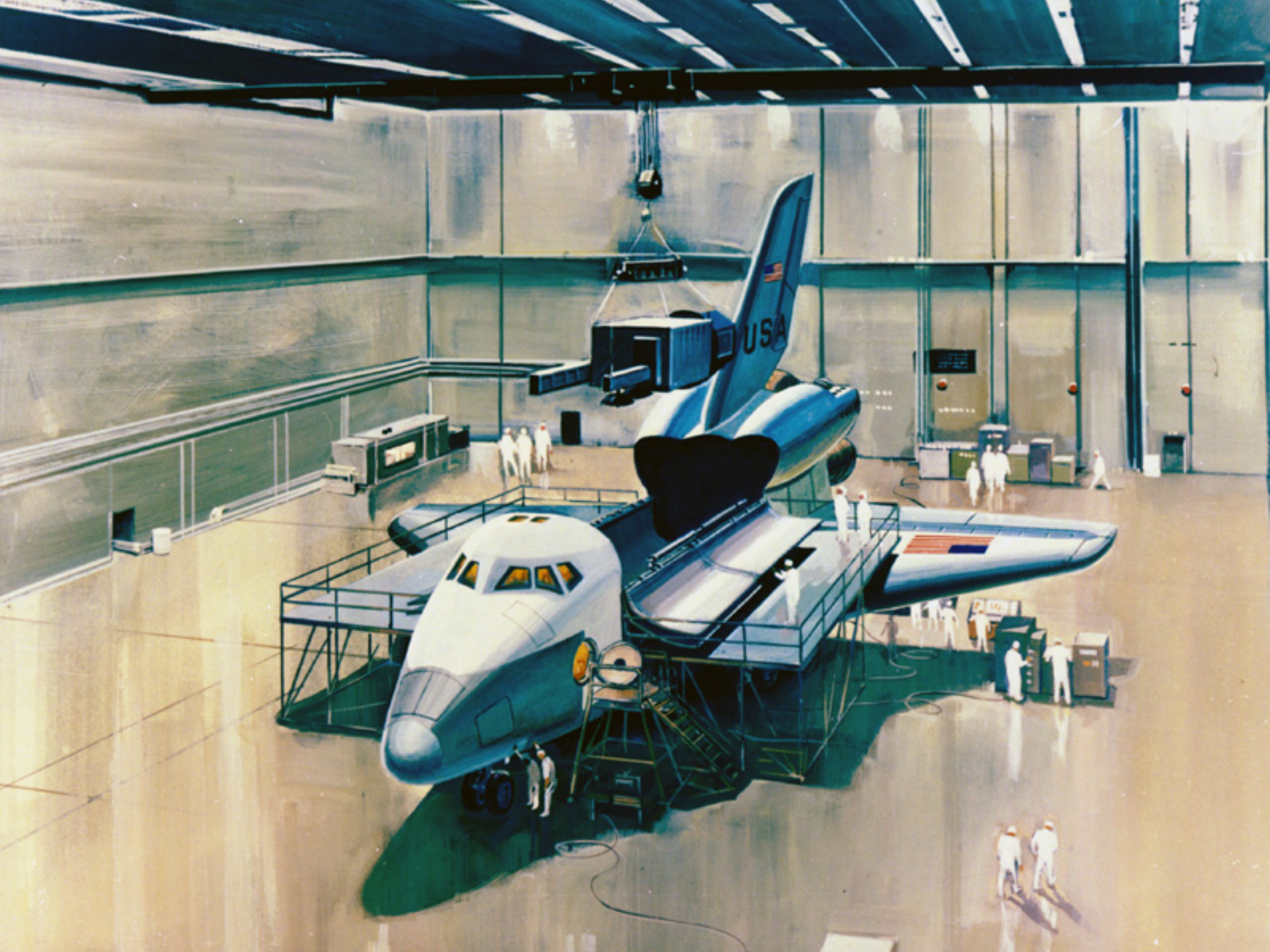
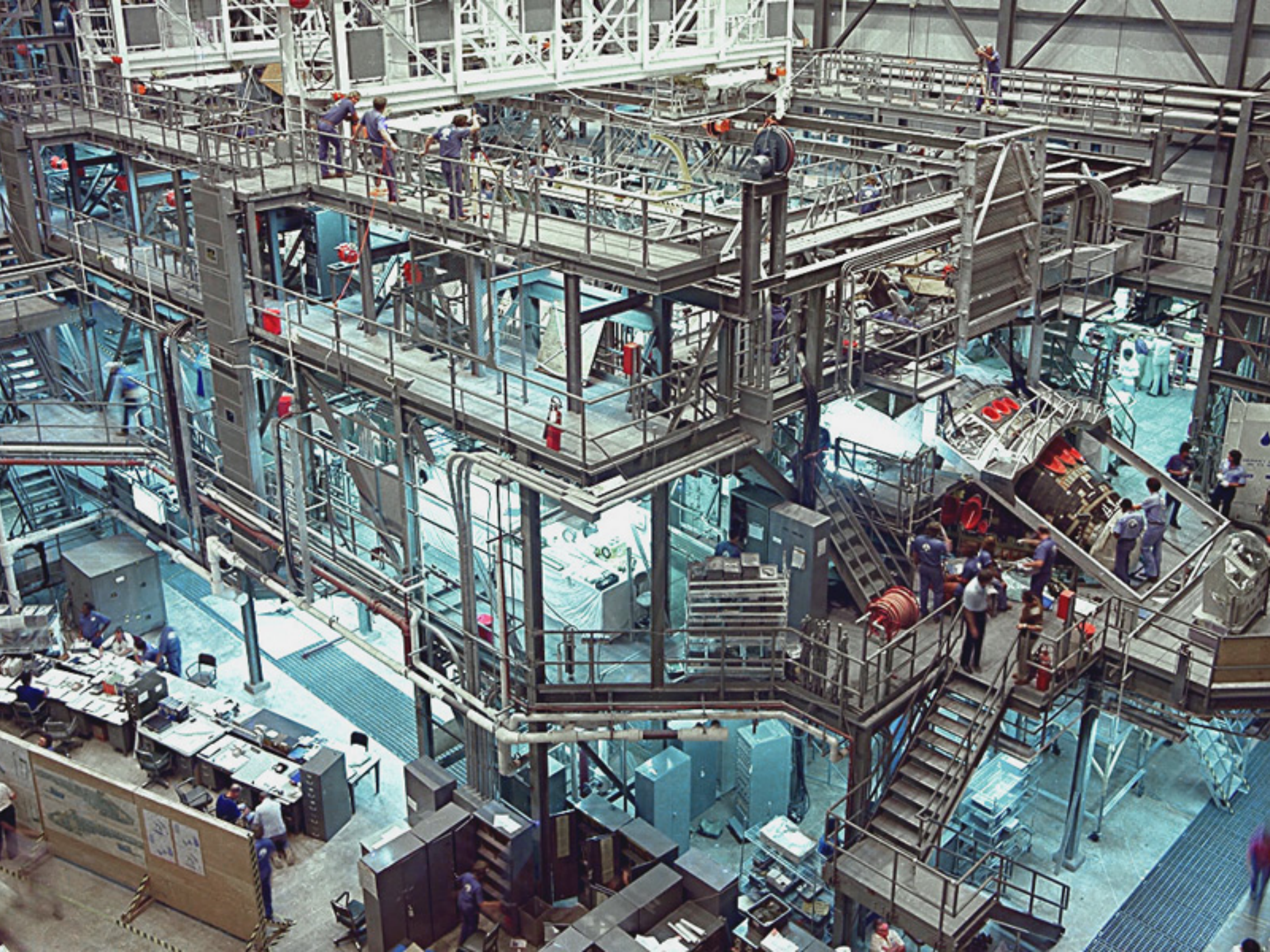
Astrodynamics.jl: A Julia-Based Open Source Framework for Orbital Mechanics

WHAT WE BUILD TODAY...


USA



...WHAT WE NEED TO BUILD IN THE FUTURE

“Simplicity is prerequisite for reliability.”

- Edsger Dijkstra

“Simplicity is a great virtue but it requires hard work to achieve it and education to appreciate it. And to make matters worse: **complexity sells better.**”

- Edsger Dijkstra

Existential Complexity

- a.k.a. “things we care about”
- a.k.a. “rocket science”
- complexity of the problem we try to solve

Accidental Complexity

- a.k.a. “things we do not care about (at all)”
- a.k.a. “non-rocket science”
- complexity introduced by the tooling, programming language, environment etc.

```
println("Hello World!")
```

2 concepts

```
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello World!");
    }
}
```

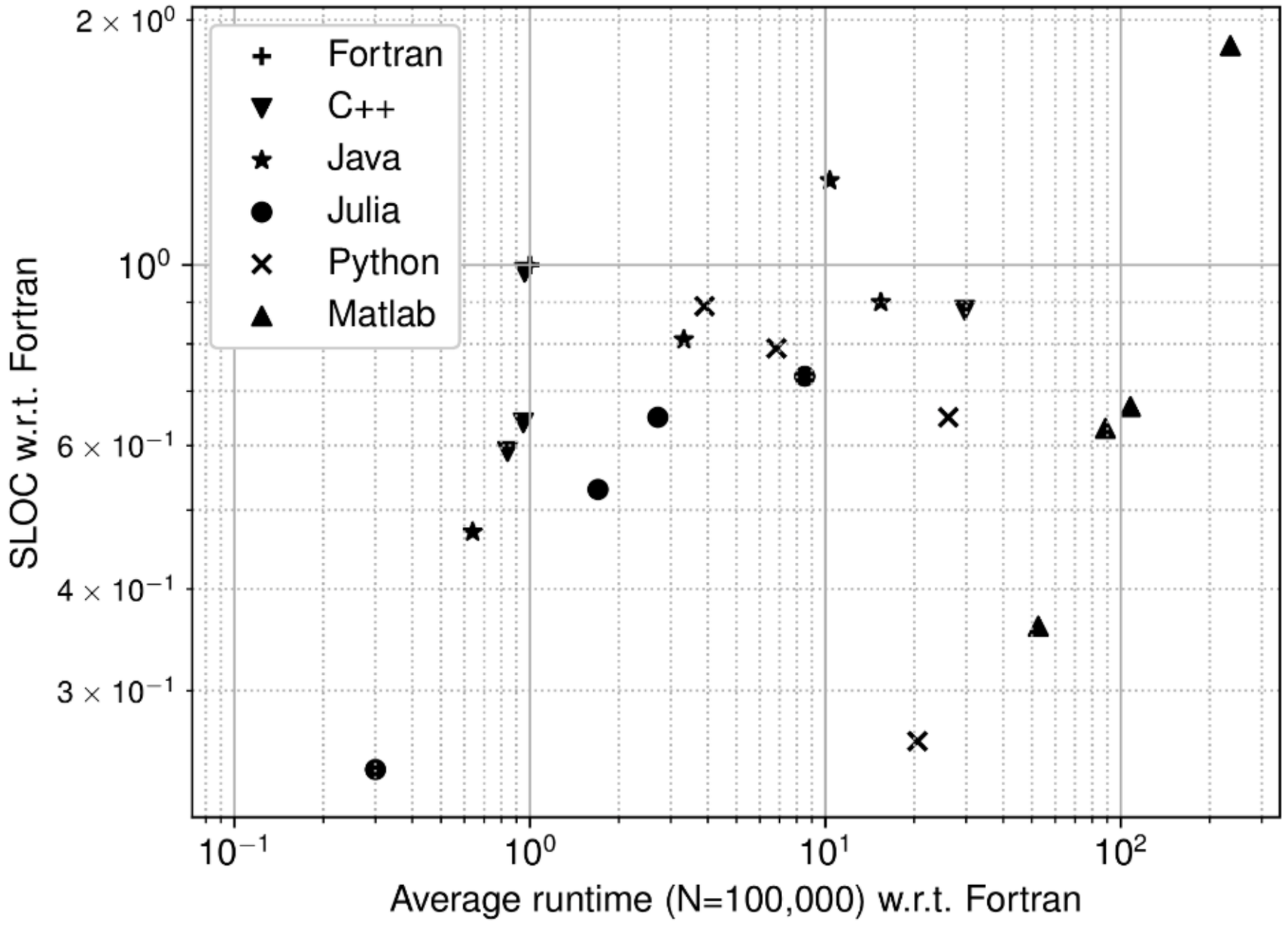
12 concepts

Existential vs. Accidental Complexity in Mission Analysis

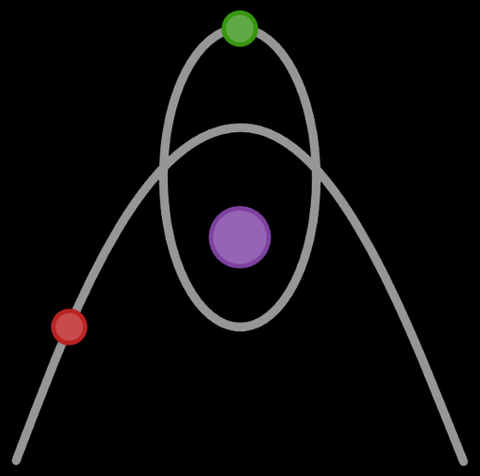
Existential Complexity	Accidental Complexity
Optimizing a trajectory	Dependency management
	Build systems
	Memory management
	Compiler flags, linkers, libraries
	Class hierarchies
	Syntax

How about C++?

https://twitter.com/timur_audio/status/1004017362381795329



Eichhorn, H., Cano, J.L., McLean, F. et al. CEAS Space J (2018) 10: 115.



Astrodynamics.jl

Live Demo

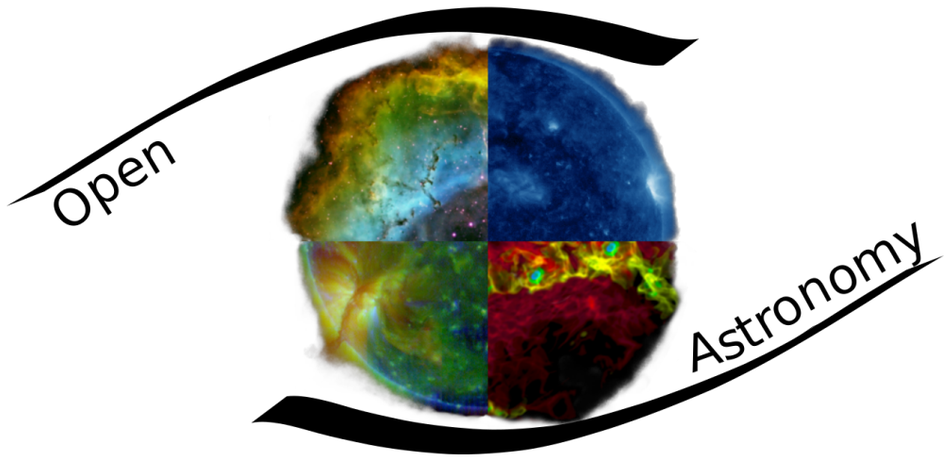
GSOC Project: Porting Essential ERFA Functions to Julia

Prakhar Srivastava (prakharcode)

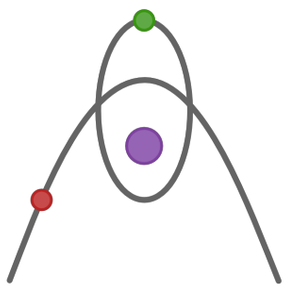
22 pull requests merged in AstroTime.jl

24 pull requests merged in AstroBase.jl

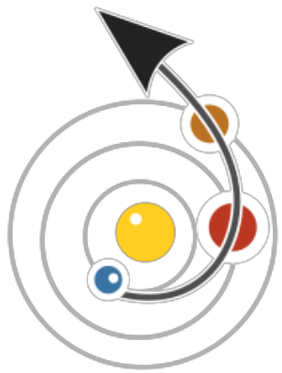
🎉 🎉 🎉



OpenAstrodynamics



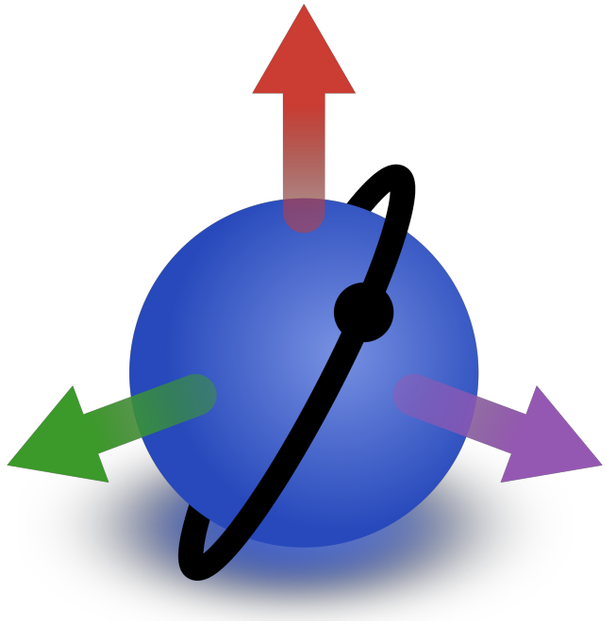
Astrodynamics.jl



poliastro

Astrodynamics in Python

openastro

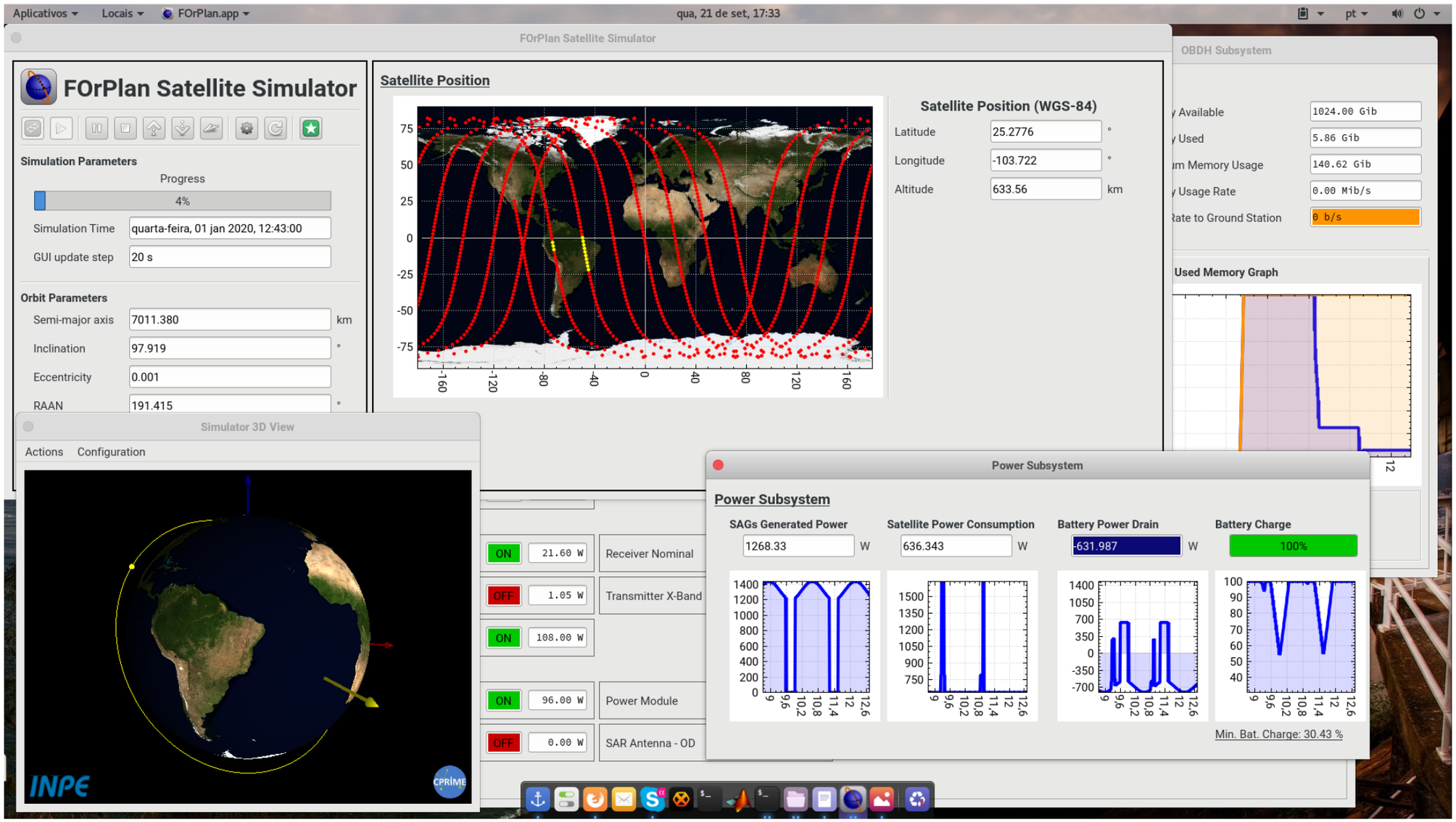


SatelliteToolbox.jl

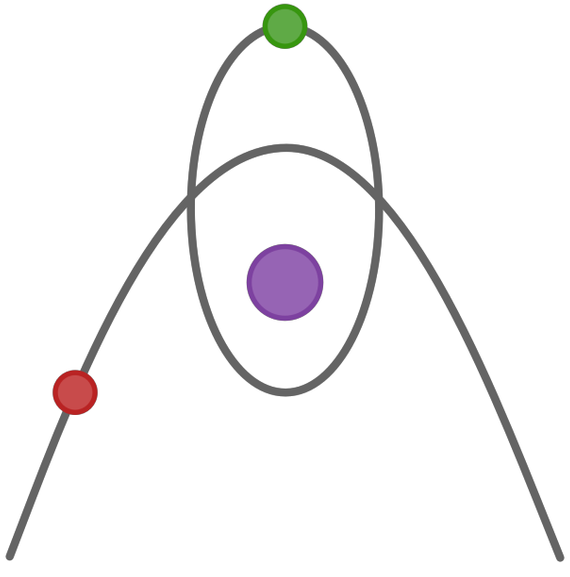
Set of functions related to satellite simulation and analysis created at the **Brazilian National Institute for Space Research (INPE)** by Ronan Arraes Jardim Chagas.

Started as an educational project in 2014 and quickly became a comprehensive toolbox for satellite simulations, especially for the Pre-Phase A studies.

Published as a public Julia package on **May 13, 2018**.



Currently, it is used as the engine behind the **INPE's FOrPlan Satellite Simulator,** which simulates the space mission operational concept for Pre-Phase A studies.



Julia Astrodynamics

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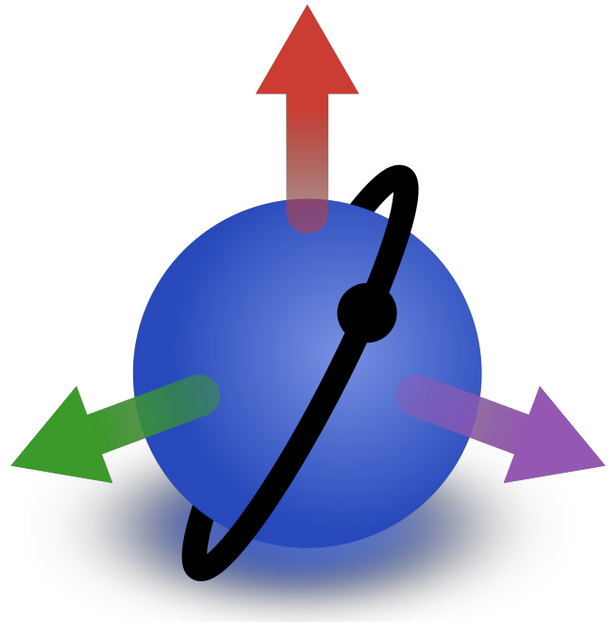

Satellite Toolbox

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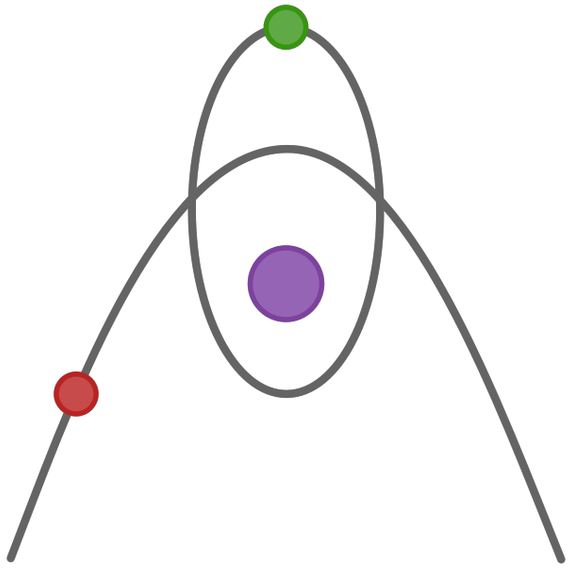

Julia Space

https://github.com/JuliaSpace

Thank you for your attention!