Remaining Major Topics

- Arrays and algorithms that take advantage of them.
- Function calling and returning: The rest of the story.
  - Local variables and the stack.
  - Recursion (a function that can call itself.)
Python vs. Java

- A program can be bare statements interspersed with function definitions.
- Running begins at the top.
- Bare statements end with a newline (or semi.)
- Loop, if, and function bodies are indented.

- A program must be one or more classes.
- Running begins by an automatic call of the `main` method.
- Bare statements end with a semicolon.
- Loop, if and method bodies are bracketed by curly braces `{ ... }`, bare statements discouraged.
• Correct indentation is mandatory.
  – IDLE (Python's Integrated Development Environment) does the indenting for you.

• You can try out Python statements by typing them into the IDLE shell.

• Correct balancing or nesting of { ... } s is mandatory.
  – Indentation is ignored by the Java parser, but is MANDATORY in this course and in serious programming shops.
  – Dr. Java and other IDEs do the indenting for you (you type { }s)

• You can try out Java statements in Dr. Java's interaction window.
Procedural Programming—most of ThinkCSP

Def. functions, use statements, use but don't create your own classes.

- What we did so far.
- Define functions, decide on the starting function (could be main.)
- myC = Color(24, 50, 0) (Color is a Myro class.)
- Don't define your own classes.

- Code whole program in one class.
- Make all its methods static, like main(String a[])
- import java.util.Scanner;
  ...
  Scanner sc = newScanner(System.in);
- print `expr1`, `expr2`
- print `(expr1, expr2)`
- print `expr1`, `expr2`
- `V = input('prompt')` (Python evaluates an inputted expression!)

```java
import java.util.Scanner;
...
Scanner sc = new Scanner(System.in);
...
System.out.print("prompt");
int V = sc.nextInt();
float W = sc.nextFloat();
```
Variables
Declaring a variable means introducing its name. Defining a variable means giving it a value.

- No explicit “declarations.” A Python variable is introduced when it appears.
- A variable is local to a function when the function can change its value (except if a global statement is used).

- Every variable MUST be “declared.” How?
  `<type name> Var ... ;`
- Examples:
  `int x;`
  `int x = 3;`
  `Scanner sc = new Scanner(System.in);`
Defining a variable (means giving it a value.)

- When a Python operation tried to use the value of an undefined variable...
  
  NameError: name 'x' is not defined

- By careful design of Java, variables can NEVER be undefined.

- Declarations like
  
  ```java
  int var;
  ```
  provide a default initial value, in this case, 0

(Java's design makes program runs predictable and it thwarts nasty Internet “crackers”.)

(Some SW engineers hate default values.)
A Class is a TYPE that a library writer or a programmer like you has added to the programming environment. So..

*It has a NAME like `class Scanner`
*It has a set of values.
*Each value when actually in the computer is called an “instance.”
*ALSO.. It usually has operations that apply each instance, called `instance methods`.
Lists and Arrays

- myList = [ 1, 3, 5 ]
- No native array type; must import from a library.

- No native list type; must import from a library.

- myStr = 'abc'
  
  or "abc" (except in Version 3)

- int ar[ ] = new int[3];
  ar[0] = 1; //etc.

- String myStr = "abc";
while and if

- if `<cond.>`:
  <body stmt. 1>
  <body stmt. 2>
  etc.

- if `<cond.>`
  
  `{ 
  <body stmt. 1>;
  <body stmt. 2>;
  etc.
  }`

same syntax for while
(Very Different meaning!)

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