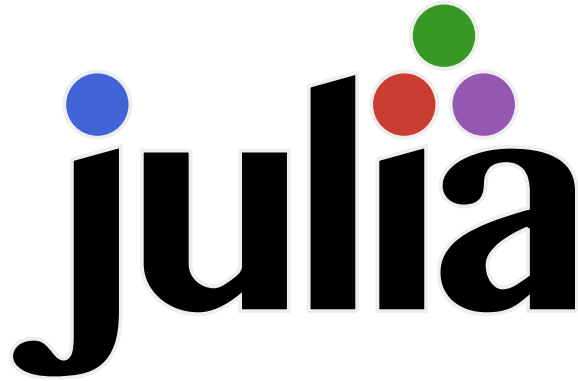


# GSoC 2024

## Project Proposal

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## Language Interoperability

### CxxWrap.jl

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## Google Summer of Code

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# 1. Introduction

## 1.1. Project Synopsis

## 1.2. Why I chose this project

## 1.3. Relevant Work

## 1.4. Technical Skills

## 1.5. Why choose me

## 1.6. Contact Information

# 2. Benefits to Community

# 3. Deliverables

Through this project, I aim to expose a larger portion of the C++ standard library to Julia.

## 3.1. Primary Goals

### 3.1.1. Add STL Container Types

The following containers, along with their commonly used methods, will be added

- `std::set`
- `std::multiset`
- `std::stack`
- `std::priority_queue`
- `std::unordered_set`
- `std::unordered_multiset`
- `std::bitset`
- `std::list`
- `std::forward_list`

### 3.1.2. Add STL Algorithms

The following algorithms will be added

- `std::ranges::lower_bound`
- `std::ranges::upper_bound`
- `std::ranges::binary_search`
- `std::ranges::sort`
- `std::ranges::stable_sort`
- `std::ranges::max`
- `std::ranges::max_element`
- `std::ranges::min`
- `std::ranges::min_element`
- `std::ranges::minmax`
- `std::ranges::minmax_element`
- `std::ranges::clamp`
- `std::ranges::equal`

### 3.1.3. Documentation

Currently, `StdVector` and `StdString` are documented. I will document the functionality of the existing containers (`StdValArray`, `StdDeque` and `StdQueue`) and all the new containers that I will be adding.

The algorithms being added will also be documented, along with usage examples for them.

I will also be documenting the implementation steps for exposing more of the standard library to help future contributors.

### 3.1.4. Testing

I will be implementing unit tests for all the containers and algorithms being added.

For integration testing on the [libcxxwrap.jl](https://github.com/JuliaLang/libcxxwrap.jl) component, the automated tests currently work for pull requests. I will update the testing solution such that it works outside of pull requests as well.

## 3.2. Stretch Goals

If time permits, I would like to make general improvements to the core of CxxWrap, and add more STL containers.

### 3.2.1. Add Iterator Support

Many STL algorithms depend upon the use of iterators. For this, an iterator type for containers has to be exposed from the C++ side, so that it can be used to call these algorithms from the Julia side.

### 3.2.2. Add more STL Container Types

These containers have been introduced in C++ 23

- `std::flat_set`
- `std::flat_multiset`

## 4. Project Details

### 4.1. Modularize the codebase

## 5. Project Schedule

### 5.1. Pre-Project Phase

### 5.2. Project Phase

### 5.3. Post-Project Phase

### 5.4. Logistics