

SIGCSE 2019 Demo Proposal

Demo Title: Building Simple Games with BRIDGES

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Demo Website: [Bridges Games App](http://bridges-games.herokuapp.com) <http://bridges-games.herokuapp.com>

Abstract: Many newcomers to programming and computational thinking have been brought up on interactive, gamified learning environments. Introductory computer science courses at the university level need to dig deeper into these topics, but must do so with similarly engaging technologies and projects. To address this need, we have built a framework for a grid-based game API with event-based blocking and continuous non-blocking interfaces. The framework abstracts away much of the complexity of inputs and rendering and exposes a simple game grid similar to a 2D array indexed by rows and columns. As such, our project helps reinforcing basic computing concepts (arrays, loops, OOP, recursion) with a customizable and engaging game interface. We have discussed the valuable influence of visual representations of student's data structures using BRIDGES in previous publications, and believe our game API can provide significance and intrigue for students in introductory courses and beyond. Our [Bridges Games App](http://bridges-games.herokuapp.com) website presents descriptions and instructions.

Significance and Relevance of the Topic: This demo is motivated by 2 of the factors that motivate the BRIDGES [1] project: (1) providing highly engaging, visually rich assignments/exercises that can engage CS majors, while at the same time strengthening their foundational CS knowledge, and (2) using such tools to improve the preparation level of sophomore level CS students. Our game API enables both blocking (event-based games such as board games) and non-blocking games, while targeting course objectives that relate to basic CS concepts such as decision making, loops, array addressing, recursion, etc. By scaffolding the code, our framework can be made accessible to students with varying levels of programming experience.

Expected Audience: The primary audience will be instructors of lower division CS courses, or K-12 teachers, who would like to use open-source software to teach programming concepts using a simple game API.

Other Presenters: David Burlinson, Kalpathi Subramanian, Erik Saule

Expertise of Presenters: Kalpathi Subramanian and Erik Saule are faculty members at UNC-Charlotte, and are two of the PI(s) of the NSF funded BRIDGES project which aims at extending BRIDGES to introductory courses as well as providing better preparation for incoming sophomore CS students. David Burlinson is a PhD candidate and a principal developer of BRIDGES, including this extension of BRIDGES into game applications. All of the presenters have worked closely on the

planning for this project and the implementation of the Bridges Games website, API, and general infrastructure.

Rough Agenda for the Demo:

1. 0-10 minutes: Setup and Introduction to Bridges Games.
We will give a high-level overview of the simple game API, describe the two models of games we support, and briefly discuss how we envision the use of this tool in the classroom.
2. 10-20 minutes: Blocking Game Model: scaffolding and concepts.
We will demonstrate a basic code stub for an event-based game in Bridges, show some samples of scaffolded game assignments, and discuss mapping from learning outcomes to implementation details for students.
3. 20-30 minutes: Non-Blocking Game Model: scaffolding and concepts.
Same plan as Blocking Game Model, but with our non-blocking interface.
4. 30-40 minutes: Implementation, Usage in the classroom, and Future Goals.
We will discuss how the framework is set up and discuss pros and cons for our chosen approach, motivate its utility for computer science students, and point the audience to our online app and github page to show documentation and how to get started.
5. 40-45 minutes: Questions and answers with the audience.

Audio/Visual and Computer Requirements: All content in this demo will be presented from a laptop computer. As such, we have the following requirements:

1. Wireless/Ethernet internet access
2. Access to a power socket
3. A projector or TV to display the screen of the laptop. HDMI cord preferable but DVI or VGA works too

References

- [1] K. Subramanian. BRIDGES (Bridging Real-world Infrastructure Designed to Goal-align, Engage, and Stimulate), 2018. <http://bridgesuncc.github.io/>.