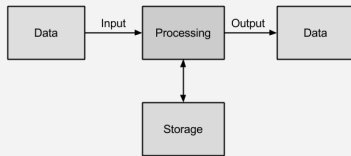


Computer Components and Calculations



General process for all languages. Appearances may vary

Computer Components in Execution

CPU + RAM = **Program**. CPU = 1 billion executions/sec. Steps called Machine Cycle.

CPU = Ctrl unit^{instructions} + Logic(ALU)^{math}

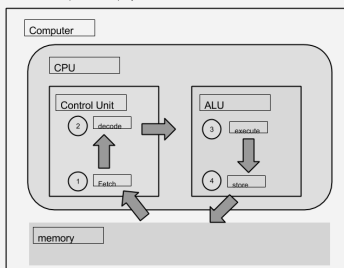
Calculating a single instruction:

1. **Fetch** 2. **Decode** 3. **Execute** 4. **Store**

internal clock: sync computer operations

Machine Cycle

The Machine(Instruction) Cycle



Programming Languages & Developing Process

C.S: Math + Engineering + Science

Skill 1: Problem Solving

C.S: what can be computed? Solution -> Algorithm

High level Language User interpretable (s.c)

Low level Language Machine interpretative

Processing High Level Languages:

1. Interpreting: (read and execute)

Programming Languages & Developing Process (cont)

2. **Compiling** (translate completely)

Compiling VS Interpreting:

Once compiled, execute over and over
Interpreted program lets the user know bugs

Outcome Applications Software & OS

Information processing cycle

1: **input** 2: **processing** 3: **output** 4: **storage**

Error Types

Run-Time Errors:

occurs when the program is running (e.g division by 0)
or using a undefined variable

Exception Handling:

detect cases where r.t errors would occur

Specific Exception Handling:

specifying the error type

argument of an exception:

you can capture an exception's argument by supplying a variable in the except clause

e.g

```

answer = raw_input("choose a, b, or c:")
if answer != "a" and answer != "b" and answer != "c":
    raise ValueError("Question 1: Invalid Input: please enter a, b, or c")
else:
    print "thank you"
except ValueError, errorvar:
    print errorvar
  
```

Variables

anything in quotes are assigned as a string

pure numbers are assigned as integers

decimal is assigned as float

Rules

Case sensitive

_use underscore for spaces

must begin with letter

Using input input("text") lets user input what they want for the variable

Data Types

int = integer

float = decimal

str = strings (words, letters, symbols)

Python Math

/ is for divide

** exponent

* multiply

+ add

- subtract

Use \" for double quotes in print statement

\\ for backslash

\n for line feed

\\ for backslash

for comment

raise ValueError("Question 1: Invalid Input: please enter a, b, or c")

IPO CHARTS

Gather input data

Process data

Output data

T and F

```
x = 4
y = 5
z = x > y
print "The result of",x,">",y,"is",z
result : False
```

Calculating Totals



Functions and Libraries

int(<expr>) convert to integer
float(<expr>) convert an expression to float
abs(<expr>) return absolute value
round(<expr>) round off expression
pow(x,y) same as x^y
math.sqrt(c_sqrd)

Rounding off

round(pi,2) = 3.14

C

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Page 2 of 2.

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