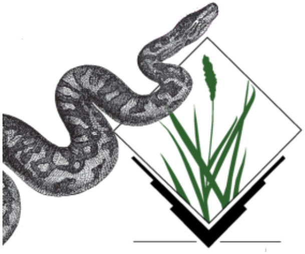

# A Python sweeps in the GRASS

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Perugia, ITALY

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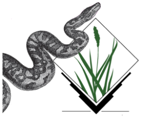
Let's verify:



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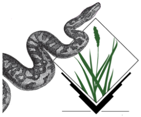

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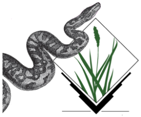

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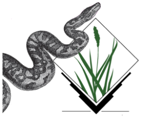

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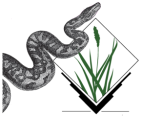
- what it did
- and what it is going to do!

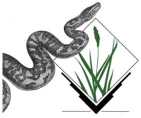


## What is Python?

Quoting from `http://www.python.org`:

> *Python is an interpreted, interactive, object-oriented programming language. People use to compare it to Tcl, Perl, Scheme or Java.*

Python was created in the 1990s by Guido van Rossum as a successor to a language called ABC, a language for teaching and prototyping



## Python design guidelines

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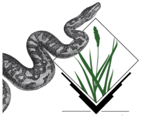

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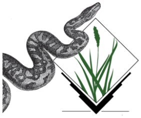
can be approached by using Python



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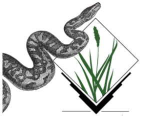

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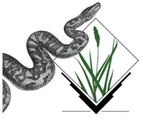
Python design philosophy fits extremely well into the GRASS-GIS environment.

## Interfacing Python to GRASS

There have been basically two approaches to interface GRASS and Python:



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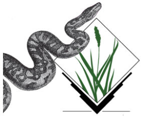
There have been basically two approaches to interface GRASS and Python:

- By simply accessing directly grass through e.g. the os module
- By using the Simplified Wrapper and Interface Generator (SWIG), an interface compiler that connects programs written in C and C++ with scripting languages such as Perl, Python, Ruby, and Tcl

In short time we had several chances to play with Python and GRASS-GIS.



## What has been done: a review

### Python-SWIG wrapped GRASS C API

It allows to call and use GRASS library functions from python programs. So, as we programmed a module in C, we can use the same functions in python:

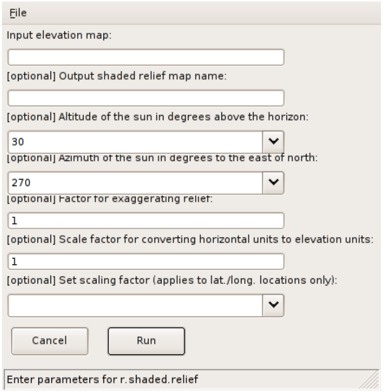
```
import python_grass6
mapset = python_grass6.G_mapset()
print mapset
```

Contributed by Sajith VK, March 2006. Now available in the CVS in swig/python directory.

## What has been done: a review

wx-Windows python interface to grass modules

```
r.shaded.relief --interface-description | grassgui.py
```



Input elevation map:

[optional] Output shaded relief map name:

[optional] Altitude of the sun in degrees above the horizon: 30

[optional] Azimuth of the sun in degrees to the east of north: 270

[optional] Factor for exaggerating relief: 1

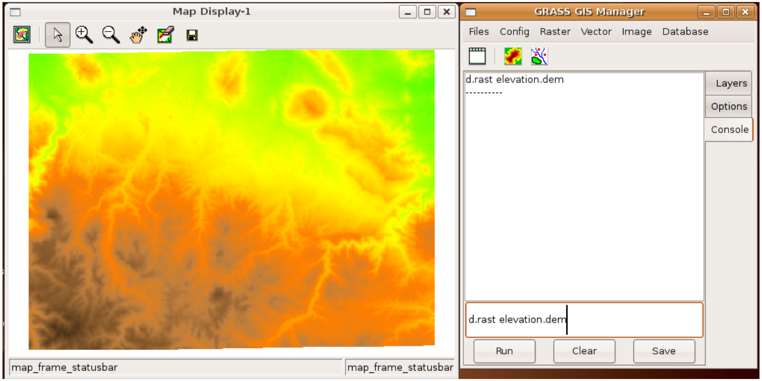
[optional] Scale factor for converting horizontal units to elevation units: 1

[optional] Set scaling factor (applies to lat./long. locations only):

Enter parameters for r.shaded.relief

## What has been done: a review

### wx-Windows python GIS manager



```
d.rast elevation.dem
----------
```

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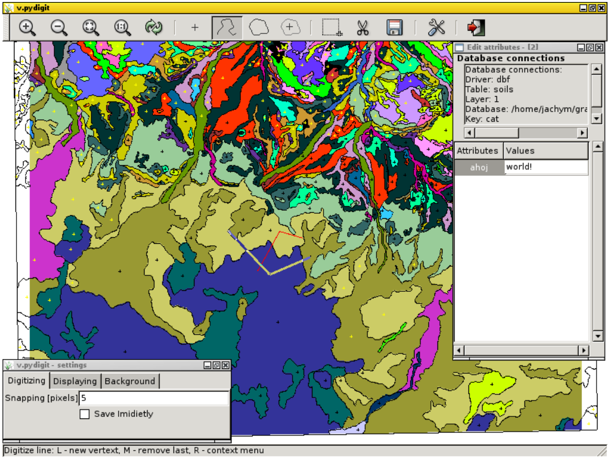
```

Developed by Michael Barton

## What has been done: a review

### GTK Interface – v.pydigit



Database connections

Database connections:
Driver: dbf
Table: soils
Layer: 1
Database: /home/jachym/gra
Key: cat

| Attributes | Values |
|---|---|
| ahoj | world! |

Snapping [pixels] 5

Save Imidietly

Digitize line: L - new vertext, M - remove last, R - context menu

by Jachym Cepicky, 2005

## One step beyond

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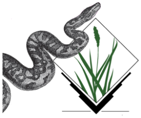

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- creation of documentation
  - A user manual
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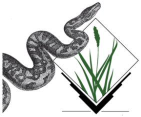

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Put it all together and....

## Introducing you....

The pyGrass package
(ver. 0.1beta)

## pyGrass-0.1 requirements

| Software | Version | Notes |
|---|---|---|
| Python | $>=$ 2.3 | – |
| python_grass6 | – | Comes with GRASS6 sources |
| numpy | – | – |

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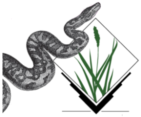

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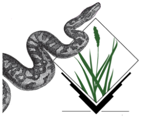

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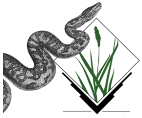
- a real user manual!
- Interactive or scripting usage
- No need to be inside an interactive GRASS session
- Multi-session support
- Raster data is mapped into Numpy

## Documentation!

*Documentation is important as the package itself*

- User manual, written in reST `http://docutils.sourceforge.net/rst.html`, output in:
  - HTML
  - PDF (LaTeXto PDF)
  - XML
- pydoc documentation: just `pydoc pyGrass` and enjoy!

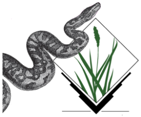


## pyGrass-0.1 namespaces

The main namespaces are:

```
pyGrass.session
pyGrass.maps
pyGrass.utils
pyGrass.gui.qt (*)
pyGrass.gui.tk (*)
pyGrass.gui.wx (*)
pyGrass.gui.gtk (*)
pyGrass.gui.xwin
pyGrass.web (*)
```

(*) empty for now



## (multi-)Session management

We can use pyGrass to manage several grass sessions in the same script, let's see the code:

```
from pyGrass.session import Session
from pyGrass.gui.xwin import device

db = '/home/alf/grassdb'
user = 'PERMANENT'

spearfish = Session(db,'spearfish60',user)
fire = Session(db,'firedata',user)
```

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- no need to be inside a running GRASS session
- we can create as much session objects as we need

refer to `example-multisession.py` file with pyGrass-0.1beta

## import numpy, import pylab... import world!

Raster data is read by the swigged GRASS library and put into an numpy array. Let's visualize it with pylab!

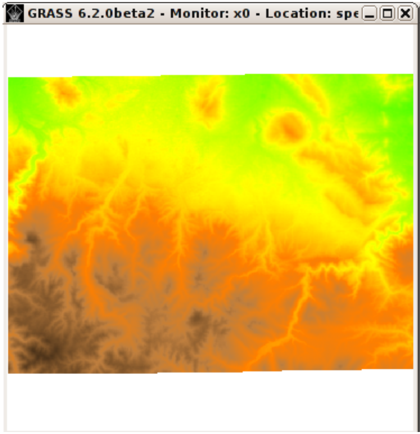
```
# Let's create mydem object
mydem = Rmap('elevation.dem',spearfish)

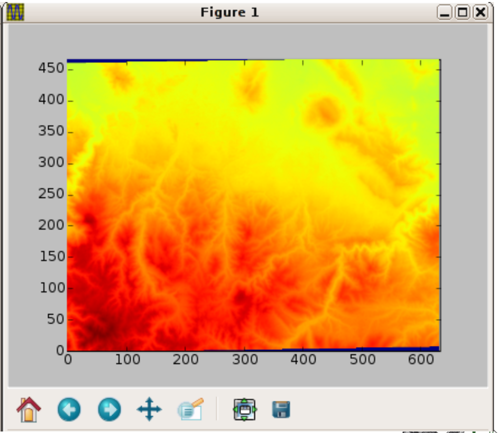
# get data of the map, the m object is an numpy array
m = mydem.getData()

# let's see the image in matplotlib
import pylab
pylab.imshow(m)
pylab.show()
```

If all worked, we should get the most famous county in the world...

## Spearfish dem in matplotlib!





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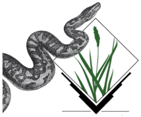

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Thank you!
afrigeri at unipg.it