Problems with the C API

The C-API Workgroup

2023 Language Summit

3 back-to-back sessions on the C API

Agreement was reached that

- The C API has problems
- We don’t know what those problems are
- We can’t evaluate and compare proposed solutions before we agree on the problems they are intended to solve

C API Workgroup

A GitHub org

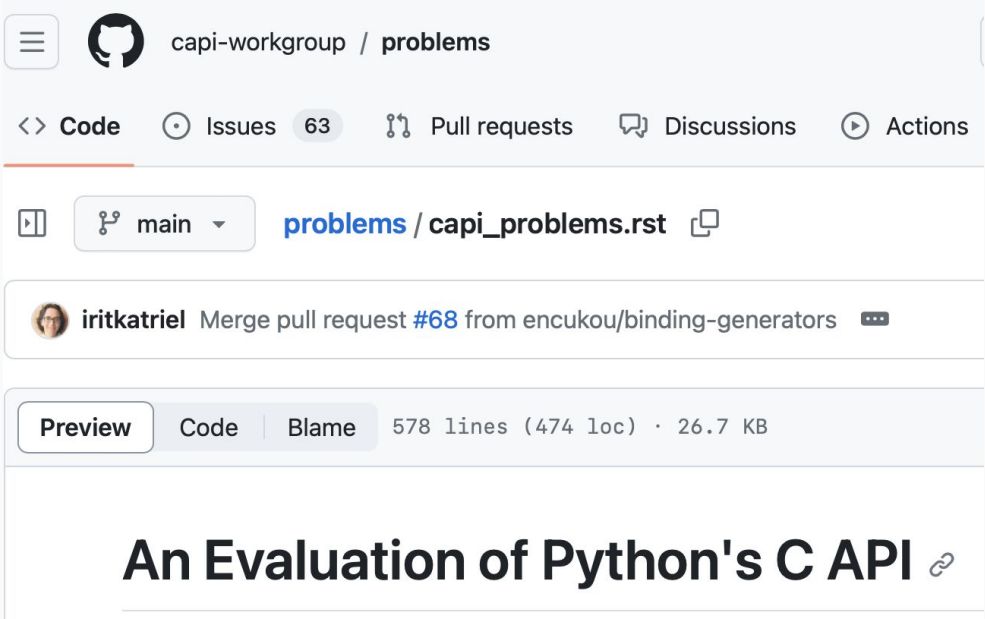
“Problems” repo to crowdsource problem areas (as individual issues)

- Initially invited a small group of contributors to get started (> 60 issues so far)
- We may want to widen it next

Goal: an informational PEP on the current state of the C API, strengths and weaknesses

Irit volunteered to be the scribe for this PEP

Draft PEP - submit PRs to edit



Structure

Introduction: How the C API developed over the years for new use cases

C API Stakeholders: The different types of users, and their particular needs

Strengths of the C API: Things we should make sure to keep

Problems with the C API, organized into 9 categories

Introduction

The contribution of the C API to Python’s success

Its evolution to support use cases it was not originally designed for

Background about the language summit discussions

Description of the document and and methodology of its creation

Stakeholders

- Extension Writers (numpy, pandas, …)
- Embedders (Blender, OBS, …)
- Alternative Python Implementations (PyPy, GraalPy, …)
- Alternative APIs (HPy, Cython, …)
- Binding Generators (pybind11 for C++, PyO3 for Rust, PyJNIus for Java, …)

Strengths

The way that the C API evolved over 3 decades and adapted to new use cases is testament to its success.

Specific features that were identified as good ideas:

- Heap types
- APIs taking a C string to look up based on Python strings
- Limited API and Stable ABI

Problem Categories

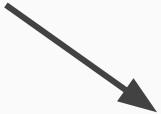
- API Evolution and Maintenance
- API Specification and Abstraction
- Object Reference Management
- Type Definition and Object Creation
- Error Handling
- API Tiers and Stability Guarantees
- The C Language
- Implementation Flaws
- Missing Functionality

Next Steps

Finish the problems document (Informational PEP)

- This week: read it and make PRs to suggest edits
- After the sprint we solicit input from the wider community

Process for discussions about replacement APIs



Guidelines for evolution of the C API
Discussion on
https://github.com/capi-workgroup/api-evolution