

Build List Visualization

Google Summer of Code Program 2023 Project Proposal

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Project Abstract:

RTEMS archives the test results from the RTEMS Test and RTEMS Source Builder (RSB) ecosystem tools in a mailing list. However, the archives are not easy to review manually, and it is challenging to form an overview from them. This project aims to develop a visualization tool that can process the mailing list archives into a data format, which is capable of generating reports. The visualization tool will have a user friendly UI and generate the necessary data needed for the web browser to present. The goal is to provide reports and views that all RTEMS users can understand easily.

Project Scope:

Medium-scale project (175+ hours)

Project Description:

The visualization tool for the Build Mailing List archives is being developed for the RTEMS (Real-Time Executive for Multiprocessor Systems) project. The Build List Archives is a public list where RTEMS users can post test results from the RTEMS Test or RTEMS Source Builder (RSB) ecosystem tools. The tool aims to provide a visualization of the data in a format that is easy to understand and analyze. This project will help the RTEMS project in tracking the stability of tools and BSP test results and will also be used as the basis for the RTEMS Tier list.

The project has three main parts: parsing of the email archives into a data format that can be used to generate reports, determining the types of reports required by the RTEMS project, and creating a visualization tool with a suitable user interface. The tool will process only the current month when parsing the mailing list data and generating static data. The data will be presented in a web browser using Typescript as the scripting language, React.js framework for frontend and Python as the server language. The tool will provide separate data tables

for tool builds, BSP builds, and test results. It will also provide various reports, including a year summary page, a monthly build page, a monthly test page, a BSP score table, an architecture/BSP tier scorecard, and a build failure timeline.

Project Deliverables:

March 20 - April 4 (Application period):

Submit a detailed project proposal and complete application

May 4 - May 28 (Community bonding period):

Documentation of community & mentor interactions and a working development environment

May 29 (Coding begins):

Working code that can parse the email archives, generate the data tables, and visualize the data in the UI

July 10 - July 14 (Phase 1 evaluation period):

Self-evaluation report and project progress update

July 14 - August 21 (Work Period):

Working code that can generate all the required reports and visualizations

August 21 - September 4 (Final Week):

Final working code submission and project documentation

Proposed Schedule:

March 20 - April 4 (Application period):

During this phase, I will be working on preparing the proposal for the project. The following tasks shall be completed during this phase:

- Understand the project requirements and objectives in detail
- Communicate with my mentor to clarify any doubts or questions
- Plan and document the proposed approach for the project
- Draft the proposal and submit it before the deadline

May 4 - May 28 (Community bonding period) :

During this phase, I will be working on getting familiar with the RTEMS community and its processes. The following tasks shall be completed during this phase:

- Get to know other contributors and introduce myself to the community
- Discuss the project plan with my mentor and finalize any pending details
- Set up the RTEMS environment and ensure all tools are working properly
- Get familiar with the codebase and start exploring it

May 29 (Coding begins) :

During this phase, I will start working on the project implementation. The following tasks shall be completed during this phase:

- Implement the parsing of the email archives into JSON Format which can be directly implemented into the frontend statically, while also improving the builds.py file.
- Develop the front-end of the tool using Typescript and React.js with a user-friendly UI. Then integrate the JSON Objects into the Frontend.
- Implement data tables for tool builds, BSP builds, and test results.

July 10 - July 14 (Phase 1 evaluation period) :

During this phase, I will be evaluated by my mentor on my progress so far. The following tasks should be completed during this phase:

- Complete any pending tasks from the previous phase
- Conduct a self-evaluation and submit it to my mentor for review
- Discuss the project progress and any issues with my mentor
- Develop the year summary page with a table of monthly high-level results

July 14 - August 21 (Work Period) :

During this phase, I will continue working on the project implementation. The following tasks should be completed during this phase:

- Implement the monthly build page with the pass and fail results for architectures and BSP builds
- Implement the monthly test page for the BSP test results
- Implement the BSP score table for the BSP with test results and number of passes and failures
- Implement the architecture/BSP tier scorecard to check and see the state of a BSP

August 21 - September 4 (Final Week) :

During this phase, I will finalize the project and prepare it for submission. The following tasks should be completed during this phase:

- Conduct thorough testing and debugging of the code
- Write documentation and user manuals for the project
- Prepare the final code submission and submit it for review

Future Improvements:

- Real-time updates: The current system only generates static data once a month. In the future, the system can be updated to generate real-time updates whenever a new test result is posted on the mailing list. This will provide users with up-to-date information on the stability of the tools and BSP test results.
- Interactive Visualization: While the current system provides visualizations of the data, it would be beneficial to add interactive visualization features that allow users to manipulate the data and explore it in more depth. This will enhance the user experience and provide more value to users.
- User customization: In the future, the system can be enhanced to allow users to customize their visualization by selecting specific data and criteria they want to see. This will allow users to create personalized reports that meet their specific needs and requirements.
- Integration with other data sources: The system can be extended to integrate with other data sources to provide a more comprehensive view of the stability of the tools and BSP test results. For example, the system can integrate with hardware monitoring systems to provide real-time updates on the status of the BSPs.

Continued Involvement:

I would like to continue contributing to RTEMS even after the completion of the project. I am interested in working on other RTEMS projects, and I would like to help new contributors to get started with RTEMS development.

Conflict of Interests or Commitment:

I confirm that I have no conflicts that may hinder my ability to work at full capacity or contribute to the code developed during GSoC. I am not currently participating in any other full-time summer internships, nor do I hold any scholarship or fellowship that limits my ability to claim copyright on my work.

However, I would like to inform you that I will have end-semester examinations lasting for two weeks in May. I understand the importance of meeting project deadlines and ensuring timely delivery of quality work. Therefore, I will communicate with my mentor well in advance to discuss and plan accordingly to manage my schedule and timeline effectively.

Eligibility:

I confirm my eligibility to participate in the program as defined by the rules in 7. Contributors.

Major Challenges Foreseen:

- The email archives may contain different types of data and formats that need to be parsed and converted into a usable format. The parsing process may be challenging and require careful attention to detail.
- Choosing the right type of visualization for different types of data may be challenging. The data visualization should be able to clearly communicate the information to the user.
- The tool needs to be maintained and updated regularly to keep up with changes in the RTEMS ecosystem. This may require ongoing development and support even after the initial project is completed.

Relevant Background Experience:

I have coordinated several web based projects during my tenure at ACM Thapar, a student run technical society at my college. Some of the projects include:

- Recruitment Portal (<https://github.com/ACM-Thapar/Recruitment-Portal>) :
- ACM Member Dashboard (https://github.com/ACM-Thapar/ACM_Member_Dashboard):
- Flagship Event Website (<https://github.com/ACM-Thapar/Eclipse-v3>)

Personal:

I began my journey in coding in 2018 when I was introduced to Google Code-In by a senior at my school. It was during my contributions to GCI that I became aware of RTEMS. Initially, I began with design and documentation tasks and gradually progressed to more complex coding tasks as I familiarized myself with the ecosystem.

It was a steep learning curve for me as I only possessed basic knowledge of Python at the time. I had to start from scratch, learning C, virtual machines, and Git to contribute to RTEMS. However, each completed task further motivated me to improve myself, and I eventually became a finalist, inspiring me to participate in subsequent years. Unfortunately, I was unable to do so due to my final year board exams.

Nonetheless, GCI ignited my passion for coding and led me to pursue Computer Science at Thapar University, a highly esteemed engineering college in my country. I am currently in my penultimate year of my Bachelor's degree in Computer Science and Business Systems. I have learned the fundamentals of operating systems, compiler design, and data structures, laying a strong foundation for my career.

Additionally, I hold the position of General Secretary of ACM Thapar, the student chapter of the Association of Computing Machinery, the world's largest computing society. Furthermore, I was a finalist in HackMIT 2021, the world's largest international student hackathon, and the winner of HackPrinceton 2021, thanks to my innovative technical projects.

I attribute much of my current success to RTEMS and Google Code-In, which provided me with a valuable kickstart and important learnings. Therefore, contributing to RTEMS as a part of GSoC 2023 would be a mesmerizing experience and provide me an opportunity to give back to the organization which set me up for what I am today.

Language Skill Set

- Python - Advanced
- Javascript - Advanced
- Typescript - Intermediate
- HTML - Advanced
- CSS - Advanced
- C++ - Intermediate

Experience

Free Software Experience/Contributions:

- Contributed to RTEMS as part of Google Code-In 2018 by completing the following tasks:
 - [Implement POSIX API Signature Compliance Tests for setjmp.h File](#)
 - [Implement POSIX API Signature Compliance Tests for syslog.h File](#)
 - [Implement POSIX API Signature Compliance Tests for fenv.h File](#)
 - [Implement POSIX API Signature Compliance Tests for glob.h File](#)
 - [Implement POSIX API Signature Compliance Tests for arpa/inet.h File](#)
 - [Add Doxygen to POSIX API Compliance Tests](#)
 - [Improve English for webpages and wiki](#)
 - [Propose a project mascot!](#)
 - [Design a T-Shirt](#)
 - [Doxygen Enhancement Task #1 arm_altera-cyclone-v](#)
 - [Design a square organization logo](#)
 - [Design a new organization logo](#)
- Served as General Secretary of Association of Computing Machinery Student Chapter at Thapar University contributing to a wide range of open projects in React.js, Typescript and Node.js
 - <https://github.com/ACM-Thapar>

References:

- **Original Ticket:**
 - <https://devel.rtems.org/ticket/4880>
- **RTEMS-Documentation:**
 - <https://lists.rtems.org/pipermail/build/>
 - <https://docs.rtems.org/branches/master/user/hardware/tiers.html>
 - <https://docs.rtems.org/branches/master/user/testing/index.html>
 - <https://docs.rtems.org/branches/master/eng/python-devel.html>
- **External Resources:**
 - <https://www.typescriptlang.org/>
 - <https://www.w3schools.com/typescript/>