

What will we do today?

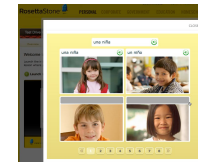
- **Practice solving problems**
 - Solving problems without a computer
 - Is this different than solving problems with a computer?
- **Learning about vocabulary and sentences**
 - English, Spanish, Swedish, Pythonic!
- **Practice using tools for Duke CompSci courses**
 - Eclipse, APT, ambient
 - Blackboard/Sakai, Bulletin board, Feedback
- **Reveling in the wonder of thinking and working**
 - How do we know when something works?

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2.1

Vocabulary

- **What's the Spanish word for *boy*? *eat*? *fish*?**
 - How do you know?
- **What about the Swedish equivalents?**
 - How do you know?
- **How do you learn vocabulary of Python?**
 - Words
 - Sentences
 - Paragraphs
 - Essays



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2.2

What else will we do today?

- **Naming**
 - The power of abstraction and parameterization
 - What is abstraction?
 - What are parameters? What has them?
- **Types**
 - What have we seen? What's used in computing?
 - Determine names of types in Python
- **Expressions and operators in Python**
 - Arithmetic: +, -, *, /, %, **, ...
 - Boolean: <, ==, >, and, ...
 - String: +, *, [], [:], [::]

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2.3

Counting words in a file redux

```
name = "/data/poe.txt"
file = open(name)
str = file.read()
words = str.split()
print "# words in", name, "=", len(words)
```

- **What are the *names* in the code above?**
 - Why are names important?
- **What are the *types* in the code above?**
 - How do we get Python to help us answer this question
- **How do we re-use this code more generally**
 - The power of names!

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2.4

Names and Types summarized

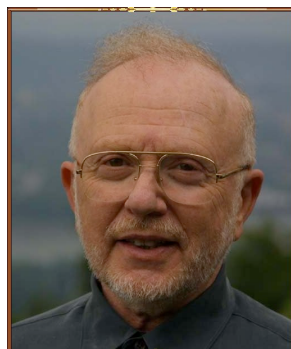
- There are *rules* for what a valid name is in Python
 - In addition there are *conventions* we will use for names
- In code shown we see *variables, constants, functions, and methods*
 - This is more vocabulary, talking Python to others?
- Types for variables and expressions
 - We see file, string, list, int
 - There are others we'll use in the course, e.g., double, set, ...
- Always ask yourself: what's name, what's type

Interlude

- Use word-counting code in Eclipse
 - Python console, type and see
 - Using names, what is a .py file, user-defined functions
 - Modules and functions: re-use with minimal re-typing
 - Function is abstraction, parameterization over code
 - Module is abstraction over functions
- Python functions and expressions, practicing solving problems
 - Pounds2Stone
 - [BMI](#)
 - [Heron's formula](#)
 - ...

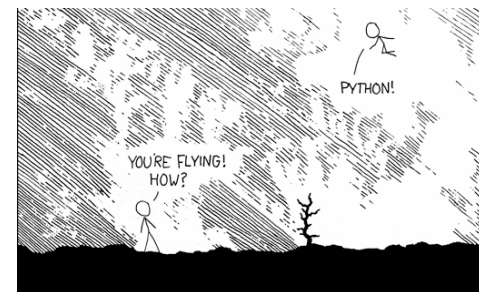
David Parnas

"For much of my life, I have been a software voyeur, peeking furtively at other people's dirty code. Occasionally, I find a real jewel, a well-structured program written in a consistent style, free of kludges, developed so that each component is simple and organized, and designed so that the product is easy to change."



Parnas on re-invention [xkcd 353](#)

"We must not forget that the wheel is reinvented so often because it is a very good idea;



I've learned to worry more about the soundness of ideas that were invented only once."

David Parnas (entry in [Wikipedia](#))

- *Module Design*: Parnas wrote about the criteria for designing modules, in other words, the criteria for grouping functions together. This was a key predecessor to designing objects, and today's object-oriented design.
- *Social Responsibility*: Parnas also took a key stand against the [Strategic Defense Initiative](#) (SDI) in the mid 1980s, arguing that it would be impossible to write an application that was free enough from errors to be safely deployed.
- *Professionalism*: He believes that software engineering is a branch of traditional engineering.

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2.9

String operator interlude

- **Concatenation, what can be added to a string?**
 - How do we find this out using Python?
 - How are types related to this question?
- **Slicing and Indexing**
 - How do we get parts of a String?
 - What are the parts of a String?
 - [] and [:],
- **What does immutable mean? Hello to Jello?**
 - What is a variable in Python?

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2.10

Expressions, Operators, Names

- **Why is $3+5*4$ different than $(3+5)*4$?**
 - Where can you find information about precedence?
- **Why is $5/3$ different than $5.0/3$?**
 - What will happen in Python 3? Accommodate in 2.6?
- **What happens when operators go bad?**
 - What is "apple" + 3? What is "apple" + "pi"?
- **What is a variable in Python?**
 - Does it have a name? Does it have a type?

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2.11

Alma Whitten

- **Google: Engineering Lead for Privacy, Director for Privacy**
 - Across marketing and engineering
 - Why Johnny Can't Encrypt

"It's more and more the case that every individual is going around with a cheap yet powerful data-capture device, and the ability to connect that device to powerful data services.

There's a whole interesting minefield to be picked through,"
(cnet news, October 2010)



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2.12