



# Programming Languages Pragmatics

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THE PROGRAMMING LANGUAGE SPECTRUM

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# Computer Scientist Group Language as ...

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declarative

functional

Lisp/Scheme, ML, Haskell

dataflow

Id, Val

logic, constraint-based

Prolog, spreadsheets, SQL

imperative

von Neumann

C, Ada, Fortran, ...

object-oriented

Smalltalk, Eiffel, Java, ...

scripting

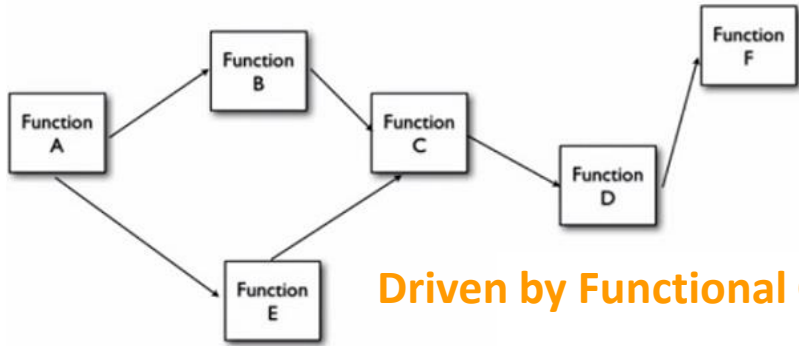
Perl, Python, PHP, ...



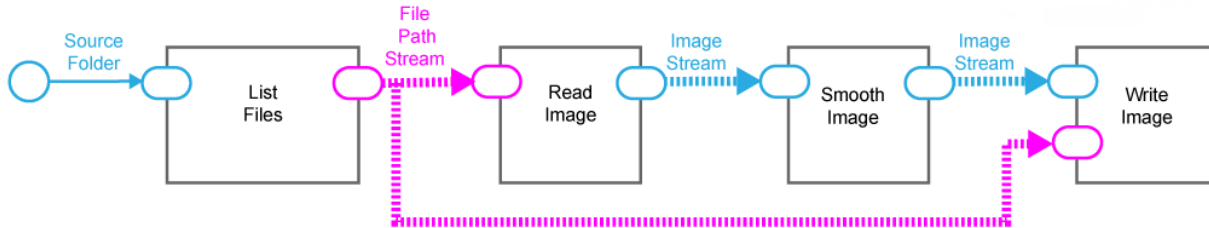
# Programming Paradigm

## Declarative Languages

### Functional Programming



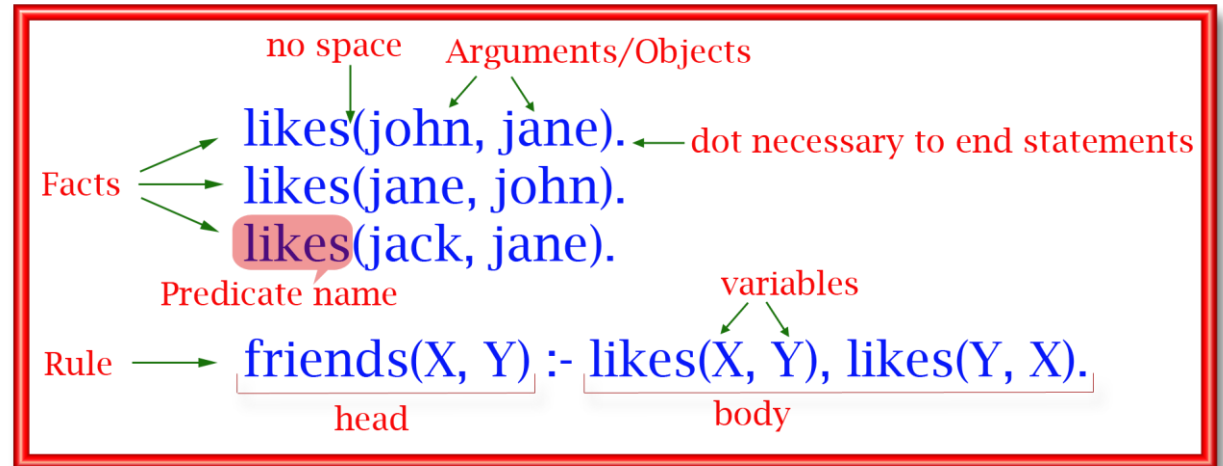
### Data Flow Programming



Driven by Data Flow

### Logic Programming

#### Program Window



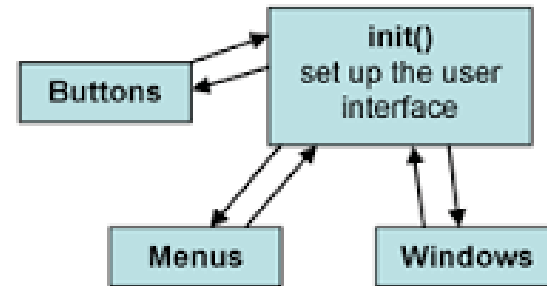
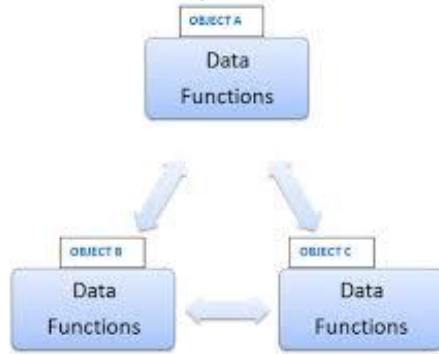
Driven by Logic Reasoning



# Programming Paradigm

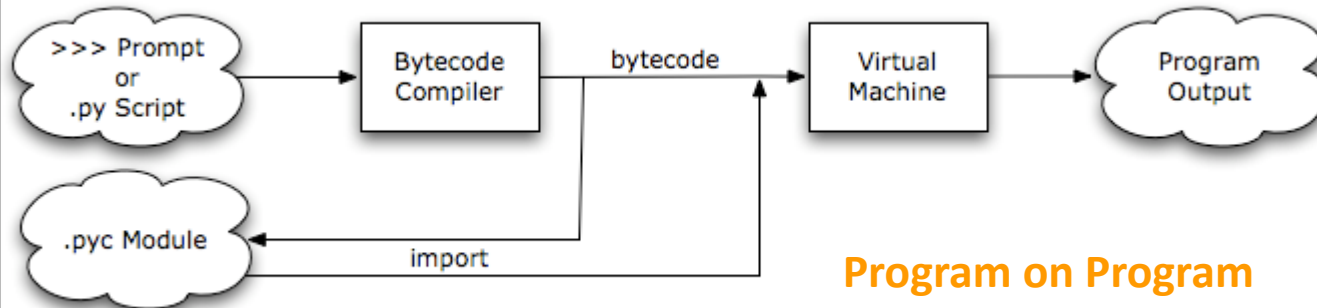
## Imperative Languages

### Object-Oriented Programming



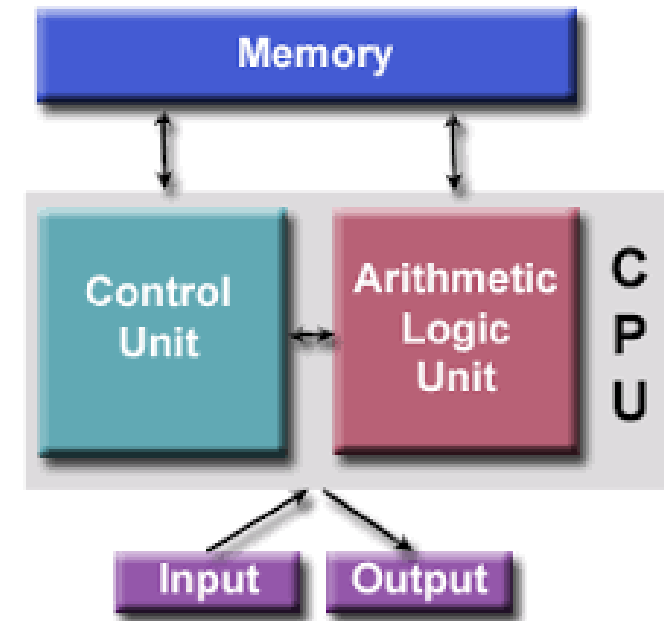
### Event-Driven Programming

### Scripting Programming



### Program on Program

### Von Neumann Programming (Accumulator Model)





# Programming Paradigm

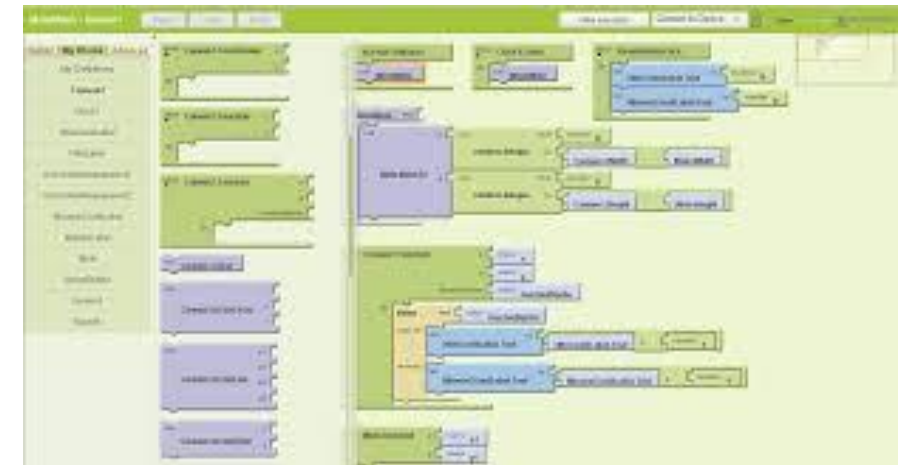
## Block Programming



Scratch, Snap!



My Blocks



MIT My Inventor II

Graphical Design (Imperative, Data Flow, Rule-Based)

```
int gcd(int a, int b) {  
    while (a != b) {  
        if (a > b) a = a - b;  
        else b = b - a;  
    }  
    return a;  
}
```

```
// C
```



```
let rec gcd a b =  
    if a = b then a  
    else if a > b then gcd b (a - b)  
    else gcd a (b - a)
```

```
(* OCaml *)
```

```
gcd(A,B,G) :- A = B, G = A.  
gcd(A,B,G) :- A > B, C is A-B, gcd(C,B,G).  
gcd(A,B,G) :- B > A, C is B-A, gcd(C,A,G).
```

```
% Prolog
```