

Instructor's Guide for Learn Java in *N* Games

Motivation and Relevance

Games provide a nice stepping-stone between shorter exercises and messier “real-world” projects. Game rules provide well-defined specifications, but there are often a few subtleties that create opportunities for problem-solving and discussion. For example, what should a program do if a player tries to make an illegal move? What if a player doesn't have a legal move?

A few students may go on after graduation to work in the computer game industry. Some very successful games, such as *Words with Friends*, *2048*, and *Flappy Bird*, are on the scale of Learn Java in *N* Games (LJING) projects.

Wherever students end up in industry or academia, they will be able to make use of the skills they gain via LJING. This includes both technical skills (Java coding, data structures, algorithms, unit testing, etc.) and equally important “soft skills” (teamwork, communication, problem solving, etc.).

Lastly, games are fun! Almost all students have grown up playing games on their tabletops and on various devices. Games are inclusive of students who may not have a background in, e.g., physics or finance. When they have completed a project, students have a working program that they can immediately use in their everyday lives (and show off to friends and potential employers).

Process Oriented Guided Inquiry Learning (POGIL)

Many of the LJING activities are meant to be tackled in class by teams of three or four students using the POGIL technique. POGIL is briefly summarized in another document in this folder, which you may wish to copy and hand out to students. Much more detail on POGIL can be found at pogil.org and (specifically for computer science) cspogil.org.

Ideally a POGIL instructor acts as a facilitator and has read material from pogil.org or attended a POGIL training session (e.g., at SIGCSE). Barring that, here's a whirlwind guide:

1. Divide the students into teams of four. It is better to assign teams randomly than to allow students to pick their own teams. If the class size does not divide evenly, have one or more teams of three. It is best if students stay in the same teams for the entire term.
2. For each activity, assign each student a role. (Alternately, they can choose their own roles.) In a team of three, one person might serve as both Analyst and Recorder. Students should rotate roles from one activity to the next.
3. Give each team's Recorder a copy of the activity and let the teams start working. All team members have access to the document if they've downloaded the LJING materials, but only the Recorder will write on the paper.

4. Circulate around the room observing the teams. Avoid the temptation to answer questions; instead, answer with leading questions: “What do you think the answer is?” “Can you think of any other answers?” “How would you determine which answer is better?” Also observe the teams’ process, nudging them to work together, get input from all team members, etc.
5. When most teams have reached a stopping point (marked in the activity), get the class’ attention and ask some teams’ Presenters to share their answers to some question. This is an opportunity for a very brief class-wide discussion to ensure that everyone is on the same page (metaphorically).
6. At the end of the class, collect all of the papers. It’s best to grade on earnest participation, not on correctness; this allows students to focus more on the process without too much stress on getting the right answers.

Each POGIL activity in LJING is intended to fill a one hour class period. Getting the timing right can take some practice; see where each team is at the halfway point in the class, speeding up or slowing down if necessary. Some teams will inevitably work faster than others; the open-ended questions after each stopping point are meant to give these faster teams something to do.

Pair Programming

The non-POGIL projects in LJING can be completed by individual student or pairs. An excellent introductory video on pair programming can be found here:

https://www.youtube.com/watch?v=rG_U12uqRhE

Feedback

If you have comments, questions, or errata, or would like to see the results of the user survey mentioned at the end of each activity, feel free to contact the author at drake@lclark.edu.