Functional Python

An introduction to solving the world's problems with iterators.

Types of programming languages

- **Procedural** – Just a good, old fashioned list of instructions.
  - C, Bash, Python, JavaScript, Rust
- **Object-oriented** – Focuses on classes as the primary building block. This merges state and logic into one unit.
  - Java, Smalltalk
- **Functional** – Prioritizes the use of *pure* functions. Avoids the use of state and side effects.
  - Haskell, ML, OCaml

Note: Many modern languages are procedural but support features that are object-oriented or functional in nature. For example, classes in Python and JavaScript or functional utilities in Rust and Python.

Functional design

Input → Function 1 → Function 2 → Function 3 → Output

- It's harder to reason about code when its behavior is dependent on internal state.
- Functional languages avoid this by discouraging or prohibiting use of state or side effects.
- As a result these functions only read their input and their only effect is the output.
- These are often called pure functions.

Benefits of the functional style

- **Readability/maintainability** – Functional code tends to be easier to reason about as there isn't state to keep track of. This makes your code easier to read and maintain.
- **Modularity** – A pure function is self-contained and consistent in its behavior. This produces a natural separation in the code.
- **Composability** – When there's no state to worry about it's very easy to build out new behavior by combining existing functions.
- **Reduction of bugs** – When your logic is dependent on state it tends to be exposed to far more edge cases. These open you up to bugs that can be a pain to chase down.

Functional code in Python

- Python isn't a functional language and as a result won't enforce the use of pure functions.
- Additionally, many Python features require the use of state and side effects.
- However, Python has many great functional features.
- This allows you to use the functional style where it makes sense without committing to using it for your whole program.

Let's see some examples