

Python API



Python API



- The four Oasys LS_DYNA Environment programs (PRIMER, D3PLOT, T/HIS and REPORTER) can be driven from Python.
- The Python API allows you to do most things that can be done from the JavaScript API.
- Python scripts are run outside the programs (*JavaScripts are run inside the programs*).
- Python communicates with the programs using the gRPC framework.



Python modules

- To use the Python API, the following Python modules need to be installed:
 - <https://pypi.org/project/Oasys.PRIMER/>
 - <https://pypi.org/project/Oasys.D3PLOT/>
 - <https://pypi.org/project/Oasys.THIS/>
 - <https://pypi.org/project/Oasys.REPORTER/>
- The modules require Python ≥ 3.8 .



Connection: Python – Oasys

- The connection is made with gRPC, using the Oasys.gRPC Python module.
 - Oasys.gRPC doesn't need to be installed nor imported in the scripts.
 - It is automatically installed and used by the other Oasys modules.
- To launch PRIMER from Python:

```
import Oasys.PRIMER  
connection = Oasys.PRIMER.Start(abspath="path_to_executable")
```

- To terminate PRIMER:

```
Oasys.PRIMER.terminate(connection)
```

- To disconnect Python from PRIMER but leave PRIMER open:

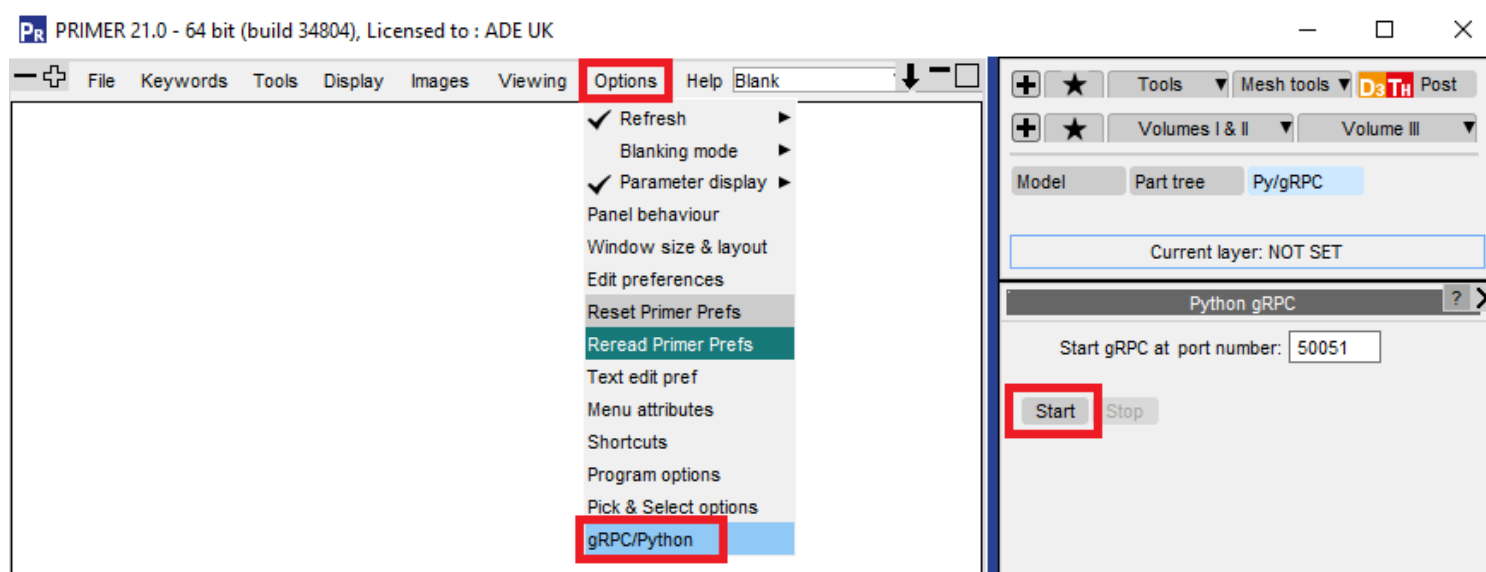
```
Oasys.PRIMER.disconnect(connection)
```



To connect to an instance of PRIMER that is already running



- PRIMER must be in a special mode, listening on a port for gRPC messages.
- There are two possible methods to do so:
 - Use the -grpc command line argument when starting PRIMER:
`C:\\path_to_executable\\primerxx_x64.exe' -grpc=50051`
 - Start the program in the usual way, and then under **Options > gRPC/Python** click on "**Start**":



Advantages of Python API over JS API

- As the Python scripts run outside the programs, from **the same** Python script it is possible to communicate to PRIMER, D3PLOT, T/HIS and REPORTER.
- The same script can also communicate to any other software that has a Python API.
- In Python there are lots of available modules that can be imported into the script.
 - For example, there are open-source libraries to create geometry or mesh.



Example (launch PRIMER, create a model, create nodes)



```
import Oasys.PRIMER

connection = Oasys.PRIMER.start(abspath="C:\\path_to_PRIMER_executable\\primerxx_x64.exe")

m = Oasys.PRIMER.Model()

Oasys.PRIMER.Message("Making nodes")

for y in range(0, 11):
    for x in range(0, 11):
        Oasys.PRIMER.Node(m, 1+x+(y*11), x*10, y*10, 0)

Oasys.PRIMER.disconnect(connection)
```



Example (use of external Gmsh library to create geometry)

```
import Oasys.PRIMER
import gmsh

gmsh.initialize()

# Add geometry points defining perimeter
gmsh.model.geo.addPoint(0, 0, 0, lc, 1)
gmsh.model.geo.addPoint(1, 0, 0, lc, 2)
gmsh.model.geo.addPoint(1, 1, 0, lc, 3)

# Add lines defined by points
gmsh.model.geo.addLine(1, 2, 1)
gmsh.model.geo.addLine(2, 3, 2)

# .....
# .....

connection = Oasys.PRIMER.start(abspath="C:\\path_to_PRIMER_executable\\primerxx_x64.exe")

m = Oasys.PRIMER.Model()

# Add here code to convert Gmsh geometry into PRIMER nodes, shells, etc.

Oasys.PRIMER.disconnect(connection)
```

Full example available in the [Python API manual](#)



Python API manual

- There is a comprehensive [Python API manual](#) to help you start scripting.
- It contains:
 - Overview;
 - Examples;
 - Links to the documentation of the four programs:
 - PRIMER
 - D3PLOT
 - T/HIS
 - REPORTER



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