ScimBa Feel++

CSMI1

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Mathematics and applications
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1. Introduction to the project
2. Introducing ScimBA
3. Compatibility with Feel++
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Introduction

This project aims for the coupling of ScimBa and Feel++. This involves integrating the capabilities of both tools.
This integration would allow users to leverage the advanced features of each of these libraries and use them synergistically to solve complex problems.

ScimBa

gathers tools for scientific machine learning, mainly focusing on solving partial differential equations (PDEs) and related tasks in scientific computing.

- ScimBa blends machine learning with scientific computing.
- ScimBa offers PDE solvers as a core feature.

Feel++

is a C++ implementation that combines Galerkin methods, including finite element and spectral element methods, to tackle partial differential equations across 1D, 2D, and 3D domains.

- Feel++ includes toolboxes for solving physics-based problems like fluid mechanics, solid mechanics, and heat transfer.
- provides a Python interface (pyFeel++) for manipulating mathematical objects and solving PDEs with Python.

Coupling

Tight Coupling

Modules are highly dependent on each other. Changes in one module often require corresponding changes in other modules.

Loose Coupling

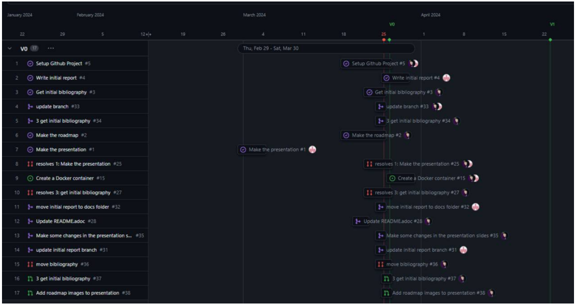
Modules are relatively independent and have minimal dependencies on each other.

Starting Points

Objective:
Implement loose coupling between ScimBa and Feel++ to leverage the strengths of both libraries effectively.

- Analyze ScimBa and Feel++ functions to find integration points.
- Use Feel++ for simulations and scientific computing to create diverse datasets.
- Establish clear interface and protocols for seamless communication between libraries.

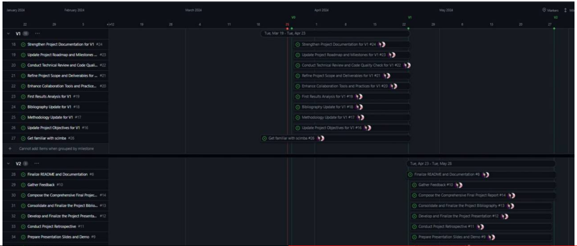
Roadmap



V0 17 ···

Thu, Feb 29 - Sat, Mar 30

1 Setup Github Project #5
2 Write initial report #4
3 Get initial bibliography #3
4 update branch #33
5 3 get initial bibliography #34
6 Make the roadmap #2
7 Make the presentation #1
8 resolves 1: Make the presentation #25
9 Create a Docker container #15
10 resolves 3: get initial bibliography #27
11 move initial report to docs folder #32
12 Update README.adoc #28
13 Make some changes in the presentation s... #35
14 update initial report branch #31
15 move bibliography #36
16 3 get initial bibliography #37
17 Add roadmap images to presentation #38



V1 10 ···

Tue, Mar 19 - Tue, Apr 23

18 Strengthen Project Documentation for V1 #24
19 Update Project Roadmap and Milestones ... #23
20 Conduct Technical Review and Code Quali... #22
21 Refine Project Scope and Deliverables for ... #21
22 Enhance Collaboration Tools and Practice... #20
23 First Results Analysis for V1 #19
24 Bibliography Update for V1 #18
25 Methodology Update for V1 #17
26 Update Project Objectives for V1 #16
27 Get familiar with scimba #26

+ Cannot add items when grouped by milestone

V2 9 ···

Tue, Apr 23 - Tue, May 28

28 Finalize README and Documentation #8
29 Gather Feedback #10
30 Compose the Comprehensive Final Projec... #14
31 Consolidate and Finalize the Project Biblio... #13
32 Develop and Finalize the Project Presenta... #12
33 Conduct Project Retrospective #11
34 Prepare Presentation Slides and Demo #9

References

- Feel++ Documentation
- ScimBa Documentation
- Coupling