CMSC 124
Design and Implementation of Programming Languages

Kristine Bernadette Pelaez
Institute of Computer Science
University of the Philippines Los Baños

Language categories

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1. Imperative Languages

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1. Imperative Languages

executes a
sequence of statements

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1. Imperative Languages

each statement changes
the program's *state*

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1. Imperative Languages

State
   values at a particular point
   in execution

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1. Imperative Languages

```c
int main(){
   int a, b, sum;
   a = 2; b = 3;
   sum = a + b;
   return 0;
}
```

---

2. Functional Languages

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2. Functional Languages

operate only through
functions which *return one value*

avoids *mutable data*,
and consequently, *states*

Mutable Data: can be changed

Immutable Data: cannot be changed

```
(define (summation a b)
  (if (= a b)
    a
    (+ a (summation (+ a 1) b))
  )
)
```

---

3. Logic Languages

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rule-based language that
follows predicate calculus

---

uses a series of *axioms or facts*
to answer a query

---

output is *true or false*

```
?- hard(cmsc124).
false.
?- hard(cmsc127).
true.
```

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4. Object-oriented Languages

4. Object-oriented Languages

grew out of *imperative* languages

4. Object-oriented Languages

has *support for objects* that
contains a set of procedures/data

5. Visual Languages

5. Visual Languages

allows *drag–and–drop*
of code segments

5. Visual Languages

allows easier creation of
graphical user interfaces

6. Scripting Languages

6. Scripting Languages

used to *automate tasks*
(tedious/repetitive)

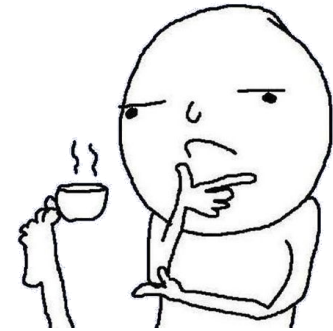## 6. Scripting Languages

usually, they are
interpreted languages

7. Mark-up Languages

used to *store information*
in an organized manner

```
<book>
    <title> Clean Code </title>
    <author> Robert Cecil Martin </author>
    <tags>
        <tag> programming </tag>
        <tag> software development </tag>
        <tag> cmsc127 </tag>
    </tags>
</book>
```

Programming language

a language that can do
some kind of computation

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