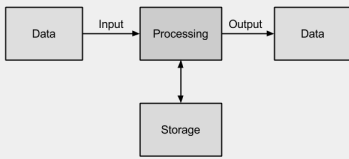


## Computer Components and Calculations

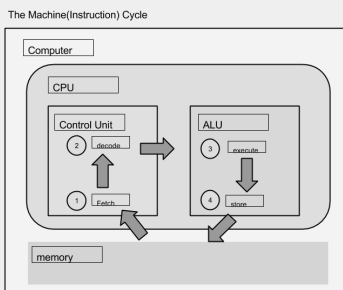


General process for all languages.  
Appearances may vary

## 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



## 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)  
2. Compiling: (translate completely)

## Programming Languages & Developing Process (cont)

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  
\t for tab  
\\n for line feed  
\\ for backslash  
# for comment

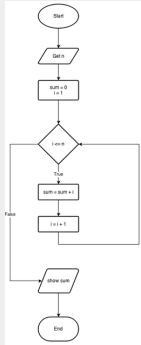
## IPO CHARTS

**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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