



DIRAC API

DIRAC Project

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# Why APIs are important?

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- ▶ Application Programming Interface (API)
- ▶ The DIRAC API is encapsulated in several Python classes designed to be used easily by users to access a large fraction of the DIRAC functionality. Using the API classes it is easy to write small scripts or applications to manage user jobs and data.
- ▶ The DIRAC API provides a transparent and secure way for users to submit jobs to the Grid.
- ▶ Permit debug locally the programs before submit jobs to the Grid.
- ▶ While it may be exploited directly by users, the DIRAC API also serves as the interface for the Ganga Grid front-end to perform distributed user analysis for LHCb, for example.



# Why advanced users prefer APIs

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- ▶ API provides a simple, seamless interface to Grid resources to submit jobs that can be:
  - ▶ Single applications
  - ▶ Multiple steps of different applications
- ▶ Can perform a typical user analysis using understandable Python code

- ▶ The API allows creating DIRAC jobs using the Job object.
- ▶ Example:

```
from DIRAC.Interfaces.API.Job import Job
from DIRAC.Interfaces.API.Dirac import Dirac
dirac = Dirac()
j = Job()
j.setExecutable('ls', arguments='-al', logFile='ls.log')
dirac.submit(j)
```

**Note that all the DIRAC API commands described here may also be executed directly from the Python prompt.**

Setting the computing resources to use:

▶ Operating system and system architecture:

```
j.setSystemConfig("slc4_ia32_gcc34")
```

▶ CPU requirement determined:

```
j.setCPUTime(21600)
```

▶ Site name:

```
j.setDestination('LCG.CERN.ch')
```

▶ Banned sites:

```
j.setBannedSites(['LCG.CNAF.it', 'LCG.CNAF-t2.it'])
```

# Configurable Job Parameters

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## ▶ Multiple Jobs:

```
for i in range(20):  
    j.setName('MyJob_%d' % i)  
    dirac.submit(j)
```

## ▶ Log Level:

```
j.setLogLevel('DEBUG')
```

## ▶ Environment variables:

```
j.setExecutionEnv({'MYVARIABLE': 'TOTO'})
```

## ▶ Input Sandbox

```
j.setInputSandbox(['Input.options', '*.txt', 'lib/'])
```

## ▶ Output Sandbox

```
j.setOutputSandbox(['*.log', 'summary.data'])
```

## ▶ Input Data

```
j.setInputData(['/vo.formation.idgrilles.fr/user/h/hamar/input1.data'])
```

## ▶ Output Data

```
j.setOutputData(['output1.data', 'output2.data'], outputSE=['M3PEC-disk'], outputPath='MyFirstAnalysis')
```





# APIs Example

```
from DIRAC.Interfaces.API.Job import Job
from DIRAC.Interfaces.API.Dirac import Dirac
j = Job()
dirac = Dirac()
j.setName('MyFirstJob')
j.setOutputSandbox(['*.log', 'summary.data'])
j.setInputData(['/my/logical/file/name1',
               '/my/logical/file/name2'])
j.setOutputData(['output1.data', 'output2.data'],
                outputPath='MyFirstAnalysis')
j.setSystemConfig("slc4_ia32_gcc34")
j.setCPUTime(21600)
j.setDestination('LCG.IN2P3.fr')
j.setBannedSites(['LCG.CNAF.it', 'LCG.CNAF-t2.it'])
j.setLogLevel('DEBUG')
j.setExecutionEnv({'MYVARIABLE': 'TOTO'})
j.setExecutable('echo $MYVARIABLE')
print j._toJDL()
dirac.submit(j)
```

- ▶ Local mode doesn't send the job to the Grid, the execution is not remote.
- ▶ The Local submission mode is a very useful tool to check the sanity of your job before submission to the Grid.
- ▶ The job executable is run locally in exactly the same way ( same input, same output ) as it will do on the Grid Worker Node.
- ▶ This allows to debug the job in a friendly local environment.



# Local Mode Example

```
$ python
Python 2.5.5 (r255:77872, Mar 25 2010, 14:17:52)
[GCC 4.1.2 20080704 (Red Hat 4.1.2-46)] on linux2
Type "help", "copyright", "credits" or "license" for
more information.
>>> from DIRAC.Interfaces.API.Dirac import Dirac
>>> from DIRAC.Interfaces.API.Job import Job
>>> j = Job()
>>> j.setExecutable('/bin/echo hello')
{'OK': True, 'Value': ''}
>>> Dirac().submit(j,mode='local')
```

- ▶ Exercises can be found at:
  - ▶ <https://github.com/DIRACGrid/DIRAC/wiki/JobManagementAdvanced>
- ▶ Run multiple Mandelbrot jobs, get output data files
- ▶ Prepare a Mandelbrot job with multiple input data files



# What do you have learnt?

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- ▶ How to submit jobs using APIs.
- ▶ Debug the payload before submitting jobs to the grid
- ▶ Handle job management using APIs