

# A hacker's guide to debugging in Python

0800  
1000

stopped - antan ✓

13" VC (032) MP - MC

1.582647000

9.037 846 995 correct

2.130476415 (3) 4615925059(-2)

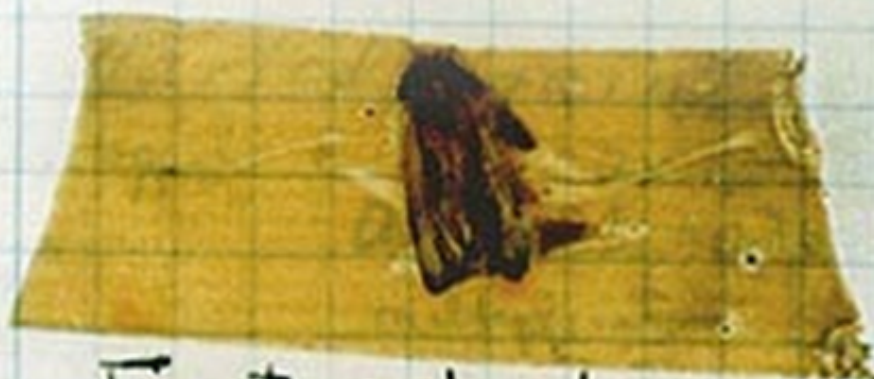
Relays 6-2 in 033 failed special speed test  
in relay " 10.000 test.

Relays changed

1100  
1525

Started Cosine Tape (Sine check)  
Started Multi-Adder Test.

1545



Relay #70 Panel F  
(moth) in relay.

1630

First actual case of bug being found.  
Antan started.

1700

closed down.

Relay 2145  
Relay 337

**Things break.**  
**So they should break...**

**Things break.**  
**So they should break...**

- **gracefully**

**Things break.**  
**So they should break...**

- **gracefully**
- **helpfully**

# Things break.

## So they should break...

- gracefully
- helpfully
- silently

# Exceptions

**Some examples:**

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- **TypeError** - for problems related to data types

# Exceptions

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- **KeyError** - for when a key can't be found in a dictionary
- **NameError** - for problems related to variable names
- **TypeError** - for problems related to data types
- ...etc. See all of the built-in ones [here](#).

# Packages can define their own exceptions

...and you can too!

```
class MissingDataError(Exception):  
    """To be raised when some non-optional  
    data is missing."""  
    pass
```

# Raising an exception

```
# every movie must have a title  
if 'title' not in mojo_dict.keys():  
    raise MissingDataError('JSON must have a'  
                           'key called "title"')
```

**Why spend so much time on  
making different kinds of errors?**

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- 1. Makes debugging easier**

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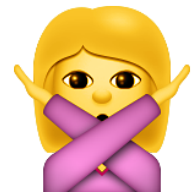


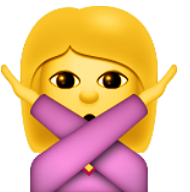
- 1. Makes debugging easier**
- 2. We can deal with them programmatically**

# Catching an exception

```
try:
    year = int(meta_dict.get('year'))
except ValueError:
    logging.warning("No parseable year for movie %s.",
                    title)
    movie['year'] = None
```



**except** is not for making errors “go away”.

  **DON'T DO THIS**  

```
try:  
    process_data(thing)  
except:  
    pass
```

# Reading a traceback

```

-----
AttributeError                                Traceback (most recent call last)
<ipython-input-1-f5dl38cdde43> in <module>()
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AttributeError: 'list' object has no attribute 'keys'

```

your function  
call (where  
the error  
happened)

```
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the function  
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called

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The line of code that actually raised the error

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The error  
itself (its  
type, and  
any message  
supplied)

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```
----> 3 pd.DataFrame(stuff)
```

*Hmm, error occurs when I'm trying to make a new DataFrame...*

```
AttributeError: 'list' object has no attribute 'keys'
```

*Looks like somewhere deep in Pandas, it's trying to get keys from a list...*

*Which means it's probably expecting a dictionary and getting a list instead...*

```
for thing in stuff:  
    print type(thing), thing
```

```
<type 'dict'> {'a': 3, 'c': 2, 'b': 1}
```

```
<type 'dict'> {'a': 1, 'c': 3, 'b': 2}
```

```
<type 'list'> ['a', 'b', 'c']
```

***Yep. Oops.***

# **pdb**

```
import pdb
```

```
...
```

```
pdb.set_trace()
```





# Logging





How do I know when this thing is done?  
How do I know what happened?

**A good way:**

```
print "Done with %d of %d" % (i, total)
```

# A slightly better way:

```
import logging

# will print a message to the console
logging.warning('Watch out!')

# will not print anything
logging.info('I told you so')
```



# Levels of logging

- **DEBUG** - notes for you, while working on code
- **INFO** - notes that everything is going OK
- **WARNING** - something seems wrong but it's not urgent. running out of disk space, or data is probably too small, or things like that

- **ERROR** - something broke. things did not work.
- **CRITICAL** - oh 💩. things are seriously screwed. the whole program probably stopped running.

# The most robust way:

```
import logging
logging.basicConfig(filename='example.log',
                    level=logging.DEBUG)
logging.debug('This message should go to the log file')
logging.info('So should this')
logging.warning('And this, too')
```

**That's just the beginning.**

**You can customize the information it provides with things like dates, version numbers, policies for logging to multiple files, and more.**

**Python logging howto**