Team Amalgam

Exact, Discrete, Multiobjective Optimization

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Outline

- Project and Customer
- Background
- Current Progress
- Demo
- Next Steps
- Summary

Project and Customer

Project

- Optimize the Guided Improvement Algorithm (GIA) for solving multiobjective optimization problems

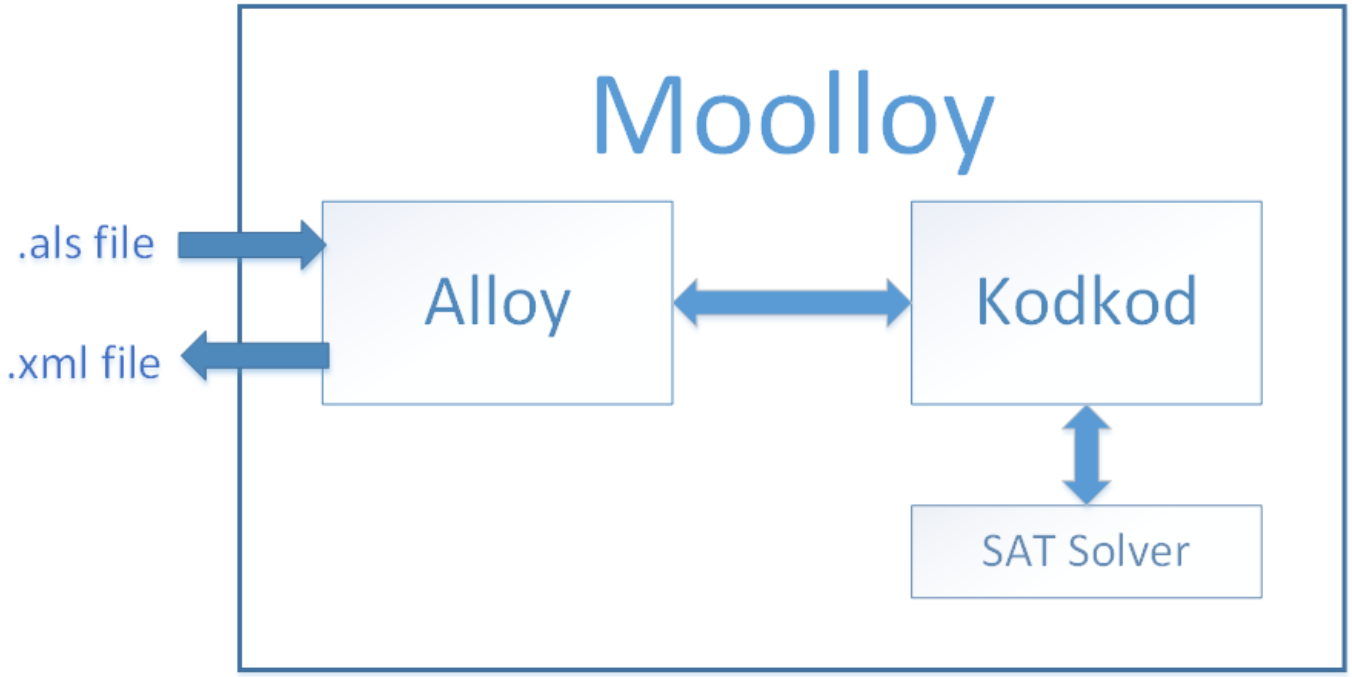
Customer

- Professor Derek Rayside

Background

- Multiobjective optimization
  - Given constraints, minimize or maximize the objectives
  - Multiple objectives may conflict
- Example: NASA Decadal Survey
  - Ten-year satellite launch schedule that maximizes scientific value

Existing Moolloy System

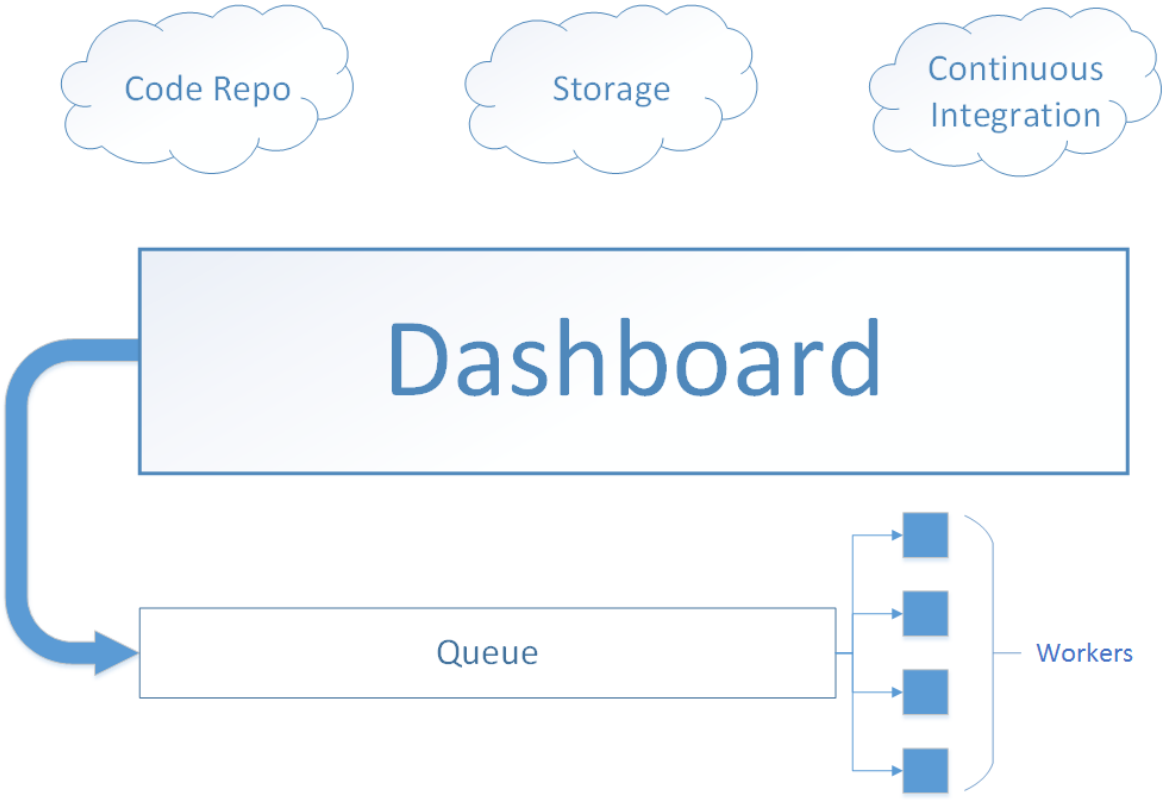


Current Progress

January - May 2013

- Focused on infrastructure
  - Test models
  - Custom test dashboard
  - Build system, Travis, and JUnit
  - Started refactor

Test Dashboard



Current Progress

June 2013

- Updated worker and dashboard infrastructure
  - Set up performance workers
- Finished JUnit tests
- Finished refactor

Current Progress

June 2013

- Incremental GIA
  - GIA continually adds constraints to find better solutions
  - Incremental solving means we can reuse previous solutions

Demo

Next Steps

- Integrating Z3 into Kodkod
  - SMT Solver (SAT + other stuff)
  - "push" and "pop" behaviour for constraints
- Parallel GIA
  - How can we split the problem up?
  - How can we deduplicate solutions?

Summary

- Project: Optimize GIA
- Implemented incremental GIA
  - Up to 4x speedup
- Next steps:
  - Integrate Z3
  - Parallel GIA