

Loop Efficiency

Programming Language \longrightarrow Machine Code

Interpretation

Each Statement is converted to machine code during runtime

Slower

MATLAB

```
tic
x = [... ]
y = [... ]
Z = zeros(size(x))
for i = 1:length(x)
    Z(i) = x(i) * y(i)
end
toc
```

Compilation

The code is converted to machine code before runtime

Faster

C
Fortran

MATLAB Function

```
tic
X = [... ]
Y = [... ]
Z = X .* Y
toc
```

$$\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{bmatrix} [1 \ 2 \ 3 \ 4 \ 5 \ 6] = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 4 & 6 & & & \end{bmatrix}$$