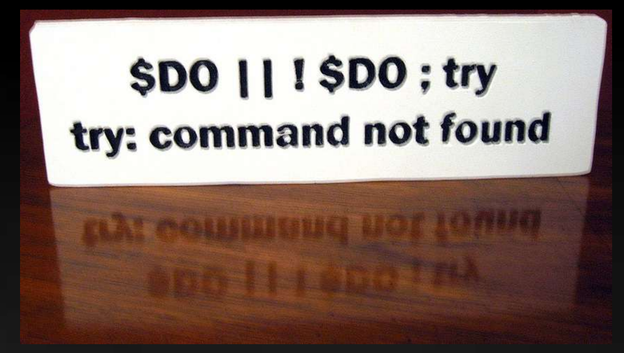
SI 413: Programming Languages and Implementation



This course examines basic concepts underlying the design of modern programming languages: types, control structures, abstraction mechanisms, inheritance, and constructs for programming. This course will include programming assignments in several languages.

Some languages used

Imperative: Ada, C
Object-Oriented: Java, C++
Functional: Haskell, Lisp
Scripting: Bash, Perl
Logic-based: Prolog

Imperative vs Functional Programming

Imperative programming is a list of step-by-step instructions for the program to follow in order to execute. The programmer tells the computer exactly *how* to solve the problem. In functional programming, the programmer defines *functions* that are very similar to mathematical functions , defining *what* is computed, not *how*. For example, adding 1 to each element of a list or array is very different in a functional vs imperative language.

IMPERATIVE (C)

```
int x = 0;
while( x < arraySize ){
   array[x] = array[x] + 1;
   x = x + 1;
}
```

FUNCTIONAL (Haskell)

```
map (1+)[LIST]
```