KU LEUVEN

Scientific Computing with Python and Julia

MATLAB, Python and Julia

MATLAB

- Closed Source
- Licensing
  1. MATLAB: €2000 (standalone)
  2. Simulink: €3000 (standalone)
  3. Added cost for toolboxes
- Currently being phased out of KUL P&Os (perhaps more)
- Compatibility
- Strong IDE
- Simulink

Python and Julia

- Open Source
- No cost
- Easy, concise syntax
- Rapid development for testing
- Portability

Noteworthy Points

Some similarities between Python and Julia

- Interoperability: can call one from another easily
- Interfaces with low level languages (e.g. Cython)
- Easily parallelizable

And some differences

- Julia has strong core language, built for scientific computing
- Python weak core, relies on third party libraries
- Julia has smaller user base

Pitfalls

- Bracket notation: A[i,j]
- Python uses 0-based indexing (Julia is 1-based like MATLAB)

```
>>> x = np.array([1, 2])
>>> x[0]
>>> 1
```

- Python and Julia pass by reference (MATLAB passes by value)

```
>>> y = x
>>> y[0] = 3
>>> x
>>> array([3, 2])
```

- Python allows negative indexing

```
>>> y[-1]
>>> 2
```

- Indentation is important in Python!