

# DM820

## Advanced Topics in Programming Languages

Peter Schneider-Kamp

[petersk@imada.sdu.dk](mailto:petersk@imada.sdu.dk)

<http://imada.sdu.dk/~petersk/DM820/>

# Lectures 3–6

- Lecture 3:
  - Scripting Languages
  - Example: Python
- Lecture 4:
  - Domain Specific Languages
  - Examples: PL/pgSQL, Csound
- Lecture 5:
  - Aspect-Oriented Programming
  - Examples: AspectJ
- Lecture 6:
  - Multi-Paradigm & Constraint Programming
  - Example: Curry

# SCRIPTING LANGUAGES

# A Zoo of Languages

- Popular scripting languages:
  - Javascript
  - PHP ☹️
  - Python
  - Perl
  - Ruby
  - Lua
  - Tcl
  - ...

# Common Features

- Highly dynamic (types, member variables, ...)
- Automatic memory management (garbage collection, reference counting, ...)
- Usually compiled to a virtual machine
- Often embedded into host applications or host languages
- Usually extendable with modules written in C/C++
- Usually cross-platform

# Advantages

- Less code needed (100-1000 instructions per statement)
- Powerful built-in types (lists, dictionaries, ...)
- Dynamic features allow flexible use of code
- Extensive standard libraries
  
- Consequence: ideal for rapid prototyping!

# Usage

- Successful in many applications:
  - As “glue” languages combining libraries, systems, and program pieces in different languages
  - For typical “scripting” applications, i.e., text processing
  - For client- or server-side “web programming”
  - In game development and CGI
  - ...

# Example: Python

- Developed originally as a first language
- Clean syntax and focus on readability
- A little verbose & inheritance sucks
- Prominent users:
  - NASA
  - Google
  - Youtube
  - Industrial Light & Magic
  - Philips Semiconductors
  - Dropbox
  - ...



# Hands-On

- Friendly syntax
- Everything is an object
- Standard library
- Memoizing functions
- Monkey patching
- Comparison to Java
- Python extensions in C