan4res on windows



If not already there, install Git for Windows (use default settings) <https://git-for-windows.github.io/>

2 options to install plan4res on Windows:

- (Highly recommended): WSL (Windows Subsystem for Linux)
- (Highly UN-recommended): Vagrant and VirtualBox

WSL as well as Vagrant+VirtualBox allow to emulate a UNIX system on the windows computer



Installing plan4res in WLS



Requirements:

- Windows 10 or higher
- powershell

Procedure:

- Open PowerShell as administrator and enter: `wsl -install`
 - For more advanced option see <https://learn.microsoft.com/en-us/windows/wsl/install>
- Open a linux terminal and follow the plan4res linux installation procedure
 - See <https://learn.microsoft.com/en-us/windows/wsl/tutorials/linux> to find out how to open a terminal



Installing plan4res with Vagrant



Requirements:

- Windows 7 pro 64bit SP1 or higher
- powershell 3.0 or higher
- CPU must support hardware virtualization (which may require being enabled in the BIOS)

Procedure:

- Install Git for Windows (use default settings) <https://git-for-windows.github.io/>
- Install VirtualBox and Extension Pack <https://www.virtualbox.org/wiki/Downloads>
- Install Vagrant <https://www.vagrantup.com/downloads.html>
- Open Git Bash and follow the Linux installation procedure

See <https://gitlab.com/cerl/plan4res/p4r-env#windows>



Installing plan4res in linux



Create a directory (e.g. P4R) and move into it (P4R can be on a server)

- `mkdir P4R && cd P4R`

Prepare your installers/licence for commercial solvers (LINUX versions required)

- plan4res can use HiGHS (default), SCIP , Gurobi or CPLEX
- For CPLEX: copy your `cplex_studioXXXX.linux_x86_64.bin` installer in P4R
- For Gurobi: copy your `gurobiXX.X.X_linux64.tar.gz` installer and your `gurobi.lic` licence file in P4R

Download the installation script and launch the installation

- `git clone https://github.com/plan4res/install`
- `mv install/$.sh . && rm -rf install && chmod a+x $.sh`
- Launch the installer: `./plan4res_install.sh` WITH specific options



Installing plan4res in linux



The installer is launched as follows, from your install directory (here P4R)

```
./plan4res_install.sh [-S <SOLVER>] [-I <installer>] [-L <license>] [-v <version>]  
[-M <mpi>] [-V <memory>]
```

- **-S SOLVER**: CPLEX or GUROBI or SCIP or HiGHS (default: HiGHS)
- **-I Installer**: name of installer file for CPLEX or GUROBI
- **-L license**: license file for gurobi
- **-V version**: version number for SCIP (default 9.2.0)
- **-M mpi** : if running on a system with MPI, you can choose MPICH or OpenMPI (default: OpenMPI); With Vagrant, MPICH is mandatory
To check which mpi you have type: `mpiexec --version`
- **-V memory**: option `-V` is mandatory when using Vagrant. Memory is the memory which will be given to the virtual machine



Installing plan4res in server mode



If you have installed plan4res on a shared directory , eg. P4R, the users can run it in a personal directory (eg. MY_P4R)

copy the configuration file `user_init_plan4res.sh` to MY_P4R

From MY_P4R, type

```
./user_init_plan4res.sh [-S <SOLVER>] [-D <installdir>]
```

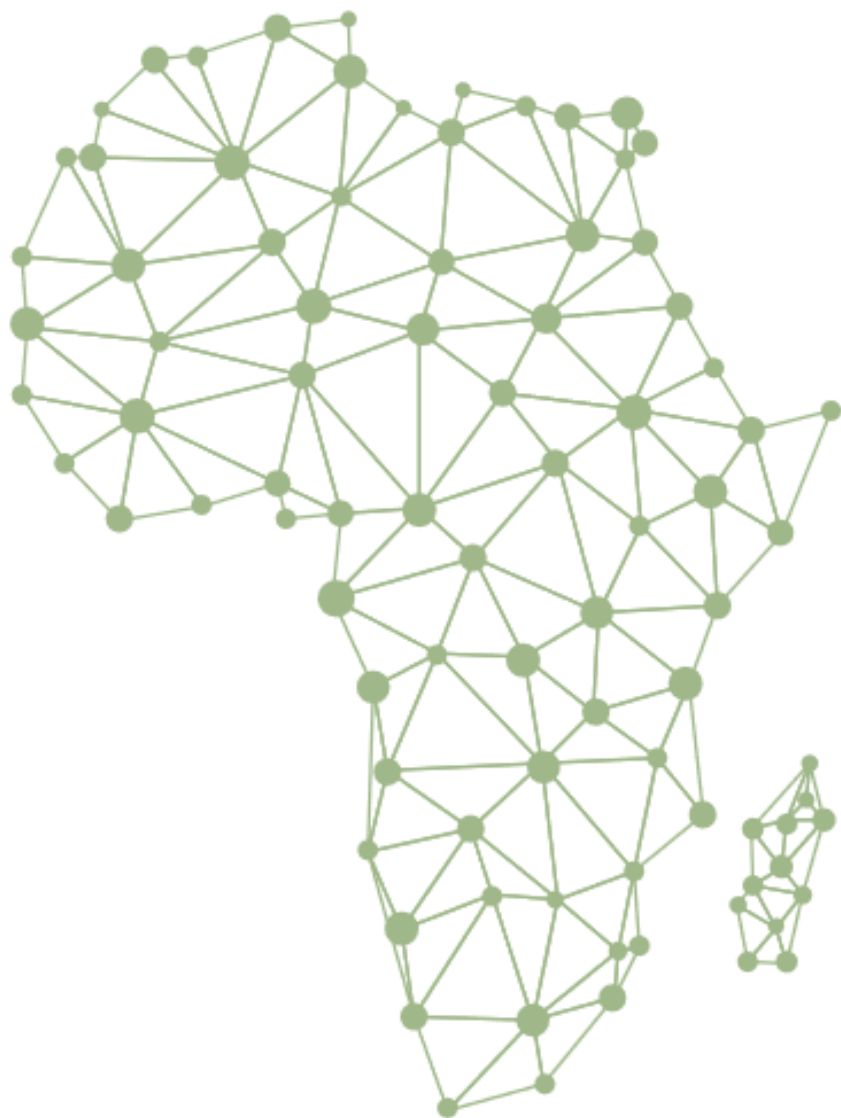
- **-S SOLVER**: CPLEX or GUROBI or SCIP or HiGHS (default: HiGHS)
- **-D installdir**: directory where plan4res is installed, here P4R

This script will:

update your `.bashrc` file to allow running plan4res

download the example dataset (toyDataset) and the documentation in MYP4R





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The plan4res environment

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Plan4res

Power System Model



- Generation mix (capacities, costs, constraints) (incl. Storages....)
- Electricity demand (and system services rqrts)
- Interconnections
- Uncertainties
- Costs (OPEX and CAPEX)
- Investment potentials



- Generation schedules
- Emissions
- Marginal costs
- Costs and revenues
- Power not served

- Additional Generation capacities
- Additional Interconnection capacities
- Additional storage capacities



Plan4res environment



plan4res is set-up as a container

Containers are executable units of software that package application code along with its libraries and dependencies. They allow code to run in any computing environment, whether it be desktop, traditional IT or cloud infrastructure.



Plan4res structure



plan4res is composed of the following pieces:

- ❑ The p4r-env container : <https://gitlab.com/cerl/plan4res/p4r-env>
- ❑ The SMS++ modelling and optimization library : <https://gitlab.com/smspp>
- ❑ The plan4res python linkage, data pre/post processing, and visualisation scripts : <https://github.com/plan4res/plan4res-scripts>
- ❑ The plan4res workflow scripts: <https://github.com/plan4res/include>

The plan4res installation script install all the pieces



p4r-env: the plan4res environment



It is composed of the following sub-repos

- (hidden) **.cache_p4r** : contains the .sif singularity image of the plan4res container
- **bin**: contains executables to run the container or to update/rebuild it
- **config**: contains the configuration files of the plan4res container
- **executor**: contains the definition files of the plan4res container
- **scripts**: contains all software installed after the container was built
 - ❖ **python**: contains all plan4res python scripts
 - ❖ **include**: contains the bash scripts used for plan4res workflows
 - ❖ **add-ons**: contains the main softwares=> SMS++ and the solvers



The container



The plan4res container is a singularity image (.sif)

❑ It includes:

- A full linux installation (currently debian:bullseye, soon debian:bookworm)
- All dependencies required by of SMS++ (in particular boost, eigen, netcdf-C++, see <https://gitlab.com/smspp/smspp#getting-started>)
- Python3 and all packages needed by the plan4res python scripts
- Soon: julia and the packages needed by GENeSYS-MOD

❑ It can be ran by typing **bin/p4r** from **p4r-env/**

- This will launch a linux prompt within the container environment. All plan4res modules can be manually ran from this prompt.



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 plan4res is now ready for running!

Thanks for your attention!

