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Behind the scenes: an overview of the GAMA platform's environment and development practices

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Keywords

GAMA, Continuous integration, Continuous development, DevOps, GitHub, Quality gate, Unit testing

Abstract

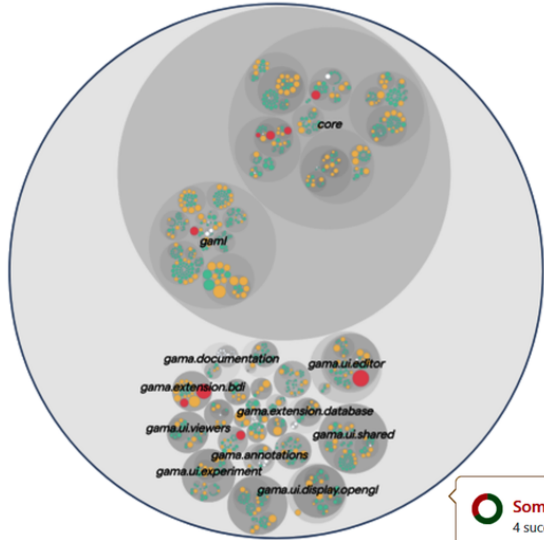
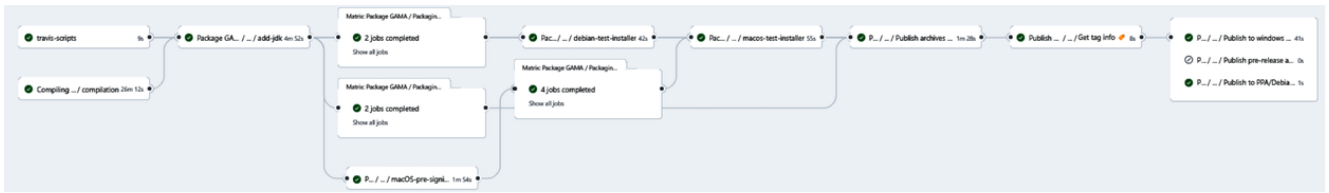
GAMA, a versatile agent-based modeling platform, has been in development for over 15 years and has attracted a close community of users and developers around the world, each adding their own unique twist to the project. Its use cases range from standard multi-agent simulation, to serving as the basis for serious virtual reality games, to feeding reinforcement learning algorithms.

This diversity, however, brings many challenges to the development of the software and the communication around it.

The multifaceted nature of the platform has resulted in a complex code base, causing the various layers of software to interact in intricate ways, especially in complex models. This complexity poses significant difficulties in maintaining the platform, which encompasses a wide range of technical issues. It can also hinder communication within the community, leaving active members unaware of new features, outdated practices, or upcoming events.

GAMA has taken steps to improve its development practices, taking advantage of the many tools developed by the open source community, and in particular, making advanced use of the features provided by the Github platform. These changes are already showing results, such as more consistent software releases with detailed explanations of the changes they bring, or an overall improvement in code quality leading to greater stability.

This keynote aims to show what's going on behind the scenes by presenting an overview of the life of the GAMA community (the different events, trainings, ways of communication, etc.), as well as the different solutions implemented in recent years to improve software quality and what are the plans for the future of GAMA.



```

passed: MathsTest in C:\Users\baptiste\workspace\306334380_win
Test test basic math operations
passed (10 ^ 0) = 1
passed (10 ^ 1) = 10
passed is_error(10 / 0)
passed abs(-0.5) = 0.5
passed abs(-7) = 7
passed abs(-7.0) = 7
passed mod(45, 10) = 5
passed div(45, 10) = 4
  
```

Some checks were not successful Hide all checks
 4 successful and 2 failing checks

- ✗ CodeScene Cloud Delta Analysis (2024-06) Failing after 1m — CodeScene PR Check Details
- ✗ Pull Request validation / SpotBugs (pull_request) — SpotBugs Source Code Analyzer report Details
- ✓ Pull Request validation / Compiling GAMA from base branch / compilation (pull_request) Successful in 12m Details
- ✓ Pull Request validation / Compiling GAMA from PR branch / compilation (pull_request) Successful in 12m Details
- ✓ Pull Request validation / Testing built GAMA / compilation (pull_request) Successful in 1m Details

✓ **This branch has no conflicts with the base branch**
 Merging can be performed automatically.

Merge pull request ▼ [Convert to draft or view command line instructions.](#)

```

536 → public void sendMessage(final IScope scope, final Object message) {
537 → → → sendMessage(scope, GamaServerMessage.Type.SimulationOutput);
  
```

Check warning on line 537 in gama.core/src/gama/core/kernel/root/PlatformAgent.java

GitHub Actions / SpotBugs
IL_INFINITE_RECURSIVE_LOOP
 There is an apparent infinite recursive loop in gama.core.kernel.root.PlatformAgent.sendMessage(IScope, Objec

Figure 1: The different tools used for the development of GAMA: Above, a workflow to automate the deployment for Windows, Mac and Linux and publish it to third parties; on the left, an overview of the codebase components and their estimated code quality; first on the right, unit tests; second on the right, automated integrity and quality checks in code submissions; at the bottom, automated bug detection.