gem5 Vision

UC DAVIS COMPUTER SCIENCE

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Project Overview

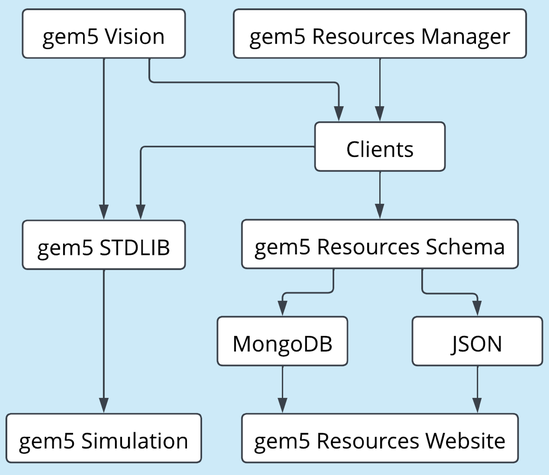
Revamping gem5 Resources
Enhancing the existing gem5 Resources infrastructure for improved user-friendliness and accessibility

Advanced Search Functionality
Implementing advanced search features to streamline resource discovery, making it more efficient for users to find relevant resources within the gem5 ecosystem

Comprehensive Resource Categorization
Introducing a categorization system that enables users to access specific resource types, such as SimPoints, kernels, binaries, benchmarks, etc., based on resource requirements

Expanded Database Support
Enhancing gem5 Resources by extending support for various databases, including local JSON files, remote JSONs, and MongoDB, enabling users to store, retrieve, and manage resources through all specified formats.

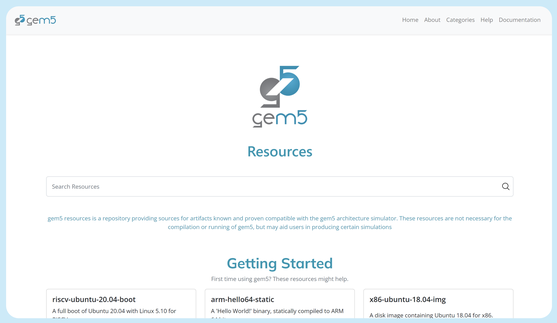
System Architecture

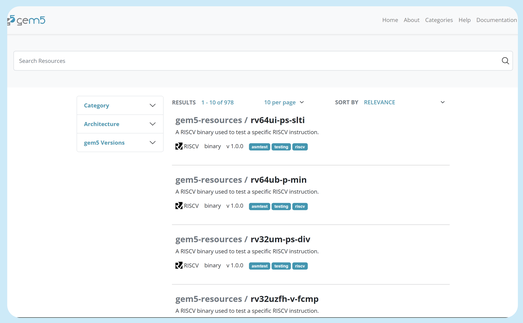


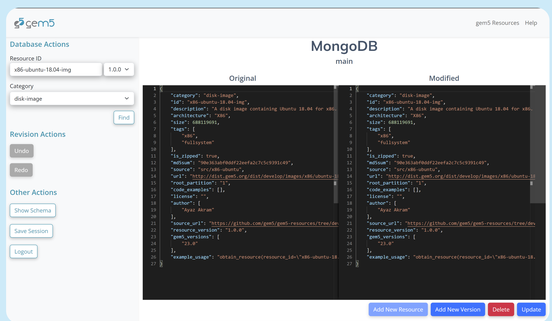
Approach

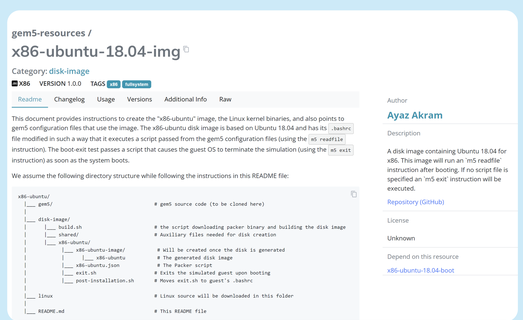
- **Created schema** which specializes the resources into multiple categories.
- **Enforced schema** to create a new JSON file with semantic versioning.
- **Created a MongoDB database**, populating it with our modified resources that support resource specialization and semantic versioning.
- **Designed website** to make searching, sorting and filtering for resources more efficient, along with integration into current gem5 and gem5 Resources repositories to display all relevant information for a given resource.
- **Extended searching** so that JSON emulates features from MongoDB such as fuzzy searching, score based ranking, filtering and exact matching.
- **Implemented multi-database support**, such that the website can be populated with resource from multiple sources, for instance JSON, local JSON, and/or MongoDB Atlas Collection.
- **Contributed to gem5** to include support for **multiple databases** and **semantic versioning**, along with backwards compatibility so that the latest version of a resource compatible with a user's gem5 version is used.
- **Created Resources Manager utility**, that streamlines adding, updating, and deleting resources, with multi-database support and schema enforcement.

Artifacts









Technologies

Website: ReactJS, NextJS
Database: MongoDB, JSON
Resources Manager: Flask, HTML Bootstrap, JSON Schema
gem5 API Wrapper: Python

Challenges

- Static deployment on GitHub pages
  - Token front-end exposure and management
  - Dynamic routing for a static website
- MongoDB not allowing direct querying from front-end due to CORS policies
- Supporting multiple databases and query aggregation
- Decoupling gem5 versions and resource versions, implementing semantic versioning
- Contributing to a massive open source project and Gerrit code review
- Thorough testing for a production-level project

Next Steps

- Actively engage with the gem5 community by organizing workshops, webinars, or conferences to showcase the revamped gem5 Resources infrastructure.
- Extending the website to show simulation statistics of a resource on gem5's pre-built boards.

Acknowledgements

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