Names and Python Syntax

If we recall from previous lectures, Python syntax makes very few restrictions on the ways that we can name our variables, functions, and classes.

- Variables names must start with a letter or an underscore
- Every character after the first (if any) must be a letter, underscore, or number
- Names cannot be a reserved Python keyword:

<table>
<thead>
<tr>
<th>False</th>
<th>class</th>
<th>finally</th>
<th>is</th>
<th>return</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>continue</td>
<td>for</td>
<td>lambda</td>
<td>try</td>
</tr>
<tr>
<td>True</td>
<td>def</td>
<td>from</td>
<td>nonlocal</td>
<td>while</td>
</tr>
<tr>
<td>and</td>
<td>del</td>
<td>global</td>
<td>not</td>
<td>with</td>
</tr>
<tr>
<td>as</td>
<td>elif</td>
<td>if</td>
<td>or</td>
<td>yield</td>
</tr>
<tr>
<td>assert</td>
<td>else</td>
<td>import</td>
<td>pass</td>
<td></td>
</tr>
<tr>
<td>break</td>
<td>except</td>
<td>in</td>
<td>raise</td>
<td></td>
</tr>
</tbody>
</table>

However, we have also discussed guidelines and naming conventions. These are not enforced by the language, but the community has agreed to abide by a standard that defines best practices.

Classifying Common Styles

Python is not the only language with naming conventions. To help us describe the naming conventions for Python’s conventions, PEP 8 describes and names a set of common styles. The following naming styles are commonly distinguished:

- b (single lowercase letter)
- B (single uppercase letter)
- lowercase
- lower_case_with_underscores
- UPPERCASE
- UPPER_CASE_WITH_UNDERSCORES
- CapitalizedWords (or CapWords, or CamelCase – so named because of the bumpy look of its letters). This is also sometimes known as StudlyCaps.
  - When using abbreviations in CapWords, capitalize all the letters of the abbreviation. Thus HTTPServerError is better than HttpServerError.
- mixedCase (differs from CapitalizedWords by initial lowercase character!)
- Capitalized_Words_With_Underscores (ugly!)

We can write regular expressions that match each of these styles. Some expressions may match multiple styles. For example, a regex that matches lower_case_with_underscores will also match lowercase, b, and single-word mixedCase names. If want to match the “best” example, we should think about the order we check for matches.
**Python-specific Naming Conventions**

In addition to naming common styles, PEP 8 also discusses style guidelines specific to Python. It urges backwards compatibility with existing code, but it includes the following guidelines (and more):

- Class names should normally use the CapWords convention.
- Because exceptions should be classes, the class naming convention applies here. However, you should use the suffix "Error" on your exception names (if the exception actually is an error).
- Function names should be lowercase, with words separated by underscores as necessary to improve readability.
- Always use `self` for the first argument to instance methods.
- Use one leading underscore only for non-public methods and instance variables.
- Constants are usually defined on a module level and written in all capital letters with underscores separating words.
- Modules should have short, all-lowercase names. Underscores can be used in the module name if it improves readability.
- “Magic” object or attributes that live in user-controlled namespaces use the `__double_leading_and_trailing_underscore__`
Regular Expression Examples

Styles

b : [a-z]
B : [A-Z]
lowercase : [a-z]+
lower_case_with_underscores : [a-z][a-z_]*
UPPERCASE : [A-Z]+
UPPER_CASE_WITH_UNDERSCORES : [A-Z][A-Z_]*
CapitalizedWords : [A-Z][a-zA-Z]*
mixedCase : [a-z][a-zA-Z]*
Capitalized_Words_With_Underscores : [A-Z][a-zA-Z_]*

Python Conventions

Class names : [A-Z][0-9a-zA-Z_]*
Exceptions : [A-Z][0-9a-zA-Z_]*Error
local variables : [a-z][0-9a-z_]*
Function names : [a-z][0-9a-z_]*
Instance variables (public) : self\.[a-z][a-z0-9_.]*
Instance variables (private) : self\_.\[a-z\][a-z0-9_.]*
Constants : [A-Z][A-Z0-9_.]*
Modules : [a-z][0-9a-z_]*0,15
“Magic” object or attribute : (\[a-z\] .)(\[a-z\][a-z0-9_.]*[a-z0-9_.]*)