ICS 214 IT Workshop III (Python)
IIIT Kottayam

Session 3 - Writing Effective Functions

Parameters, Arguments, Recursion, and Decorators

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Agenda

- Functions
- Arguments
- Recursion
- Passing Functions to Functions

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Functions are like mini programs within our programs that allow us to break code into smaller units. This spares us from having to write duplicate code, which can introduce bugs. But writing effective functions requires making many decisions about naming, size, parameters, and complexity.

Al Sweigart

Beyond The Basic Stuff with Python

Built-in Functions

```
a = ['foo', 'bar', 'baz', 'qux']
len(a)
```

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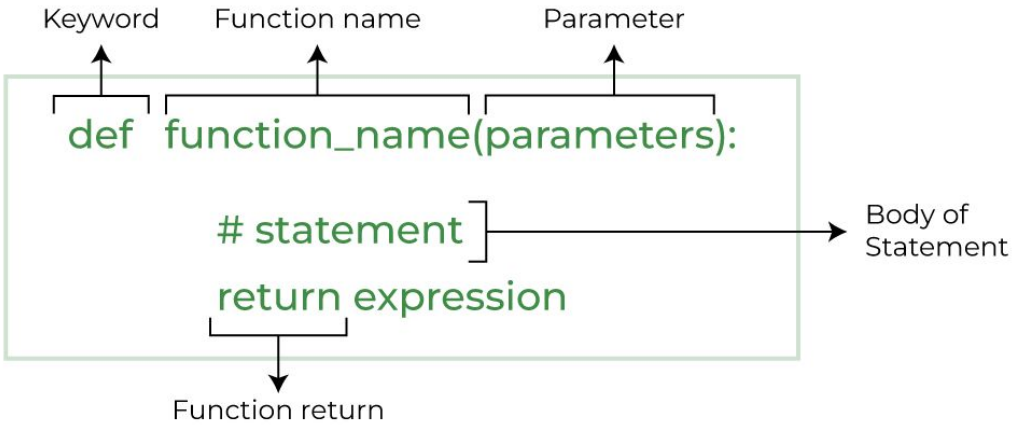
Subroutines?
Functions?
Procedures?
Methods?
Subprograms?

Almost all are user-defined functions but are called differently in different Programming Languages.

Understanding the Need for User-defined Functions

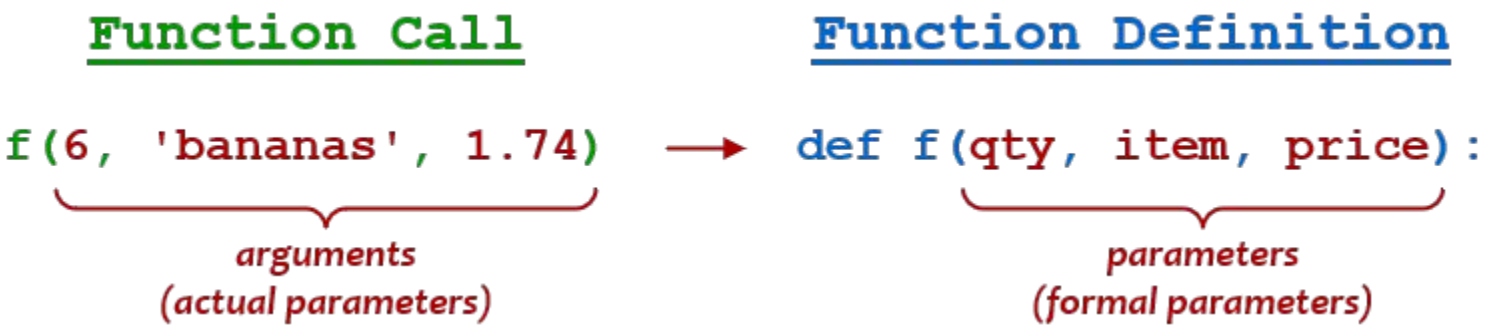
- Reusability - Don’t Repeat Yourself (DRY) principle
- Avoid Maintenance Nightmares
- Abstraction
- Modularity - break large chunks into smaller coherent units
- Namespace segregation

Structure of a Function



Source: GeeksForGeeks

Example



Source: Real Python

Arguments

- **Positional Arguments:** Required; order is important
- **Keyword Arguments:** Required; order is not important
- **Default/Optional Parameters:** Defaults set in the function definition
  - But with a Caveat for Mutable Objects like Lists
    - Use ***None***?
- ***Pass-by-Value/Pass-by-Reference?***
  - Object References - ***Pass-by-Assignment***
  - ***Changes in the Calling Environment - Side Effect?***
- **Variable-length Arguments**
  - Tuple Packing ***(*args)***
  - Dictionary Packing ***(**kwargs)***
  - Tuple Unpacking
  - Dictionary Unpacking
  - Multiple Unpacks

References

- [**Real Python**] Functions in Python
- [**Real Python**] Python Dictionaries
- [**Real Python**] Python Recursion