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Introduction to julia

Presentation and Workshop

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Overview

- What is Julia?
- Installation & REPL
- Main features
- Packages
- Pluto Notebooks
- Workshop: Let's get you started with Julia!

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What is Julia?

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Goal: Scientific Computing & Fast Prototyping

In scientific computing we need

- high performance to tackle large scale problems
  - $\Rightarrow$ compiled languages (C/C++, Rust)
  - all types are known at compile time
  - static, hence maybe missing flexibility

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Often: Fast code is written in C/C++ and is interfaced.

$\Rightarrow$ new users might have to compile the C/C++ (e.g. MEX files)

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Combine both: Julia!

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A short history

2009 Adam Edelman starts the project with Jeff Bezanson, Stefan Karpinski, Viral B. Shah

2012 first public version

2018 Julia 1.0, i.e. no breaking releases since then

2024 Julia 1.11

Resources

Main homepage https://julialang.org

Documentation https://docs.julialang.org/en/v1/

Modern Julia Workflows https://modernjuliaworkflows.org/

Discourse https://discourse.julialang.org

JuliaHub webfrontend for the General Registry
https://juliahub.com/ui/Packages

These slides
https://github.com/Julia-Users-Trondheim/Intro-to-Julia/blob/main/presentation/introduction-to-julia.pdf

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Installation & REPL

Installation

Windows Install Julia from the Microsoft Store by running this in the command prompt

```
winget install julia -s msstore
```

Mac OS / Linux run the installer for example by

```
curl -fsSL https://install.julialang.org | sh
```

...or install `juliaup` via your favourite package manager

We can take a closer look at your individual installation after this presentation in the workshop.

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Read-Eval-Print Loop (REPL)

The Julia command line is called REPL.

- for fast computations
- easily define functions
- `include("script.jl");` to run a script.

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Quick commands

^D Quit

^L Clear console screen

Up Arrow last command

REPL modes

Starting with special characters on REPL enters specific modes

? help mode
quick access to the documentation of a function

Example:
`?` `sqrt` displays the help for the `sqrt` function on REPL,
see also the (HTML) documentation
`https://docs.julialang.org/en/v1/base/math/#Base.sqrt-Tuple{Number}`

] package mode
quick access to manage packages

; shell mode
quick access to shell without exiting Julia,
e. g. to change folders

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Main features

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General philosophy

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General code format

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TLDR: Main differences to Python

TLDR: Main differences to R

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TLDR: Main differences to Matlab

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For-loops, while and such

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Functions

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structs – Data structures

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Multiple Dispatch

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Scripts

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Packages

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Installing & Using Pacakges

Package versions & Updating

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Package environments

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Pluto Notebooks

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Pluto.jl – Motivation

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Similarities & differentes to Jupyter

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Live Demo

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Workshop: Let's get you started with Julia!