Intro to Coding #2

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Go to:

https://github.com/ianpajohnsonSBU/WISE_computing_heavens

And download today’s files

Last Time…

- Command line interface
- Data Structures
- Loops
- Functions
- ***Packages***

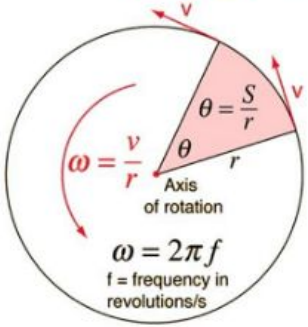
And

- The orbit of earth around the sun
- Gravitation
- Circular motion

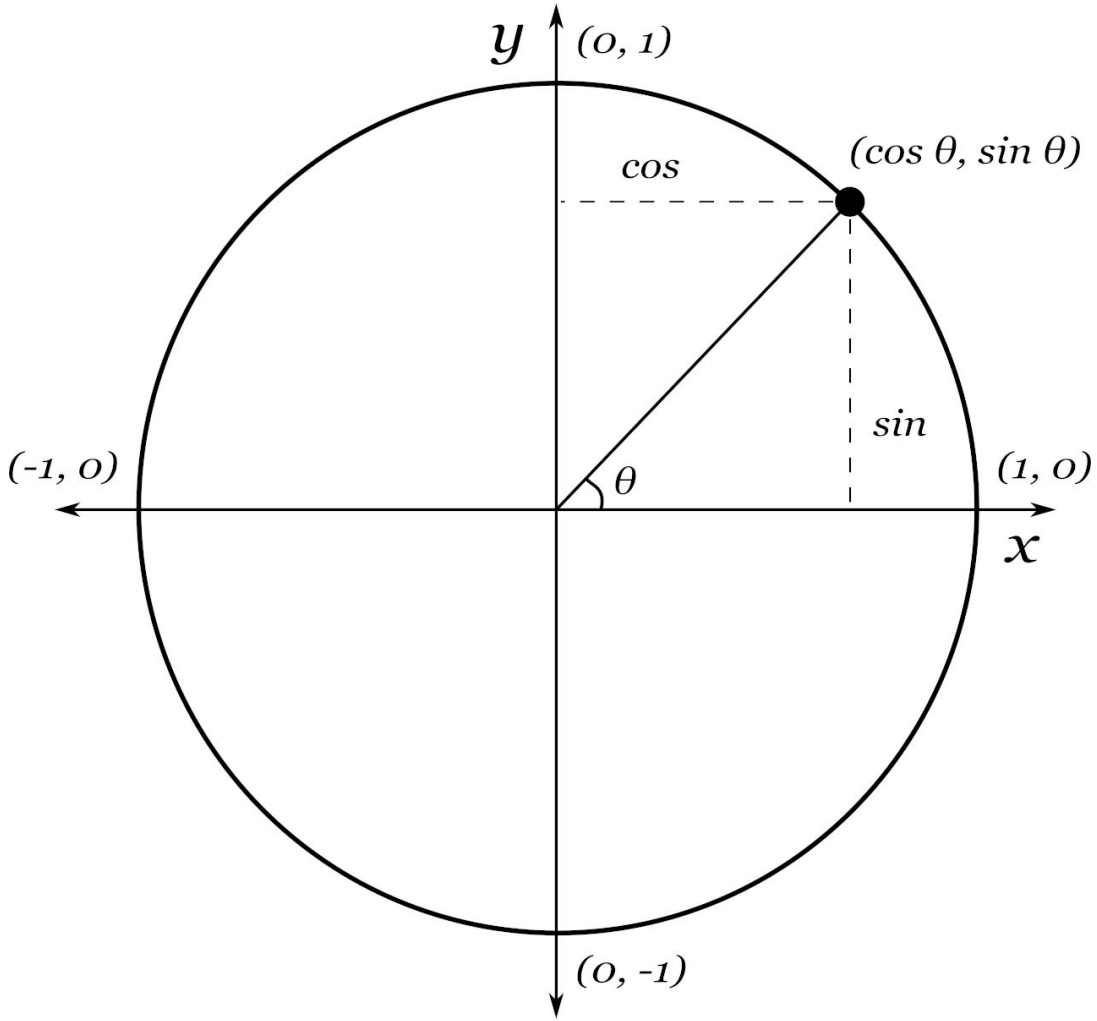
Orbital Period:

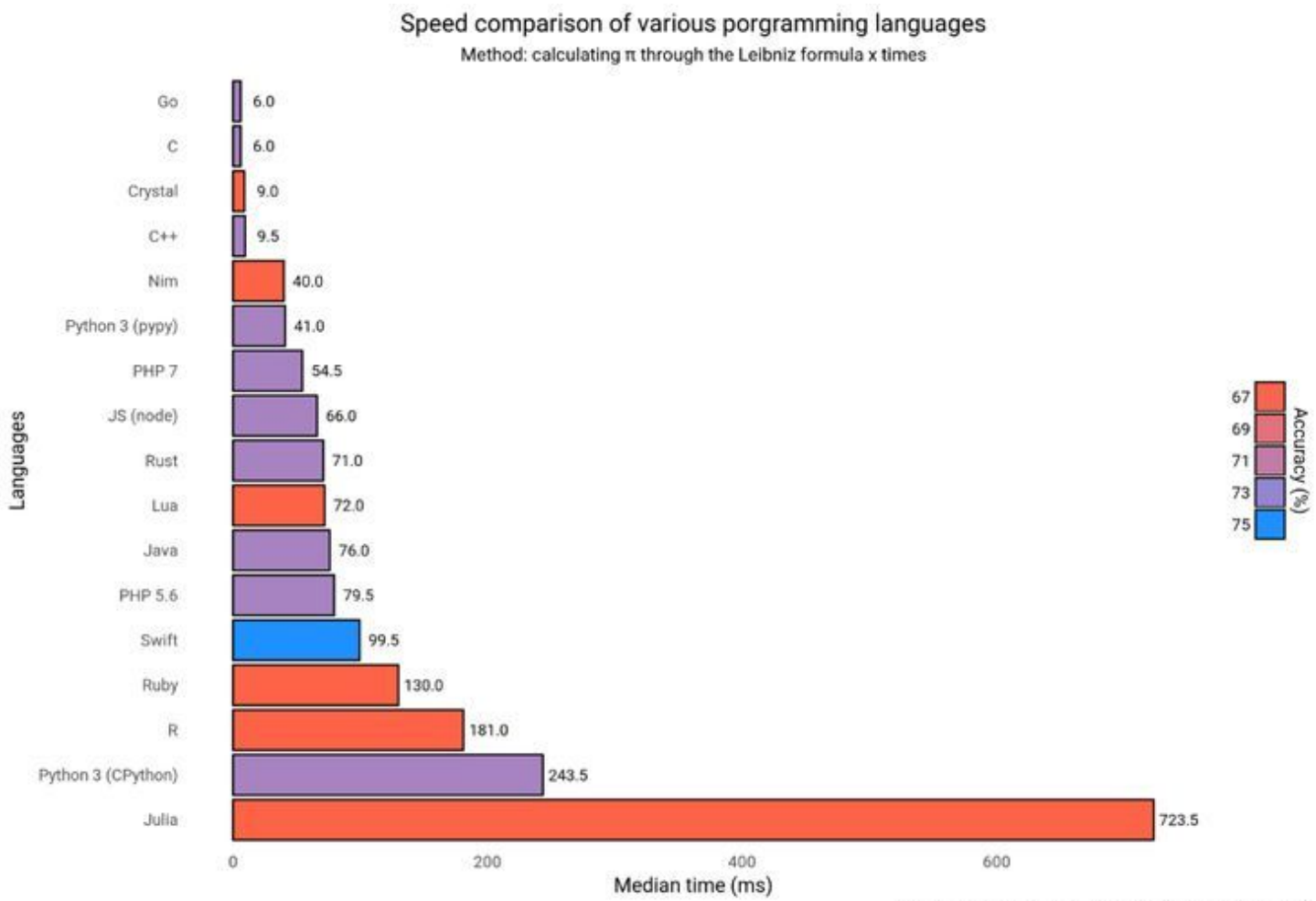
$$T = 2\pi\sqrt{\frac{r^3}{GM}}$$

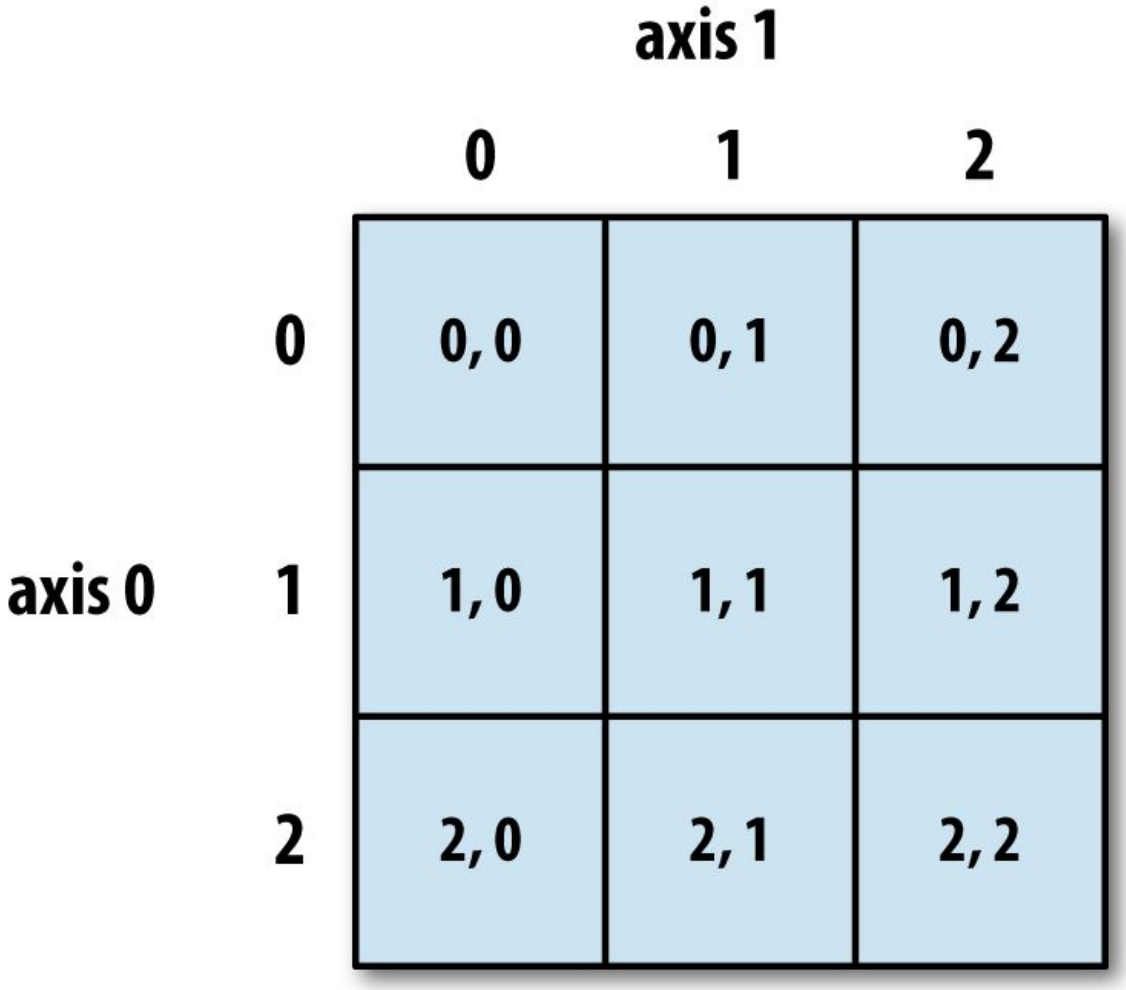
Angular Velocity

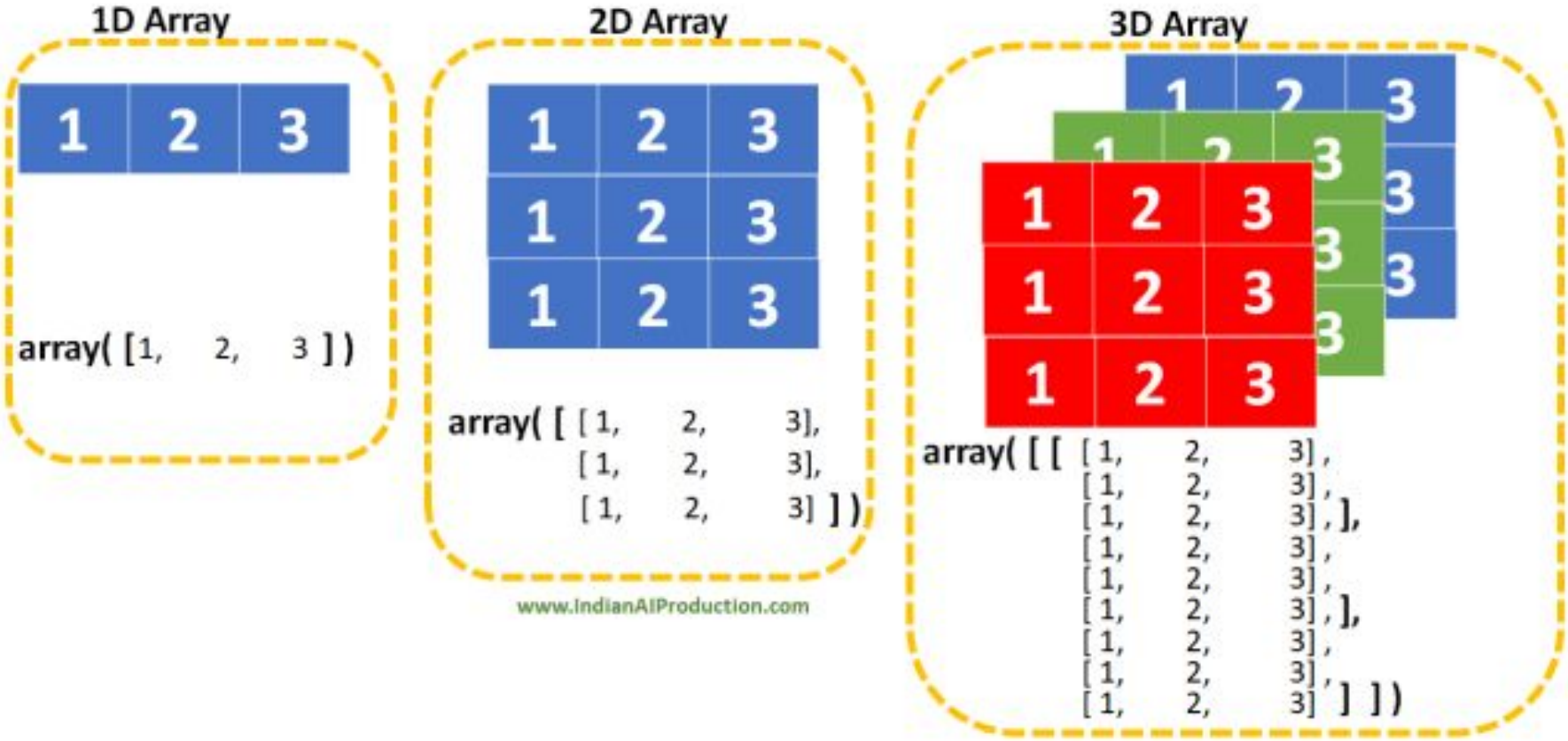


$$\omega = \frac{\Delta\theta}{\Delta t}$$


y
(0, 1)
cos
(cos θ, sin θ)
sin
(-1, 0)
θ
(1, 0)
x
(0, -1)


Speed comparison of various porgramming languages
Method: calculating π through the Leibniz formula x times
Languages
Go
C
Crystal
C++
Nim
Python 3 (pypy)
PHP 7
JS (node)
Rust
Lua
Java
PHP 5.6
Swift
Ruby
R
Python 3 (CPython)
Julia
6.0
6.0
9.0
9.5
40.0
41.0
54.5
66.0
71.0
72.0
76.0
79.5
99.5
130.0
181.0
243.5
723.5
0
200
400
600
Median time (ms)
Accuracy (%)
67
69
71
73
75
https://github.com/niklas-heer/speed-comparison


axis 1
0
1
2
axis 0
0
1
2
0, 0
0, 1
0, 2
1, 0
1, 1
1, 2
2, 0
2, 1
2, 2


1D Array
1 2 3
array([1, 2, 3])
2D Array
1 2 3
1 2 3
1 2 3
array([[1, 2, 3],
[1, 2, 3],
[1, 2, 3]])
www.IndianAIProduction.com
3D Array
1 2 3
1 2 3
1 2 3
array([[[1, 2, 3] ,
[1, 2, 3] ,
[1, 2, 3] ,],
[1, 2, 3] ,
[1, 2, 3] ,
[1, 2, 3] ,],
[1, 2, 3] ,
[1, 2, 3] ,
[1, 2, 3]]])

Matrix rules

scalar multiplication

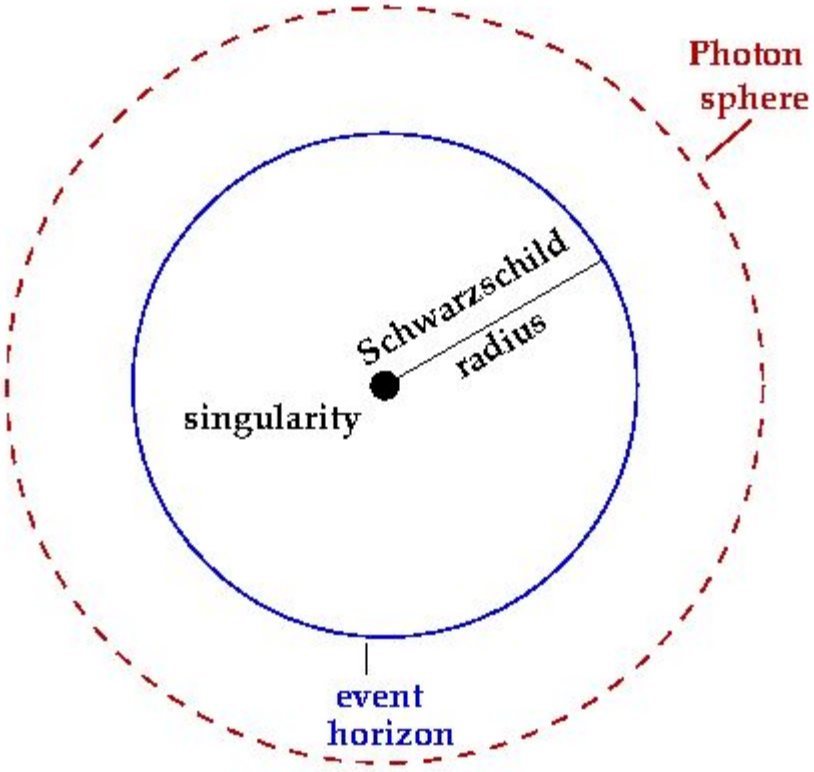
$$n \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} = \begin{bmatrix} na & nb & nc \\ nd & ne & nf \end{bmatrix}$$

matrix addition

$$\begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix} + \begin{bmatrix} g & h \\ i & j \\ k & l \end{bmatrix} = \begin{bmatrix} a+g & b+h \\ c+i & d+j \\ e+k & f+l \end{bmatrix}$$

matrix multiplication

$$\begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} \begin{bmatrix} g & h \\ i & j \\ k & l \end{bmatrix} = \begin{bmatrix} ag+bi+ck & ah+bj+cl \\ dg+ei+fk & dh+ej+fl \end{bmatrix}$$


Photon
sphere
Schwarzschild
radius
singularity
event
horizon

$$R = \frac{2GM}{C^2}$$