Testing

ISYS2001, School of Marketing and Management

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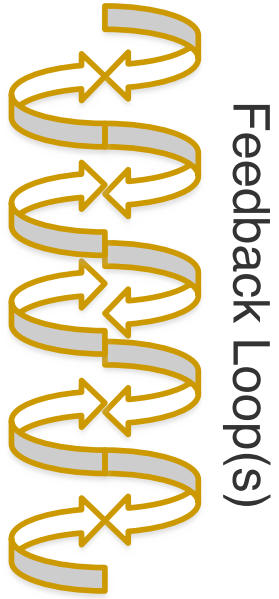
I acknowledge the traditional custodians of the land on which I work and live, and recognise their continuing connection to land, water and community. I pay respect to elders past, present and emerging.

Today

- Understand the difference between testing and debugging
- Describe one approach of debugging
- State why we test
- List common testing strategies

Problem Solving Methodology

- State the problem clearly
- Describe the input and output
- Work a simple example by hand
- Develop and algorithm (and convert to Python)
- **Test solution with a variety of data**



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"I'm not a great programmer, I'm just a good programmer with great habits"

Kent Beck

Great Habits

- Comments
- Docstrings
- Use/Create functions
- Use/Create modules
- Make small frequent commits

*A **software bug** is an error, flaw or fault in computer software that causes it to produce an incorrect or unexpected result, or to behave in unintended ways.*

Wikipedia https://en.wikipedia.org/wiki/Software_bug

Debugging *is the process to correct the bugs found during testing.*

Types of Errors

- Syntax Errors
- Run-Time Errors
- Logic Error

Debugging

- Step/Trace through code
  - **print()**
  - logging()
- Inspect Objects
  - **type()**
  - inspect module
- Python debugger – pdb
  - **breakpoint()**
  - traceback and other methods not enough

Debugging Strategies

- Apply Trail and Error
- Compare to similar code
- Copy and paste for working code
- Ask for help (peer, forum, google)
- Use IDE
  - Syntax Highlighting
  - Auto completion
  - Linting

*Program **testing** can be used to show the presence of bugs, but never to show their absence!*

Dijkstra (1970)

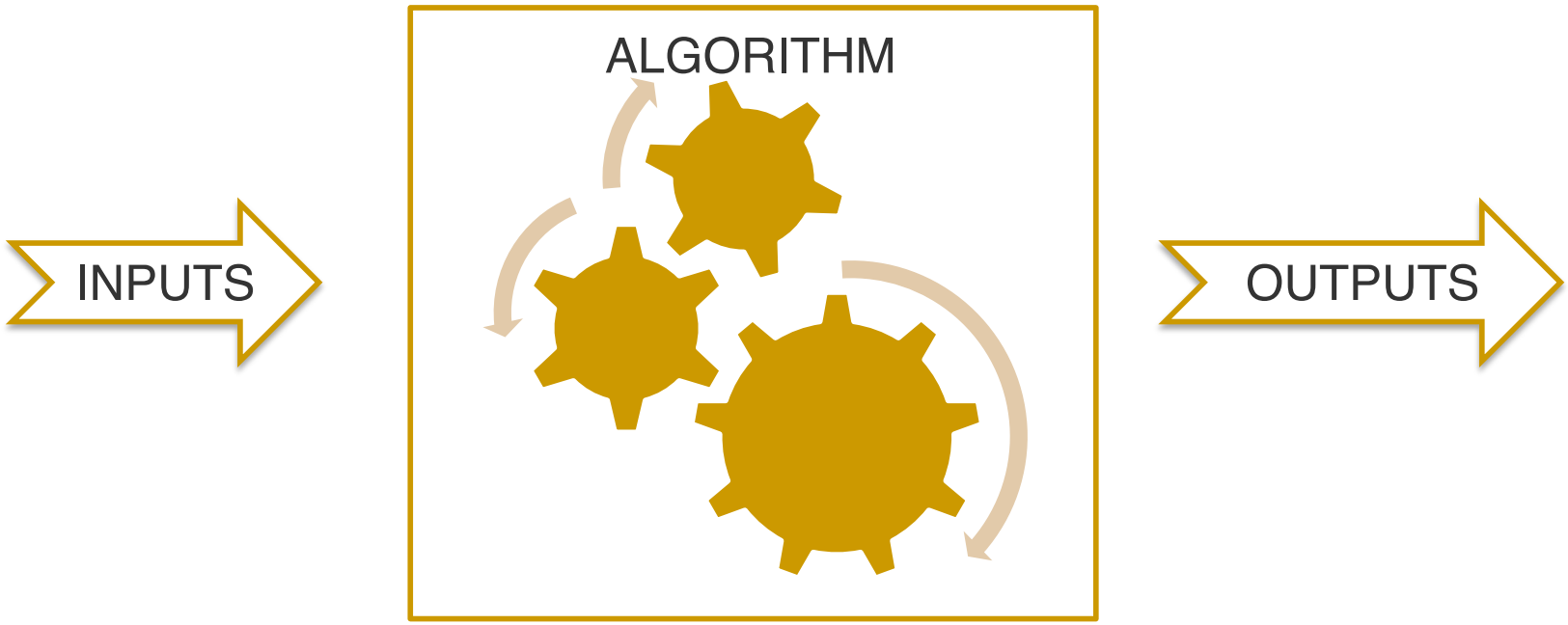
Why Test

Testing leads to failure, and failure leads to understanding.

Burt Rutan

- Reliable
- Reproducible
- Shareable

What to test?



You already doing tests!

- Validate input
- Try variety of inputs (data)
- We check output meet requirements

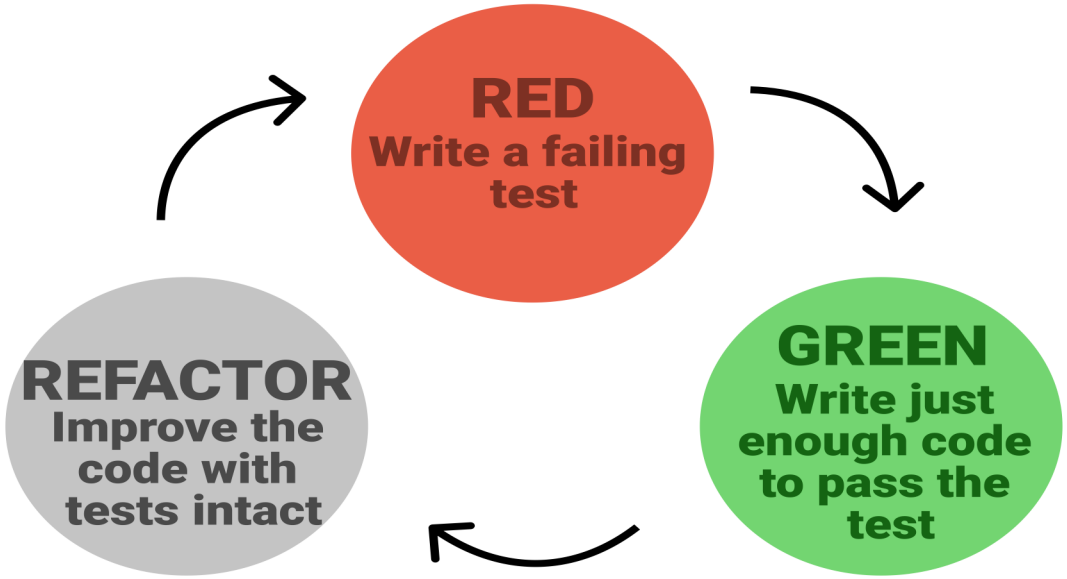
We are provide more structure to the process

Types of Test

- Unit – test an individual isolated component
- Integration – test multiple units work together
- End-to-End – act as user, test entire stack
- Acceptance Test – verify user store works as expected

Test Driven Development

- A discipline where you grow software in small increments (steps) where you write the test before the implementation.



Approach Notebooks

- Write python script to test notebook

  Package: testbook

- Write test and code in one notebook

  Packages: **assert(), doctest**, unittest, nose2 etc..

- ‘Testing Notebook’ and import notebook(s)

  Packages: **assert(), doctest**, unittest, nose2 etc..

Testing Everything

- Build up a suite of Tests
- Run all test with one cell/notebook/script
- Regression testing
- Test Table

    Sane test, then edge cases

Can you…

- Understand the difference between testing and debugging
- Describe one approach of debugging
- State why we test
- List common testing strategies