

Why Julia?

*Making the case for **Julia**.*

Ujjwal Panda

National Centre for Radio Astrophysics



Contents

Introduction	1
What's this?	1
Who's this for?	1
Who am I?	2
A cosmic firework show.	2
The trap of (big) data.	2
Two languages, many problems.	2

Introduction

In short, because we are greedy¹.

What's this?

This is a proposal. This is a story. This is a rant. This is me trying to convince anyone who will listen that we should be using **Julia** to develop software for astronomical applications, especially the data processing pipelines for all the upcoming big projects and telescopes (like the **Square Kilometer Array (SKA)**, the would-be largest radio telescope in the world). I first conceived the idea of writing something like this last year, when I finally became convinced that my thoughts actually made sense, and were maybe worthy of being written down to paper (or a PDF, which is the next best thing). In the end, this is my scream into the void, my message in the bottle; if my fellow astronomers can hear me, I hope they scream back.

This document lives on **Github**. If you think I have missed something, or gotten something wrong, or maybe you saw a typo in passing, feel free to open an issue [here](#), or make a pull request! If you want to talk to me about any of this, feel free to send an [email](#), or hit me up on [Twitter](#).

¹ From the post announcing the **Julia** programming language to the world on the 14th of February, 2012, [here](#) (accessed on the 8th of June, 2023).

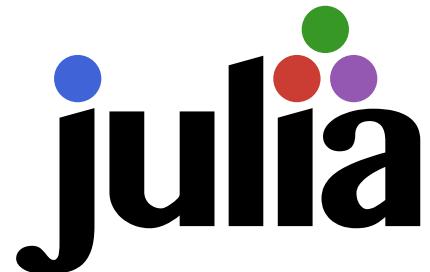


Figure 1: The official logo for **Julia**. Released on 14 February 2012, work on it started back in 2009, when Jeff Bezanson, Stefan Karpinski, Viral B. Shah, and Alan Edelman banded together to create a high-level, dynamic language that could be as fast as C, C++ or Fortran.

Who's this for?

My fellow astronomers, especially those who are working in the same field, and/or are routinely developing software for astronomical applications. To that end, I do assume some basic knowledge of astronomy, programming, and software development. However, I take care not to assume too much. Wherever necessary, I will take my time to explain certain concepts. Since this is directed to astronomers across the board, I will also spend some time introducing the field I work in. Feel free to skip parts of this document you have already familiar with. In the end, however, this is for me; it is a way to record my thoughts into something that is coherent and readable.

Who am I?

Oh, I forgot to introduce myself! I am [Ujjwal Panda](#), working towards a Ph.D. at the [National Centre of Radio Astrophysics \(NCRA\)](#). My work focuses primarily on searching and studying **pulsars** and **Fast Radio Bursts (FRBs)** in the radio. I am a part of the [National Supercomputing Mission \(NSM\)](#)'s [Survey for sPoradic radio bursTs](#), via a commensal, multi-beam, GPU-powered, HPC at the GMRT ([SPOTLIGHT](#)); as the name indicates, it is a commensal survey for pulsars and FRBs via the [Giant Metrewave Radio Telescope \(GMRT\)](#), with a dedicated high-performance, GPU-powered, cluster serving as the backend.

A cosmic firework show.

The trap of (big) data.

Two languages, many problems.



Figure 2: The **GMRT**. It is an interferometer, consisting of 30 dishes, each 45 meters in diameter. There are 12 dishes in the central square, while the other 18 dishes are distributed into three *arms*, along the East, West, and South. The telescope is known for its wide frequency coverage, its imaging capabilities, and its state-of-the-art sensitivity, especially at lower frequencies. Image taken from the official GMRT site [here](#).