

Loop Efficiency

Programming Language \rightarrow Machine Code

Interpretation

Each statement is converted to machine code at runtime

Slower

MATLAB

Compilation

The code is converted to machine code before runtime

Faster

C
Fortran

Most MATLAB functions

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

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

$$\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{bmatrix} [1 \ 2 \ 3 \ 4 \ 5] = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 4 & 6 & 8 & 10 \end{bmatrix}$$