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Best Programming Practices - II

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Before the project

Dig for requirements

Document requirements

Make use case diagrams

Maintain a glossary

Document, Document, …

Easy development versus easy maintenance

- projects live much longer than intended
- adopt more complex and readable language

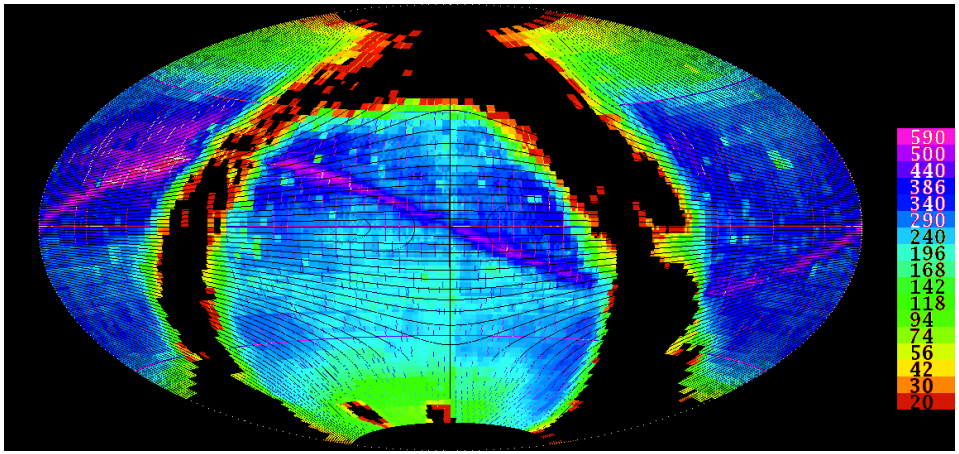
Check requirements

Design, implement, integrate

Validate

Validation

- Don’t trust the work of others
  - Validate data (numbers, chars etc.)
  - Put constraints (-90 <= dec <= 90)
  - Check consistency



Validation

- Don’t trust the work of others
  - Validate data
  - Put constraints
  - Check consistency
- Don’t trust yourself
  - Do all the above to your code too

When something goes wrong

- Crash early
  - Sqrt of negative numbers (require, ensure, NaN)
- Crash, don't trash
  - Die
  - Croak (blaming the caller)
  - Confess (more details)
  - Try/catch (own error handlers e.g. HTML 404)
- Exceptions – when to raise them
  - should it have existed?
  - Don't know?

try/except

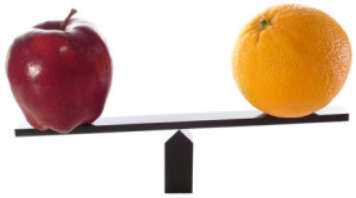
Yes:

```
try:
    value = collection[key]
except KeyError:
    return key_not_found(key)
else:
    return handle_value(value)
```

No:

```
try:
    # Too broad!
    return handle_value(collection[key])
except KeyError:
    # Will also catch KeyError raised by handle_value()
    return key_not_found(key)
```

- Don’t optimize code – benchmark it
- Don’t optimize data structures – measure them
- Cache data when you can – use Memoize
- Benchmark caching strategies
- Don’t optimize applications – profile them (find where they spend most time)



gridgain.blogspot.com

Momoization

```
factorial_memo = {}
def factorial(k):
    if k < 2: return 1
    if not k in factorial_memo:
        factorial_memo[k] = k * factorial(k-1)
    return factorial_memo[k]

factorial(10)
```

Profiling

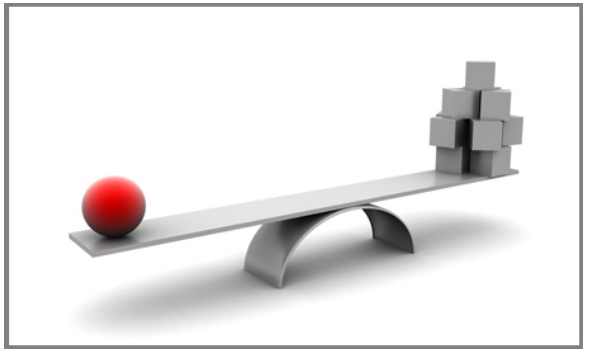
```
import cProfile
import re
cProfile.run('re.compile("Hello|World")')
```

```
         238 function calls (233 primitive calls) in 0.000 seconds

   Ordered by: standard name

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000    0.000    0.000 <string>:1(<module>)
        1    0.000    0.000    0.000    0.000 re.py:188(compile)
        1    0.000    0.000    0.000    0.000 re.py:226(_compile)
        1    0.000    0.000    0.000    0.000 sre_compile.py:178(_compile_charset)
        1    0.000    0.000    0.000    0.000 sre_compile.py:207(_optimize_charset)
        4    0.000    0.000    0.000    0.000 sre_compile.py:24(_identityfunction)
      3/1    0.000    0.000    0.000    0.000 sre_compile.py:32(_compile)
        1    0.000    0.000    0.000    0.000 sre_compile.py:361(_compile_info)
        2    0.000    0.000    0.000    0.000 sre_compile.py:474(isstring)
```

Benchmarking

Benchmarking game:

http://shootout.alioth.debian.org/



blog.insresearch.com

Benchmarking python:

http://ziade.org/2007/10/18/unobtrusive-benchmark-and-debug-of-python-applications/

Necessary ingredients

- Robustness
- Efficiency
- Maintainability

Robustness

- Introducing (tests for) errors
  - checking for existence (uniform style)
- Edge cases
  - 0? 1? last?
- Error handling
  - exceptions? Verifying terminal input
- Reporting failure
  - Traces? Errors don't get quietly ignored

Checking for overloaded cases

```
def square(x):
    """Squares x.

    >>> square(2)
    4
    >>> square(-2)
    4
    >>> square(complex(0,1))
    (-1+0j)
    """

    return x * x

if __name__ == '__main__':
    import doctest
    doctest.testmod()
```

Efficiency

- Working with strength
- Proper data structures
- Avoiding weaknesses
- Dealing with version changes (backward compatibility) [python 2.X and 3.0!]

Maintainability

- More time than writing
- You don’t understand your own code
  - Comment amply
- You yourself will maintain it
- Consistent practices
  - Braces, brackets, spaces
  - Line lengths, tabs, blank lines

Next time …

- Design by contract
- Comments, Arguments and all that

http://ib.ptb.de/8/85/851/sps/swq/graphix