

# Python

## Logging and Debugging

# 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.warning("Danger! Will Robinson! Danger!")
WARNING: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

```
$ python double.py
```

```
> /home/vagrant/double.py(5)double_it()
```

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

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

```
> /home/vagrant/double.py(6)double_it()
```

```
-> return double
```

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

```
68 34
```

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

```
--Return--
```

```
> /home/vagrant/double.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'`

`> /home/vagrant/double.py(5) double_it()`

`-> double = 2 * x`

**The line where the error occurred**

(Pdb) `print(x)`

**Let's look at x when the error occurred**

`{'key': 34}`

(Pdb) `type(x)`

**It failed because we can't double a dictionary!**

`<class 'dict'>`