



**National Centre for
Atmospheric Science**
NATURAL ENVIRONMENT RESEARCH COUNCIL



Python Logging and De-bugging

Logging

Python has the “logging” module which allows you to log in many useful ways:

- To the terminal
- To file(s)
- To custom-handlers (e.g. e-mail)
- To system log files

Logging options

- You can configure:
 - The number of loggers
 - The format of log messages
 - The level of ferocity with which logging should happen, e.g.:
 - Log everything in “DEBUG” mode
 - Only log errors in “operational” mode

Alas, no time

We do not have time to cover logging properly. This could get you started:

```
>>> import sys, logging # You'll need both these modules
>>> stream_handler = logging.StreamHandler(sys.stderr)
>>> stream_handler.formatter =
    logging.Formatter(logging.BASIC_FORMAT)

>>> log = logging.getLogger() # Create logger
>>> log.addHandler(stream_handler) # Add handler to display
>>> log.setLevel(logging.DEBUG) # Set minimum logging level

>>> log.warn("Danger! Will Robinson! Danger!")
WARN:root:Danger! Will Robinson! Danger!"
```

Or, the shortened version

```
>>> import logging
>>> logging.basicConfig()
>>> log = logging.getLogger()
>>> log.setLevel(logging.INFO)
>>> log.info("The system is running")
INFO:root:The system is running.
```

```
>>> log.debug("Nothing said") # Not displayed
because logging at lower than
priority level
```

```
>>> log.error("Now it's serious!")
ERROR:root:Now it's serious!
```

What is the python debugger?

We all write code with bugs in...that is why it is important to write tests for our code.

The python debugger is a tool that allows you to:

- Run through your code interactively;
- Inspect/change the variables at run-time;
- Set “break points” in the code where you can step in and examine the state.

Best illustrated through an example...

A simple script

```
def double_it(x):  
    double = 2 * x  
    return double
```

Can you guess where
python raises an error?

```
# Now the main code  
items = [34, 6.2, {"key": 34}]  
for i in items:  
    print double_it(i)
```

A simple script – with debugger

```
import pdb                                # Import the debugger

def double_it(x):
    pdb.set_trace()                       # Set a break point
    double = 2 * x
    return double

# Now the main code
items = [34, 6.2, {"key": 34}]
for i in items:
    print double_it(i)
```


Debugger in action

```
> c:\python27\double_pydb.py(5)double_it()
```

```
-> double = 2 * x
```

```
(Pdb) n    # Run the next line of code
```

```
> c:\python27\double_pydb.py(6)double_it()
```

```
-> return double
```

```
(Pdb) double, x    # Display current values of double and x
```

```
(68, 34)
```

```
(Pdb) n    # Run the next line of code
```

```
--Return--
```

```
> c:\python27\double_pydb.py(6)double_it()->68
```

```
-> return double
```

Finding the error

...

(Pdb) n **# Step through until we hit the error**

TypeError: "unsupported operand type(s) for *: 'int' and 'dict'"

> c:\python27\double_pydb.py(5)double_it()

-> double = 2 * x **# The line where the error occurred**

(Pdb) x **# Let's look at x when the error occurred**

{'key': 34}

(Pdb) type(x) **# It failed because we can't double a dictionary!**

<type 'dict'>